

# Tableau Server on Windows Administrator Guide

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# Contents

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<b>Tableau Server Release Notes</b> .....	<b>1</b>
<b>Plan Your Deployment</b> .....	<b>3</b>
Validating your server deployment plan .....	3
Server Administrator Overview .....	3
Validating your server deployment plan .....	4
Architectural overview .....	5
Tableau and your data .....	6
User access .....	7
Where should I install Tableau Server in my network? .....	7
Sizing and scalability .....	8
Tableau Server management model .....	9
Administrative roles .....	10
Tableau Server administrator .....	10
TSM administrator .....	10
Tableau portal administrator .....	11
Management tools .....	11
Security .....	12
Tableau Services Manager Overview .....	12
Functionality .....	13
Components .....	13
TSM Authentication .....	14

---

Connecting TSM clients .....	14
Infrastructure Planning .....	15
Validating your server deployment plan .....	15
Before you install... ..	16
Validating your server deployment plan .....	16
Hardware recommendations for production installations .....	17
Operating system requirements .....	20
Installation directory .....	21
Non-default installation locations .....	21
Tableau Prep Conductor .....	22
Additional requirements .....	23
Disk Space Requirements .....	27
Drive size and type of partition .....	27
Publishing extracts to Tableau Server .....	28
Refreshing extracts .....	28
Creating many workbooks .....	28
Logging .....	28
Backup and restore processes .....	28
Restore disk space requirements .....	30
Site Export and Import .....	30
Recommended Baseline Configurations .....	31
Validating your server deployment plan .....	31

Hardware recommendations for production installations .....	31
Estimating Disk Space .....	33
Baseline Configurations .....	34
Single Server Installations .....	34
Recommendations .....	34
Server Configuration .....	35
Multi-Node Installations .....	37
Two Node Installation – Specialised for extract heavy environments .....	38
Recommendations .....	38
Server Configuration .....	39
Two Node Installation – Specialised for flow environments .....	42
Server Configuration .....	43
High Availability Installations (HA) .....	46
Recommendations .....	46
Server Configuration .....	46
Virtual Machines and Public Cloud Deployments .....	49
Beyond Baseline Configurations .....	49
High VizQL Peak Usage Considerations .....	49
Disaster Recovery Considerations .....	50
Tableau Server Scalability .....	51
Run As Service Account .....	53
Default Run As service account: Network Service .....	54

---

Run As service account: Domain user .....	55
Data Access with the Run As Service Account .....	56
Recommendations .....	56
Configure Data Source Connection Settings .....	57
Change the Run As Service Account .....	58
Replacing the default Run As local account (NetworkService) with a domain account .....	59
Creating the Run As service account .....	59
Configuring the Run As service account in Tableau Server .....	60
Changing an existing domain Run As service account to a different account ....	61
Updating the Run As service account password .....	65
Troubleshooting: Update the password in the Microsoft Services console ....	66
Related tasks .....	68
Troubleshoot Run As User .....	69
Required Run As Service Account Settings .....	69
Verify Folder Permissions .....	70
Installing in a non-default location .....	71
Reapplying folder permissions .....	72
Verify Registry Permissions .....	72
Permissions .....	73
Verify the Local Security Policy .....	74
Verify Tableau Service Settings .....	76
Changing the Log On Value .....	78

Revoke Run As Service Account Permissions .....	78
Remove folder permissions .....	79
Remove registry permissions .....	79
Remove security policies .....	79
Identity Store .....	80
Local identity store .....	80
External identity store .....	80
LDAP bind .....	81
LDAP with GSSAPI (Kerberos) bind .....	82
LDAP over SSL .....	82
Authenticating clients .....	83
User Management in Deployments with External Identity Stores .....	83
Arbitrary LDAP directories .....	83
User binding behaviour on sign-in .....	83
Active Directory .....	84
Active Directory user authentication and Tableau Server .....	84
Active Directory user name attributes and Tableau Server .....	85
Adding users from Active Directory .....	85
Adding user groups .....	86
Sync behaviour when removing users from Active Directory .....	86
Domain nicknames .....	87
Support for multiple domains .....	87

---

Duplicate display names .....	88
Sign in to Tableau Server with NetBIOS name .....	88
Domain Trust Requirements for Active Directory Deployments .....	88
Connecting to live data in one-way trust scenarios .....	90
Communicating with the Internet .....	90
How Tableau communicates with the internet .....	91
Configuring Proxies and Load Balancers for Tableau Server .....	95
Who should read this article? .....	95
Configure a forward proxy server .....	95
Configuring Tableau Server on Windows to work with a forward proxy .....	96
Step 1: Add the Run As service account to the Local Administrators group ...	97
Step 2: Configure the proxy server in Windows LAN Settings .....	97
Step 3: Add exceptions to bypass the proxy server .....	98
Step 4: Verify proxy settings do not conflict with Windows environment variables .....	99
Step 5: Verify that the WinHTTP proxy settings do not conflict with Windows LAN settings .....	100
Step 6: Test the proxy configuration .....	101
Step 7: Remove the Run As service account from the Local Administrator group .....	101
Server crash reporter .....	101
How a reverse proxy and a load balancer works with Tableau Server .....	101
TLS/SSL .....	102

Mobile access .....	103
Reverse proxy, load balancer and user authentication .....	103
Configure Tableau Server to work with a reverse proxy server and/or load balancer .....	104
Configure the reverse proxy or load balancing server to work with Tableau Server .....	107
Validate reverse proxy and load balancer configuration .....	110
Related topics .....	110
<b>Deploy .....</b>	<b>111</b>
Validating your server deployment plan .....	111
Install and Configure Tableau Server .....	111
What version are you installing or upgrading to? .....	112
Other installation methods .....	112
Validating your server deployment plan .....	112
Before you begin .....	113
Installation steps .....	113
Before you install... ..	114
Validating your server deployment plan .....	114
Hardware recommendations for production installations .....	115
Operating system requirements .....	117
Installation directory .....	119
Non-default installation locations .....	119
Tableau Prep Conductor .....	120

---

Additional requirements .....	121
Minimum Hardware Requirements and Recommendations for Tableau Server .....	124
Minimum installation hardware requirements .....	126
Minimum production hardware recommendations .....	127
Determining Computer Hardware .....	130
Manually determining the number of cores on your computer .....	131
Install TSM .....	132
Prerequisites .....	132
Use the TSM web interface .....	132
Running Setup .....	133
Use the TSM CLI .....	137
Install Tableau Server .....	137
Configure Tableau Server for a forward proxy .....	138
Next step .....	138
Activate and Register Tableau Server .....	138
Prerequisite .....	139
Use the TSM web interface .....	139
Use the TSM CLI .....	143
Configure for forward proxy .....	143
Activate Tableau Server .....	143
Register Tableau Server .....	143
Next step .....	145



Activate Tableau Server Using the Authorisation-To-Run (ATR) Service .....	145
How Tableau Server ATR works .....	145
ATR Duration .....	146
ATR Duration for Offline Activations .....	147
Set or change the Server ATR duration .....	147
Move a Server ATR product key to another Tableau Server .....	148
Deactivate a product key for reuse on another Tableau Server .....	149
Deactivate a product key in version 2021.4 and later .....	149
Deactivate a product key in version 2021.3 and earlier .....	149
Activate Tableau Server Offline .....	150
Offline activation and login-based licence management (LBLM) .....	150
Offline activation and updateable subscription licences (USL) .....	151
Offline activation overview .....	151
Offline activation file name changes .....	151
Use the TSM web interface .....	152
Use the TSM CLI .....	155
Step 1. Log in to Tableau Services Manager .....	155
What if I can't log in? .....	155
Step 2. Generate an offline activation request file .....	156
Step 3. Upload the offline activation request to the Tableau activation web-site .....	156
Step 4. Initialise or activate your licence .....	156
Configure Product Key Operations with Forward Proxy .....	157

---

Before you begin .....	157
Step 1: Verify proxy configuration .....	158
Step 2: Temporarily change log on account for Tableau Server Administrative Controller service .....	159
Step 3: Temporarily change log on account for Tableau Server Activation ser- vice .....	160
Step 4: Activate, refresh, or deactivate Tableau product keys .....	160
Step 5: Revert the log on account back to Network Service (Administrative Controller) .....	161
Step 6: Revert the log on account back to Local System account (Activation service) .....	161
Configure Initial Node Settings .....	162
Prerequisite .....	162
Use the TSM web interface .....	162
Identity store settings .....	164
Run As service account .....	165
Gateway port .....	166
Product usage data .....	166
Sample workbook installation .....	167
Initialising install .....	167
Use the TSM CLI .....	168
Configure identity store settings .....	168
Configure gateway settings (optional) .....	169
Configure product usage data (optional) .....	169

---

Configure sample workbook installation (optional) .....	169
Apply pending configuration changes .....	170
Verify LDAP configuration (Optional) .....	170
Initialise and start Tableau Server .....	171
Next Step .....	171
Configuration File Example .....	171
Entities vs keys .....	172
Server Usage Data .....	173
Disable Usage Data Sharing .....	174
Disabling the sharing of usage data at install .....	174
Disabling the sharing of usage data after install .....	174
Use the TSM web interface .....	174
Use the TSM CLI .....	175
Basic Product Data .....	175
Disabling sharing of Basic Product Data on individual computers .....	176
Disabling the sharing of Basic Product Data at the enterprise level .....	176
Add an Administrator Account .....	177
Prerequisites .....	177
Use web UI .....	178
Use tabcmd CLI .....	178
Next steps .....	179
Initial Node Installation Defaults .....	179

---

Jump-start Installation .....	180
Before you begin .....	181
Step 1: Install Tableau Server and start Tableau Services Manager .....	181
Step 2: Activate and register Tableau Server .....	184
Step 3: Configure local identity store .....	188
Step 4: Add administrator account .....	190
Step 5: Validate your installation .....	191
Install Switches and Properties for Tableau Server .....	191
Automated Installation of Tableau Server .....	198
Benefits of using the automated installer .....	198
When not to use the automated installer .....	198
Before you begin .....	199
How to use the SilentInstaller.py script .....	200
Step 1: Install the automated installer .....	200
Step 2: Create files to provide additional configuration information required to run the automated install .....	201
Step 3: Run the automated install .....	202
Install the initial node .....	202
Install additional nodes .....	204
Update cluster topology .....	206
Configuration, registration, and secrets file templates .....	207
Secrets file template example .....	208
Server Configuration file template example .....	208

Server registration file template example .....	214
Install Tableau Server in a Disconnected (Air-Gapped) Environment .....	215
Prerequisites .....	215
Installing Tableau Server on an Air-Gapped Computer Running Windows .....	216
Activating Tableau Server in an Air-Gapped Environment .....	217
Offline activation overview .....	217
Offline activation file name changes .....	217
Step 1. Log in to Tableau Services Manager .....	218
Step 2. Determine your Tableau Server licensing type .....	218
Step 3 (Server ATR licensing type) Generate and copy json content to Activation page. ....	219
Step 3 (Legacy licensing type) Transcribe data from your air-gapped system into an activation request template. ....	220
Step 4. Initialise or activate your licence .....	221
Displaying Maps in an Air-Gapped Environment .....	222
Configuring Tableau Server to use offline maps: .....	222
Clone Tableau Server .....	222
Security considerations .....	222
Limitations of the clone payload .....	223
Using the clone command to create a copy of Tableau Server .....	223
Creating the clone payload .....	223
Using the clone payload to create a copy of Tableau Server .....	224
Post Installation Tasks .....	224

Security Hardening Checklist .....	225
Installing security updates .....	225
1. Update to the current version .....	225
2. Configure SSL/TLS with a valid, trusted certificate .....	226
3. Disable older versions of TLS .....	226
4. Configure SSL encryption for internal traffic .....	227
5. Enable firewall protection .....	227
6. Restrict access to the server computer and to important directories .....	228
7. Update the Tableau Server Run As User account .....	228
8. Generate fresh secrets and tokens .....	228
9. Disable services that you're not using .....	229
JMX Service .....	229
10. Verify session lifetime configuration .....	229
11. Configure a server allowlist for file-based data sources .....	230
12. Enable HTTP Strict Transport Security for web browser clients .....	231
13. Disable Guest access .....	231
14. Set referrer-policy HTTP header to 'same-origin' .....	232
15. Configure TLS for SMTP connection .....	233
16. Configure SSL for LDAP .....	234
17. Scope permissions for non-default installation locations .....	234
Change List .....	235
Configure SMTP Setup .....	236

---

Secure SMTP .....	237
Use the TSM web interface .....	237
Use the TSM CLI .....	238
SMTP CLI configuration reference .....	240
TLS ciphers .....	244
Configure Server Event Notification .....	246
Use the TSM web interface .....	246
Use the TSM CLI .....	249
Set notification values individually .....	250
Set all notification values with a single json file .....	251
Configure Data Cache .....	253
Database Drivers .....	253
Install drivers in a cluster .....	254
Tableau Server Pre-Flight Check .....	254
tsm pre-flight check commands .....	255
Server Crash Reporter .....	255
Configure Server Crash Reporter .....	256
Use the TSM web interface .....	256
Use the TSM CLI .....	257
Crash reporter settings .....	258
Configuration template .....	258
Configuration file reference .....	258

---

Navigate the Admin Areas of the Tableau Web Environment .....	260
Access based on site role and number of sites .....	260
Server administrator .....	261
Site administrator .....	263
Server administrator tasks .....	263
Site administrator tasks .....	264
Move Tableau Server to Another Drive .....	265
Before you start .....	265
Tableau Server product key activation .....	267
Distributed and High Availability Tableau Server Installations .....	268
Validating your server deployment plan .....	268
Installation types .....	268
External repository .....	270
Prerequisite .....	270
Licensing .....	271
Creating a distributed Tableau Server installation .....	271
Creating a highly available (HA) Tableau Server installation .....	271
If an initial node fails .....	273
Recover from an initial node failure .....	273
Configure Coordination Service ensemble on additional nodes .....	274
Add Client File Service (CFS) to additional nodes .....	274
Tableau Server service licence check .....	274



---

Distributed Requirements .....	275
Hardware .....	275
Hardware Guidelines for High Availability .....	275
Software .....	276
Installation location .....	277
Networking and Ports .....	277
Best Practices .....	278
SSL .....	279
Distributed Installation Recommendations .....	279
Recommendations for all installations .....	280
Install and Configure Additional Nodes .....	281
Installation location .....	281
Use the TSM web interface .....	282
Generate the node bootstrap file .....	282
Install and initialise an additional node .....	284
Configure the additional node with Cluster Controller .....	289
Use the TSM CLI .....	291
Generate the node bootstrap file .....	292
Install and initialise an additional node .....	293
Configure the additional node .....	293
Install drivers .....	295
Drivers and administrative views .....	295

---

Install Tableau Resource Monitoring Tool Agent .....	295
Database Drivers .....	295
Install drivers in a cluster .....	296
Example: Install and Configure a Three-Node HA Cluster .....	296
A Single Server System .....	297
A Three-Node System .....	299
Configuration steps .....	299
Before you begin .....	300
Use the TSM web interface .....	300
Step 1: Install the initial node .....	300
Step 2: Generate a bootstrap file for the additional nodes .....	300
Step 3: Install and initialise node 2 .....	302
Step 4: Install and initialise node 3 .....	307
Step 5: Configure the new node with a minimum topology .....	307
Step 6: Deploy a Coordination Service ensemble .....	309
Step 7: Configure Client File Services (CFS) on additional nodes .....	311
Step 8: Configure processes for node 2 .....	312
Step 9: Configure processes for node 3 .....	314
Use the TSM CLI .....	315
Step 1: Install the initial node .....	315
Step 2: Generate a bootstrap file for the additional nodes .....	315
Step 3: Install and initialise node 2 .....	316

Step 4: Install and initialise node 3 .....	<b>316</b>
Step 5: Add a process to the additional nodes .....	<b>317</b>
Step 6: Deploy a Coordination Service ensemble .....	<b>318</b>
Step 7: Configure Client File Services (CFS) on additional nodes .....	<b>320</b>
Step 8: Configure processes for node 2 .....	<b>321</b>
Step 9: Configure processes for node 3 .....	<b>322</b>
Step 10: Configure firewall rules (optional) .....	<b>323</b>
Add a Load Balancer .....	<b>324</b>
Add a Load Balancer .....	<b>324</b>
Configure Tableau Server to work with a load balancer .....	<b>325</b>
Deploy a Coordination Service Ensemble .....	<b>325</b>
Hardware requirements .....	<b>326</b>
The Coordination Service Quorum .....	<b>326</b>
Number of Coordination Service instances to use .....	<b>327</b>
Deploy a new Coordination Service ensemble .....	<b>328</b>
Configure Client File Service .....	<b>331</b>
Configure CFS on additional nodes .....	<b>331</b>
Repository Failover .....	<b>332</b>
Automatic repository failover .....	<b>332</b>
Manual repository failover .....	<b>333</b>
Preferred active repository .....	<b>333</b>
Recover from an Initial Node Failure .....	<b>334</b>

---

If an initial node fails .....	334
General requirements .....	335
Move the TSM Controller, Licence Service and Activation Service to another node .....	336
Recover from a Node Failure .....	342
General requirements .....	342
Removing a Failed Node .....	343
Configure Nodes .....	346
Use the TSM web interface .....	347
Use the TSM CLI .....	349
Adding processes to a node .....	350
Changing the number of processes on a node .....	351
Removing all instances of a process from a node .....	351
Moving all instances of a process from one node to another node .....	352
Workload Management through Node Roles .....	352
Backgrounder node roles .....	353
Using Backgrounder node roles .....	353
Configuration options .....	354
Licence requirements .....	355
Considerations .....	356
File Store node roles .....	357
Guidelines to optimise for extract refresh and backup or restore workloads. ....	358
Fine tune extract query workload management .....	359

Configuration options .....	360
Licence requirements .....	361
How to see node roles .....	361
Who can do this .....	361
Install Tableau Server on a Two-Node Cluster .....	361
Restart Multi-Node Tableau Server Computers .....	362
Maintain a Distributed Environment .....	363
Move the Repository Process .....	363
Use the TSM web interface .....	364
Add a new instance of the repository. ....	364
Remove an instance of the repository. ....	365
Use the TSM CLI .....	365
Add a new instance of the repository. ....	366
Remove an instance of the repository. ....	366
Move the File Store Process .....	367
Use the TSM web interface .....	367
Adding a second instance of File Store .....	367
Decommissioning and removing an instance of file store .....	368
Use the TSM CLI .....	369
Adding a second instance of file store .....	369
Decommissioning and removing an instance of File Store .....	370
Move the Messaging Service Process .....	371

---

Use the TSM web interface .....	371
Moving the Messaging Service .....	371
Use the TSM CLI .....	372
Moving the Messaging Service .....	372
Remove a Node .....	373
Prerequisites for removing a node .....	373
Use the TSM web interface .....	374
Use the TSM CLI .....	375
Configure Tableau Server for High Availability with Coordination Service-Only Nodes .....	376
Prerequisite .....	377
Deploy an ensemble on Coordination Service-only nodes .....	377
Add a Load Balancer .....	379
Configure Tableau Server to work with a load balancer .....	380
Upgrade Tableau Server Overview .....	381
Choose your upgrade path .....	381
Blue/Green upgrades .....	381
Upgrading in place .....	381
Upgrade Type .....	382
Determine your Tableau Server version .....	382
Determine your Tableau Server install location .....	382
Preparing for Upgrade .....	383
Release Navigator .....	384

Server Upgrade - Minimum Hardware Recommendations .....	384
Determining Computer Hardware .....	387
Manually determining the number of cores on your computer .....	388
Server Upgrade - Review What's Changed .....	389
Server Upgrade - Gather Configuration Details .....	390
Take screen shots .....	391
Record object counts .....	391
Gather asset files .....	391
Gather custom configuration information .....	392
Secure SMTP .....	392
Analytics extensions .....	392
External Repository .....	393
External File Store .....	394
Port customisation .....	394
Proxy customisation .....	394
Server Upgrade - Verify Licensing Status .....	395
Server Upgrade - Verify Accounts .....	396
Server Upgrade - Back Up Tableau Server .....	397
Server Upgrade - Download Setup .....	398
How Tableau Server Upgrade Works .....	398
What's Changed - Things to Know Before You Upgrade .....	399
Upgrading from 2018.2 and Later (Windows) .....	399

---

Support and services to help with Tableau Server upgrades .....	401
Server Upgrade - Disable Scheduled Tasks .....	401
Single-Server Upgrade -- Run Setup .....	402
Run Setup .....	402
Multi-node Upgrade -- Run Setup .....	405
Run Setup .....	405
Multi-node Upgrade -- Run Setup on Each Node .....	406
Run Setup .....	406
Multi-node Upgrade -- Run Upgrade Script .....	406
Run Upgrade script .....	406
Verify Tableau Server Upgrade .....	409
Verify Tableau Service processes .....	409
Verify TSM global settings .....	410
Enable subscriptions and scheduling .....	410
Verify user access .....	410
View published workbooks .....	411
Verify publishing workbooks and data sources .....	411
Verify Tableau Prep Builder .....	411
Verify count of Tableau objects .....	411
Verify API functionality .....	411
REST API .....	411
Compatibility testing .....	412



Post Upgrade Cleanup .....	412
Uninstall previous version .....	412
Delete 'Tableau Server' folders from \packages directory .....	413
Using a Blue/Green approach for upgrading Tableau Server .....	413
Test the Upgrade .....	417
Prepare a test environment .....	418
Upgrade the test environment .....	419
Confirm that everything works as expected .....	419
Performance and user acceptance testing .....	420
Test new features .....	420
Communicate about the upgrade .....	420
Troubleshoot Tableau Server Install and Upgrade .....	420
General Troubleshooting Steps .....	421
Common Tableau Server Install Issues .....	421
Installation logs location .....	421
Install program does not prompt for location to install to .....	422
Install program does not restart Windows .....	422
TSM Install fails with 'initialisation failed' error .....	422
TSM Initialise screen does not display .....	423
Multiple install attempts fail .....	423
Obliterate script generates error: 'refresh-environment-variables.cmd' is not recognised as an internal or external command .....	424
Install fails due to hardware requirements .....	424

---

Install or upgrade fails due to CPU requirements .....	424
Common Tableau Server Upgrade Issues .....	425
Upgrade logs location .....	425
Error: Failed to establish a connection with Active Directory .....	425
Maps do not display or display incompletely after upgrading .....	426
Upgrade script error: "Tableau Server Version change validation failed." .....	426
Upgrade multi-node, initialising additional node fails with 'Enter your credentials again' error .....	426
Upgrading fails due to lack of disk space .....	427
Upgrade fails on RebuildSearchIndex job .....	427
Upgrade fails on 2022.1 and later .....	428
Upgrade fails on 2020.4.0 or later .....	428
Upgrade fails due to permission problems with the backup/restore file location	430
Common Settings Import Issues .....	431
Import of settings file causes "not present on any node" validation error due to missing services .....	431
Import of settings file causes "configuration value you specified does not match" error .....	432
"You cannot directly modify instances of the Coordination Service" error .....	433
If you see this error after importing a settings file: .....	433
If you see the error when setting the process count for Coordination Service manually: .....	434
Troubleshooting connections to TSM .....	435
Unable to connect to TSM .....	435

Starting Tableau Server .....	435
Tableau Server cannot determine if it fully started .....	435
Tableau Server doesn't start .....	435
Reindexing Tableau Server Search & Browse .....	436
Problems that can be solved by rebuilding Search & Browse index .....	436
Activating Tableau Server .....	436
Tableau Server licence activation fails .....	436
Confirm you can access the licensing server .....	436
Verify the date and time .....	438
Verify FlexNet Licensing Service has started .....	438
Force the product key to be read again .....	439
Send the contents of trusted storage to Tableau Support .....	439
tabcmd Installation Problems .....	440
Installing tabcmd separately .....	440
Problems installing tabcmd on Linux .....	440
Java is not installed .....	440
Incorrect version of Java is installed .....	440
Uninstall Tableau Server .....	441
Uninstalling and completely removing Tableau Server .....	441
Uninstall a Tableau Server version .....	442
Remove Tableau Server from Your Computer .....	443
What tableau-server-obliterate does .....	444

---

Preserving Tableau Server backup and log files .....	445
Running the tableau-server-obliterate script .....	445
To completely remove Tableau Server without removing server licensing .....	446
To completely remove Tableau Server and licensing .....	447
Help Output for tableau-server-obliterate Script .....	448
Output .....	448
<b>Migrate</b> .....	450
Migrate Tableau Server to Tableau Cloud .....	450
Technical Considerations for Migrating from Tableau Server to Tableau Cloud .....	450
Summary outline .....	451
Security, administration and governance .....	453
Security and compliance .....	453
Hosting and upgrades .....	453
Site level administration .....	454
Observability data .....	454
Availability .....	454
Data connectivity .....	455
Files .....	456
Applications and databases .....	457
Custom connectivity .....	457
Cube data sources .....	457
Data prep .....	457

---

Licensing and user management .....	458
Licensing .....	458
Single sign-on .....	458
Active Directory, Kerberos and LDAP .....	458
Automated user and group management .....	459
Extensibility and external integrations .....	459
Automated tooling .....	459
Extensibility .....	460
Embedding .....	460
Customisations .....	460
Server to Server Migrations .....	461
Migrate to New Hardware .....	461
Tableau Server product key activation .....	463
Migrate Tableau Server from an On-Premises Computer to a VM in the Cloud .....	464
Prerequisites .....	464
To migrate Tableau Server to a VM in the cloud .....	464
Changing the Identity Store .....	467
Warning .....	468
Methods for restoring content and permissions .....	468
User filters .....	470
User names and the Tableau Identity store .....	470
Method 1: Use site export and import .....	471

---

Method 2: Fresh installation—users republish content .....	471
Back up, remove, and then reinstall .....	471
Step 1: Back up Tableau Server .....	472
Step 2: Remove Tableau Server .....	472
Step 3: Reinstall Tableau Server with new authentication type .....	472
<b>Manage Individual Sites .....</b>	<b>473</b>
What is a site .....	473
Site administrator tasks .....	474
Steps for setting up your site .....	475
Planning a Site .....	476
Projects .....	477
Users and groups .....	477
Site roles and permissions .....	478
Extract refresh schedules .....	479
Site Settings Reference .....	479
Accessing site settings .....	479
General tab .....	481
Authentication tab (Tableau Cloud) .....	491
Bridge tab (Tableau Cloud) .....	492
Extensions tab .....	492
Integrations tab .....	493
Connected Apps tab .....	494

---

Mobile tab .....	494
Manage Users and Groups .....	496
Add Users to a Site .....	496
Site administrator access to user management .....	496
Add local users to a site .....	497
Add Active Directory users to a site .....	499
Remove local users .....	500
Related information .....	500
Set Users' Site Roles .....	500
How user licences, site roles and content permissions work together .....	501
Change a user's site role .....	502
General capabilities allowed with each site role .....	503
What this article covers and where to find what's not covered here .....	503
Tableau site roles as of version 2018.1 .....	504
Who can publish content .....	509
Site roles and Active Directory import and synchronisation .....	509
View, Manage or Remove Users .....	511
Set the User Authentication Type for SAML .....	517
Notes .....	518
Import Users .....	518
Add users from a CSV file .....	519
How users' site roles are assigned or maintained .....	520

---

Importing at the server level in multi-site environments .....	521
Importing to a single-site environment .....	522
Multi-site versus single-site import .....	522
CSV Import File Guidelines .....	523
CSV file format requirements .....	523
Required columns in the CSV file .....	524
Additional import file options .....	524
Improve performance for large CSV files passed through tabcmd .....	526
Notes .....	527
CSV settings and site roles .....	527
CSV import examples for Tableau Server .....	529
Identity pools examples .....	529
Manage Site User Visibility .....	530
Limit user visibility .....	530
Best practices for limiting user visibility .....	532
Restore Full User Visibility .....	533
Guest User .....	533
Guest user permissions .....	534
Enable or disable Guest access .....	534
Additional Guest account characteristics .....	535
Work with Group Sets .....	535
Turn on group sets .....	536



---

Create group sets .....	536
Set permissions on group sets .....	537
Groups .....	538
Add Users to a Group .....	539
Add users to a group (Users page) .....	540
Add users to a group (Groups page) .....	540
Create a Local Group .....	541
Dynamic group membership using assertions .....	542
Step 1: Turn on the setting .....	543
Step 2: Ensure group membership claims are included in the assertion .....	544
Create Groups via Active Directory .....	544
Before you begin .....	544
Import from AD to add a group .....	545
Synchronise External Directory Groups in a Site .....	548
Set the minimum site role for users in an external directory group .....	548
What happens when users are removed in the source external directory? .....	549
What happens when a user name changes in the source external directory .....	550
What happens when an external directory group is removed from Tableau Server? .....	550
Synchronise External Directory Groups on the Server .....	551
Before you begin .....	551
Synchronise external directory groups on a schedule .....	551
Synchronise all external directory groups on demand .....	552

---

View synchronisation activity .....	553
Set the minimum site role for users in an external directory group .....	553
What happens when users are removed in the source external directory? .....	555
Improving group synchronisation performance .....	555
Synchronise All Active Directory Groups on a Schedule .....	555
1 Set a minimum site role for synchronisation .....	556
2 Set the schedule .....	557
3 Run synchronisation on-demand (optional) .....	557
4 View the status of synchronisation tasks .....	558
Grant Licence on Sign-in .....	559
Activate Grant role on sign in .....	560
Modifying user roles with Grant role on sign-in .....	562
Removing users affected by Grant role on sign-in .....	562
Delete Groups .....	563
Effects of deleting groups .....	563
Groups in group sets .....	563
Work with Group Sets .....	564
Turn on group sets .....	564
Create group sets .....	565
Set permissions on group sets .....	566
Dashboard-based Custom Portals .....	567
Sketch out a portal design .....	568

---

Gather images for logos and navigation elements .....	568
Lay out text, images and selected sheets on a dashboard .....	569
Link dashboard elements to content .....	569
Publish, test, and refine your portal .....	570
Manage Content Access .....	571
Set a Site's Web Authoring Access and Functions .....	571
Turn web authoring on or off for a site .....	571
Notes .....	572
See which sites allow web authoring .....	572
Configure cross-database join options .....	573
Set Web Edit, Save, and Download Access on Content .....	574
Why allow users to work on the site directly .....	574
Web authoring pros and cons .....	574
Managing permissions to help users avoid content proliferation .....	575
Coordinate edit and save capabilities with site roles for the appropriate level of access .....	575
Site role access .....	576
Configure Projects, Groups, Group Sets and Permissions for Managed Self-Service .....	576
Plan your strategy .....	577
Use a closed permissions model .....	577
Identify the types of projects and groups you'll need .....	578
Consider site roles .....	579

---

Create the groups and group sets .....	580
Membership in multiple groups .....	580
Impact of group sets .....	581
Remove permissions that will cause ambiguities and establish default permission patterns .....	581
Create permission rules .....	582
Create projects and adjust permissions .....	583
Lock content permissions .....	584
Possible project structures .....	584
Workbooks shared for open collaboration on the server .....	585
Shared reports that cannot be edited .....	585
Vetted data sources for Analysts to connect to .....	586
Inactive content .....	586
Source for workbook templates .....	587
Next steps .....	587
Use Projects to Manage Content Access .....	589
Why use projects .....	590
When to create project hierarchies (example) .....	590
Why not use sites? .....	591
Project-level administration .....	591
Add Projects and Move Content Into Them .....	591
Add a top-level or child (nested) project .....	592
Move an asset to another project .....	594

---

How moving projects affect permissions .....	594
Delete a project .....	595
Requirements for moving assets .....	596
Required site role .....	596
Required permissions for the project that users move content to .....	596
Required permissions for the project that users move content from .....	596
Add a Project Image .....	597
Set a project image .....	597
Let Site Users Request Access to Content .....	600
Default settings .....	601
Configure project permissions .....	602
Change project permissions .....	602
Change content permissions .....	604
Set permissions on content .....	604
Set permissions on a view .....	606
Permissions .....	606
Permissions fundamentals .....	608
Set permissions .....	609
Project-level permissions .....	609
Set project permissions for all content types .....	612
Configure the asset permissions setting .....	612
Content-level permissions .....	612

---

Set permissions on assets .....	613
Set permissions on a view .....	614
Set permissions at publish .....	615
Clean up the All Users group .....	616
Permission settings for specific scenarios .....	617
Saving, publishing and overwriting .....	617
Web Editing and Web Authoring .....	618
Required Permission Capability Settings .....	618
Data access for published Tableau data sources .....	619
Move content .....	621
Metrics .....	621
Metrics display data from their owner's perspective .....	622
Explain Data .....	623
Show or Hide Sheet Tabs .....	623
Turn off tabbed views to allow independent view permissions .....	624
Collections .....	625
Permission Capabilities and Templates .....	625
Templates .....	626
Copy and paste permissions .....	626
Capabilities .....	627
Projects .....	627
View template .....	627

---

Publish template .....	627
Workbooks .....	627
View template .....	627
Explore template .....	628
Publish template .....	629
Administer template .....	629
Views .....	629
Data Sources .....	630
View template .....	630
Explore template .....	630
Publish template .....	630
Administer template .....	631
Other types of assets .....	631
Manage Permissions with Projects .....	633
Project administration .....	633
Special projects .....	634
Set a project leader .....	635
Lock asset permissions .....	636
Set asset permissions (lock a project) .....	637
Change asset permissions .....	638
Move projects and content .....	639
Move Tableau content and external assets .....	639

---

Move projects .....	640
Collections .....	642
Private collections .....	642
Effective permissions .....	642
Evaluate permission rules .....	644
Evaluate permissions set at multiple levels .....	645
Permissions on views .....	646
Permissions, Site Roles and Licences .....	647
Site roles and their maximum capabilities .....	648
Projects .....	648
Workbooks .....	648
Data Sources .....	650
Data Roles .....	651
Flows .....	651
Ask Data Lenses .....	652
Metrics .....	652
Collections .....	653
Virtual Connections .....	653
Quick Start: Permissions .....	654
Create group permission rules for projects .....	654
1. Add users to groups .....	654
2. Access project-level permissions settings .....	655



---

3. Create a permissions rule .....	655
4. View a user's effective permissions .....	656
Site roles .....	656
Permission logic .....	656
Manage Content Ownership .....	659
Who can change or be given ownership, by content type .....	659
Considerations for changing content ownership .....	661
Change the owner of a content resource .....	662
Manage Permissions for External Assets .....	664
Tableau Catalogue indexes content and assets .....	664
How does Tableau Catalogue work? .....	665
Permissions on metadata .....	666
Access metadata .....	666
Permissions on Tableau content .....	666
Permissions on external assets using derived permissions .....	666
Set permissions on individual external assets .....	670
Access lineage information .....	673
Who can do this .....	677
Manage Data .....	683
Tableau Server Data Sources .....	683
Managing data sources .....	684
Restrictions .....	686

---

Extract Upgrade to .hyper Format .....	686
Discontinuation of support for TDE extract files .....	687
Set the Site Time Zone for Extracts .....	687
Create Extracts on the Web .....	687
Create extracts in Web Authoring .....	688
Extract an Embedded Data Source in Web Authoring .....	688
Define your Extract Settings .....	689
Conditions for using the Physical Tables option .....	691
Set up Incremental Refresh .....	693
Use Advanced Settings .....	694
Create extracts in Content Server .....	697
Extract a Published Data Source on Content Server .....	697
Extract an Embedded Data Source on Content Server .....	698
Limitations .....	698
Keep Extracted Data Fresh .....	699
Monitor and Manage Extracts .....	699
View Data Source Attributes .....	699
View data sources by name .....	699
View a list of connections .....	700
Keep Data Fresh .....	701
Manage Refresh Tasks .....	701
See also .....	702

---

Refresh Data on a Schedule .....	702
Quick Start: Refresh Extracts on a Schedule .....	703
1 Set up a schedule on the server .....	704
2 Enable scheduled extract refreshes and failure emails .....	704
3 Publish a workbook with an extract .....	705
4 Monitor refresh performance .....	706
Automate Refresh Tasks .....	707
Handle Extract Refresh Alerts .....	707
Resolving Extract Refresh Problems .....	709
Automatically Suspend Extract Refreshes for Inactive Workbooks and Data Sources .....	710
Configure the feature .....	711
Notifications .....	711
Resume suspended extract refreshes .....	711
Edit Connections on Tableau Server .....	712
Authentication types for Google, Salesforce, and WDC data .....	714
Google authentication options .....	715
Salesforce.com authentication options .....	715
Monitor progress .....	717
Cube Data Sources .....	717
Web Data Connectors in Tableau Server .....	718
Before you run connectors on Tableau Server .....	718
Manage connectors in a safe list .....	719

---

Updating WDC safe lists requires a server restart .....	719
Add connectors to the safe list and secondary safe list .....	719
Allow or disallow WDCs or WDC extract refreshes .....	721
Remove one or more WDCs from the safe list .....	721
List all WDCs on the safe list .....	721
Refresh the extract for a connector .....	722
Troubleshooting .....	722
Testing and Vetting Web Data Connectors .....	723
Examine the source .....	723
Test the web data connector in an isolated environment .....	724
Monitor the traffic created by the web data connector .....	724
Test the performance and resource usage of the web data connector .....	724
Enable Tableau Catalog .....	725
Before enabling Catalogue .....	725
Required versions .....	725
What to expect when enabling Catalogue .....	726
Initial ingestion .....	726
Initial ingestion speed .....	726
Disk space to store metadata .....	726
Memory for non-interactive microservice containers .....	727
Best practices for enabling Catalogue .....	728
Summary of steps to enable Catalogue .....	728

---

Enable Catalogue .....	729
Step 1: Determine the amount of content on Tableau Server .....	729
Step 2: Estimate how long initial ingestion will take .....	729
Step 3: Decrease the time of initial ingestion .....	730
Step 4: Activate the Data Management licence .....	731
Step 5 (optional): Turn off Catalogue capabilities for each site .....	731
Step 6: Run the tsm maintenance metadata-services command .....	732
Step 7: Monitor initial ingestion progress and validate its status .....	733
Step 8: Configure SMTP Setup .....	733
Step 9 (optional): Turn on Catalogue capabilities for each site .....	733
Troubleshoot Catalogue .....	733
Timeout limit and node limit exceeded messages .....	733
Missing content .....	734
Performance after initial ingestion .....	735
Out of memory errors .....	736
Disable Catalogue .....	736
Turn off Catalogue capabilities for each site .....	736
Stop indexing metadata .....	736
Get Initial Ingestion Status .....	736
Step 1: Authenticate using the REST API .....	737
Step 2: Make a GET request .....	737
Status values from the response .....	737

---

Example response .....	738
Get Eventing Status .....	742
Step 1: Authenticate using the REST API .....	742
Step 2: Make a GET request .....	742
Status values from the response .....	742
Example response .....	743
Use Lineage for Impact Analysis .....	743
Navigate lineage .....	743
Embedded asset appears in External Assets .....	746
Lineage and custom SQL connections .....	747
Catalogue doesn't support cubes .....	747
Mismatch between lineage count and tab count .....	748
Workbook count mismatch example .....	748
Use email to contact owners .....	749
Data Labels .....	749
Assets you can label .....	750
Label names and categories .....	750
Label categories .....	751
Certification .....	751
Data quality warnings .....	751
Sensitivity labels .....	752
Custom label categories .....	752

---

Where data labels appear .....	753
The Data Labels dialog .....	757
Permissions required to interact with data labels on assets .....	759
Comparison of data labels and tags .....	760
Use Certification to Help Users Find Trusted Data .....	761
How certification helps users find trusted data .....	761
Create guidelines for selecting data to certify .....	763
Who can certify data .....	763
How to certify data .....	764
Customise certification .....	766
Set a Data Quality Warning .....	766
About data quality warnings .....	767
Where data quality warnings appear .....	768
Visibility .....	770
Data quality warnings in subscriptions .....	771
How to set a quality warning .....	772
Remove a data quality warning .....	774
How to turn on a monitoring quality warning .....	775
How to turn off a monitoring quality warning .....	776
Site-wide monitoring for extract refresh and flow run failures .....	777
Interaction of site-wide monitoring and explicit monitoring .....	777
Who can set quality warnings .....	778

---

Customise data quality warnings .....	778
Sensitivity Labels .....	778
Attach a sensitivity label to an asset .....	779
Remove a sensitivity label from an asset .....	780
Where sensitivity labels appear .....	781
Visibility .....	782
Sensitivity labels in email subscriptions .....	783
Who can set sensitivity labels .....	783
Customise sensitivity labels .....	783
Labels with Custom Categories .....	784
Attach labels with custom categories to an asset .....	785
In Tableau Cloud and Tableau Server 2024.2 and later .....	785
In Tableau Server 2023.3 .....	786
Remove labels with custom categories from an asset .....	788
In Tableau Cloud and Tableau Server 2024.2 and later. ....	788
In Tableau Server 2023.3 .....	789
Where labels with custom categories appear .....	789
Who can add custom category labels .....	790
Customise a label with a custom category .....	790
Manage Data Labels .....	791
Label Manager .....	791
Properties of Data Labels .....	794



---

Name .....	794
Category .....	795
Description .....	796
Visibility .....	797
Create a data label .....	797
Limitations for creating labels .....	798
Edit a data label .....	798
Limitations for editing labels .....	799
Delete a data label .....	800
Limitations for deleting labels .....	800
Revert a built-in data label to its defaults .....	800
Create a data label category .....	800
Limitations for creating label categories .....	801
Edit a data label category .....	801
Limitations for editing label categories .....	802
Delete a data label category .....	802
Scenarios for customisation .....	802
Scenario: Customise a built-in data label .....	802
Scenario: Create a custom data label .....	802
Scenario: Create a new data label category and associated data labels .....	802
Manage Dashboard and Viz Extensions in Tableau Server .....	803
Before you run extensions on Tableau Server .....	803

---

Control extensions and access to data .....	805
Change the global setting enabling extensions on the server .....	805
Change the default settings for a site .....	805
Identifying the URL of an extension .....	806
From the manifest file .....	806
From Tableau Exchange .....	806
Identifying a dashboard extension using the About dialog box .....	807
Add extensions to the safe list and configure user prompts .....	808
Block specific extensions .....	809
Using regular expressions in the safe list URL .....	809
Test Network-enabled extensions for security .....	811
Examine the source files .....	811
Understand data access .....	812
Test the extension in an isolated environment .....	812
Monitor traffic created by the dashboard extension .....	813
Configure Connections with Analytics Extensions .....	813
Server SSL .....	814
Enable analytics extensions .....	814
Configure analytics extensions settings .....	815
Edit or delete an analytics extension connection .....	817
Client requirement: Intermediate certificate chain for Rserve external service ....	817
Script errors .....	817

---

Determining analytics extensions usage .....	818
Table Extensions .....	818
Benefits .....	818
Prerequisites .....	819
Create a Table Extension .....	819
Table Extensions vs Analytics Extensions .....	821
Table Extensions .....	821
Analytics Extensions .....	822
Configure Einstein Discovery Integration .....	822
Einstein Discovery dashboard extensions .....	822
Einstein Discovery analytics extensions .....	823
Einstein Discovery Tableau Prep extensions .....	824
Configure External Actions Workflow Integration .....	824
Editions, site roles, and permissions requirements .....	825
Deployment requirements for External Actions .....	825
Turn External Actions On or Off .....	826
Use the TSM CLI .....	826
Modify Site-Level Settings .....	826
Integrate Tableau with a Slack Workspace .....	826
Connect a Tableau Server site to a Slack workspace .....	827
Step 1: Create a Tableau App for Slack .....	828
Step 2: Add an OAuth client to the Tableau site .....	829

---

Step 3: Finalise the connection .....	829
Disconnect a Tableau site from Slack .....	830
Update your Tableau App for Slack .....	830
Troubleshoot the Tableau App for Slack .....	831
Creators: Connect to Data on the Web .....	831
Open the Connect to Data page .....	831
Tableau Server .....	832
Connect to data On this site .....	833
Connect to files .....	833
Use connectors .....	833
Tableau Server connectors .....	834
Tableau Catalog Supported Connectors .....	835
Tableau Cloud .....	835
Connect to data On this site .....	835
Connect to files .....	836
Use connectors .....	836
Tableau Cloud Connectors .....	837
Tableau Catalog Supported Connectors .....	838
Use Dashboard Starters .....	838
Tableau Public .....	838
Connect to files .....	838
Use connectors .....	839

---

Tableau Public Connectors .....	839
After you connect .....	839
Keep data fresh in web authoring .....	839
Run Initial SQL .....	840
To use initial SQL .....	841
Parameters in an initial SQL statement .....	842
Defer execution to the server .....	844
Security and impersonation .....	844
Troubleshoot 'create table' for MySQL and Oracle connections .....	844
For MySQL connections, tables aren't listed after using initial SQL to create a table .....	844
For Oracle connections, using initial SQL to create a table causes Tableau to stall .....	845
Create and Interact with Flows on the Web .....	845
Turn flow web authoring on or off for a site .....	846
Enable linked tasks .....	846
Enable flow parameters .....	847
Enable Tableau Prep Conductor .....	849
Enable Run Now .....	849
Flow Subscriptions .....	850
Enable Tableau Prep Extensions .....	850
Turn autosave off or on .....	851
Tableau Prep on the Web .....	851

---

Installation and Deployment .....	852
Sample data and processing limits .....	852
Available features on the web .....	853
Autosave and working with drafts .....	855
Publishing flows on the web .....	856
Embed credentials .....	856
Publish a flow .....	857
Who can do this .....	858
Create Views and Explore Data on the Web .....	858
Alerts and subscriptions .....	859
Manage Saved Credentials for Data Connections .....	859
Test connections using saved credentials .....	860
Update saved credentials .....	860
Clear all saved credentials .....	861
Remove saved credentials .....	861
Create and Edit Private Content in Personal Space .....	862
Privacy in Personal Space .....	862
Tableau Catalogue and Personal Space .....	862
Collaboration tools .....	863
Extract refreshes in Personal Space .....	863
Find content in Personal Space .....	863
Publish a workbook to Personal Space .....	865

---

Publish a workbook to Personal Space on Tableau Server or Tableau Cloud ...	865
Publish a workbook to Personal Space from Tableau Desktop .....	865
Move workbooks to Personal Space .....	866
Move workbooks from Personal Space .....	867
Use Relationships for Multi-table Data Analysis .....	867
The Tableau Data Model .....	870
Layers of the data model .....	872
Understanding the data model .....	873
Build a new model .....	874
Multi-table model .....	875
Single-table model .....	877
Single-table model that contains other tables .....	877
Supported data model schemas .....	878
Single-table .....	878
Star and snowflake .....	879
Star and snowflake with measures in more than one table .....	880
Multi-fact analysis .....	881
Requirements for relationships in a data model .....	883
Factors that limit the benefits of using related tables .....	883
How Relationships Differ from Joins .....	883
Characteristics of relationships and joins .....	885
Relationships .....	885

---

Joins .....	886
Requirements for using relationships .....	886
Factors that limit the benefits of using related tables .....	886
Where did joins go? .....	887
Optimise Relationship Queries Using Performance Options .....	888
What the Cardinality and Referential Integrity settings mean .....	889
Cardinality options .....	889
Referential Integrity options .....	889
Where did joins go? .....	890
Tips on using Performance Options .....	892
Terms defined .....	893
About Multi-fact Relationship Data Models .....	893
Levels of relatedness .....	894
Example .....	896
Field-level relatedness indicators .....	897
Relatedness indicators on a worksheet .....	897
Relatedness warning dialog .....	898
Table-level relatedness in the data model .....	899
Unrelated tables .....	899
Related tables .....	900
Shared tables .....	900
Field-level relatedness in the analysis .....	900



---

Related fields .....	901
Unrelated fields .....	901
Stitching fields .....	901
Ambiguously related fields .....	902
Resolve ambiguity .....	903
Stitching vs resolving ambiguity .....	904
How joins are used for each level of relatedness .....	905
Related dimensions use inner joins .....	908
Unrelated dimensions use cross joins .....	909
Stitched dimensions use outer joins .....	910
Intermediate results are outer joined .....	911
Additional joins to retain measures .....	913
Related measures .....	914
Unrelated measures .....	915
Troubleshooting .....	916
Considerations when working with multi-fact relationship data models .....	916
Known issues in 2024.2 .....	917
When to Use a Multi-fact Relationship Model .....	918
Why did we build the capability to model unrelated tables? .....	919
Where did the name come from? .....	920
When to use multi-fact relationship data models .....	920
Multi-fact analysis .....	921

---

Other scenarios .....	922
Identify the base tables .....	923
Characteristics of base tables and shared tables .....	924
Try an additional base table instead .....	925
Understand Tooltips for Multi-fact Relationship Data Models .....	925
Field-level relatedness .....	925
Know your data model .....	926
Unrelated dimension-dimension pair .....	927
Unrelated dimension-measure pair .....	928
Filters .....	930
Build a Multi-fact Relationship Data Model .....	931
Build the model .....	931
Explore the model .....	933
Identify a relationship tree .....	934
View relationship details .....	934
Select a relationship .....	934
Swap with base table .....	935
Example .....	935
Collapse a base table .....	936
Troubleshooting .....	937
Create a single data source .....	937
Example .....	937

---

Resolve a cycle .....	937
Data model restrictions .....	938
Cycles .....	938
Nested shared tables .....	939
Add Web Images Dynamically to Worksheets .....	940
Prepare your data source .....	940
Example data set: .....	941
Assign an image role to your URLs .....	941
From the Data Source page: .....	941
From a worksheet: .....	942
Add images to your visualisations .....	942
Share your visualisations .....	943
Troubleshoot image connections .....	943
None of the images are being displayed in my viz .....	943
Some of the images aren't displaying in my viz .....	944
The images aren't being displayed outside of my worksheet .....	946
Automatically Build Views with Ask Data .....	947
Navigating to Ask Data lenses .....	948
Ask Data from a lens page or dashboard object .....	950
Navigate to a lens and learn more about its data .....	950
Build queries by entering text .....	952
Build queries by adding suggested phrases .....	953

---

Build queries by adding fields and filters .....	954
See how elements of your query are applied .....	955
Rephrase your question .....	956
Change the viz type .....	956
Change fields, filters and displayed data .....	957
Adjust date filters .....	959
Compare differences over time .....	962
Apply simple calculations .....	963
Add sheets with other vizzes .....	964
Share Ask Data vizzes via email, Slack, or a link .....	964
Send feedback to the lens owner .....	965
Tips for successful queries .....	965
Create Lenses that Focus Ask Data for Specific Audiences .....	966
Create or configure a lens page on your Tableau site .....	967
Change the list of recommended visualisations .....	969
Add or replace a recommended visualisation .....	969
Edit section titles and recommendation names, or delete recommendations .....	970
Add an Ask Data lens to a dashboard .....	970
Apply a different lens to an Ask Data dashboard object .....	972
Change a lens name, description or project location .....	972
See how people use Ask Data with a lens .....	973
Let users email you questions about a lens .....	973

---

Permissions for publishing and viewing lenses .....	974
Disable or Enable Ask Data for a Site .....	975
Optimise Data for Ask Data .....	976
Optimise data in Ask Data .....	976
Changing settings at the data source or lens level .....	976
Add synonyms for field names and values .....	978
Exclude values of specific fields from search results .....	978
Optimise data sources .....	979
Optimise indexing for Ask Data .....	979
Use data extracts for faster performance .....	980
Ensure that users can access the data source .....	980
Be aware of unsupported data source features .....	981
Anticipate user questions .....	981
Simplify the data .....	981
Set appropriate field defaults .....	982
Create hierarchies for geographic and categorical fields .....	982
Create a Tableau Data Story (English Only) .....	982
Understand how Data Stories handles data .....	983
Learn about how Data Stories are written .....	983
Manage Data Stories for your site .....	984
Add a Tableau Data Story to a Dashboard .....	984
Choose the Right Story Type for Your Tableau Data Story .....	989

---

Continuous .....	989
Discrete .....	990
Percentage of whole .....	991
Scatter plot .....	992
Configure Settings for a Tableau Data Story .....	993
Configure Tableau Data Story Settings: Analytics .....	993
Configure analytics for your story .....	993
Understand different types of analytics .....	994
Correlation .....	994
Clustering .....	994
Distribution .....	994
Segments .....	994
Trend line .....	995
Volatility .....	995
Break down how analytics are used to generate stories .....	995
Understand analytics for discrete stories .....	996
Understand analytics for discrete stories .....	997
Understand analytics for scatter plot stories .....	999
Understand analytics for percentage of whole stories .....	1001
Configure Tableau Data Story Settings: Characteristics .....	1001
Use dimension and measure characteristics .....	1002
Learn more about measure characteristics .....	1002

---

Formatting .....	1002
Content .....	1003
Sorting .....	1003
Configure Tableau Data Story Settings: Display .....	1004
Configure the display for your story .....	1004
Understand when to use story display settings .....	1004
Configure Tableau Data Story Settings: Drivers .....	1005
Set dimension drivers .....	1005
Understand dimension driver types .....	1005
Use secondary contributors .....	1006
Set metric drivers .....	1006
Configure Tableau Data Story Settings: Narrative .....	1007
Set verbosity .....	1007
Set drilldowns .....	1008
Add dimension terms .....	1008
Manage measure labels .....	1008
Configure Tableau Data Story Settings: Relationships .....	1009
Create Actual vs. Benchmark relationship for continuous or discrete stories .....	1009
Create Current/Most Recent vs. Previous Period relationship .....	1010
Customise Your Tableau Data Story .....	1010
Add your own insights .....	1010
Add headers and footers .....	1011

---

Add functions .....	1011
Add conditions .....	1012
Duplicate custom content .....	1013
Add custom content in drilldown sections .....	1014
Customise Your Tableau Data Story: Context Variables .....	1015
Set a context variable .....	1015
When to use a context variable: reference two or more measures .....	1016
When to use a context variable: period-over-period analysis .....	1018
Customise Your Tableau Data Story: Functions .....	1021
Average .....	1022
Count .....	1022
Difference .....	1022
DifferenceFromMean .....	1022
Direction .....	1022
Ending Label .....	1023
EndingValue .....	1023
Label .....	1023
LargestNegativeChangeDifference .....	1023
LargestNegativeChangeEndingLabel .....	1023
LargestNegativeChangeEndingValue .....	1024
LargestNegativeChangePercentDifference .....	1024
LargestNegativeChangeStartingLabel .....	1024



---

LargestNegativeChangeStartingValue .....	1024
LargestNegativePercentChangeDifference .....	1025
LargestNegativePercentChangeEndingLabel .....	1025
LargestNegativePercentChangeEndingValue .....	1025
LargestNegativePercentChangePercentDifference .....	1025
LargestNegativePercentChangeStartingLabel .....	1025
LargestNegativePercentChangeStartingValue .....	1026
LargestPositiveChangeDifference .....	1026
LargestPositiveChangeEndingLabel .....	1026
LargestPositiveChangeEndingValue .....	1026
LargestPositiveChangePercentDifference .....	1027
LargestPositiveChangeStartingLabel .....	1027
LargestPositiveChangeStartingValue .....	1027
LargestPositivePercentChangeDifference .....	1027
LargestPositivePercentChangeEndingLabel .....	1027
LargestPositivePercentChangeEndingValue .....	1028
LargestPositivePercentChangePercentDifference .....	1028
LargestPositivePercentChangeStartingLabel .....	1028
LargestPositivePercentChangeStartingValue .....	1028
LongestStreakDifference .....	1029
LongestStreakDirection .....	1029
LongestStreakEndingLabel .....	1029

---

LongestStreakEndingValue .....	1029
LongestStreakLength .....	1029
LongestStreakPercentDifference .....	1030
LongestStreakStartingLabel .....	1030
LongestStreakStartingValue .....	1030
MaxLabel .....	1030
MaxValue .....	1030
Median .....	1031
MinLabel .....	1031
MinValue .....	1031
PercentDifference .....	1031
PercentOfWhole .....	1031
PeriodLabel .....	1032
PeriodLabelNewest .....	1032
PeriodValue .....	1032
PeriodValueNewest .....	1032
Range .....	1032
SortAscendingLabel .....	1033
SortAscendingValue .....	1033
SortDescendingLabel .....	1033
SortDescendingValue .....	1033
StartingLabel .....	1033

---

StartingValue .....	1034
StartToFinishDifference .....	1034
StartToFinishPercentDifference .....	1034
StdDev .....	1034
Sum .....	1034
Total .....	1035
Value .....	1035
Z-Score .....	1035
Customise Your Tableau Data Story: Hide and Reorder Content .....	1035
Hide content and sections .....	1035
Reorder content within a section .....	1036
Add More Data to Your Tableau Data Story .....	1037
Use a hidden sheet .....	1037
Concatenate dimensions .....	1039
Stack multiple data stories .....	1040
Add a Pop-up Tableau Data Story to Your Dashboard .....	1040
Create Custom Measure Relationships in Your Tableau Data Story .....	1041
Refresh Parameters in a Tableau Data Story .....	1044
Use a Table Calculation in a Tableau Data Story .....	1045
Discover Insights Faster with Explain Data .....	1048
Access to Explain Data .....	1049
How Explain Data helps to augment your analysis .....	1050

---

Get Started with Explain Data .....	1050
Run Explain Data on a dashboard, sheet or mark .....	1050
Explain Data permissions required for seeing explanations .....	1053
Tips for using Explain Data .....	1054
Drill into explanations .....	1054
View analysed fields .....	1054
Terms and concepts in explanations .....	1056
Explanation Types in Explain Data .....	1059
Explore underlying values .....	1059
Underlying Characteristics .....	1060
Extreme Values .....	1060
Visualise the Difference .....	1062
Null Values .....	1063
Number of Records .....	1064
Average Value of Mark .....	1066
Contributing Single Value .....	1067
Top Contributors .....	1069
Contributing Dimensions .....	1069
Contributing Measures .....	1071
Other things to explore .....	1072
Other Dimensions of Interest .....	1073
Analysed Fields in Explain Data .....	1074

---

View fields analysed by Explain Data .....	1075
To view fields used by Explain Data for statistical analysis .....	1076
Change fields used for statistical analysis .....	1078
To edit the fields used by Explain Data for statistical analysis .....	1079
Fields excluded by default .....	1081
Requirements and Considerations for Using Explain Data .....	1082
What makes a viz a good candidate for Explain Data .....	1083
What data works best for Explain Data .....	1083
Situations where Explain Data is not available .....	1084
Control Access to Explain Data .....	1085
Who can access Explain Data .....	1085
Control who can use Explain Data and what they can see .....	1086
Editing mode .....	1086
Viewing mode .....	1087
Open the Explain Data Settings dialog box .....	1087
Include or exclude explanation types displayed by Explain Data .....	1088
Include or exclude fields used for statistical analysis .....	1089
Configure Tableau to allow users to share explanations via email and Slack ..	1090
How Explain Data Works .....	1091
What Explain Data is (and isn't) .....	1091
How explanations are analysed and evaluated .....	1092
What is an expected range? .....	1093

---

Models used for analysis .....	1094
Disable or Enable Explain Data for a Site .....	1096
Use Dashboard Extensions .....	1097
Add an extension to a dashboard .....	1097
Configure a dashboard extension .....	1098
Reload a dashboard extension .....	1099
Data security, Network-enabled and Sandboxed extensions .....	1099
Allow or deny data access to a Network-enabled extension .....	1100
Ensure that JavaScript is enabled in Tableau Desktop .....	1101
Ensure that extensions run on Tableau Cloud or Tableau Server .....	1101
Supported web browsers for Sandboxed extensions .....	1101
Supported versions of Tableau Server for Sandboxed extensions .....	1101
Get support for dashboard extensions .....	1101
Format Animations .....	1102
Understanding simultaneous and sequential animations .....	1103
Simultaneous animations .....	1103
Sequential animations .....	1103
Animate visualisations in a workbook .....	1104
Reset animation settings for a workbook .....	1107
Completely disable all animations .....	1107
Format decimals for axes animations .....	1108
Why animations won't play .....	1108

---

Server rendering .....	1108
Unsupported browsers and features .....	1108
Format Numbers and Null Values .....	1109
For Tableau Desktop .....	1109
Specify a number format .....	1109
Define a custom number format .....	1112
Custom number format examples .....	1113
Include special characters in a custom number format .....	1114
Set the default number format for a field .....	1115
Format a measure as currency .....	1115
Use locale to specify number formats .....	1117
Format null values .....	1120
For Tableau Server or Tableau Cloud .....	1122
Specify a number format .....	1122
Custom Date Formats .....	1125
How to find the custom date format field .....	1126
Format a date field in a view (Tableau Desktop) .....	1126
Format a date field in a view (Tableau Cloud and Tableau Server) .....	1127
Format a date field in the Data pane (Tableau Desktop only) .....	1127
Supported date format symbols .....	1128
Custom date format examples .....	1131
Support for Japanese era-based date formats .....	1132

---

Using literal text in a date format .....	1134
Format syntax in DATEPARSE function for extract data sources .....	1134
URL Actions .....	1138
Open a web page with a URL action .....	1138
Create an email with a URL action .....	1142
Using field and filter values in URLs .....	1144
Including aggregated fields .....	1145
Inserting parameter values .....	1145
Create a Subscription to a View or Workbook .....	1146
Set up a subscription for yourself or others .....	1146
Update or unsubscribe from a subscription .....	1150
Resume or delete suspended subscriptions .....	1151
See also .....	1151
Use Custom Views .....	1152
Notes on custom views .....	1152
Create a custom view .....	1153
Find a custom view .....	1153
From a view .....	1153
From the workbook .....	1153
Set a default custom view .....	1154
Share a custom view .....	1154
Delete a custom view .....	1155



---

Take care when deleting .....	1155
Manage custom views .....	1155
Safely change content with custom views .....	1156
Publish Views to Salesforce .....	1156
Prerequisites .....	1157
Publish a view to Salesforce .....	1157
Who can see the published view in Salesforce? .....	1158
Configuring Tableau Lightning Web Components and Seamless Authentication ..	1158
Add Trusted URL .....	1159
Turn on Tableau LWCs and set up seamless authentication .....	1159
Configure Salesforce settings .....	1159
Configure Tableau settings .....	1160
Set up or edit host mapping .....	1161
Create a new host mapping .....	1162
Edit a host mapping .....	1162
Add Tableau LWCs to a Lightning page using Lightning App Builder .....	1162
Add a Tableau LWC to a Lightning page .....	1163
Save and activate the page .....	1163
Embed multiple Tableau views .....	1164
Tableau View LWC seamless authentication on Mobile .....	1164
Troubleshooting Tableau View LWC seamless authentication .....	1165
Verify the Salesforce and Tableau configuration .....	1165

---

Verify the JWT token .....	1165
Verify page activation .....	1166
Confirm that Tableau View LWC is working without seamless authentication (Tableau View LWC only) .....	1166
Error: LWC component version no longer supported (Tableau View LWC only) .....	1166
See Also .....	1166
Interact with Data in Tableau .....	1167
Go ahead. It's safe to click around .....	1167
1: What is a Tableau Site? .....	1167
2: Search for a viz .....	1168
3: Interact with Content .....	1170
See Details and Sort Data .....	1170
Filter Data .....	1171
Undo/Revert .....	1172
4: Keep up .....	1172
Select Background Maps .....	1173
To select a new background map: .....	1174
Set a default background map in Tableau Desktop .....	1174
Use the Offline background map in Tableau Desktop, Tableau Cloud or Tableau Server .....	1175
About the Tableau background map .....	1176
Create and Troubleshoot Metrics (Retired) .....	1176

---

Retirement of legacy metrics .....	1176
Find metrics on your site .....	1177
Components of a metric .....	1179
Timeline .....	1180
Comparison .....	1181
Status .....	1183
Create a metric from a view .....	1184
Select the mark to define your metric .....	1184
Describe and configure your metric .....	1185
Finalise your metric .....	1187
Overwrite a metric .....	1188
When you can't create a metric .....	1188
Edit a metric's configuration .....	1189
How metrics refresh .....	1190
Fix failing refreshes .....	1190
If the connected view is still listed .....	1191
If there is no connected view listed .....	1192
Resume suspended refreshes .....	1192
Metrics appear in Tableau Catalogue .....	1193
Set Credentials for Accessing Your Published Data .....	1195
Set the authentication type .....	1196
Dropbox, OneDrive connections .....	1197

---

Workbook connections to Tableau data sources .....	1197
Virtual connections .....	1198
See also .....	1198
Explore Dashboards with Data Guide .....	1199
Customise Data Guide as an author .....	1199
Explore Data Guide as a dashboard user .....	1200
Explore Data Guide at different levels .....	1201
Understand dashboard-level details .....	1201
Understand viz-level details .....	1202
Understand mark-level details .....	1204
Control Data Guide visibility .....	1206
Set a Data Freshness Policy for Query Caches and View Acceleration .....	1206
Understand data freshness for Query Caches .....	1206
Understand data freshness for View Acceleration .....	1206
Choose what's best for your workbook .....	1207
Edit a workbook data freshness policy .....	1207
Use Dynamic Axis Ranges .....	1209
Supported field types .....	1209
Configure a dynamic axis range .....	1209
Understand limitations and edge cases .....	1210
Use Dynamic Axis Titles .....	1210
Supported field types .....	1211

---

Configure a dynamic axis title .....	1211
Understand limitations and edge cases .....	1211
Use Dynamic Zone Visibility .....	1212
Supported field types .....	1212
Configure a dynamic dashboard zone .....	1212
Workbook Optimiser .....	1215
Run the Workbook Optimiser .....	1216
Optimiser categories .....	1216
Ignore a guideline .....	1217
Autofix a guideline .....	1218
The guidelines .....	1218
Calculation length .....	1219
From the Workbook Optimiser .....	1219
Additional information .....	1219
Calculation uses multiple data sources .....	1219
From the Workbook Optimiser .....	1219
Additional information .....	1219
Dashboard size not fixed .....	1220
From the Workbook Optimiser .....	1220
Additional information .....	1220
Filter uses conditional logic .....	1220
From the Workbook Optimiser .....	1220

---

Additional information .....	1221
Filter uses "Only Relevant Values" .....	1221
From the Workbook Optimiser .....	1221
Additional information .....	1221
Live data connections .....	1221
From the Workbook Optimiser .....	1221
Additional information .....	1222
Multiple connections in a data source .....	1222
From the Workbook Optimiser .....	1222
Additional information .....	1222
Nested calculations .....	1222
From the Workbook Optimiser .....	1222
Additional information .....	1222
Non-materialised calculations .....	1223
From the Workbook Optimiser .....	1223
Additional information .....	1223
Number of data sources .....	1224
From the Workbook Optimiser .....	1224
Additional information .....	1224
Number of filters .....	1225
From the Workbook Optimiser .....	1225
Additional information .....	1225

---

Number of layout containers .....	1225
From the Workbook Optimiser .....	1225
Additional information .....	1226
Number of LOD calculations .....	1226
From the Workbook Optimiser .....	1226
Additional information .....	1226
Number of views in a dashboard .....	1226
From the Workbook Optimiser .....	1226
Additional information .....	1227
Number of workbook sheets .....	1227
From the Workbook Optimiser .....	1227
Additional information .....	1227
Unused data sources .....	1228
From the Workbook Optimiser .....	1228
Additional information .....	1228
Unused fields .....	1229
From the Workbook Optimiser .....	1229
Additional information .....	1229
Uses data blending .....	1229
From the Workbook Optimiser .....	1229
Additional information .....	1229
Uses date calculations .....	1230

---

From the Workbook Optimiser .....	1230
Additional information .....	1230
Uses grouping .....	1230
From the Workbook Optimiser .....	1230
Additional information .....	1231
<b>Manage Server .....</b>	<b>1233</b>
Security .....	1238
Authentication .....	1238
Add-on authentication compatibility .....	1240
Client authentication compatibility .....	1242
Authentication handled through a user interface (UI) .....	1242
Authentication handled programmatically .....	1243
Local authentication .....	1244
External authentication solutions .....	1244
NTLM and SSPI .....	1244
Kerberos .....	1245
SAML .....	1245
OpenID Connect .....	1245
Mutual SSL .....	1245
Connected apps .....	1246
Direct trust .....	1246
EAS or OAuth 2.0 trust .....	1246



---

Trusted authentication .....	1246
LDAP .....	1246
Other authentication scenarios .....	1247
Data access and source authentication .....	1247
Local Authentication .....	1247
Password storage .....	1248
Configure password settings .....	1248
Use the TSM web interface .....	1249
Use the TSM CLI .....	1249
Configuration file reference .....	1251
SAML .....	1253
Authentication overview .....	1255
SAML Requirements .....	1256
Certificate and identity provider (IdP) requirements .....	1256
SSL off-loading .....	1258
Using SSL certificate and key files for SAML .....	1259
User management requirements .....	1259
SAML compatibility notes and requirements .....	1261
Using SAML SSO with Tableau client applications .....	1265
Redirecting authenticated users back to Tableau clients .....	1266
XML data requirements .....	1266
Configure Server-Wide SAML .....	1270

---

Before you begin .....	1271
Use the TSM web interface .....	1271
Use the TSM CLI .....	1275
Before you begin .....	1275
Step 1: Configure return URL, SAML entity ID and specify certificate and key files .....	1276
Step 2: Generate Tableau Server metadata and configure the IdP .....	1277
Step 3: Match assertions .....	1278
Optional: Disable client types from using SAML .....	1279
Optional: Add AuthNContextClassRef value .....	1280
Test the configuration .....	1280
Configure SAML with Salesforce IdP on Tableau Server .....	1281
Enable Salesforce as a SAML Identity Provider .....	1281
Configure SAML on Tableau Server .....	1281
Add Tableau Server as a Connected App in Salesforce .....	1282
Enable Lightning Web Component .....	1282
Embed Tableau Views into Salesforce .....	1283
Configure SAML for Tableau Viz Lightning Web Component .....	1283
Requirements .....	1283
Configuring the authentication workflow .....	1284
Enable in-frame authentication on Tableau Server .....	1284
Tableau Server Versioning .....	1285
Enable in-frame authentication with your SAML IdP .....	1285

---

Salesforce safelist domains .....	1285
Salesforce IdP .....	1285
Okta IdP .....	1286
Ping IdP .....	1286
OneLogin IdP .....	1286
ADFS and EntraID IdP .....	1286
Salesforce Mobile App .....	1286
Configure SAML with Azure AD IdP on Tableau Server .....	1287
Before you begin: Prerequisites .....	1287
Step 1: Verify SSL connection to Azure AD .....	1288
Step 2: Configure SAML on Tableau Server .....	1288
Step 3: Configure Azure AD claim rules .....	1288
Step 4: Provide Azure AD metadata to Tableau Server .....	1289
Azure AD App Proxy .....	1290
Troubleshooting .....	1290
Configure SAML with AD FS on Tableau Server .....	1291
Prerequisites .....	1291
Step 1: Verify SSL connection to AD FS .....	1292
Step 2: Configure SAML on Tableau Server .....	1292
Step 3: Configure AD FS to accept sign-in requests from Tableau Server ...	1292
Step 4: Provide AD FS metadata to Tableau Server .....	1296
Use SAML SSO with Kerberos Database Delegation .....	1297

---

Overview of the process .....	1298
Configure Tableau Server for SAML with Kerberos .....	1299
Configure Site-Specific SAML .....	1299
Prerequisites for enabling site-specific SAML .....	1299
Server-wide settings related to site-specific SAML .....	1300
Configure the server to support site-specific SAML .....	1301
About the commands .....	1302
Configure SAML for a site .....	1302
Update SAML Certificate .....	1306
Update certificate for server-wide SAML .....	1306
Update certificate for site-specific SAML .....	1308
Troubleshoot SAML .....	1309
SAML and Enable Automatic Logon .....	1309
HTTP status 500 error when configuring SAML .....	1309
Signing in from the command line .....	1310
Login fails: Failed to find the user .....	1310
Login fails: SSL offloading .....	1310
SAML error log .....	1311
Trailing slash .....	1311
Confirm connectivity .....	1312
Multiple domains .....	1312
Kerberos .....	1312

---

How Kerberos works .....	1313
Kerberos Requirements .....	1314
General requirements .....	1314
Active Directory requirements .....	1315
Kerberos delegation .....	1315
Understanding Keytab Requirements .....	1316
User authentication (SSO) in Windows Active Directory .....	1316
Batch file: Set SPN and create keytab in Active Directory .....	1317
SPN and keytab batch file contents .....	1318
Operating system .....	1324
Directory service .....	1325
Datasource delegation .....	1326
Configure Kerberos .....	1327
Use the TSM web interface .....	1327
Use the TSM CLI .....	1328
Confirm your SSO configuration .....	1329
Tableau Client Support for Kerberos SSO .....	1329
General browser client support .....	1330
Tableau Desktop and browser clients .....	1330
Tableau Mobile app clients .....	1331
Operating system and browser-specific notes .....	1331
Note 1: Internet Explorer or Chrome on Windows desktop .....	1331

---

Note 2: Firefox on Windows or Mac OS X desktop .....	1333
Note 3: Chrome on Mac OS X desktop .....	1334
Note 4: Mobile Safari or Tableau Mobile on iOS .....	1334
Note 5: Android platform .....	1334
More information .....	1335
Troubleshoot Kerberos .....	1335
Single sign-on to Tableau Server .....	1335
Troubleshooting sign-in errors on the client computer .....	1336
Troubleshooting sign-in errors on the server .....	1337
Verify Kerberos configuration script .....	1339
Data source SSO .....	1339
Delegated data source access failures .....	1339
Kerberos delegation multi-domain configuration .....	1340
Cross-domain constrained delegation .....	1341
Web authoring .....	1341
Configure Mutual SSL Authentication .....	1342
User authentication session time limits .....	1342
Certificate usage .....	1343
Client certificate requirements .....	1343
Use the TSM web interface .....	1344
Use the TSM CLI .....	1346
Step 1: Require SSL for external server communication .....	1346

Step 2: Configure and enable mutual SSL .....	1347
Additional options for mutual SSL .....	1348
Fallback authentication .....	1348
User name mapping .....	1348
Certificate Revocation List (CRL) .....	1349
How Mutual SSL Authentication Works .....	1349
Mapping a Client Certificate to a User During Mutual Authentication .....	1350
User-name mapping options .....	1351
Change the certificate mapping .....	1352
Address user-name mapping ambiguity in multi-domain organisations .....	1353
OpenID Connect .....	1353
Authentication overview .....	1354
How Tableau Server works with OpenID Connect .....	1356
Requirements for Using OpenID Connect .....	1357
IdP account .....	1357
Local identity store .....	1358
IdP claims – mapping users .....	1358
Default: using email claim to map users .....	1358
Ignoring the domain name .....	1359
Using custom claims to map users .....	1360
Changing the sub claim .....	1361
Authentication context .....	1362

---

Configure the Identity Provider for OpenID Connect .....	1362
Configure the IdP .....	1362
Redirect URL .....	1363
Example IdP process .....	1363
Configure Tableau Server for OpenID Connect .....	1364
Use the TSM web interface .....	1364
Use the TSM CLI .....	1366
Configure OpenID to work with a forward proxy .....	1367
Windows system proxy configuration .....	1367
Forward proxy server .....	1368
Signing In to Tableau Server Using OpenID Connect .....	1368
Signing in using OpenID Connect .....	1369
Restricting sign-in to server administrators for command-line tools .....	1370
OpenID Connect Authentication Request Parameters .....	1370
Configure the scope value .....	1371
Changing IdPs in Tableau Server for OpenID Connect .....	1372
Change providers .....	1372
Reset user identifiers .....	1372
Troubleshoot OpenID Connect .....	1373
Enabling enhanced OpenID logging .....	1373
Signing in from the command line .....	1373
Login failed .....	1374



Error 69: "Unable to Sign In" .....	1374
OpenID error log .....	1374
User not found .....	1375
Trusted Authentication .....	1375
How Trusted Authentication Works .....	1376
How is a trusted ticket stored? .....	1378
Add Trusted IP Addresses or Host Names to Tableau Server .....	1378
Use the TSM web interface .....	1378
Use the TSM CLI .....	1380
Get a Ticket from Tableau Server .....	1382
Display the View with the Ticket .....	1383
Tableau Server View Examples .....	1383
Embedded View Examples .....	1384
Optional: Configure Client IP Matching .....	1386
Test Trusted Authentication .....	1386
Step 1: Add a test user .....	1387
Step 2: Create a test HTML page .....	1387
Step 3: Retrieve a trusted ticket from Tableau Server .....	1389
Step 4: Test access with trusted ticket .....	1390
Troubleshoot Trusted Authentication .....	1390
See also .....	1391
Ticket Value of -1 Returned from Tableau Server .....	1391

---

HTTP 401 - Not Authorised .....	1393
HTTP 404 - File Not Found .....	1393
Invalid User (SharePoint or C#) .....	1394
Attempting to Redeem the Ticket from the Wrong IP Address .....	1394
Cookie Restriction Error .....	1395
An error occurred communicating with the server (403) .....	1395
Personal Access Tokens .....	1395
Understand personal access tokens .....	1396
Server administrator impersonation .....	1397
Enable Tableau Server to accept personal access tokens during impersonation sign-in requests .....	1397
Create personal access tokens .....	1398
Change personal access tokens expiry .....	1398
Revoke a personal access token .....	1398
Track and monitor personal access token usage .....	1399
Use Tableau Connected Apps for Application Integration .....	1399
Direct trust .....	1400
OAuth 2.0 trust .....	1400
Configure Connected Apps with Direct Trust .....	1401
How connected apps work .....	1402
Key components of a connected app .....	1402
Connected app workflow .....	1402
Embedding workflows .....	1402

---

Create a connected app .....	1404
Step 1: Create a connected app .....	1404
Step 2: Generate a secret .....	1406
Step 3: Configure the JWT .....	1406
Example JWTs .....	1410
Step 4: Next steps .....	1411
For embedding workflows .....	1411
For REST API authorisation workflows .....	1412
For Metadata API workflows .....	1412
Manage a connected app .....	1412
Effects of disabling or deleting a connected app, or deleting a secret .....	1414
Access level (embedding workflows only) .....	1415
Domain allowlist rules (embedding workflows only) .....	1415
Domain options .....	1415
Domain formatting .....	1416
Dynamic group membership (embedding workflows only) .....	1417
Known issues (embedding workflows only) .....	1417
Configure Connected Apps with OAuth 2.0 Trust .....	1418
Step 1: Before you begin .....	1419
Step 2: Register your EAS with Tableau Server .....	1422
About site-level EAS .....	1422
Server-wide EAS .....	1422

Option 1: Using TSM web UI .....	1423
Option 2: Using TSM CLI .....	1425
Site-level EAS .....	1425
Step 1: Enable connected apps .....	1426
Step 2: Register the EAS .....	1427
Step 3: Next steps .....	1428
For embedding workflows .....	1428
Control where content can be embedded using domain allowlist for embed- ding .....	1429
For REST API authorisation workflows .....	1429
For Metadata API workflows .....	1429
Dynamic group membership (embedding workflows only) .....	1429
Known issues (embedding workflows only) .....	1430
Troubleshoot .....	1430
Access Scopes for Connected Apps .....	1435
Scope actions .....	1435
Scope types .....	1436
Summary of how to authorise REST API access .....	1438
Example .....	1438
REST API methods that support JWT authorisation .....	1440
Wildcard (*) scopes .....	1441
Cross-category scopes .....	1441
Individual scopes .....	1442

---

Labels .....	1443
Data sources .....	1444
Extracts .....	1445
Flows .....	1446
Metrics .....	1446
Subscriptions .....	1448
Views .....	1448
Workbooks .....	1450
Publish .....	1451
Download .....	1452
Users .....	1453
Groups .....	1454
Projects .....	1455
Permissions .....	1455
Site .....	1458
Troubleshoot scopes .....	1459
401001 - signin error .....	1459
401002 – unauthorised access error .....	1460
Troubleshoot Connected Apps - Direct Trust .....	1460
Data Connection Authentication .....	1465
More information .....	1465
Enable Kerberos Delegation .....	1465

---

Supported data sources .....	1466
Requirements .....	1466
Web authoring and user Kerberos authentication .....	1467
Configuration process .....	1467
See also .....	1469
Enable Kerberos Delegation for JDBC Connectors .....	1469
Supported data sources .....	1470
Requirements .....	1470
Configuration process .....	1471
Enable Run As Service Account to Act as the Operating System .....	1473
Enable Kerberos Run As Authentication for JDBC Connectors .....	1474
Supported data sources .....	1475
Requirements .....	1475
Configuration process .....	1475
OAuth Connections .....	1478
Overview of the OAuth process .....	1478
Default saved credential connectors .....	1479
Access tokens for data connections .....	1482
Access tokens for authentication from approved clients .....	1482
Default-managed keychain connectors .....	1482
Token limits and storage .....	1483
Removing unused keychain records .....	1483

---

Scenario limitations with managed keychain .....	1484
Convert managed keychain to saved credentials .....	1484
Configure a custom OAuth for a site .....	1484
Change Salesforce.com OAuth to Saved Credentials .....	1485
Summary of steps .....	1486
Step 1: Create a Salesforce connected app .....	1486
Step 2: Configure Tableau Server for Salesforce.com OAuth .....	1488
Configure custom OAuth for a site .....	1489
Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	1489
Step 2: Register the OAuth client ID and client secret .....	1489
Step 3: Validate and update saved credentials .....	1491
Step 4: Notify users to update their saved credentials .....	1491
Manage access tokens .....	1491
Forward proxy for OAuth authentication .....	1491
Connect Tableau Server to the Salesforce Data Cloud .....	1492
Tableau Server (version 2023.3 and later) .....	1492
Step 1: Create a Salesforce connected app .....	1492
Step 2: Configure Tableau Server for Salesforce.com OAuth .....	1494
Configure custom OAuth for a site .....	1495
Tableau Server (version 2023.1 and earlier) .....	1495
Step 1: Set up the connector .....	1495
Step 2: Install the Customer Data Platform JDBC driver .....	1495

---

Step 3: Create a Salesforce connected app .....	1496
Use OAuth with the Customer Data Platform .....	1498
Use TSM Commands for OAuth Setup .....	1499
Setting multiple connectors .....	1499
Step 1: Register OAuth client ID and client secret .....	1500
Step 2: Validate and update saved credentials .....	1501
Step 3: Notify users to update their saved credentials .....	1501
See also .....	1501
Hyper Query Processing (Beta) .....	1501
Enable Hyper Query Processing in Tableau Server .....	1502
See Also .....	1502
Set up OAuth for Google .....	1503
Summary of steps .....	1503
Obtain a client ID and enable Google APIs .....	1504
Configure Tableau Server for Google OAuth .....	1506
Configure custom OAuth for a site .....	1507
Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	1507
Step 2: Register the OAuth client ID and client secret .....	1507
Step 3: Validate and update saved credentials .....	1509
Step 4: Notify users to update their saved credentials .....	1509
Create and edit Google data source .....	1509
Managing access tokens .....	1510



---

Forward proxy for OAuth authentication .....	1510
Configure Azure AD for OAuth and Modern Authentication .....	1510
Step 1: Register OAuth client for Azure .....	1510
Step 2: Configure Tableau Server for Azure .....	1512
Configure default OAuth client for Azure Data Lake Storage Gen2 .....	1512
Configure default client for Azure Synapse, Azure SQL Database or Databricks ...	1513
Configure a default OAuth client for OneDrive and SharePoint Online .....	1514
Configure a default OAuth client for SharePoint Lists (JDBC) .....	1514
Configure a default OAuth client for OneDrive (deprecated) .....	1515
Server Restart Scenarios .....	1516
Setting multiple connectors .....	1516
Configure custom OAuth for a site .....	1517
Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	1517
Step 2: Register the OAuth client ID and client secret .....	1517
Step 3: Validate and update saved credentials .....	1519
Step 4: Notify users to update their saved credentials .....	1519
Forward proxy for OAuth authentication .....	1519
Configure OAuth for Snowflake Connections .....	1519
Step 1: Obtain a client ID with Snowflake .....	1520
Option 1: Configure Tableau Server for Snowflake OAuth .....	1520
Option 2: Configure OAuth with a site .....	1522
Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	1523

Step 2: Register the OAuth client ID and client secret .....	<b>1523</b>
Step 3: Validate and update saved credentials .....	<b>1524</b>
Step 4: Notify users to update their saved credentials .....	<b>1525</b>
Forward proxy for OAuth authentication .....	<b>1525</b>
Set Up OAuth for Intuit QuickBooks Online .....	<b>1525</b>
Step 1: Create an Intuit app .....	<b>1525</b>
Step 2: Configure Tableau Server for Intuit QuickBooks Online .....	<b>1526</b>
Managing access tokens .....	<b>1526</b>
Set Up OAuth for Dremio .....	<b>1527</b>
Step 1: Register OAuth client in Dremio .....	<b>1527</b>
Step 2: Configure Tableau Server for Dremio OAuth .....	<b>1527</b>
Setting multiple connectors .....	<b>1528</b>
Configure custom OAuth for a site .....	<b>1529</b>
Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	<b>1529</b>
Step 2: Register the OAuth client ID and client secret .....	<b>1530</b>
Step 3: Validate and update saved credentials .....	<b>1531</b>
Step 4: Notify users to update their saved credentials .....	<b>1531</b>
Forward proxy for OAuth authentication .....	<b>1531</b>
Set Up OAuth for Dropbox .....	<b>1532</b>
Step 1: Create a new app .....	<b>1532</b>
Step 2: Configure Tableau Server for Dropbox .....	<b>1532</b>
Configure custom OAuth for a site .....	<b>1533</b>

---

Step 1: Prepare the OAuth client ID, client secret and redirect URL .....	1533
Step 2: Register the OAuth client ID and client secret .....	1534
Step 3: Validate and update saved credentials .....	1535
Step 4: Notify users to update their saved credentials .....	1536
Forward proxy for OAuth authentication .....	1536
Set Up Amazon Redshift IAM OAuth .....	1536
Configure the IDP .....	1537
Configure IDP on AWS .....	1537
Configure Roles for Redshift Users .....	1537
Connect to Redshift .....	1539
Okta .....	1541
Update Driver .....	1541
Troubleshooting .....	1542
Set Up Amazon Redshift IAM Identity Centre OAuth .....	1544
Configure the IDP .....	1544
Step 2: Configure IDP and Roles on AWS .....	1545
Step 3: Connect to Redshift .....	1545
Okta .....	1547
Update the driver .....	1547
Troubleshooting Redshift IAM IDC OAuth .....	1547
Allow Saved Access Tokens .....	1550
Managing credentials centrally .....	1551

---

Forward proxy for OAuth authentication .....	1551
See also .....	1552
Troubleshoot OAuth Connections .....	1552
Conflict error .....	1552
Configure SAP HANA SSO .....	1553
Before you begin .....	1553
Configure Tableau Server SAML for SAP HANA .....	1554
Enable Single Sign-On for SAP BW .....	1555
SQL Server Impersonation .....	1556
Impersonation Requirements .....	1556
How Impersonation Works .....	1557
Impersonate with a Run As Service Account .....	1558
Impersonate with Embedded SQL Credentials .....	1560
Configure a Custom TSM Administration Group .....	1562
Step 1: Create the new group .....	1563
Step 2: Configure Tableau Server .....	1563
Step 3: Add users to the new group .....	1564
Authorisation .....	1564
Site roles .....	1564
Permissions .....	1564
Data access and external authorisation .....	1565
Data Security .....	1566

---

Overview of Row-Level Security Options in Tableau .....	1568
Create a user filter and map users to values manually .....	1569
Create a dynamic user filter using a security field in the data .....	1569
Use a data policy .....	1569
Use existing RLS in the database .....	1570
Row-level security option comparison .....	1570
Which row-level security option should I use? .....	1572
RLS Best Practices for Data Sources and Workbooks .....	1572
RLS workflow .....	1573
Entitlement tables .....	1574
Entitlement table models .....	1574
Users and roles .....	1574
Joins .....	1575
Implement row-level security .....	1575
Deepest granularity .....	1575
Sparse entitlements .....	1576
Data source filter .....	1577
All access with deepest granularity .....	1577
Performance and processing order of operations .....	1578
Live connections .....	1578
Extracts .....	1579
Considerations with extracts .....	1579

---

Single table extracts .....	1580
Use built-in row-level security in a database .....	1581
Row-Level Security in the Database .....	1581
Impersonation (Microsoft SQL Server) .....	1582
Kerberos and constrained delegation .....	1582
OLAP Cubes .....	1583
SAML delegation and SAP HANA .....	1583
Initial SQL to force a user-specific session (Oracle VPD) .....	1583
Comparison matrix for row-level security methods .....	1584
Manage Server Secrets .....	1586
Understanding how secrets storage works .....	1587
Who has access to the master key? .....	1587
Import and export configuration information .....	1588
Securing secrets for import and export operations .....	1588
Cluster nodes .....	1588
Secrets storage event logging .....	1589
Managing secrets .....	1589
Updating secrets .....	1589
Retrieving passwords .....	1589
Extension Security - Best Practices for Deployment .....	1594
Security for extensions in Tableau .....	1594
Network-enabled extensions .....	1594

---

Sandboxed extensions .....	1594
Potential security risks with Network-enabled extensions .....	1595
Mitigating the security threats with Network-enabled extensions .....	1596
Manage extensions using Tableau .....	1596
Recommendations for Tableau Desktop .....	1597
Deployment scenarios .....	1597
Recommendations for Tableau Server and Tableau Cloud .....	1599
Trust Sandboxed extensions and the Network-enabled extensions on the safe list .....	1600
Checklist for the safe list: .....	1601
Add extensions to the safe list: .....	1601
Block specific extensions from running on Tableau Server .....	1601
Turn off extensions for a site .....	1601
Show or hide user prompts to run Network-enabled extensions .....	1602
Turn off Sandboxed extensions .....	1602
Tableau Server Key Management System .....	1602
Tableau Server local KMS .....	1603
Troubleshoot configuration .....	1603
Multi-node misconfiguration .....	1603
Regenerate RMK and MEK on Tableau Server .....	1604
Extract Encryption at Rest .....	1604
Limitations .....	1604
Performance Overview .....	1605

---

Increase in Backgrounder Load .....	1605
Increase in Viz Load Time and Worker Load .....	1606
Impact on Backup and Restore .....	1606
Enforce Encryption at Rest on a Site .....	1606
Enable Encryption at Rest on a Site .....	1607
Disable Encryption at Rest on a Site .....	1607
View Extract Encryption Mode for All Sites .....	1608
Encrypt or Decrypt Extracts for a Published Workbook or Data Source .....	1608
Encrypt or Decrypt Multiple Items .....	1608
View Encryption Status for a Single Item .....	1609
Filter Data Sources by Encryption Status .....	1609
Filter Workbooks by Encryption Status .....	1609
View Status of Encrypt or Decrypt Extracts Background Tasks .....	1609
The tabcmd Utility .....	1610
Specify the extract encryption mode when you create a site .....	1610
Specify the extract encryption mode when you edit a site .....	1610
Get the extract encryption mode when you list sites .....	1610
Encrypt extracts when you publish a workbook, data source, or extract to the server .....	1610
Decrypt all extracts on a site .....	1610
Encrypt all extracts on a site .....	1611
Reencrypt all extracts on a site with new encryption keys .....	1611
Tableau Server Rest API .....	1611



Network Security .....	1611
Client to Tableau Server .....	1612
Client access from the Internet .....	1612
Clickjack Protection .....	1613
Tableau Server to your database .....	1613
Tableau Server to the internet .....	1613
Tableau Server to a SMTP server .....	1614
Communication with the repository .....	1614
Server component communication in a cluster .....	1614
Clickjack Protection .....	1615
Effects of clickjack protection .....	1615
Disabling clickjack protection .....	1616
HTTP Response Headers .....	1617
Configuring response headers .....	1617
HTTP Strict Transport Security (HSTS) .....	1617
Options .....	1617
Referrer-Policy .....	1618
Options .....	1618
X-Content-Type-Options .....	1619
Option .....	1619
X-XSS-Protection .....	1619
Option .....	1619

---

Content Security Policy .....	1619
Configure and enable CSP .....	1620
Step 1: Set default directives .....	1620
Step 2: Add additional directives (optional) .....	1622
Step 3: Specify report-only directives (optional) .....	1623
Step 4: Enable CSP on Tableau Server .....	1623
Step 5: Run tsm pending-changes apply .....	1624
View CSP report .....	1624
SSL .....	1625
Configure SSL for External HTTP Traffic to and from Tableau Server .....	1625
SSL certificate requirements .....	1626
Configuring SSL for a Cluster .....	1627
SSL with multiple gateways .....	1628
Additional configuration information for Tableau Server cluster environments .....	1628
Prepare the environment .....	1629
Configure SSL on Tableau Server .....	1629
Use the TSM web interface .....	1629
Use the TSM CLI .....	1630
Port redirection and logging .....	1631
Change or update SSL certificate .....	1631
Example: SSL Certificate - Generate a Key and CSR .....	1632
Steps to generate a key and CSR .....	1633

Configure a certificate for multiple domain names .....	1633
Set the OpenSSL configuration environment variable (optional) .....	1633
Generate a key .....	1634
Create a certificate signing request to send to a certificate authority .....	1634
Send the CSR to a certificate authority to obtain an SSL certificate .....	1636
Use the key and certificate to configure Tableau Server .....	1636
For SAN certificates: modify the OpenSSL configuration file .....	1636
Additional information .....	1638
Configure SSL for Internal Postgres Communication .....	1638
Use the TSM web interface .....	1638
Use the TSM CLI .....	1640
What the command does .....	1640
Option for repository-ssl enable .....	1641
Cluster environments .....	1641
Configure Custom SSL Certificate for TSM Controller .....	1641
Default TSM SSL functionality .....	1642
Tableau Server v2023.1 SSL custom certificate .....	1642
Configuration .....	1643
Configure Postgres SSL to Allow Direct Connections from Clients .....	1643
Configure Mutual SSL Authentication .....	1645
User authentication session time limits .....	1645
Certificate usage .....	1645

---

Client certificate requirements .....	1646
Use the TSM web interface .....	1647
Use the TSM CLI .....	1649
Step 1: Require SSL for external server communication .....	1649
Step 2: Configure and enable mutual SSL .....	1649
Additional options for mutual SSL .....	1650
Fallback authentication .....	1650
User name mapping .....	1651
Certificate Revocation List (CRL) .....	1651
Mapping a Client Certificate to a User During Mutual Authentication .....	1651
User-name mapping options .....	1652
Change the certificate mapping .....	1653
Address user-name mapping ambiguity in multi-domain organisations .....	1654
Configure Encrypted Channel to LDAP External Identity Store .....	1654
Certificate requirements .....	1655
Import certificate into the Tableau keystore .....	1656
LDAPS encryption method .....	1656
Configure encrypted channel for simple bind .....	1657
When to configure .....	1657
For new installations of Tableau Server .....	1657
Security Hardening Checklist .....	1657
Installing security updates .....	1658

---

1. Update to the current version .....	1658
2. Configure SSL/TLS with a valid, trusted certificate .....	1658
3. Disable older versions of TLS .....	1658
4. Configure SSL encryption for internal traffic .....	1659
5. Enable firewall protection .....	1660
6. Restrict access to the server computer and to important directories .....	1660
7. Update the Tableau Server Run As User account .....	1660
8. Generate fresh secrets and tokens .....	1661
9. Disable services that you're not using .....	1661
JMX Service .....	1661
10. Verify session lifetime configuration .....	1662
11. Configure a server allowlist for file-based data sources .....	1662
12. Enable HTTP Strict Transport Security for web browser clients .....	1663
13. Disable Guest access .....	1664
14. Set referrer-policy HTTP header to 'same-origin' .....	1665
15. Configure TLS for SMTP connection .....	1666
16. Configure SSL for LDAP .....	1667
17. Scope permissions for non-default installation locations .....	1667
Change List .....	1668
Manage Licences .....	1669
Licensing Overview .....	1669
Activation .....	1669

---

Online activation .....	1670
Offline activation .....	1670
Lost activation .....	1670
Deactivate .....	1671
Tableau Server licensing and virtual machines (VMs) .....	1671
Login-based Licence Management .....	1672
Adding users .....	1672
Understanding Licence Models and Product Keys .....	1672
Term licensing models .....	1673
Role-based licence model .....	1675
Core-based licence model .....	1677
Embedded Analytics usage-based model .....	1677
Perpetual licence model (legacy) .....	1678
Licence editions .....	1679
Tableau licence edition .....	1679
Tableau Enterprise licence edition .....	1679
Feature licences .....	1680
Data Management .....	1680
Advanced Management .....	1681
Login-based Licence Management .....	1681
Updateable Subscription Licensing (USL) .....	1682
Understanding the Basics of USL .....	1682

---

Activating USL in Online/Connected Environments .....	1682
Activating USL in Offline or Disconnected Environments .....	1683
Managing licence entitlement updates in offline environments .....	1683
USL Offline Activation Instructions .....	1684
USL offline licence entitlement updates .....	1685
View Server Licences .....	1686
Viewing licences from the Tableau Server web UI .....	1686
Use the TSM web interface .....	1687
Use the TSM CLI .....	1687
Refresh Expiration Date and Attributes for the Product Key .....	1689
Before you begin .....	1690
Use the TSM web interface .....	1691
Use the TSM CLI .....	1691
Add Capacity to Tableau Server .....	1692
Use the TSM web interface .....	1692
Use the TSM CLI .....	1695
Activate Tableau Server Offline .....	1696
Offline activation and login-based licence management (LBLM) .....	1697
Offline activation and updateable subscription licences (USL) .....	1697
Offline activation overview .....	1697
Offline activation file name changes .....	1698
Use the TSM web interface .....	1698

---

Use the TSM CLI .....	1701
Step 1. Log in to Tableau Services Manager .....	1701
What if I can't log in? .....	1701
Step 2. Generate an offline activation request file .....	1702
Step 3. Upload the offline activation request to the Tableau activation web-site .....	1702
Step 4. Initialise or activate your licence .....	1702
Deactivate Product Key .....	1703
Before you begin .....	1703
Use the TSM web interface .....	1703
Use the TSM CLI .....	1704
Deactivate Tableau Server Offline .....	1704
Automate Licensing Tasks .....	1706
Command Line Tool Options and Better Script Automation .....	1706
Product key operations with forward proxy servers .....	1706
Activate .....	1707
Refresh .....	1707
Deactivate .....	1707
Example .....	1707
Error Handling .....	1707
Troubleshoot Licensing .....	1710
Product key failure with forward proxy servers .....	1710
Handle an unlicensed server .....	1710



---

Unlicensed role-based server .....	1711
Unlicensed core-based server .....	1711
Unlicensed server administrator .....	1711
Troubleshoot role-based licensing .....	1712
A user or administrator is unlicensed due to licence expiry .....	1713
Server Administrator site role is unchanged when using a Creator licence .....	1714
Licences are not immediately available .....	1714
A user with a Viewer licence cannot open Tableau Server or Tableau Cloud workbooks from Tableau Desktop .....	1714
Migrate from Core-Based to Role-Based Licensing .....	1715
Prepare for migration to role-based licensing .....	1715
Migrate to role-based licensing .....	1715
Use role-based licences on a server with core-based licensing .....	1716
Example of completing a migration from core-based licensing .....	1717
Quick Start: Use Login-based Licence Management with Tableau Server .....	1718
Step 1: Install Tableau Server .....	1718
Step 2: Add authorised users to Tableau Server .....	1718
Step 3: Activate Tableau Desktop or Tableau Prep Builder .....	1719
Login-based Licence Management .....	1719
How login-based licence management works .....	1720
Login-based licence management with Tableau Cloud .....	1721
Login-based licence management with Tableau Server .....	1721
Use login-based licence management .....	1722

---

Step 1: Install Tableau Server .....	1722
(Optional) Step 2: Change login-based licence management settings .....	1723
Login-based licence management settings .....	1727
Microsoft Windows .....	1730
macOS .....	1731
(Optional) Step 3: Change the authorisation to run (ATR) duration .....	1731
Step 4: Activate Tableau Desktop .....	1733
View login-based licence usage .....	1735
Troubleshooting .....	1736
Login-based licence management is not enabled on Tableau Server .....	1736
Login-based licence management is not enabled on Tableau Desktop .....	1737
Product key expiry date doesn't change after purchasing a year subscription .....	1737
You do not have a Creator licence .....	1737
You have activated the maximum number of computers .....	1738
To shorten the ATR token duration for maximum activation .....	1738
To return your computer to an unlicensed state .....	1739
Your Tableau credentials are invalid .....	1740
Your computer's clock is not synchronised to the current time .....	1740
Unable to activate with your credentials .....	1740
Zero Downtime Licensing .....	1741
When should you restart Tableau Server? .....	1741
About Tableau Enterprise .....	1742

---

Tableau Enterprise Licensing .....	1742
Tableau Enterprise Feature Table .....	1742
About the Identity Migration .....	1743
Summary of steps for existing deployments .....	1744
Key terms .....	1744
Purpose of the identity migration .....	1745
What happens during the identity migration .....	1746
Step 1: Before you begin .....	1747
Step 2: Start the identity migration .....	1748
Step 3: Complete the identity migration .....	1748
Step 4: Configure Tableau Server to use the Identity Service .....	1750
Manage the Identity Migration .....	1750
Manage identity migration jobs .....	1752
Change identity migration settings .....	1754
Migration settings .....	1755
Disable identity migration .....	1757
Complete the identity migration and configure the Identity Service .....	1757
Step 1: Validate and complete the identity migration .....	1757
Step 2: Configure Tableau Server to use the Identity Service .....	1758
Resolve Identity Migration Conflicts .....	1759
Step 1: Resolve identity conflicts .....	1759
Quick reference: Identity conflicts .....	1760

---

Step 2: Complete the identity migration .....	1762
Step 3: Configure Tableau Server to use the Identity Service .....	1763
Troubleshoot Issues with the Identity Migration .....	1764
Unable to restore backup .....	1764
Step 1: Enable legacy-identity-mode and restore the backup .....	1764
Step 2: Validate and complete the identity migration .....	1765
Step 3: Configure Tableau Server to use the Identity Service .....	1766
"Unexpected error" on Identity Migration page .....	1767
Migration progress appears unresponsive or stuck .....	1767
"Identity migration is in progress" pop-up persists .....	1768
Identity Migration page disappears .....	1768
Users can't sign in .....	1769
Revert identity migration .....	1769
Provision and Authenticate Users Using Identity Pools .....	1769
What are identity pools? .....	1771
When to use identity pools .....	1771
More about identity pools .....	1772
Initial pool (TSM configured) versus identity pools .....	1772
Identity pools impact on users' sign-in experience .....	1772
Usernames and identifiers in Tableau .....	1772
Set Up and Manage Identity Pools .....	1773
Prerequisites .....	1774

---

Get started .....	1774
Step 1: Configure Tableau Server and establish a session .....	1774
Step 2: Set up an identity store .....	1776
Example .....	1777
URI .....	1777
Example .....	1777
URI .....	1777
Request body (JSON) .....	1777
Response body .....	1778
Step 3: Set up authentication .....	1778
Example .....	1779
URI .....	1779
Request body (JSON) .....	1779
Response body .....	1780
Step 4: Create an identity pool .....	1780
Example .....	1781
URI .....	1781
Request body (JSON) .....	1781
Example response body .....	1781
Step 5: Add users to identity pool .....	1782
Test identity pools .....	1784
Manage identity pools .....	1784

---

Troubleshoot identity pools .....	1785
Limitations of identity pools .....	1785
Tableau Server landing page shows IdP errors .....	1785
Tableau Server landing page is not showing identity pools .....	1785
Add Users to Tableau Server .....	1786
Before you begin .....	1786
When adding users at the server level versus the site level .....	1786
Add a user to the server .....	1788
No identity pools configured .....	1788
One or more identity pools configured .....	1790
Sign in to the Tableau Server Admin Area .....	1796
Reset the server administrator account and password .....	1798
Navigate the Admin Areas of the Tableau Web Environment .....	1798
Access based on site role and number of sites .....	1799
Server administrator .....	1799
Site administrator .....	1801
Server administrator tasks .....	1802
Site administrator tasks .....	1803
Sign in to Tableau Services Manager Web UI .....	1803
Requirements .....	1804
Sign in to the TSM web UI .....	1805
Customise Your Server .....	1806

Language and Locale for Tableau Server .....	1807
Supported Languages .....	1808
Default Settings .....	1808
How Language and Locale are Determined .....	1808
Use Custom Fonts in Tableau Server .....	1809
Manage Sites Across a Server .....	1810
Sites Overview .....	1810
What is a site .....	1810
Authentication and sign-in credentials .....	1811
The Default site .....	1811
Why or why not add sites .....	1812
Administrator-level access to sites .....	1813
Licensing and user limits .....	1814
Export or Import a Site .....	1815
Site Migration Options .....	1815
Site Migration Limitations .....	1816
What information is preserved in a site export .....	1816
What information isn't preserved in a site export .....	1816
Prepare the Source and Target Sites .....	1816
Delete stale content .....	1817
Remove obsolete users .....	1817
Create or identify the target site .....	1817

---

Locate site IDs .....	1817
Check the identity store .....	1818
Create users on the target server if necessary .....	1818
Configure the target server to deliver subscriptions .....	1818
Check schedules .....	1818
Tips for importing to a target with fewer users or schedules .....	1819
Migrating a Site .....	1820
Step 1: Export a site .....	1820
Step 2: Generate the import mapping files .....	1820
Step 3: Verify that site settings are mapped correctly .....	1821
To verify mapping files .....	1822
Step 4: Import the correctly mapped files to the target site .....	1822
Mapping File Content Reference .....	1823
CSV file name: mappingsDomainMapperForGroups .....	1823
CSV file name: mappingsScheduleMapper .....	1824
CSV file name: mappingsSiteMapper .....	1825
CSV file name: mappingsSystemUserNameMapper .....	1825
CSV file name: MappingsScheduleRecurrenceMapperWithAutoCreation .....	1826
Add or Delete Sites .....	1826
Add a site .....	1827
Delete sites .....	1827
Site Availability .....	1828



---

To activate or suspend a site .....	1828
Manage Site Role Limits .....	1829
Create role limits on a site .....	1829
When site role limits are met .....	1830
Allow Users to Save Revision History .....	1831
Notes .....	1831
Permissions users need to work with revision history .....	1831
Enable revision history and set the number of revisions allowed .....	1832
Clear all revisions .....	1832
Security for previewing and restoring workbooks .....	1832
See also .....	1833
Tableau Mobile App Security Settings .....	1833
Security settings .....	1833
Extract Refresh Schedules .....	1834
Before refreshing extracts .....	1835
Setting up refresh schedules .....	1835
Refreshing extracts manually .....	1836
Refreshing extracts from Tableau Desktop .....	1836
Enable Extract Refresh Scheduling and Failure Notification .....	1837
Managing schedules from the server .....	1838
How refresh failure emails work .....	1838
How the last successful refresh date is determined .....	1839

---

Create or Modify a Schedule .....	1839
To create a new schedule .....	1839
To modify an existing schedule .....	1841
Rules for Creating or Modifying Schedules .....	1842
See also .....	1842
Enable Custom Schedules for Subscriptions .....	1843
Enable custom schedules .....	1843
How Scheduled Server Jobs are Prioritised .....	1844
Jobs and Tasks .....	1844
Priority Rules for Jobs .....	1844
Configure Workbook Performance after a Scheduled Refresh .....	1846
Determine the performance impact .....	1847
Turn off workbook caching for the server .....	1847
Turn off workbook caching for a site .....	1848
Configure the workbook caching threshold .....	1848
Ensure Access to Subscriptions and Data-Driven Alerts .....	1849
Set Up a Site for Subscriptions .....	1849
Prerequisite: Configure the server to send subscription emails .....	1850
Enable subscriptions .....	1850
Test subscriptions in a site .....	1852
Manage all user subscriptions .....	1853
Suspended Subscriptions .....	1853

---

Resume suspended subscriptions .....	1853
See also .....	1854
Set Up for Data-Driven Alerts .....	1854
Configure email for data-driven alerts .....	1855
Manage all data-driven alerts in a site .....	1855
Disable data-driven alerts for a site .....	1855
Suspend data-driven alerts .....	1856
Resume suspended alerts .....	1856
Control how often the server checks data-driven alerts .....	1856
Track the server's alert-checking process .....	1857
Identify and fix failing alerts .....	1857
Set Up for Metrics .....	1859
Ensure that users can create metrics .....	1860
Disable metrics for a site .....	1860
Disable metrics for a server .....	1860
Configure how often metrics refresh .....	1861
Configure failure notifications for metric refreshes .....	1861
Configure when metric refreshes are suspended .....	1861
Manage metrics .....	1862
Address failing and suspended metric refreshes .....	1862
Resume suspended refreshes .....	1863
Monitor metric activity with administrative views .....	1863

---

Edit a Published Data Source .....	1864
Edit and test changes .....	1864
Roll back changes .....	1865
Understand supported connections .....	1866
Learn about permissions .....	1866
Edit data sources published by a flow .....	1866
Managing Background Jobs in Tableau Server .....	1866
Overview .....	1867
Task Types .....	1869
Filters .....	1869
Cancelling Jobs .....	1870
Status .....	1871
Tableau Service Manager Jobs .....	1874
Cancelling tsm Jobs .....	1876
Cancel TSM Jobs .....	1876
Cancelling Jobs that are in progress .....	1877
Administrative Views .....	1878
Navigating to administrative views .....	1879
Pre-built Administrative Views .....	1880
Performance of Views .....	1881
Performance of Flow Runs .....	1882
Traffic to Views .....	1883

---

Traffic to Data Sources .....	1885
Actions by All Users .....	1886
Actions by Specific User .....	1887
Actions by Recent Users .....	1888
Background Tasks for Extracts .....	1889
Understand this view .....	1890
Status .....	1890
See details about a task .....	1891
Background Tasks for Non Extracts .....	1891
Upgrade Thumbnails Job .....	1893
Troubleshooting .....	1894
Background Task Delay .....	1894
Stats for Load Times .....	1896
Stats for Space Usage .....	1897
Server Disk Space .....	1899
Login-based Licence Usage .....	1901
Filters .....	1902
Which creator seats are in use in the last <nn> days? .....	1903
Which creator seats have not been used in the last <nn> days .....	1903
Desktop Licence Usage .....	1904
Who has used Tableau in the last <nn> days? .....	1905
What licences have not been used in the last <nn> days .....	1906

---

Desktop Licence Expiration .....	1906
Backgrounder Dashboard .....	1908
Summary and Filters .....	1909
Details .....	1911
Stale Content .....	1914
Summary and Filters .....	1915
Details .....	1917
Archive or Delete Stale Content .....	1919
Ask Data Usage .....	1921
Explore the dashboard .....	1922
Data Quality Warning History .....	1924
See warning details .....	1924
Filter warning history .....	1925
Filter by time range .....	1925
Filter by content type .....	1926
Access data quality warning history data .....	1926
Who can do this .....	1927
Create Custom Administrative Views .....	1927
Performance .....	1928
Tableau Server Performance Overview .....	1928
General Performance Guidelines .....	1929
Hardware and Software .....	1929

---

External repository .....	1929
Configuration .....	1930
Antivirus Software .....	1931
Server Resource Manager (SRM) .....	1931
Tableau Server Notifications .....	1932
Performance Monitoring Overview .....	1932
Collect Data with Windows Performance Monitor .....	1933
How to collect data with Windows Performance Monitor .....	1934
Step 1: Create a new data collector set .....	1934
Step 2: Select performance counters .....	1934
Step 3: Save the data collector set .....	1938
Step 4: Run the data collector set .....	1938
Step 5: Allow Remote Access for Multiple Computers .....	1938
Collect Data with the Tableau Server Repository .....	1939
Enable access to the Tableau Server repository .....	1939
Connect to the Tableau Server repository .....	1940
PostgreSQL Version .....	1942
About the Tableau Server Data Dictionary .....	1943
Analyse Data with the Sample Performance Workbook .....	1943
Download the sample performance workbook .....	1944
Edit the connections to the Tableau Server repository .....	1945
Edit the connection to the PerfMon data .....	1947

---

Replace references to PerfMon fields .....	1947
Update calculations .....	1948
Remove the date filter from the extract .....	1948
Publish to Tableau Server .....	1949
Performance Tuning .....	1949
Optimise for User Traffic .....	1950
When to optimise for user traffic .....	1951
Slow load times for views .....	1951
High resource usage corresponding to user traffic .....	1951
Ways to optimise for user traffic .....	1954
Adjust the number of VizQL server processes .....	1954
Adjust the number of other processes .....	1954
Adjust the VizQL session timeout limit .....	1955
Refresh the cache less often .....	1955
Assess view responsiveness .....	1955
Configure Client-Side Rendering .....	1956
Supported browsers .....	1956
Configure the complexity threshold for computers and mobile devices .....	1956
Disable client-side rendering .....	1957
Testing with the URL Parameter .....	1958
Optimise for Extracts .....	1958
When to optimise for extracts .....	1958



High CPU usage corresponds to extract schedules .....	1958
Extracts fail or run slowly .....	1960
Ways to optimise for extracts .....	1961
Adjust the extract refresh schedule .....	1961
Speed up specific extracts .....	1962
Configure the execution mode for extract refreshes .....	1962
Increase the number of backgrounder processes .....	1963
Isolate processes .....	1963
Optimise for Extract Query-Heavy Environments .....	1963
When to use this configuration .....	1964
Benefits of using this configuration .....	1964
When not to use this configuration .....	1966
Configuration .....	1966
Hardware Guidance .....	1967
Other Performance Tuning and Optimisations: .....	1968
When to Add Nodes and Reconfigure .....	1972
Performance Recording .....	1973
Create a Performance Recording .....	1973
Start a Performance Recording for a View .....	1976
View a Performance Recording .....	1976
Interpret a Performance Recording .....	1976
Performance Summary .....	1977

---

Timeline .....	1977
Events .....	1977
Query .....	1979
Detailed Timeline .....	1980
Detailed Views .....	1980
Depth .....	1980
CPU and Elapsed Time .....	1981
Performance Monitoring Tools .....	1982
Configure Client-Side Rendering .....	1984
Supported browsers .....	1984
Configure the complexity threshold for computers and mobile devices .....	1985
Disable client-side rendering .....	1985
Testing with the URL Parameter .....	1986
View Acceleration .....	1986
Accelerate your view .....	1987
Understand why View Acceleration is unavailable, suspended or ineffective .....	1989
View Acceleration is unavailable .....	1989
View Acceleration is suspended .....	1990
View Acceleration is ineffective .....	1991
Refresh accelerated views .....	1991
Event-based refresh of accelerated views .....	1991
Schedule-based refresh of accelerated views .....	1991

---

Manage View Acceleration on your site .....	1992
Accelerate recommended views .....	1992
Manage Views recommended for acceleration .....	1993
Automatically suspend acceleration to save resources .....	1994
View and manage accelerated workbooks .....	1994
Manage View Acceleration notifications .....	1995
Understand user context for precomputation .....	1995
Understand the cost of View Acceleration .....	1996
Extract Query Load Balancing .....	1996
Monitoring Tableau Server .....	1997
Configure SMTP Setup .....	1997
Secure SMTP .....	1998
Use the TSM web interface .....	1998
Use the TSM CLI .....	1999
SMTP CLI configuration reference .....	2001
TLS ciphers .....	2004
Configure Server Event Notification .....	2007
Use the TSM web interface .....	2007
Use the TSM CLI .....	2010
Set notification values individually .....	2010
Set all notification values with a single json file .....	2012
Maintenance .....	2013

---

Backup and Restore .....	2014
Platform compatibility .....	2014
Disk Space Usage for Backup and Restore .....	2015
Restore disk space requirements .....	2016
Best Practices for Backing Up Tableau Server .....	2017
Protect backup file .....	2017
Maximise backup efficiency .....	2017
Perform a Full Backup and Restore of Tableau Server .....	2018
Backup data types .....	2019
Backup assets that require a manual process .....	2020
Backing up Tableau Server for recovery .....	2021
Restoring core Tableau Server functionality .....	2023
Restore other functionality .....	2026
Reencrypt Extracts After Restore .....	2026
Back up Tableau Server Data .....	2027
Disk Space Usage for Backup .....	2028
Optimising Tableau Server Backup .....	2029
Create a backup using the TSM command line interface (CLI) .....	2030
Create a pre-upgrade backup .....	2031
Backups during upgrades .....	2032
Scheduling and Managing Backups .....	2032
To schedule a backup: .....	2032

To view a scheduled backup: .....	2033
To update a scheduled backup: .....	2033
To suspend or resume a backup schedule: .....	2034
Script the backup process .....	2034
Remove log files and clear temporary folders .....	2035
Run the backup .....	2035
Copy the backup file to another computer .....	2036
Restore from a Backup .....	2036
Limitations when restoring Tableau Server .....	2036
Restore Tableau Server from a backup file .....	2037
Server Maintenance .....	2038
View Server Process Status .....	2038
Viewing process status with TSM CLI .....	2039
Viewing process status in web UI .....	2039
Tableau Services Manager (TSM) Status page .....	2040
Tableau Server Status page .....	2041
External Node .....	2042
Access Status Remotely .....	2044
Get Process Status as XML .....	2045
Status values in the XML .....	2047
Troubleshoot Server Processes .....	2047
Cluster Controller .....	2048

---

File Store .....	2049
Index and Search Server .....	2051
Repository .....	2052
VizQL Server .....	2053
Clear Saved Data Connection Passwords .....	2053
To clear saved data connection passwords for all server users: .....	2053
Synchronise External Directory Groups on the Server .....	2054
Before you begin .....	2055
Synchronise external directory groups on a schedule .....	2055
Synchronise all external directory groups on demand .....	2056
View synchronisation activity .....	2057
Set the minimum site role for users in an external directory group .....	2057
What happens when users are removed in the source external directory? ....	2059
Improving group synchronisation performance .....	2059
Set the Default Start Page for All Users .....	2059
To set the default start page for all users .....	2060
User-set start pages and hierarchy .....	2060
Access Sites from Connected Clients .....	2061
Disable Automatic Client Authentication .....	2061
Remove Unneeded Files .....	2062
Monitoring disk space usage .....	2062
Reducing disk space usage .....	2062

---

Server Settings (General and Customisation) .....	2063
General .....	2063
Customisation .....	2077
Mobile .....	2077
Stop or Restart the Tableau Server Computer .....	2078
tsm Command Line Reference .....	2079
Using the tsm CLI .....	2080
Authenticating with tsm CLI .....	2080
Logging into tsm CLI locally .....	2081
Logging into tsm CLI remotely .....	2081
Scripting and automating with tsm CLI .....	2081
Viewing help content in the shell .....	2082
Synopsis .....	2082
Commands .....	2082
Categories .....	2082
tsm authentication .....	2083
tsm authentication identity-migration configure .....	2084
Synopsis .....	2084
Options .....	2084
tsm authentication kerberos <commands> .....	2085
Synopsis .....	2085
Options for kerberos configure .....	2085

---

tsm authentication legacy-identity-mode <commands> .....	2085
Synopsis .....	2085
tsm authentication list .....	2085
Synopsis .....	2086
Options .....	2086
tsm authentication mutual-ssl <commands> .....	2086
Synopsis .....	2086
Options .....	2086
tsm authentication openid <commands> .....	2087
Synopsis .....	2087
Options for openid configure .....	2088
Options for openid map-claims .....	2090
tsm authentication pat-impersonation <commands> .....	2090
Synopsis .....	2091
tsm authentication saml <commands> .....	2091
Available commands .....	2091
tsm authentication saml configure .....	2091
Synopsis .....	2091
Options .....	2092
Example .....	2094
tsm authentication saml enable and saml disable .....	2095
Synopsis .....	2095



---

tsm authentication saml export-metadata .....	2095
Synopsis .....	2095
Options .....	2095
tsm authentication saml map-assertions .....	2096
Synopsis .....	2096
Options .....	2096
Example for saml map-assertions .....	2096
tsm authentication sitesaml enable and sitesaml disable .....	2097
Synopsis .....	2097
tsm authentication sspi <commands> .....	2097
Synopsis .....	2097
tsm authentication trusted <commands> .....	2098
Synopsis .....	2098
Options .....	2098
Global options .....	2099
tsm configuration .....	2100
"Unknown key" responses .....	2100
"Null" value responses .....	2100
tsm configuration get .....	2101
Synopsis .....	2101
Option .....	2101
tsm configuration list-dynamic-keys .....	2101

---

Synopsis .....	2101
tsm configuration set .....	2101
Synopsis .....	2102
Options .....	2102
Global options .....	2103
tsm configuration set Options .....	2104
Using the tsm CLI .....	2104
Basic Use of tsm configuration keys .....	2105
Setting a configuration key .....	2105
Resetting a configuration key to default .....	2105
Viewing the current value of a configuration key .....	2105
Configuration Keys .....	2106
adminviews.disabled .....	2106
api.server.enabled .....	2106
auditing.enabled .....	2106
backgrounder.default_run_now_priority .....	2107
backgrounder.enable_parallel_adsync .....	2107
backgrounder.externalquerycachewarmup.enabled .....	2107
backgrounder.externalquerycachewarmup.view_threshold .....	2107
backgrounder.extra_timeout_in_seconds .....	2108
backgrounder.default_timeout.run_flow .....	2108
backgrounder.failure_threshold_for_run_prevention .....	2108

---

backgrounder.log.level .....	2108
backgrounder.querylimit .....	2109
backgrounder.restrict_serial_collections_to_site_level .....	2109
backgrounder.notifications_enabled .....	2109
backgrounder.sort_jobs_by_type_schedule_boundary_heuristics_mil- liSeconds .....	2110
backgrounder.subscription_failure_threshold_for_run_prevention .....	2110
backgrounder.subscription_image_caching .....	2110
backgrounder.timeout_tasks .....	2111
backgrounder.timeout.single_subscription_notify .....	2111
backgrounder.timeout.sync_ad_group .....	2111
backgrounder.vInstances_max_overflow_queue_size .....	2112
backup.zstd.thread_count .....	2112
basefilepath.backuprestore .....	2112
basefilepath.log_archive .....	2113
basefilepath.site_export.exports .....	2113
basefilepath.site_import.exports .....	2113
clustercontroller.log.level .....	2113
clustercontroller.zk_session_timeout_ms .....	2113
dataAlerts.checkIntervalInMinutes .....	2114
dataAlerts.retryFailedAlertsAfterCheckInterval .....	2114
dataAlerts.SuspendFailureThreshold .....	2114
databaseservice.max_database_deletes_per_run .....	2114

---

dataserver.log.level .....	2115
dataserver_<n>.port .....	2115
elasticserver.vmopts .....	2115
excel.shadow_copy_all_remote.enabled .....	2116
extractservice.command.execution.timeout .....	2116
features.ActiveMQ .....	2116
features.DeleteOrphanedEmbeddedDatabaseAsset .....	2117
features.DesktopReporting .....	2117
features.IdentityMigrationBackgroundJob .....	2117
features.IdentityPools .....	2118
features.MessageBusEnabled .....	2119
features.NewIdentityMode .....	2119
features.PasswordlessBootstrapInit .....	2119
features.PasswordReset .....	2120
filestore.empty_folders_reaper.enabled .....	2120
filestore_empty_folders_reap.frequency_s .....	2120
features.Hyper_DisallowTDEPublishing .....	2120
filestore.log.level .....	2120
filestore.reapemptyfoldersholdoffms .....	2121
floweditor.max_datafile_upload_size_in_kb .....	2121
gateway.external_url .....	2121
gateway.http.cachecontrol.updated .....	2122

---

gateway.http.hsts .....	2122
gateway.http.hsts_options .....	2122
gateway.httpd.loglevel .....	2122
gateway.httpd.shmcb.size .....	2122
gateway.httpd.socache .....	2123
gateway.http.request_size_limit .....	2123
gateway.http.x_content_type_nosniff .....	2123
gateway.http.x_xss_protection .....	2124
gateway.log.level .....	2124
gateway.public.host .....	2124
gateway.public.port .....	2124
gateway.slow_post_protection.enabled .....	2125
gateway.slow_post_protection.request_read_timeout .....	2125
gateway.timeout .....	2125
gateway.trusted .....	2125
gateway.trusted_hosts .....	2126
hyper.file_partition_size_limit .....	2126
hyper.global_file_partition_size_limit .....	2126
hyper.enable_accesspaths_symbolic_canonicalization .....	2127
hyper.log_queries .....	2127
hyper.log_query_cpu .....	2127
hyper.log_timing .....	2128

---

hyper.log_troublesome_query_plans .....	2128
hyper.memory_limit .....	2128
hyper.memtracker_hard_reclaim_threshold .....	2128
hyper.memtracker_soft_reclaim_threshold .....	2129
hyper.network_threads .....	2129
hyper.objectstore_validate_checksums .....	2130
hyper.query_total_time_limit .....	2130
hyper.session_memory_limit .....	2130
hyper.srm_cpu_limit_percentage .....	2131
hyper_standalone.consistent_hashing.enabled .....	2132
hyper_standalone.health.enabled .....	2132
hyper.temp_disk_space_limit .....	2132
hyper.hard_concurrent_query_thread_limit .....	2133
hyper.soft_concurrent_query_thread_limit .....	2133
hyper.use_spooling_fallback .....	2134
indexandsearchserver.vmopts .....	2135
jmx.security.enabled .....	2135
jmx.ssl.enabled .....	2135
jmx.ssl.require_client_auth .....	2136
jmx.ssl.user.name .....	2136
jmx.ssl.user.password .....	2136
jmx.user.access .....	2137

---

licensing.login_based_licence_management.default_requested_duration_seconds .....	2137
licensing.login_based_license_management.enabled .....	2137
licensing.login_based_licence_management.max_requested_duration_seconds .....	2138
maestro.app_settings.sampling_max_row_limit .....	2138
maestro.input.allowed_paths .....	2138
maestro.output.allowed_paths .....	2139
maestro.output.write_to_mssql_using_runas .....	2140
maestro.sessionmanagement.maxConcurrentSessionPerUser .....	2141
metadata.ingestor.blocklist .....	2141
metadata.ingestor.pipeline.throttleEventsEnable .....	2142
metadata.ingestor.pipeline.throttleLimit .....	2142
metadata.ingestor.pipeline.throttlePeriodLength .....	2143
metadata.query.limits.time .....	2143
metadata.query.limits.count .....	2144
metadata.query.throttling.enabled .....	2144
metadata.query.throttling.queryCostCapacity .....	2145
metadata.query.throttling.tokenRefilledPerSecond .....	2145
metricsservices.checkIntervalInMinutes .....	2146
metricsservices.enabled .....	2146
metricsservices.failureCountToWarnUser .....	2146
metricsservices.maxFailedRefreshAttempts .....	2147

mobile.deep_linking.on_prem.enabled .....	2147
monitoring.dataengine.connection_timeout .....	2147
native_api.allowed_paths .....	2147
native_api.connection.limit.<connection class> .....	2148
native_api.connection.globallimit .....	2148
native_api.ExplainDataEnabled .....	2148
native_api.force_alternative_federation_engine .....	2149
native_api.ProtocolTransitionLegacyFormat .....	2149
native_api.InitializeQueryCacheSizeBasedOnWeights .....	2149
native_api.QueryCacheMaxAllowedMB .....	2149
native_api.LogicalQueryCacheMaxAllowedWeight .....	2150
native_api.MetadataQueryCachMaxAllowedWeight .....	2150
native_api.NativeQueryCacheMaxAllowedWeight .....	2150
native_api.QueryCacheEntryMaxAllowedInPercent .....	2150
native_api.UserInfoInGeneratedSQLEnabled .....	2151
nlp.concepts_shards_count .....	2151
nlp.values_shards_count .....	2152
nlp.defaultNewSiteAskDataMode .....	2153
noninteractive.vmopts .....	2153
pgsql.port .....	2153
pgsql.preferred_host .....	2154
pgsql.ssl.ciphersuite .....	2154



---

pgsql.ssl.max_protocol_version .....	2154
pgsql.ssl.min_protocol_version .....	2154
pgsql.verify_restore.port .....	2155
ports.blocklist .....	2155
recommendations.enabled .....	2155
recommendations.vizrecs.enabled .....	2155
redis.max_memory_in_mb .....	2156
refresh_token.absolute_expiry_in_seconds .....	2156
refresh_token.idle_expiry_in_seconds .....	2156
refresh_token.max_count_per_user .....	2156
rsync.timeout .....	2157
schedules.display_schedule_description_as_name .....	2157
schedules.display_schedules_in_client_timezone .....	2157
schedules.ignore_extract_task_priority .....	2157
searchserver.connection_timeout_milliseconds .....	2157
searchserver.index.bulk_query_user_groups .....	2158
searchserver.javamemopts .....	2158
searchserver.startup.zookeeper_healthcheck_timeout_ms .....	2159
searchserver.zookeeper_session_timeout_milliseconds .....	2159
ServerExportCSVMaxRowsByCols .....	2159
service.jmx_enabled .....	2160
service.max_procs .....	2160

---

service.port_remapping.enabled .....	2160
session.ipsticky .....	2160
sheet_image.enabled .....	2161
ssl.ciphersuite .....	2161
ssl.client_certificate_login.blocklisted_signature_algorithms .....	2161
ssl.client_certificate_login.min_allowed.elliptic_curve_size .....	2162
ssl.client_certificate_login.min_allowed.rsa_key_size .....	2162
ssl.protocols .....	2162
storage.monitoring.email_enabled .....	2162
storage.monitoring.warning_percent .....	2163
storage.monitoring.critical_percent .....	2163
storage.monitoring.email_interval_min .....	2163
storage.monitoring.record_history_enabled .....	2163
subscriptions.enabled .....	2163
subscriptions.timeout .....	2164
svcmonitor.notification.smtp.enabled .....	2164
svcmonitor.notification.smtp.mime_use_multipart_mixed .....	2164
tabadmincontroller.auth.expiration.minutes .....	2165
tdsservice.log.level .....	2165
tomcat.http.maxrequestsize .....	2165
tomcat.http.proxyHost .....	2165
tomcat.http.ProxyPort .....	2166

---

tomcat.https.proxyHost .....	2166
tomcat.https.ProxyPort .....	2166
tomcat.https.port .....	2166
tomcat.server.port .....	2166
tomcat.useSystemProxies .....	2166
tomcatcontainer.log.level .....	2166
tsm.log.level .....	2167
tsm.controlapp.log.level .....	2167
usernotifications.reap_after_days .....	2167
vizportal.adsync.update_system_user .....	2167
vizportal.alwaysUseEmbeddedShareLinks .....	2168
vizportal.art_skip_list .....	2168
vizportal.commenting.delete_enabled .....	2168
vizportal.csv_user_mgmt.index_site_users .....	2169
vizportal.csv_user_mgmt.bulk_index_users .....	2169
vizportal.enable_art .....	2169
vizportal.log_art_java .....	2169
vizportal.log.level .....	2170
vizportal.oauth.connected_apps.max_expiration_period_in_minutes .....	2170
vizportal.oauth.external_authorization.enabled .....	2171
vizportal.oauth.external_authorization_server.blocklisted_jws_algorithms ....	2171
vizportal.oauth.external_authorization_server.issuer .....	2172

---

vizportal.oauth.external_authorization_server.jwks .....	2172
vizportal.oauth.external_authorization_server.max_expiration_period_in_ minutes .....	2172
vizportal.openid.client_authentication .....	2173
vizportal.openid.essential_acr_values .....	2173
vizportal.openid.full_server_request_logging_enabled .....	2174
vizportal.openid.voluntary_acr_values .....	2174
vizportal.rest_api.cors.allow_origin .....	2174
vizportal.rest_api.cors.enabled .....	2175
vizportal.site_user_group_count_enabled .....	2175
vizqlserver.allow_insecure_scripts .....	2175
vizqlserver.browser.render .....	2176
vizqlserver.browser.render_threshold .....	2176
vizqlserver.browser.render_threshold_mobile .....	2176
vizqlserver.clear_session_on_unload .....	2176
vizqlserver.force_maps_to_offline .....	2177
vizqlserver.geosearch_cache_size .....	2177
vizqlserver.initialsql.disabled .....	2177
vizqlserver.log.level .....	2178
vizqlserver.NumberOfWorkbookChangesBetweenAutoSaves .....	2178
vizqlserver_<n>.port .....	2178
vizqlserver.protect_sessions .....	2178
vizqlserver.querylimit .....	2178

---

vizqlserver.RecoveryAttemptLimitPerSession .....	2179
vizqlserver.session.expiry.minimum .....	2179
vizqlserver.session.expiry.timeout .....	2179
vizqlserver.sheet_image_api.max_age_floor .....	2179
vizqlserver.showdownload .....	2179
vizqlserver.showshare .....	2180
vizqlserver.url_scheme_allowlist .....	2180
vizqlserver.web_page_objects_enabled .....	2180
vizqlserver.WorkbookTooLargeToCheckpointSizeKiB .....	2180
vizqlserver.workflow_objects_enabled .....	2181
webdataconnector.refresh.enabled .....	2181
webdataconnector.allowlist.fixed .....	2181
webdataconnector.enabled .....	2182
webdataconnector.allowlist.mode .....	2182
wgserver.audit_history_expiration_days .....	2182
wgserver.authentication.legacy_identity_mode.enabled .....	2183
wgserver.authentication.identity_pools.default_pool_description .....	2183
wgserver.change_owner.enabled .....	2183
wgserver.clickjack_defense.enabled .....	2184
wgserver.domain.accept_list .....	2184
wgserver.domain.allow_insecure_connection .....	2185
wgserver.domain.fqdn .....	2185

---

wgserver.domain.password .....	2186
wgserver.domain.username .....	2186
wgserver.domain.allowlist .....	2186
wgserver.extended_trusted_ip_checking .....	2186
wgserver.ignore_domain_in_username_for_matching .....	2186
wgserver.restrict_options_method .....	2187
wgserver.saml.blocklisted_digest_algorithms .....	2187
wgserver.saml.forceauthn .....	2188
wgserver.saml.idpattribute.username .....	2188
wgserver.saml.iframe_idp.enabled .....	2189
wgserver.saml.maxassertiontime .....	2189
wgserver.saml.min_allowed.elliptic_curve_size .....	2189
wgserver.saml.min_allowed.rsa_key_size .....	2190
wgserver.saml.responseskew .....	2191
wgserver.saml.sha256 .....	2191
wgserver.session.apply_lifetime_limit .....	2191
wgserver.session.idle_limit .....	2191
wgserver.session.lifetime_limit .....	2191
wgserver.unrestricted_ticket .....	2191
workerX.gateway.port .....	2192
workerX.vizqlserver.procs .....	2192
zookeeper.config.snapCount .....	2192

---

tsm customise .....	2192
Synopsis .....	2194
Options .....	2194
Global options .....	2195
tsm data-access .....	2196
tsm data-access caching list .....	2197
Synopsis .....	2197
tsm data-access caching set .....	2197
Synopsis .....	2197
Options .....	2198
tsm data-access repository-access disable .....	2198
Synopsis .....	2198
Options .....	2198
tsm data-access repository-access enable .....	2199
Synopsis .....	2199
Options .....	2199
tsm data-access repository-access list .....	2200
Synopsis .....	2200
tsm data-access set-saml-delegation configure .....	2200
Synopsis .....	2200
Options .....	2200
tsm data-access set-saml-delegation disable .....	2201

---

Synopsis .....	2201
tsm data-access set-saml-delegation enable .....	2201
Synopsis .....	2201
tsm data-access web-data-connectors add .....	2201
Synopsis .....	2201
Options .....	2201
tsm data-access web-data-connectors allow .....	2202
Synopsis .....	2203
Options .....	2203
tsm data-access web-data-connectors delete .....	2203
Synopsis .....	2203
Options .....	2203
tsm data-access web-data-connectors list .....	2204
Synopsis .....	2204
Options .....	2204
Global options .....	2204
tsm email .....	2205
tsm email test-smtp-connection .....	2205
Synopsis .....	2205
Global options .....	2206
tsm initialise .....	2207
Synopsis .....	2207



---

Options .....	2207
Global options .....	2207
tsm jobs .....	2208
tsm jobs cancel .....	2209
Synopsis .....	2209
Options .....	2209
tsm jobs list .....	2209
Synopsis .....	2209
Options .....	2209
tsm jobs reconnect .....	2209
Synopsis .....	2210
Options .....	2210
Global options .....	2210
tsm licences .....	2211
tsm licences activate .....	2211
Synopsis .....	2212
Options .....	2212
tsm licences atr-configuration get .....	2212
Synopsis .....	2212
Options .....	2213
tsm licences atr-configuration set .....	2213
Synopsis .....	2213

---

Options .....	2213
tsm licences deactivate .....	2213
Synopsis .....	2213
Options .....	2214
tsm licences get-offline-activation-file .....	2214
Synopsis .....	2214
Options .....	2214
tsm licences get-offline-deactivation-file .....	2215
Synopsis .....	2215
Options .....	2215
tsm licences list .....	2215
Synopsis .....	2217
tsm licences refresh .....	2217
Synopsis .....	2217
Global options .....	2217
tsm login .....	2218
Synopsis .....	2218
Global options .....	2219
tsm logout .....	2220
Synopsis .....	2220
Global options .....	2220
tsm maintenance .....	2221

---

tsm maintenance backup .....	2222
Synopsis .....	2223
Options .....	2223
Examples .....	2226
tsm maintenance cleanup .....	2226
Synopsis .....	2227
Options .....	2227
Examples .....	2229
tsm maintenance jmx disable .....	2229
Synopsis .....	2230
Options .....	2230
tsm maintenance jmx enable .....	2230
Synopsis .....	2230
Options .....	2230
tsm maintenance metadata-services disable .....	2232
Synopsis .....	2232
Option .....	2232
tsm maintenance metadata-services enable .....	2232
Synopsis .....	2233
Option .....	2233
tsm maintenance metadata-services get-status .....	2233
Synopsis .....	2234

---

tsm maintenance preflight-check permissions .....	2234
Synopsis .....	2234
Option .....	2234
tsm maintenance preflight-check ports .....	2235
Synopsis .....	2235
Option .....	2235
tsm maintenance reindex-search .....	2237
Synopsis .....	2237
Option .....	2237
tsm maintenance reset-searchserver .....	2237
Synopsis .....	2237
Option .....	2238
tsm maintenance restore .....	2238
Synopsis .....	2238
Options .....	2238
tsm maintenance send-logs .....	2240
Synopsis .....	2240
Options .....	2240
tsm maintenance snapshot-backup complete .....	2241
Synopsis .....	2241
Options .....	2241
tsm maintenance snapshot-backup prepare .....	2241

---

Synopsis .....	2242
Options .....	2242
tsm maintenance snapshot-backup restore .....	2242
Synopsis .....	2243
Options .....	2243
tsm maintenance validate-backup-basefilepath .....	2243
Synopsis .....	2243
Options .....	2243
tsm maintenance validate-resources .....	2243
Synopsis .....	2244
Options .....	2244
tsm maintenance ziplogs .....	2244
Synopsis .....	2244
Options .....	2244
Global options .....	2248
tsm pending-changes .....	2249
tsm pending-changes apply .....	2250
Synopsis .....	2250
Options .....	2250
tsm pending-changes discard .....	2251
Synopsis .....	2251
Options .....	2251

---

tsm pending-changes list .....	2251
Synopsis .....	2251
Options .....	2252
Global options .....	2252
tsm register .....	2253
Synopsis .....	2253
Options .....	2253
Global options .....	2254
tsm reset .....	2255
Synopsis .....	2255
Option .....	2255
Global options .....	2256
tsm restart .....	2257
Synopsis .....	2257
Option .....	2257
Global options .....	2257
tsm schedules .....	2258
tsm schedules delete .....	2259
Synopsis .....	2259
Options .....	2259
tsm schedules list .....	2259
Synopsis .....	2259

---

Options .....	2260
tsm schedules resume .....	2260
Synopsis .....	2260
Options .....	2260
tsm schedules suspend .....	2261
Synopsis .....	2261
Options .....	2261
tsm schedules update .....	2261
Synopsis .....	2261
Options .....	2262
Global options .....	2262
tsm security .....	2263
Prerequisites .....	2265
tsm security authorise-credential-migration .....	2265
Synopsis .....	2265
Options .....	2266
Example .....	2267
tsm security cancel-credential-migrations .....	2267
Synopsis .....	2267
Options .....	2267
tsm security custom-cert add .....	2267
Synopsis .....	2268

---

Options .....	2268
tsm security custom-cert delete .....	2268
Synopsis .....	2268
tsm security custom-cert list .....	2269
Synopsis .....	2269
tsm security custom-indexandsearch-ssl add .....	2269
Synopsis .....	2270
tsm security custom-indexandsearch-ssl list .....	2270
Synopsis .....	2270
tsm security custom-tsm-ssl disable .....	2270
Synopsis .....	2270
tsm security custom-tsm-ssl enable .....	2270
Synopsis .....	2271
tsm security custom-tsm-ssl list .....	2271
Synopsis .....	2272
tsm security external-ssl disable .....	2272
Synopsis .....	2272
tsm security external-ssl enable .....	2272
Synopsis .....	2272
Options .....	2272
tsm security external-ssl list .....	2274
Synopsis .....	2274



---

tsm security kms set-mode aws .....	2274
Synopsis .....	2274
Options .....	2274
Example .....	2275
tsm security kms set-mode azure .....	2275
Synopsis .....	2275
Options .....	2275
Example .....	2276
tsm security kms set-mode local .....	2276
Synopsis .....	2276
tsm security kms status .....	2276
Synopsis .....	2277
tsm security maestro-rserve-ssl disable .....	2277
tsm security maestro-rserve-ssl enable .....	2277
Synopsis .....	2278
Options .....	2278
tsm security maestro-tabpy-ssl disable .....	2279
tsm security maestro-tabpy-ssl enable .....	2279
Synopsis .....	2279
Options .....	2279
tsm security regenerate-internal-tokens .....	2280
Synopsis .....	2281

---

Options .....	2281
tsm security repository-ssl disable .....	2281
Synopsis .....	2281
tsm security repository-ssl enable .....	2281
Synopsis .....	2282
Options .....	2282
tsm security repository-ssl get-certificate-file .....	2283
Synopsis .....	2283
Options .....	2283
tsm security repository-ssl list .....	2283
Synopsis .....	2283
tsm security rotate-coordination-service-secrets .....	2283
Synopsis .....	2284
Options .....	2284
Global options .....	2284
tsm settings .....	2285
tsm settings clone .....	2286
Synopsis .....	2286
Options .....	2286
tsm settings export .....	2286
Synopsis .....	2287
Options .....	2287

---

tsm settings import .....	2287
Synopsis .....	2288
Options .....	2288
Global options .....	2289
tsm sites .....	2290
tsm sites export .....	2290
Synopsis .....	2291
Options .....	2291
tsm sites import .....	2292
Synopsis .....	2292
Options .....	2293
tsm sites import-verified .....	2294
Synopsis .....	2294
Options .....	2294
tsm sites unlock .....	2295
Options .....	2295
Global options .....	2296
tsm start .....	2297
Synopsis .....	2297
Option .....	2297
Global options .....	2297
tsm status .....	2298

---

Synopsis .....	2298
Options .....	2298
Global options .....	2300
tsm stop .....	2301
Synopsis .....	2301
Options .....	2301
Global options .....	2302
tsm topology .....	2303
tsm topology cleanup-coordination-service .....	2304
Synopsis .....	2305
Option .....	2305
tsm topology deploy-coordination-service .....	2305
Synopsis .....	2305
Options .....	2306
tsm topology external-services gateway disable .....	2306
Synopsis .....	2306
Options .....	2306
tsm topology external-services gateway enable .....	2306
Synopsis .....	2307
Options .....	2307
tsm topology external-services gateway update .....	2307
Synopsis .....	2307

---

Option .....	2307
tsm topology external-services list .....	2307
Synopsis .....	2308
Option .....	2308
tsm topology external-services repository disable -n nodeN .....	2308
Synopsis .....	2308
Option .....	2308
tsm topology external-services repository enable .....	2308
Synopsis .....	2309
Options .....	2309
tsm topology external-services repository replace-host .....	2310
Synopsis .....	2311
Options .....	2311
tsm topology external-services storage disable .....	2311
Synopsis .....	2312
Options .....	2312
tsm topology external-services storage enable .....	2312
Synopsis .....	2312
Options .....	2312
tsm topology external-services storage switch-share .....	2313
Synopsis .....	2313
Option .....	2313

---

tsm topology failover-repository .....	2313
Synopsis .....	2313
Options .....	2314
tsm topology filestore decommission .....	2314
Synopsis .....	2314
Options .....	2315
tsm topology filestore recommission .....	2315
Synopsis .....	2316
Options .....	2316
tsm topology list-nodes .....	2316
Synopsis .....	2316
Options .....	2316
tsm topology list-ports .....	2316
Synopsis .....	2316
Options .....	2317
tsm topology node-nickname list .....	2317
Synopsis .....	2317
Options .....	2317
tsm topology node-nickname remove .....	2317
Synopsis .....	2317
Options .....	2318
tsm topology node-nickname set .....	2318

---

Synopsis .....	2318
Options .....	2318
tsm topology nodes get-bootstrap-file .....	2318
Synopsis .....	2319
Options .....	2319
tsm topology remove-nodes .....	2320
Synopsis .....	2320
Options .....	2320
tsm topology set-node-role .....	2321
Synopsis .....	2321
Options .....	2321
tsm topology set-ports .....	2322
Synopsis .....	2323
Options .....	2323
tsm topology set-process .....	2324
Synopsis .....	2324
Options .....	2324
tsm topology toggle-coordination-service .....	2325
Synopsis .....	2325
Option .....	2325
Global options .....	2325
tsm user-identity-store .....	2327

---

tsm user-identity-store get-group-mappings [options] .....	2327
Synopsis .....	2327
tsm user-identity-store get-user-mappings [options] .....	2327
Synopsis .....	2327
tsm user-identity-store list [options] .....	2328
Synopsis .....	2328
Options .....	2328
tsm user-identity-store set-connection [options] .....	2328
Synopsis .....	2328
Options .....	2328
tsm user-identity-store set-group-mappings [options] .....	2330
Synopsis .....	2330
Options .....	2330
tsm user-identity-store set-user-mappings [options] .....	2331
Synopsis .....	2331
Options .....	2331
tsm user-identity-store verify-group-mappings [options] .....	2333
Synopsis .....	2333
Options .....	2333
tsm user-identity-store verify-user-mappings [options] .....	2333
Synopsis .....	2333
Options .....	2333



---

Global options .....	2334
tsm version .....	2335
Synopsis .....	2335
Global options .....	2335
tsm File Paths .....	2336
NetworkService system account .....	2336
Permissions for the backup/restore file location .....	2336
Default locations for files .....	2337
Get the current file location .....	2340
Change the current file location .....	2341
Entity Definitions and Templates .....	2343
Configuration File Example .....	2343
Entities vs keys .....	2344
gatewaySettings Entity .....	2345
Gateway settings .....	2346
Configuration template .....	2346
Configuration file reference .....	2346
identityStore Entity .....	2348
Before you begin .....	2348
Configuration templates .....	2349
Local .....	2350
Important .....	2350

---

LDAP - Active Directory .....	2351
OpenLDAP - GSSAPI bind .....	2352
OpenLDAP - Simple bind .....	2354
Configuration template reference .....	2355
Shared identity store options .....	2355
LDAP GSSAPI bind options .....	2355
LDAP simple bind options .....	2356
Shared LDAP options .....	2357
identityStoreSchemaType options .....	2358
Importing the JSON file .....	2360
kerberosSettings Entity .....	2361
Configuration template .....	2361
Configuration file reference .....	2362
mutualSSLSettings Entity .....	2362
Configuration template .....	2363
Configuration file reference .....	2364
openIDSettings Entity .....	2367
Configuration template .....	2367
Configuration file reference .....	2368
samlSettings Entity .....	2371
Template categories and definitions .....	2372
samlSettings configuration template .....	2372

---

SAML configuration entity reference .....	2373
Pass the configuration file to Tableau Server .....	2378
See also .....	2379
sapHanaSettings Entity .....	2379
SAP HANA SAML settings .....	2379
Configuration template .....	2380
Configuration file reference .....	2380
shareProductUsageDataSettings Entity .....	2381
Configuration template .....	2382
Configuration file reference .....	2382
trustedAuthenticationSettings Entity .....	2383
Configuration template .....	2383
Configuration file reference .....	2384
web-data-connector-settings Entity .....	2386
Web data connector settings .....	2387
Configuration template .....	2387
Single WDC .....	2387
Multiple WDCs .....	2388
Configuration file reference .....	2388
tabcmd .....	2389
Install tabcmd .....	2390
How to use tabcmd .....	2395

---

Examples .....	2396
Status messages and logs .....	2397
tabcmd Commands .....	2397
addusers group-name .....	2398
Options .....	2399
Global options .....	2399
createextracts .....	2402
Options .....	2402
Global options .....	2403
creategroup group-name .....	2405
Global options .....	2405
createproject project-name .....	2408
Options .....	2408
Global options .....	2409
createsite site-name .....	2411
Options .....	2412
Global options .....	2413
createsiteusers filename.csv .....	2415
Improving performance for large CSV files .....	2416
Local authentication .....	2416
Active Directory authentication .....	2416
Options .....	2417

---

Global options .....	2418
createusers filename.csv .....	2421
Local authentication .....	2421
Active Directory authentication .....	2421
Options .....	2422
Global options .....	2423
decryptextracts .....	2426
Global options .....	2426
delete workbook-name or datasource-name .....	2428
Options .....	2429
Global options .....	2429
deleteextracts .....	2432
Options .....	2432
Global options .....	2433
deletegroup group-name .....	2436
Global options .....	2436
deleteproject project-name .....	2438
Option .....	2439
Global options .....	2439
deletesite site-name .....	2441
Global options .....	2441
deletesiteusers filename.csv .....	2444

---

Improving performance for large CSV files .....	2445
Global options .....	2445
deleteusers filename.csv .....	2447
Options .....	2448
Global options .....	2448
editdomain .....	2450
Options .....	2451
Global options .....	2452
editsite site-name .....	2454
Options .....	2455
Global options .....	2456
encryptextracts .....	2458
Global options .....	2458
export .....	2461
Options .....	2464
Global options .....	2465
get url .....	2468
Global options .....	2470
initialuser .....	2473
Options .....	2473
Global options .....	2474
listdomains .....	2476

---

Global options .....	2476
listsites .....	2479
Options .....	2479
Global options .....	2479
login .....	2482
Options .....	2483
Global options .....	2485
logout .....	2487
publish filename.twb(x), filename.tds(x), or filename.hyper .....	2488
Options .....	2489
Global options .....	2491
publishsamples .....	2494
Description .....	2494
Syntax .....	2494
Options .....	2494
Global options .....	2495
reencryptextracts .....	2497
Global options .....	2497
refreshextracts workbook-name or datasource-name .....	2500
Options .....	2501
Global options .....	2503
reset_openid_sub .....	2505

---

Options .....	2505
Global options .....	2506
removeusers group-name .....	2508
Options .....	2508
Global options .....	2509
runschedule schedule-name .....	2511
Global options .....	2512
set setting .....	2514
Global options .....	2515
syncgroup group-name .....	2517
Options .....	2518
Global options .....	2519
upgradethumbnails .....	2521
Options .....	2522
Global options .....	2522
validateidpmetadata .....	2524
Options .....	2525
Global options .....	2525
version .....	2528
Global options .....	2528
Install Switches and Properties for tabcmd (Windows) .....	2530
Troubleshooting .....	2534



Work with Log Files .....	2534
Contents of Tableau Server Logs .....	2534
Investigating Tableau Server Issues .....	2535
Tableau Server Logs and Log File Locations .....	2538
Tableau Server log files on an active cluster .....	2538
Primary log locations on a working Tableau Server installation .....	2539
Configuration file locations on a working Tableau Server installation .....	2539
Logs that are not written in the primary location .....	2539
Server Log Files in a zipped archive .....	2540
Temporary Files .....	2540
Log File Snapshots (Archive Logs) .....	2541
Use the TSM web interface .....	2541
Uploading log snapshots for Tableau Support .....	2543
Use the TSM CLI .....	2544
Sending log archives to Tableau Support .....	2545
Change Logging Levels .....	2546
Logging Levels .....	2546
Change Logging Levels .....	2547
Dynamic log level configuration .....	2547
Configuration Keys for Changing Logging Levels .....	2547
Reset Logging Levels .....	2551
Troubleshoot Tableau Server Install and Upgrade .....	2551

---

General Troubleshooting Steps .....	2552
Common Tableau Server Install Issues .....	2552
Installation logs location .....	2552
Install program does not prompt for location to install to .....	2552
Install program does not restart Windows .....	2553
TSM Install fails with 'initialisation failed' error .....	2553
TSM Initialise screen does not display .....	2554
Multiple install attempts fail .....	2554
Obliterate script generates error: 'refresh-environment-variables.cmd' is not recognised as an internal or external command .....	2555
Install fails due to hardware requirements .....	2555
Install or upgrade fails due to CPU requirements .....	2555
Common Tableau Server Upgrade Issues .....	2556
Upgrade logs location .....	2556
Error: Failed to establish a connection with Active Directory .....	2556
Maps do not display or display incompletely after upgrading .....	2557
Upgrade script error: "Tableau Server Version change validation failed." .....	2557
Upgrade multi-node, initialising additional node fails with 'Enter your cre- dentials again' error .....	2557
Upgrading fails due to lack of disk space .....	2558
Upgrade fails on RebuildSearchIndex job .....	2558
Upgrade fails on 2022.1 and later .....	2559
Upgrade fails on 2020.4.0 or later .....	2559

---

Upgrade fails due to permission problems with the backup/restore file location .....	2561
Common Settings Import Issues .....	2562
Import of settings file causes "not present on any node" validation error due to missing services .....	2562
Import of settings file causes "configuration value you specified does not match" error .....	2563
"You cannot directly modify instances of the Coordination Service" error .....	2564
If you see this error after importing a settings file: .....	2564
If you see the error when setting the process count for Coordination Service manually: .....	2565
Troubleshooting connections to TSM .....	2566
Unable to connect to TSM .....	2566
Starting Tableau Server .....	2566
Tableau Server cannot determine if it fully started .....	2566
Tableau Server doesn't start .....	2566
Reindexing Tableau Server Search & Browse .....	2567
Problems that can be solved by rebuilding Search & Browse index .....	2567
Activating Tableau Server .....	2567
Tableau Server licence activation fails .....	2567
Confirm you can access the licensing server .....	2567
Verify the date and time .....	2569
Verify FlexNet Licensing Service has started .....	2569
Force the product key to be read again .....	2570

---

Send the contents of trusted storage to Tableau Support .....	2570
tabcmd Installation Problems .....	2571
Installing tabcmd separately .....	2571
Problems installing tabcmd on Linux .....	2571
Java is not installed .....	2571
Incorrect version of Java is installed .....	2571
Troubleshoot Job Failures Due to Service Failures .....	2572
Troubleshoot Server Sign in Problems .....	2573
Troubleshooting scenarios .....	2574
TSM Initialise screen does not display .....	2574
Troubleshoot Licensing .....	2574
Product key failure with forward proxy servers .....	2574
Handle an unlicensed server .....	2574
Unlicensed role-based server .....	2575
Unlicensed core-based server .....	2575
Unlicensed server administrator .....	2575
Troubleshoot role-based licensing .....	2576
A user or administrator is unlicensed due to licence expiry .....	2577
Server Administrator site role is unchanged when using a Creator licence .....	2578
Licences are not immediately available .....	2578
A user with a Viewer licence cannot open Tableau Server or Tableau Cloud workbooks from Tableau Desktop .....	2578
Handle an Unlicensed Server Process .....	2579

---

Tableau Services Manager (TSM) Command Timeout .....	2580
Troubleshooting Tableau Services Manager (TSM) Backup .....	2580
Backup fails to start because services do not start .....	2580
Backup fails with a sharing violation error. ....	2581
tabadmincontroller*.log .....	2581
tabadminagent*.log .....	2581
Cookie Restriction Error .....	2584
Troubleshoot Data Sources .....	2584
Data Source Error Messages .....	2585
Troubleshoot WDC Problems .....	2586
WDC Extract refresh failed with error 'Render process terminated - render process crashed (exit code=-2147483645)' .....	2587
Troubleshoot Subscriptions .....	2587
"The view snapshot in this email could not be properly rendered." .....	2587
Can't see images in email .....	2588
Can't subscribe .....	2588
No subscription icon .....	2588
Receiving invalid or "broken" subscriptions .....	2589
Missing attachments .....	2589
Suspended Subscriptions .....	2590
Resume suspended subscriptions .....	2590
Can't set subscription frequency to "When Data Refreshes" .....	2590

---

Subscriptions not arriving ("Error sending email. Can't send command to SMTP host.") .....	2591
Missing data quality warnings or sensitivity labels .....	2591
Troubleshoot SAML .....	2591
SAML and Enable Automatic Logon .....	2591
HTTP status 500 error when configuring SAML .....	2592
Signing in from the command line .....	2592
Login fails: Failed to find the user .....	2592
Login fails: SSL offloading .....	2593
SAML error log .....	2593
Trailing slash .....	2594
Confirm connectivity .....	2594
Multiple domains .....	2594
Troubleshooting Mutual SSL Authentication .....	2595
We couldn't find a valid client certificate. Contact your Tableau Server administrator. ....	2595
Invalid user name or password .....	2595
We couldn't find your user name in the client certificate. Contact your Tableau Server administrator or sign in using your Tableau Server account. ....	2596
Users unexpectedly see a sign-in dialog box that displays an error message ...	2596
We couldn't find your user name in the client certificate. Contact your Tableau Server administratorCertificate does not contain a valid Tableau Server user name. ....	2597
The user is signed in using an unexpected user name (LDAP mapping) .....	2598

---

The user is signed in as the incorrect user (UPN or CN mapping) .....	2598
Troubleshoot Trusted Authentication .....	2599
See also .....	2599
Ticket Value of -1 Returned from Tableau Server .....	2600
HTTP 401 - Not Authorised .....	2601
HTTP 404 - File Not Found .....	2602
Invalid User (SharePoint or C#) .....	2602
Attempting to Redeem the Ticket from the Wrong IP Address .....	2602
Cookie Restriction Error .....	2603
An error occurred communicating with the server (403) .....	2603
Handle Extract Refresh Alerts .....	2604
Resolving Extract Refresh Problems .....	2606
Troubleshoot Server Processes .....	2607
Cluster Controller .....	2608
File Store .....	2608
Index and Search Server .....	2610
Repository .....	2611
VizQL Server .....	2612
Troubleshoot Inconsistent Process Status .....	2612
Issue .....	2613
Environment .....	2613
Resolution .....	2613

---

Assign metrics for each network interface .....	2613
Troubleshoot Desktop Licence Reporting .....	2615
Administrative views aren't available .....	2615
Troubleshoot Disk Space Usage on Tableau Server Nodes .....	2615
Viewing Disk Usage on Tableau Server Nodes .....	2616
Cleaning Up Tableau Server-Related Files .....	2616
Reducing Coordination Service logs .....	2616
Unable to access Tableau Server or TSM Web UI after running out of disk space .....	2617
Troubleshoot Run As User .....	2618
Required Run As Service Account Settings .....	2618
Verify Folder Permissions .....	2619
Installing in a non-default location .....	2620
Reapplying folder permissions .....	2621
Verify Registry Permissions .....	2621
Permissions .....	2622
Verify the Local Security Policy .....	2623
Verify Tableau Service Settings .....	2625
Changing the Log On Value .....	2627
Revoke Run As Service Account Permissions .....	2627
Remove folder permissions .....	2628
Remove registry permissions .....	2628
Remove security policies .....	2628



---

Server Administrator Reference .....	2629
Tableau Server Processes .....	2629
Licensed processes .....	2629
Process workflow .....	2656
Tableau Server Administration Agent .....	2658
Tableau Server Administration Controller .....	2658
What happens when the Administration Controller process fails? .....	2659
Moving the Administration Controller .....	2659
Restarting the Administration Controller .....	2660
Tableau Server Application Server .....	2660
Troubleshooting problems with Application Server .....	2661
Enable ART data on Tableau Server .....	2661
Disable ATR .....	2662
Tableau Server Backgrounder Process .....	2663
Managing Backgrounder Resources .....	2663
Related content .....	2664
Tableau Server Cache Server .....	2665
Tableau Server Client File Service .....	2665
Tableau Server Collections Service .....	2667
Server Configuration .....	2667
Multi-Node Configuration .....	2667
Impact if the Collections Service is not running properly .....	2668

---

One instance of Collections service .....	2668
Multiple instances of Collections service .....	2668
Log Files .....	2668
Tableau Server Content Exploration Service .....	2669
Server Configuration .....	2669
Multi-Node Configuration .....	2669
Performance Tuning .....	2670
Log Files .....	2670
Search Accuracy .....	2671
Re-indexing .....	2671
Tableau Server Coordination Service .....	2671
Configuration for the Coordination Service .....	2672
The Coordination Service Quorum .....	2672
Number of Coordination Service instances to use .....	2673
If you reduce the number of nodes .....	2674
Viewing Coordination Service Status .....	2675
Tableau Server Data Engine .....	2676
Memory and CPU usage .....	2676
CPU usage .....	2676
Memory usage .....	2677
Server configuration, Scalability, and Performance .....	2678
Scalability: .....	2679

Performance: .....	2679
Performance benefits .....	2679
Tableau Server Data Server .....	2680
Tableau Server Data Source Properties Service .....	2681
Log files for the Data Source Properties service .....	2682
Data Source Properties service in a multi-node cluster .....	2682
Tableau Server File Store .....	2682
The decommission Command .....	2683
Decommissioning File Store when co-located with the Administrative Controller .....	2683
Tableau Server Gateway Process .....	2683
Port assignment .....	2684
Log files for the gateway process .....	2685
Gateway processes in a cluster .....	2685
Additional information .....	2686
Index and Search Server .....	2686
Server Configuration .....	2686
Multi-Node Configuration .....	2686
Performance Tuning .....	2687
Re-indexing .....	2687
Tableau Server Internal Data Source Properties Service .....	2688
Log files for the Internal Data Source Properties service .....	2688
Internal Data Source Properties service in a multi-node cluster .....	2688

---

Tableau Server Messaging Service .....	2689
Impact if Messaging Service is not running properly .....	2689
Multiple instances of Messaging Service (multi-node, version 2020.1 and later) .....	2689
One instance of Messaging Service .....	2689
Messaging Service in a multi-node cluster .....	2690
Tableau Server Metrics Service .....	2690
Impact if the Metrics Service fails .....	2691
Metrics Service in a multi-node cluster .....	2691
Log files for the Metrics service .....	2691
Tableau Server Microservice Containers .....	2692
Viewing Microservice Container Status .....	2692
Microservice Container Status .....	2692
Use the TSM web interface .....	2693
Use the TSM CLI .....	2694
Tableau Server Repository .....	2695
Preferred active repository .....	2696
The failoverrepository Command .....	2696
Tableau Server Resource Limits Manager .....	2697
Tableau Server SAML Service .....	2698
Tableau Server Search and Browse .....	2698
Tuning the Search & Browse Process .....	2700
Search & Browse Max Heap Memory .....	2700

---

Default maximum heap memory allocations .....	2700
Client session timeouts .....	2701
Zookeeper connection health check timeout at startup .....	2702
Tableau Server Service Manager .....	2702
Tableau Statistical Service .....	2703
Server configuration .....	2704
Impact if the Tableau Statistical Service fails .....	2704
Performance .....	2704
Log files .....	2704
Tableau Server TSM Maintenance Services .....	2705
Tableau Server VizQL Server .....	2705
Tableau Prep Conductor .....	2706
Performance and Scale Recommendations .....	2707
Topology and Configuration .....	2708
Tableau Prep Flow Authoring .....	2708
Performance and Scale Recommendations .....	2709
Isolate flow authoring to a separate node .....	2709
Add resources .....	2710
Licence additional offerings .....	2710
Topology and Configuration .....	2711
Tableau Server Dynamic Topology Changes .....	2716
Dynamic configuration changes .....	2717

---

Example Scenarios .....	2717
Making dynamic topology changes .....	2717
Impact of dynamic topology changes .....	2718
Best practices .....	2718
Automating dynamic topology changes .....	2718
Additional information .....	2719
Server Process Limits .....	2719
Tableau Services Manager Ports .....	2720
Ephemeral port use .....	2720
Firewall requirements .....	2720
Port assignment .....	2721
Dynamic port assignment .....	2722
Changing the port range .....	2722
Blocking specific ports within the range .....	2723
Disabling dynamic port assignment .....	2723
Manual port assignment .....	2724
Configuring ports during installation .....	2724
Configuring ports after installation .....	2726
Ports that are not dynamically mapped .....	2727
Dynamically mapped ports .....	2727
Enable the JMX Ports .....	2733
Enable secure JMX ports .....	2734

---

How the JMX Ports Are Determined .....	2736
ATRDdiag.exe Command Line Reference .....	2736
Synopsis .....	2737
Options .....	2737
Global Options .....	2740
tabadmin .....	2740
Windows Accounts and Permissions .....	2740
Accounts .....	2740
Permissions .....	2741
Help Output for upgrade-tsm Script .....	2742
Output .....	2742
View Server Version .....	2744
Viewing the server version from the Tableau Server web UI .....	2744
Viewing the server version and TSM version from the TSM command line .....	2745
Short version, long version, and version_code .....	2745
Finding the long version number .....	2746
Configure Einstein Discovery Integration .....	2746
Einstein Discovery dashboard extensions .....	2747
Einstein Discovery analytics extensions .....	2748
Einstein Discovery Tableau Prep extensions .....	2748
Configure CORS in Salesforce.com for Einstein Discover Integration in Tableau Server .....	2749
Configure CORS for Einstein Discovery. ....	2749

Configure Connections with Analytics Extensions .....	2751
Server SSL .....	2752
Enable analytics extensions .....	2752
Configure analytics extensions settings .....	2753
Edit or delete an analytics extension connection .....	2755
Client requirement: Intermediate certificate chain for Rserve external service ..	2755
Script errors .....	2755
Determining analytics extensions usage .....	2756
Changing the Identity Store .....	2756
Warning .....	2757
Methods for restoring content and permissions .....	2757
User filters .....	2758
User names and the Tableau Identity store .....	2759
Method 1: Use site export and import .....	2760
Method 2: Fresh installation—users republish content .....	2760
Back up, remove, and then reinstall .....	2760
Step 1: Back up Tableau Server .....	2760
Step 2: Remove Tableau Server .....	2761
Step 3: Reinstall Tableau Server with new authentication type .....	2761
External Identity Store Configuration Reference .....	2761
Configuration methods .....	2762
Configuring Active Directory .....	2764



---

Configuration reference table .....	2764
Calculated configKeys .....	2779
Unsupported configKeys .....	2780
Basic Product Data .....	2780
Disabling sharing of Basic Product Data on individual computers .....	2781
Disabling the sharing of Basic Product Data at the enterprise level .....	2781
Archived Content .....	2782
This is archived content .....	2782
Self-Host Tableau Server in a Public Cloud Service .....	2782
This is archived content .....	2782
Introduction .....	2783
About Tableau Advanced Management on Tableau Server .....	2784
Advanced Management Licensing Requirements .....	2784
Activating the Advanced Management licence .....	2789
Who can do this .....	2790
About Tableau Resource Monitoring Tool .....	2790
What is Resource Monitoring Tool? .....	2790
	2791
Get Started with Tableau Resource Monitoring Tool .....	2791
Pre-Installation .....	2792
Product Compatibility with Tableau Server .....	2792
Resource Monitoring Tool Server (RMT Server) and Agent Compatibility ...	2793

---

Concepts and Terms .....	<b>2793</b>
Setup Architecture .....	<b>2793</b>
Minimum Hardware Requirements and Recommendations for Resource Monitoring Tool .....	<b>2794</b>
Pre-Installation Checklist for Resource Monitoring Tool .....	<b>2795</b>
Upgrading Resource Monitoring Tool .....	<b>2795</b>
Troubleshoot .....	<b>2795</b>
Concepts .....	<b>2795</b>
Agent .....	<b>2795</b>
Resource Monitoring Tool Server (RMT Server) .....	<b>2795</b>
Environment .....	<b>2796</b>
Environment Status .....	<b>2796</b>
OK .....	<b>2796</b>
Warning .....	<b>2796</b>
Critical .....	<b>2797</b>
Server .....	<b>2797</b>
Pre-Installation Checklist – Tableau Resource Monitoring Tool .....	<b>2797</b>
Machine, Network and Account Requirements .....	<b>2797</b>
Who can do this .....	<b>2801</b>
Minimum Hardware Requirements and Recommendations for Tableau Resource Monitoring Tool .....	<b>2801</b>
RMT Server Minimum Hardware Recommendations .....	<b>2801</b>
Resource Monitoring Tool Agent - Resource Utilisation .....	<b>2802</b>

Installing in a Cloud Environment .....	2802
Who can do this .....	2802
Install the Tableau Resource Monitoring Tool .....	2802
Installation version history .....	2803
Before Installing the Resource Monitoring Tool .....	2804
Setup Architecture .....	2805
Installation Overview .....	2806
External Configuration .....	2806
Installation on Windows .....	2807
Antivirus .....	2807
HTTPS .....	2807
SSL Certificate Mode and Requirements .....	2808
Default File and Directory locations: .....	2809
RMT Server: .....	2809
Agent: .....	2809
Who can do this .....	2809
Next Step .....	2810
Install the RMT Server Using Web Interface .....	2810
Installing to a Non-Default Location .....	2814
RMT Server .....	2814
Who can do this .....	2815
Next Step .....	2815

---

Install the Agent Using the Web Interface .....	2815
Before you install .....	2815
Steps to download the Agent bootstrap file .....	2816
Steps to install Agent .....	2816
Installing Agent on a Multi-Node Tableau Server Installation .....	2820
Installing to a Non-Default Location .....	2820
Who can do this .....	2820
Next Steps .....	2821
Install the RMT Server Using Command Line .....	2821
Install on Windows .....	2821
Windows install properties and switches .....	2830
Install on Linux .....	2833
Who can do this .....	2842
Next Step .....	2843
RMT Server Initialisation Script Options .....	2843
Install the Agent Using Command Line .....	2847
Before you install .....	2847
Install on Windows .....	2848
Windows install properties and switches .....	2850
Install on Linux .....	2853
Installing Agent on Multi-Node Tableau Server .....	2856
Who can do this .....	2856

---

Next Step .....	2856
RMT Agent Initialisation Script Options .....	2856
RMT Agent initialisation options .....	2856
External Repository for Tableau Resource Monitoring Tool .....	2859
New installation of Resource Monitoring Tool .....	2860
Existing Resource Monitoring Tool installation .....	2863
Manually migrating local Resource Monitoring Tool repository to an external AWS PostgreSQL DB instance .....	2864
Step 1: Create an RDS instance to host the external repository .....	2864
Step 2: Test to make sure you are able to connect to the new database .....	2865
Step 3: Obtain the admin password for the local PostgreSQL database cur- rently used by RMT .....	2865
Step 4: Take a backup of the existing PostgreSQL database .....	2866
Step 5: Configure RMT Server to point to the external repository .....	2867
Step 6: Restore the back up to the external repository .....	2867
Step 7: Start the RMT Server .....	2867
Step 8: Re-register Agents .....	2868
Step 9: Verify that RMT Server is running and you are seeing the historical data .....	2868
Upgrade best practices .....	2868
Upgrading when the new version of RMT requires a major version PostgreSQL upgrade .....	2869
Recovering from a failed upgrade .....	2870
RMT and PostgreSQL version compatibility .....	2870

Who can do this .....	2871
External Message Queue Service (RabbitMQ) for Tableau Resource Monitoring Tool .....	2871
New installation of Resource Monitoring Tool .....	2872
Existing installations of Tableau Resource Monitoring Tool .....	2873
Migrating to external AWS AMQ .....	2874
Step1: Create Amazon AMQ for RabbitMQ to host the external message queue service with the following recommendations. ....	2874
Step 2: Test the connection from RMT Server .....	2874
Step 4: Verify the queue. ....	2875
Step 5: Configure RMT Server to use the new Amazon MQ service .....	2875
Step 6: Start the RMT Server .....	2876
Step 7: Re-register Agents .....	2876
Step 8: Verify that RMT Server is running .....	2876
Upgrade best practices .....	2876
Upgrade steps with enabling TLS for RabbitMQ .....	2877
Product Compatibility .....	2878
Who can do this .....	2878
Tableau Resource Monitoring Tool Prerequisites - Licences .....	2878
Upgrading Resource Monitoring Tool .....	2879
Upgrade Notes .....	2880
How to Upgrade the Resource Monitoring Tool .....	2881
Upgrade steps with enabling TLS for RabbitMQ .....	2883

---

Who can do this .....	2884
Uninstalling Resource Monitoring Tool .....	2884
Who can do this .....	2885
Configure Tableau Resource Monitoring Tool .....	2885
Resource Monitoring Tool Server Configuration .....	2885
Post install setup configurations .....	2885
Notifications .....	2887
Slack notification settings .....	2887
Email notifications .....	2888
Troubleshoot connection failures .....	2892
Incident thresholds .....	2893
Security .....	2893
Data .....	2893
Advanced .....	2893
Who can do this .....	2893
RMT Server Configuration File .....	2894
Data Retention .....	2894
SMTP Configuration .....	2895
Notification Configuration .....	2896
Histogram Configuration .....	2897
Incident Configuration .....	2900
RMT Server Logging .....	2900

---

Agent .....	2900
Tableau Server Detection .....	2900
Agent Logging .....	2901
Common .....	2902
Encrypted Messaging .....	2902
Who can do this .....	2903
rmtadmin Command Line Utility .....	2903
rmtadmin agents .....	2905
Synopsis .....	2905
Options .....	2905
rmtadmin bootstrap-file .....	2906
Synopsis .....	2906
Options .....	2906
rmtadmin cleanup .....	2907
Synopsis .....	2907
Option .....	2907
rmtadmin create-admin-user .....	2907
Synopsis .....	2908
Options .....	2908
rmtadmin create-env .....	2908
Synopsis .....	2909
Options .....	2909



---

rmtadmin data-access .....	2912
Synopsis .....	2913
Positional Parameter .....	2913
Options .....	2913
rmtadmin delete-env .....	2913
Synopsis .....	2914
Positional Parameter .....	2914
Options .....	2914
rmtadmin delete-env-data .....	2915
Synopsis .....	2915
Positional Parameter .....	2915
Option .....	2915
rmtadmin delete-server .....	2916
Synopsis .....	2916
Options .....	2916
rmtadmin delete-server-data .....	2917
Synopsis .....	2917
Options .....	2917
rmtadmin deregister .....	2918
Synopsis .....	2918
Options .....	2919
rmtadmin deregister-agent .....	2919

---

Synopsis .....	2919
Options .....	2919
rmtadmin environments .....	2921
Synopsis .....	2921
rmtadmin get .....	2921
Synopsis .....	2921
Positional Parameter .....	2921
Supported configuration keys .....	2922
rmtadmin help .....	2923
Synopsis .....	2923
rmtadmin master-setup .....	2924
Synopsis .....	2924
rmtadmin passwd .....	2933
Synopsis .....	2933
Positional Parameter .....	2933
rmtadmin query .....	2933
Synopsis .....	2933
Positional Parameter .....	2934
Options .....	2934
rmtadmin register .....	2934
Synopsis .....	2935
Positional Parameter .....	2935

---

Options .....	2935
rmtadmin restart .....	2936
Synopsis .....	2936
Options .....	2936
rmtadmin rotate-mq-certificate .....	2937
Synopsis .....	2937
Positional Parameter .....	2937
Options .....	2938
rmtadmin rotate-mq-certificates .....	2938
Synopsis .....	2938
Options .....	2939
rmtadmin servers .....	2939
Synopsis .....	2939
Positional Parameter .....	2939
rmtadmin service-setup .....	2939
Synopsis .....	2940
Positional Parameter .....	2940
Options .....	2941
rmtadmin set .....	2942
Synopsis .....	2942
Positional Parameters .....	2942
Supported configuration keys .....	2942

---

Options .....	2943
rmtadmin start .....	2943
Synopsis .....	2943
Options .....	2944
rmtadmin status .....	2945
Synopsis .....	2945
rmtadmin stop .....	2945
Synopsis .....	2946
Options .....	2946
rmtadmin test-env .....	2947
Synopsis .....	2947
Positional Parameter .....	2947
rmtadmin update-baseline .....	2947
Synopsis .....	2948
Options .....	2948
rmtadmin update-env .....	2948
Synopsis .....	2948
Options .....	2948
rmtadmin users .....	2952
Synopsis .....	2952
rmtadmin version .....	2952
Synopsis .....	2952

rmtadmin ziplogs .....	2952
Synopsis .....	2952
Positional Parameter .....	2953
Option .....	2953
Global Option .....	2953
Tableau Resource Monitoring Tool Communication Ports .....	2953
RMT Server .....	2953
RMT Server Communications .....	2954
RabbitMQ .....	2954
PostgreSQL Database .....	2955
Agent .....	2955
Manage Users .....	2955
Add a local user .....	2956
Add a delegated user .....	2956
Change user authentication .....	2957
Server Roles in Tableau Resource Monitoring Tool .....	2957
Troubleshoot authentication issues .....	2958
Tableau Resource Monitoring Tool - Incidents .....	2958
System-defined incidents .....	2959
Configurable incidents .....	2959
Environment Down Incidents .....	2960
Who can do this .....	2961

---

Agent Incidents .....	2961
Agents Unlicensed .....	2962
Incompatible Agent Version .....	2963
Upgrading Agents: .....	2963
Upgrading RMT Server .....	2964
Agent Message Queue Credential Rotation Failure .....	2965
Agent Down .....	2966
Agent polling and incident creation times .....	2966
Who can do this .....	2967
Extract Failure Incidents .....	2967
Who can do this .....	2967
Hardware Incidents .....	2967
Use the RMT Server web interface .....	2968
Use the configuration file (config.json) .....	2970
Who can do this .....	2972
Hyper Spooling Incidents .....	2973
Who can do this .....	2973
Slow Query Incidents .....	2973
Use the RMT Server web interface .....	2973
Use the configuration file (config.json) .....	2974
Who can do this .....	2975
Slow Views Incidents .....	2975

---

Configure Slow View Incident Thresholds .....	2975
Encrypted Data Collection .....	2976
For versions 2022.3 and later .....	2976
Tableau Repository SSL Configuration .....	2977
For versions 2022.2 and earlier .....	2978
RabbitMQ Setup .....	2978
Tableau Resource Monitoring Tool Setup .....	2978
Who can do this .....	2979
Hardware Changes to RMT Server - Tuning PostgreSQL Database .....	2979
Tableau Server Topology Changes .....	2980
Adding a Node .....	2980
Removing a Node .....	2980
Re-registering an Agent .....	2982
Who can do this .....	2983
Tableau Resource Monitoring Tool Log Files .....	2983
Log Files .....	2983
Components .....	2983
Log Level Configuration .....	2985
Sending Log Files to Tableau Customer Support .....	2987
Who can do this .....	2987
Tableau Log Files .....	2987
Upgrading Tableau .....	2988

Ensure Resource Monitoring Tool supports the new Tableau version .....	2988
Stop Agents .....	2988
Upgrade Tableau .....	2988
Update Tableau Version in Resource Monitoring Tool .....	2988
Restart Agents .....	2988
Who can do this .....	2989
Monitor Tableau Server Performance .....	2989
Monitor Tableau Server Performance with Tableau Resource Monitoring Tool .....	2989
Pre-built Charts .....	2990
Custom Charts .....	2992
Who can do this .....	2992
Tableau Resource Monitoring Tool Performance Charts .....	2992
Environment Tab .....	2993
Performance Chart .....	2993
Tableau Processes Chart .....	2994
Background Tasks Chart .....	2994
Concurrent Users Chart .....	2994
Slow View Load Requests Chart .....	2995
Total View Load Requests Chart .....	2996
Server Tab .....	2996
Insights Tab .....	2996
Slowest Views .....	2996



Longest Extract Refreshes .....	2996
Status Tab .....	2997
Who can do this .....	2997
Related Topics .....	2997
Tableau Resource Monitoring Tool Activity Pages .....	2997
VizQL Sessions .....	2998
Background Tasks .....	2998
Data Queries .....	2999
View Loads .....	2999
Slow Views .....	2999
Who can do this .....	3000
Related Topics .....	3000
Tableau Resource Monitoring Tool Content Pages .....	3000
Sites .....	3001
Projects .....	3001
Workbooks .....	3001
Views .....	3002
Who can do this .....	3002
Related Topics .....	3002
Investigating Slow View Load Requests .....	3002
Who can do this .....	3005
WMI Classes .....	3005

---

Explore Monitoring Data Using Tableau Data Source Files .....	<b>3006</b>
Requirements .....	<b>3007</b>
Enable access to the Resource Monitoring Tool PostgreSQL database ....	<b>3007</b>
Resource Monitoring Tool versions 2022.3 and later: .....	<b>3008</b>
Resource Monitoring Tool with local repository: .....	<b>3008</b>
Resource Monitoring Tool with external repository: .....	<b>3008</b>
Resource Monitoring Tool versions 2022.2 and earlier: .....	<b>3008</b>
Connect to the RMT .tds files from Tableau Desktop .....	<b>3009</b>
Who can do this .....	<b>3010</b>
Chargeback Reports .....	<b>3010</b>
Security .....	<b>3011</b>
Data Generation .....	<b>3011</b>
Who can do this .....	<b>3012</b>
Troubleshoot Tableau Resource Monitoring Tool Issues .....	<b>3012</b>
Troubleshoot Missing Hardware Performance Data .....	<b>3012</b>
Step 1: Check the Agent connection status .....	<b>3013</b>
Step 2: Ensure the Agent is running .....	<b>3013</b>
Step 3: Ensure the Agent is configured correctly .....	<b>3014</b>
Step 4: Restart the Agent .....	<b>3014</b>
Step 5: Verify Run As account configuration .....	<b>3014</b>
Step 6: Contact Support .....	<b>3014</b>
Who can do this .....	<b>3015</b>

Troubleshoot RMT Server Service Interruptions .....	<b>3015</b>
Who can do this .....	<b>3015</b>
Troubleshoot SSL Certificate Errors .....	<b>3015</b>
Who can do this .....	<b>3016</b>
Troubleshoot Unknown Status of Tableau Server Processes .....	<b>3016</b>
Step 1: Check Tableau Server Environment Settings .....	<b>3016</b>
Step 2: Update Tableau Server Machines and Processes .....	<b>3017</b>
Step 3: Update Machine Name .....	<b>3017</b>
Step 4: Contact Support .....	<b>3017</b>
VizQL Session details page says the VizQL process is unknown .....	<b>3018</b>
Who can do this .....	<b>3018</b>
Troubleshoot User Authentication .....	<b>3018</b>
Troubleshoot RMT user authentication issues .....	<b>3018</b>
Using logs to troubleshoot authentication problems .....	<b>3019</b>
Who can do this .....	<b>3019</b>
Troubleshoot Web Interface Timeouts .....	<b>3020</b>
Who can do this .....	<b>3021</b>
Troubleshoot WMI Query Issues .....	<b>3021</b>
Who can do this .....	<b>3022</b>
Troubleshoot RMT Uninstall Errors .....	<b>3022</b>
Who can do this .....	<b>3023</b>
Troubleshoot Messaging Tables Disk Usage Warnings .....	<b>3023</b>

---

Who can do this .....	3023
Upgrade Power Tools for Server to Tableau Resource Monitoring Tool .....	3024
Tableau Resource Monitoring Tool Legacy Licence Key Activation .....	3025
About Tableau Content Migration Tool .....	3026
What is Content Migration Tool? .....	3026
Help and Support .....	3026
Getting Started with Tableau Content Migration Tool .....	3026
Pre-installation .....	3026
Installation requirements .....	3026
Compatibility with Tableau Server .....	3027
Compatibility with Tableau Cloud .....	3027
Compatibility with Tableau content .....	3028
Post-installation .....	3029
Limitations when migrating content .....	3029
Create a migration plan .....	3029
Install Tableau Content Migration Tool .....	3029
Installation requirements .....	3029
Install Content Migration Tool .....	3030
Upgrade Content Migration Tool .....	3030
Install Content Migration Tool from the command line .....	3031
Install switches .....	3031
Who can do this .....	3032

---

Using Tableau Content Migration Tool .....	3032
Tableau Content Migration Tool Use Cases .....	3032
Content promotion .....	3033
Tailoring content for customers .....	3035
Environment migration .....	3036
External content sharing .....	3037
Validating database migrations .....	3039
Geographical content migration .....	3040
Consolidate sites .....	3041
Maintenance tasks .....	3042
Tagging stale content .....	3042
Restoring content .....	3042
Partial backup .....	3043
Migration Plan Overview .....	3044
Limitations when migrating content .....	3044
Encryption keys .....	3044
Migration process .....	3045
Step 1: Start .....	3045
Step 2: Planning .....	3046
Step 3: Migration .....	3046
Published workbooks .....	3048
Published data sources .....	3048

---

Output .....	3048
Errors and warnings .....	3049
Who can do this .....	3050
Migration Limitations .....	3050
Compatibility with Tableau content .....	3050
Configurations .....	3050
Data connections .....	3050
Unsupported content .....	3051
Migration Plans: Sites .....	3055
Required permissions and licences .....	3055
Step 1: Source .....	3056
Sign in to the source site .....	3056
Step 2: Destination .....	3057
Saved connections .....	3057
Add or edit saved connections .....	3058
Add saved connections with personal access tokens .....	3059
Step 3: Continue to the next step .....	3060
Who can do this .....	3060
Migration Plans: Source Projects .....	3061
Step 1: Select your source project .....	3061
Step 2: Select project options .....	3062
Step 3: Continue to the next step .....	3063

---

Who can do this .....	3063
Migration Plans: Workbooks .....	3063
Step 1: Workbook selection .....	3063
Specific Workbooks Selection .....	3064
Select All .....	3065
Display: .....	3065
Thumbnails .....	3065
List .....	3065
Rule Based Selection .....	3065
Workbooks in projects .....	3066
Workbooks tagged with .....	3066
Workbooks published by .....	3066
All Workbooks Selection .....	3066
Step 2: Workbook mapping .....	3067
Rename Workbook .....	3067
Change Project .....	3068
Add Project .....	3068
Change Prefix .....	3069
Change Suffix .....	3070
Step 3: Workbook transformations .....	3070
Action URL Replacement .....	3072
Example: .....	3072

---

Set Parameter Value .....	3073
Remove Images .....	3073
Remove Tooltip Commands .....	3073
Replace Images .....	3074
Example: .....	3074
Zoom Control Visibility .....	3074
Web Page URL Replacement .....	3074
Example: .....	3075
Step 4: Data source transformations .....	3075
Set Calculation Formula .....	3078
Set Connection Info .....	3078
Set Custom SQL .....	3079
Remove Extract .....	3080
Apply Saved Credentials .....	3080
Step 5: Publish options .....	3080
Reset Dashboard Selections .....	3081
Overwrite Newer Workbooks .....	3081
Copy Workbook Permissions .....	3081
Copy Extract Refresh Schedules .....	3081
Copy Embedded Credentials for Workbooks .....	3082
Copy Workbook Owner .....	3082
Apply User Mappings .....	3082



---

Add Option .....	3082
Add Tags .....	3084
Remove Tags .....	3085
Apply Extract Refresh Schedules .....	3086
Set Permissions .....	3087
Set Generate Thumbnail As .....	3088
Step 6: Continue to the next step .....	3089
Who can do this .....	3089
Migration Plans: Published Data Sources .....	3089
Step 1: Selection .....	3090
Step 2: Mapping .....	3090
Delete .....	3091
Name .....	3091
Project .....	3091
Destination Name .....	3091
Destination Project .....	3091
Step 3: Data source transformations .....	3092
Replace Table/Schema Name .....	3094
Set Calculation Formula .....	3094
Set Connection Info .....	3095
Set Custom SQL .....	3095
Remove Extract .....	3096

---

Use Tableau Bridge .....	3096
Apply Saved Credentials .....	3096
Step 4: Publish options .....	3096
Overwrite Newer Data Sources .....	3097
Copy Data Source Permissions .....	3097
Copy Extract Refresh Schedules .....	3097
Copy Embedded Credentials for Data Sources .....	3098
Copy Data Source Owner .....	3098
Apply User Mappings .....	3098
Add Options .....	3098
Remove Tags .....	3100
Add Tags .....	3100
Apply Extract Refresh Schedules .....	3101
Set Permissions .....	3102
Step 5: Continue to the next step .....	3103
Who can do this .....	3103
Migration Plans: Permissions and Ownership .....	3103
Mapping limitations .....	3104
Step 1: Add mapping .....	3104
Domain Mapping .....	3104
User Mapping .....	3105
Group Mapping .....	3106

---

Import mappings from a CSV file .....	3106
CSV file format requirements .....	3106
Import user permissions mappings .....	3107
CSV import example .....	3108
Step 2: Change mapping order .....	3110
Step 3: Continue to next step .....	3110
Who can do this .....	3111
Migration Plans: Migration Scripts .....	3111
Step 1: Pre-Migration .....	3111
Working Directory .....	3111
Run .....	3112
Command Executable .....	3112
Command Parameters .....	3112
Script .....	3112
Step 2: Post-Migration .....	3112
Working Directory .....	3113
Run .....	3113
Command Executable .....	3113
Command Parameters .....	3113
Script .....	3113
Step 3: Continue to Next Step .....	3113
Who can do this .....	3114

---

Migration Plans: Plan Options .....	3114
Step 1: Configure options .....	3114
Exclude extract refreshes .....	3115
Step 2: Version control .....	3116
Step 3: Save plan .....	3117
Step 4: Continue to next step .....	3117
Who can do this .....	3117
Migrate Workbooks and Data Sources with Extracts .....	3118
Changing data connections that use extracts .....	3118
Option 1: Use Published Data Sources .....	3119
Option 2: Remove the Extract During Migration .....	3119
Option 3: Refresh the Extract After Migration .....	3119
Who can do this .....	3121
Migrate Workbooks and Data Sources with Embedded Credentials .....	3121
Overview .....	3121
Allow embedded credential migration .....	3122
Tableau Cloud .....	3122
TSM Command Line Interface .....	3122
Content Migration Tool .....	3123
Troubleshooting .....	3124
There is no option to migrate embedded credentials .....	3124
Migrating embedded credentials failed .....	3124

---

Who can do this? .....	3124
Using the Tableau Content Migration Tool Console Runner .....	3125
Run Plan .....	3126
Available options: .....	3126
Exit codes: .....	3126
Show Plan Summary .....	3126
help .....	3126
version .....	3126
encryption .....	3127
improvement .....	3127
Examples .....	3127
licence .....	3127
Examples .....	3127
script-warning .....	3128
Examples .....	3128
Who can do this .....	3128
Example: Scripting Migration Plans .....	3129
Who can do this .....	3130
Using the Tableau Content Migration Tool Command Line Interface .....	3131
migrate .....	3131
help .....	3131
Examples .....	3131

---

licence .....	3132
Examples .....	3132
update .....	3132
Examples .....	3132
version .....	3133
Who can do this .....	3133
Tableau Content Migration Tool Settings .....	3133
Who can do this .....	3135
Tableau Content Migration Tool Log Files .....	3136
Content Migration Tool Log File Location .....	3136
Who can do this .....	3137
Activity Log .....	3137
Audit Permissions Using the Activity Log .....	3138
Log format .....	3139
Example .....	3139
Events .....	3141
Activity Log Event Type Reference .....	3141
Event type details .....	3141
Common attributes .....	3141
add_delete_user_to_group .....	3142
background_job .....	3143
content_owner_change .....	3145

---

create_delete_group .....	3146
create_permissions .....	3146
delete_all_permissions .....	3147
delete_permissions .....	3148
delete_permissions_grantee .....	3148
display_sheet_tabs .....	3149
move_content .....	3149
project_lock_unlock .....	3150
site_storage_usage .....	3150
update_permissions .....	3151
update_permissions_template .....	3152
user_create_delete .....	3153
Tableau Server Key Management System .....	3153
Tableau Server local KMS .....	3154
Troubleshoot configuration .....	3155
Multi-node misconfiguration .....	3155
Regenerate RMK and MEK on Tableau Server .....	3155
AWS Key Management System .....	3155
AWS KMS for encryption at rest .....	3156
Configure AWS KMS for Tableau Server encrypted extracts .....	3157
Step 1: Create CMK and set key policy for Tableau Server in AWS .....	3157
Step 2: Collect AWS configuration parameters .....	3157

---

Step 3: Configure Tableau Server for AWS KMS .....	3158
Step 4: Enable encryption at rest .....	3158
Step 5: Validate installation .....	3158
Troubleshoot configuration .....	3160
Multi-node misconfiguration .....	3160
Refresh AWS CMK .....	3160
Regenerate RMK and MEK on Tableau Server .....	3161
Back up and restore with AWS KMS .....	3161
Azure Key Vault .....	3161
Azure Key Vault for encryption at rest .....	3162
Configure Azure Key Vault for Tableau Server encrypted extracts .....	3163
Step 1: Create a key vault and key for Tableau Server in Azure .....	3163
Step 2: Collect Azure configuration parameters .....	3163
Step 3: Configure Tableau Server for Azure Key Vault .....	3163
Step 4: Enable encryption at rest .....	3164
Step 5: Validate installation .....	3164
Troubleshoot configuration .....	3165
Multi-node misconfiguration .....	3165
Refresh Azure Key .....	3165
Back up and restore with Azure Key Vault .....	3165
Tableau Server External File Store .....	3166
Why use External File Store? .....	3166



Managing External File Store .....	3167
Licence Management .....	3167
Supported Migration Scenarios .....	3167
Backup and Restore .....	3167
Upgrade Considerations .....	3167
High Availability Considerations .....	3168
Topology .....	3168
Next .....	3170
Install Tableau Server with External File Store .....	3170
Prerequisites .....	3171
Install Tableau Server with External File Store .....	3172
Step 1: Configure a network share .....	3172
Step 2: Download and install TSM .....	3173
Step 3: Activate and register Tableau Server .....	3173
Step 4: Enable External File Store .....	3174
Step 5: Configure the initial node settings .....	3174
Step 6: Complete the install .....	3174
Step 7: Post-installation tasks .....	3175
Who can do this .....	3175
Next .....	3175
Reconfigure File Store .....	3175
Reconfigure Tableau Server with External File Store .....	3176

---

Prerequisites .....	3176
Step 1: Upgrade Tableau Server .....	3177
Step 2: Activate the Advanced Management licence .....	3177
Step 3: Configure File Store to use an external storage .....	3177
Reconfigure Tableau Server to use local File Store .....	3179
Configure Tableau Server to use a different external storage .....	3180
Who can do this .....	3180
Backup and Restore with External File Store .....	3181
Backup strategies: .....	3181
Tableau Server configured with External File Store .....	3182
Creating a snapshot backup .....	3182
Restoring a snapshot backup .....	3184
Tableau Server configured with External File Store and External Repository .....	3184
Backing up the repository .....	3185
Option 1: Include repository backup with network share snapshot .....	3185
Create a snapshot backup .....	3185
Restoring a snapshot backup .....	3187
Option 2: Back up repository separately .....	3188
Create snapshot backups .....	3188
Restoring a snapshot backup .....	3189
Who can do this .....	3191
Performance Considerations for External File Store .....	3191

Who can do this .....	<b>3192</b>
Tableau Server External Repository .....	<b>3192</b>
External Repository Considerations .....	<b>3193</b>
Cloud Platform .....	<b>3193</b>
Requirements .....	<b>3194</b>
Versioning .....	<b>3195</b>
Topology .....	<b>3196</b>
Managing the External Repository .....	<b>3198</b>
Licence Management .....	<b>3198</b>
Supported Migration Scenarios .....	<b>3199</b>
Backup and Restore .....	<b>3199</b>
SSL Connections .....	<b>3200</b>
Updating the SSL Certificate .....	<b>3201</b>
High Availability Considerations .....	<b>3201</b>
Upgrade considerations .....	<b>3201</b>
Monitoring the Status of the Repository .....	<b>3202</b>
Getting Logs .....	<b>3204</b>
Next Steps .....	<b>3204</b>
Create a PostgreSQL DB Instance on AWS Relational Database Service (RDS)	<b>3204</b>
Requirements and Recommendations .....	<b>3205</b>
Create a PostgreSQL DB instance on Amazon RDS .....	<b>3206</b>
Step 1: Create a parameter group .....	<b>3206</b>

Step 2: Create a PostgreSQL DB instance on Amazon RDS .....	3206
Step 3: Get the PostgreSQL DB Instance Endpoint .....	3208
Step 4: Download the SSL certificate file (.pem file) .....	3208
Configuring High Availability for your PostgreSQL DB .....	3209
Disaster Recovery for your PostgreSQL DB .....	3209
Who can do this .....	3209
Next Steps .....	3210
Create an Azure Database PostgreSQL Instance on Azure .....	3210
Requirements and Recommendations .....	3210
Create a Database PostgreSQL instance on Azure .....	3211
Step 1: Create a delegated subnet for the Azure Database for Post- greSQL instance .....	3211
Step 2: Create an Azure Database for PostgreSQL instance .....	3212
Step 3: Configure a server-level firewall rule .....	3213
Step 4: Configure the Azure Database for PostgreSQL Instance. ....	3213
Step 5: Get the PostgreSQL DB Instance Endpoint .....	3213
Step 6: Download the SSL certificate file .....	3213
Configuring High Availability for your PostgreSQL DB .....	3214
Disaster Recovery for your PostgreSQL DB .....	3214
Who can do this .....	3215
Next Steps .....	3215
Create a PostgreSQL Instance on Google Cloud .....	3215
Requirements and Recommendations .....	3215

---

Create a Database PostgreSQL instance on Google Cloud .....	3216
Step 1: Create a new PostgreSQL instance .....	3216
Step 2: Configure database flags for your PostgreSQL instance .....	3216
Step 3: Get the PostgreSQL DB Instance Endpoint .....	3217
Step 4: Download the SSL certificate file .....	3217
Configuring High Availability for your PostgreSQL DB .....	3217
Disaster Recovery for your PostgreSQL DB .....	3217
Who can do this .....	3218
Next Steps .....	3218
Create a PostgreSQL Database as a Stand-Alone Installation .....	3218
Requirements and Recommendations .....	3219
Create a stand-alone PostgreSQL Database Instance .....	3219
Step 1: Install and initialise PostgreSQL .....	3219
Step 1: Configure your PostgreSQL Instance .....	3220
Super User Settings .....	3220
Network and Security .....	3220
Database Options .....	3220
Update Parameters .....	3220
Configure remote connections .....	3221
Configure SSL .....	3221
High Availability and Disaster Recovery .....	3222
Who can do this .....	3223

---

Install Tableau Server with External PostgreSQL Repository .....	3223
Before you install .....	3223
Install and Configure Tableau Server .....	3225
Step 1: Create a configuration file .....	3225
Step 2: Install Tableau Server and Configure the External Repository .....	3226
Step 3: Complete tsm Initialise .....	3227
Step 4: Complete the install .....	3227
Who can do this .....	3227
Re-Configure Tableau Server Repository .....	3227
Move local repository to external .....	3228
Move external repository to local .....	3230
Who can do this .....	3231
Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL .....	3231
Before you upgrade .....	3231
Tableau Server Upgrade .....	3233
Product Compatibility .....	3234
Who can do this .....	3237
Upgrading your RDS Instance .....	3237
Who can do this .....	3238
Workload Management through Node Roles .....	3238
Backgrounder node roles .....	3238
Using Backgrounder node roles .....	3239

Configuration options .....	3239
Licence requirements .....	3240
Considerations .....	3241
File Store node roles .....	3242
Guidelines to optimise for extract refresh and backup or restore workloads. ....	3243
Fine tune extract query workload management .....	3245
Configuration options .....	3246
Licence requirements .....	3247
How to see node roles .....	3247
Who can do this .....	3247
Tableau Server Independent Gateway .....	3247
Why use Independent Gateway? .....	3248
Managing Independent Gateway .....	3248
Licence Management .....	3248
Backup and Restore .....	3249
High Availability Considerations .....	3249
Topology .....	3249
Next .....	3249
Install Tableau Server with Independent Gateway .....	3249
Prerequisites .....	3250
Install Tableau Server and Independent Gateway .....	3250
Step 1: Download and install Tableau Server .....	3251

---

Step 2: Download and install Independent Gateway .....	3251
Step 3: Enable Independent Gateway in Tableau Server .....	3253
The Independent Gateway JSON file contents .....	3253
The Independent Gateway authsecret .....	3254
Independent Gateway JSON file example .....	3254
Enabling Independent Gateway in Tableau Server .....	3255
Step 4: Verify Independent Gateway in Tableau Server .....	3255
Configure Tableau Server with Independent Gateway .....	3255
Direct vs relay connection .....	3256
Direct connection .....	3256
Configuration .....	3256
Manage port ingress .....	3257
Relay connection .....	3257
Configuration .....	3257
Housekeeping protocol .....	3258
Change the HK port .....	3258
Log file locations .....	3259
Troubleshooting .....	3259
Configure Authentication Module with Independent Gateway .....	3259
Example authentication module configuration .....	3260
Configuration properties .....	3260
The <Location "/tsighk"> block .....	3262



---

Troubleshoot custom authentication module configuration .....	3263
Configure TLS on Independent Gateway .....	3263
TLS configuration example .....	3264
TLS configuration overview .....	3264
Certificate requirements and considerations .....	3264
Global TLS configurations .....	3265
External TLS to Independent Gateway .....	3266
Step 1: Distribute files to Independent Gateway computers .....	3266
Step 2: Update environment variables on Independent Gateway computers .....	3266
Step 3: Set TLS configuration properties on Tableau Server .....	3267
Independent Gateway to Tableau Server .....	3269
Step 1: Configure and enable TLS on Tableau Server .....	3270
Step 2: Distribute certificate files on Independent Gateway computers .....	3270
Step 3: Set TLS configuration properties on Tableau Server .....	3270
Step 4: Upload root CA certificate to Tableau Server .....	3274
Housekeeping connection between Tableau Server and Independent Gateway .....	3274
Step 1: Distribute files to Independent Gateway computers .....	3274
Step 2: Import Independent Gateway root CA certificate into Tableau Server trust store .....	3275
Step 3: Update environment variables on Independent Gateway computers .....	3275
Step 4: Update httpd.conf.stub on Independent Gateway .....	3276
Step 5: Set TLS configuration properties on Tableau Server .....	3277

---

Step 6 Update Independent Gateway JSON configuration file .....	3280
Troubleshooting .....	3280
Upgrade Tableau Server Independent Gateway .....	3280
Overview .....	3281
Step 1: Copy files for reference .....	3281
Step 2: Obliterate Independent Gateway .....	3282
Step 3: Install Independent Gateway .....	3282
Step 4: (Optional) Overwrite tsighk-auth file with original copy .....	3282
Step 5: Update housekeeping TLS settings .....	3283
Step 6: (Optional) Update backend Tableau Server deployment .....	3284
Step 7: Restart the tsig-httpd service .....	3284
Uninstall Tableau Server Independent Gateway .....	3284
Uninstalling Independent Gateway .....	3284
Install Switches and Properties for Tableau Server Independent Gateway .....	3285
Tableau Server Backgrounder Resource Limits .....	3290
Overview and Concepts .....	3290
What it is .....	3290
When to use it .....	3290
Requirements and recommendations .....	3291
Terminology and concepts .....	3291
What you can do .....	3291
How to set Backgrounder resource limits .....	3292

Default site limits .....	3293
Custom site limits .....	3293
What happens after you configure resource limits .....	3294
When to make adjustments to the resource limits .....	3294
Who can do this .....	3295
About Data Management .....	3295
Data Management Features .....	3296
Tableau Catalog .....	3296
Tableau Prep Conductor .....	3298
Virtual connections and data policies .....	3299
Licence Data Management .....	3299
Tableau Prep Conductor .....	3300
Tableau Catalog .....	3300
Virtual connections and data policies .....	3300
How Data Management licensing works .....	3301
User-Based .....	3301
Core-Based .....	3301
Tableau Prep Conductor .....	3304
Enabling Tableau Prep Conductor on Tableau Server .....	3306
About the Flow Workspace .....	3307
Flow Overview page .....	3307
Flow Overview page without the Data Management .....	3310

---

Flow Connections page .....	3310
Flow Scheduled Tasks page (Data Management required) .....	3311
Schedules page .....	3312
Flow Run History (Data Management required) .....	3313
Flow Revision History .....	3314
Who can do this .....	3314
Enable and Configure Tableau Prep Conductor on Tableau Server .....	3314
Server Topology .....	3315
Next step: .....	3317
Who can do this .....	3317
Step 1 (New Install): Install Tableau Server with Tableau Prep Conductor ....	3317
Before you install .....	3318
Install Tableau Server and enable Tableau Prep Conductor .....	3318
Configure public gateway settings .....	3318
Enable Tableau Prep Conductor .....	3319
Verify Tableau Prep Conductor is enabled and running .....	3320
Dedicate a node for Tableau Prep Conductor .....	3322
Multi-node installations .....	3323
Next step .....	3323
Who can do this .....	3323
Step 1 (Existing Install): Enable Tableau Prep Conductor .....	3323
Before you upgrade .....	3324

Prepare for upgrade: .....	3324
Configure public gateway settings .....	3324
Tableau Server Installations using User-Based licences .....	3325
Tableau Server single-node installations .....	3325
Tableau Server multi-node installations .....	3328
Tableau Server Installations using Core-Based licences .....	3331
Tableau Server single-node installations .....	3332
Tableau Server multi-node installations .....	3334
Next step .....	3338
Who can do this .....	3338
Step 2: Configure Flow Settings for your Tableau Server .....	3338
Publishing, Scheduling, and Credential Settings .....	3339
Implication of disabling Tableau Prep Conductor .....	3340
Configure notifications for flow failures .....	3341
To enable the server-wide email notification .....	3341
Set notification values .....	3342
To configure notification for a site: .....	3343
Next step .....	3343
Who can do this .....	3343
Step 3: Create Schedules for Flow Tasks .....	3344
Create a new schedule: .....	3344
Next step .....	3345

Who can do this .....	3345
Step 4: Safe list Input and Output locations .....	3345
How to safe list input and output locations .....	3346
Next step .....	3349
Who can do this .....	3349
Step 5: Optional Server Configurations .....	3349
Set the timeout period for flows .....	3349
Set the threshold for suspended flow tasks .....	3350
Who can do this .....	3350
Schedule Flow Tasks .....	3351
Schedule a flow task .....	3352
Schedule linked tasks .....	3356
Who can do this .....	3365
Notify Users of Successful Flow Runs .....	3365
Configure the site settings for flow subscriptions .....	3365
Publish the Flow .....	3366
Add a flow subscription .....	3367
Unsubscribe from a flow subscription .....	3368
View Subscriptions .....	3369
Resume suspended flow subscriptions .....	3369
Access the flow data from a notification email .....	3370
Who can do this .....	3371

---

Manage a Flow .....	3372
Managing your flows .....	3372
Who can do this .....	3374
Monitor Flow Health and Performance .....	3383
Detect issues as they occur and resolve them .....	3383
Get notifications when a flow fails: .....	3383
View and resolve errors .....	3384
Flow Overview page .....	3385
Connections page .....	3386
Scheduled Tasks page .....	3386
Run History page .....	3387
Alerts .....	3388
Tableau Prep Conductor process status .....	3389
Who can do this .....	3390
Administrative Views for Flows .....	3390
Who can do this? .....	3391
Action by all users .....	3391
Action by Specific User .....	3392
Action by Recent Users .....	3392
Backgrounder Task Delays .....	3393
Background Tasks for Non Extracts .....	3394
Performance of Flow Runs .....	3395

---

Stats for Space Usage .....	3396
Who can do this .....	3397
Developer Resources - REST APIs .....	3397
About Tableau Catalogue .....	3398
How Tableau Catalogue works .....	3399
Key Tableau Catalogue terms .....	3399
Licence Tableau Catalogue .....	3400
Enable Tableau Catalog .....	3400
Features and functionality .....	3400
Data discovery .....	3400
Curation and trust .....	3401
Lineage and impact analysis .....	3401
Developer resources .....	3401
About Virtual Connections and Data Policies .....	3402
Key terms .....	3403
Licence virtual connections and data policies .....	3403
Enable virtual connections and data policies .....	3403
Permissions .....	3403
Permissions vs. data policies .....	3404
How permissions and data policies work together .....	3404
Features and functionality .....	3405
Virtual connection editor workflow .....	3406



---

Next step .....	3407
Create a Virtual Connection .....	3407
Connect to data .....	3407
Add another connection .....	3408
Select tables to include in the connection .....	3409
Select live or extract mode for tables .....	3409
Incremental Extracts .....	3409
Convert to Custom SQL .....	3411
Extract table data .....	3412
Set the table visibility state .....	3413
See table details .....	3413
Refresh data from the database .....	3414
Who can do this .....	3415
Next steps .....	3415
See also .....	3415
Create a Data Policy for Row-Level Security .....	3415
About data policies .....	3415
Filter with a policy column from a policy table .....	3416
An example using a policy column from a policy table .....	3420
Filter with policy column from an entitlement table .....	3420
An example using a policy column from an entitlement table .....	3423
Write a policy condition .....	3423

---

Policy condition examples .....	3423
Supported Tableau functions in policy conditions .....	3424
Who can do this .....	3424
Next steps .....	3424
Resources .....	3425
Test Row-Level Security with Preview as User .....	3425
Who can do this .....	3425
Next step .....	3426
Publish a Virtual Connection and Set Permissions .....	3426
Save a draft .....	3426
Draft in progress .....	3426
Publish the connection .....	3427
Set permissions on a virtual connection .....	3427
Who can do this .....	3428
Next step .....	3428
Schedule Extract Refreshes for a Virtual Connection .....	3428
Extract tables .....	3429
Schedule extract refreshes on Tableau Server .....	3429
Time limit for extract refreshes .....	3430
Who can do this .....	3430
Next step .....	3431
Use a Virtual Connection .....	3431


- Connect to a virtual connection .....3431
- Edit a virtual connection or data policy ..... 3432
  - Respond to underlying schema changes ..... 3432
- Work with virtual connection revision history ..... 3432
  - Restore or delete a virtual connection revision ..... 3433
- Replace an existing data source in a workbook with a virtual connection .....3434
- Who can do this .....3434



# Tableau Server Release Notes

This topic describes what's new in the latest release. Use the viz below to explore new features in Tableau Server. Click on a feature to bring up the tooltip with a link to detailed documentation for that feature. Explore the filters to refine your search. Download the data to create a customised list.

- Use the Search by **Feature** dashboard to see a list of new features for a product or version, or explore when a feature was released. The dashboard currently defaults to Server for the latest version of Server.
- Use the **Upgrade Server** dashboard to see a list of features specific to your upgrade. The upgrade view includes filters that allow you to filter for new or changed features. Features that are listed under the **changed** status are typically features that can impact upgrade. The list features categorised as changed might be useful to prepare and test your upgrades.



## Tableau Release Navigator

Search by Feature

Select a Product  
(All)

Product Version  
Latest

Offering  
(All)

Status  
(All)

Feature

Select a feature to see more details

Upgrade Server

Upgrade Desktop

Upgrade Prep

Feature List by Product and Version			
Product	Release	Status	
Tableau+	June 2024	New	Tableau+ Licence edition
Tableau Cloud	June 2024	Changed	Background service enabled for c.. Bridge file support for extract refr.. Incremental Extracts with Subran.. Manage Dashboard and Viz Ext.. Set up your Data Connect cluster .. Updated Data Cloud Connection ..
		Deprecated	Embed Tableau Views into Salesf..
		New	Convert Virtual Connection Table .. Dynamic group membership usin.. Group sets Incremental Extracts for Virtual C.. Individual Control Formatting Multi-fact Relationships

Have feedback? [Let us know](#)

View on Tableau Public

| Share

# Plan Your Deployment

The articles in this section provide information on planning a Tableau Server deployment.

In addition to consulting the articles in this section, we recommend that you review [Tableau Blueprint](#) as a first step in your planning workflow. Tableau Blueprint is a step-by-step guide to becoming a data-driven organisation.

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Server Administrator Overview

Tableau Server on Windows integrates with a number of components in your IT infrastructure to provide a unique self-service data analytics culture for your users. It's important that you, as a server administrator, understand how Tableau Server fits into your IT infrastructure.

The topics in this section provide information on planning, deploying, tuning and managing Tableau Server.

If you are deploying Tableau Server as part of a broader effort to transform your organisation into a data-driven culture, see [Tableau Blueprint](#). Tableau Blueprint is a step-by-step guide to becoming a data-driven organisation, whether your organisation is new to modern, self-service analytics or you've already deployed and need to broaden, deepen and scale the use of data.

This topic provides a brief overview of how to think about Tableau Server and how it interacts with your existing IT infrastructure.

Looking for Tableau Server on Linux? See [Server Administrator Overview](#).

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

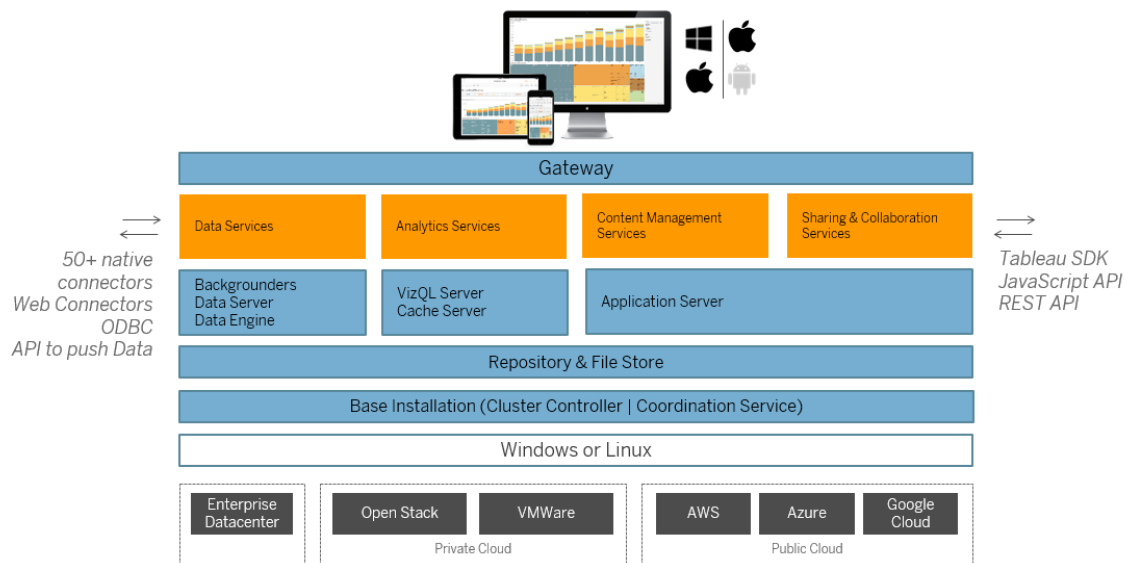
Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.



## Architectural overview

Tableau Server is a collection of processes that work together to provide a full self-service analytic platform for your users. The following diagram shows a high-level architectural view of Tableau Server.



Multiple server processes (shown in blue above) work together to provide services at various tiers. The Gateway process is the component that redirects traffic from all Tableau clients to the available server nodes in a cluster.

Data Services is a logical grouping of services that provide data freshness, shared meta data management, governed data sources and in-memory data. The underlying processes that power Data Services are the Backgrounder, Data Server and Data Engine processes.

Analytics Services, composed of the VizQL and Cache Server processes, provide user-facing visualisation and analytics services and caching services.

Sharing and Collaboration, and Content Management Service are powered by the Application Server process. Core Tableau Server functionality such as user login, content management (projects, sites, permissioning, etc.) and administration activities are provided by the Application Server process.

All of the above services use and rely on the Repository process, which contains structured relational data like metadata, permissions, workbooks, data extracts, user info and other data. The File Store process enables data extract file redundancy across the cluster and ensures extracts are locally available on all cluster nodes. Under heavier loads, extract files are available locally across the cluster for faster processing and rendering.

Tableau's architecture is flexible, allowing you to run the platform just about anywhere. You can install Tableau Server on-premises, in your private cloud or data centre, on Amazon EC2, on Google Cloud Platform or on MS Azure. Tableau analytics platform can also run atop virtualisation platforms. We recommend you follow the best practices for each virtualisation platform to ensure the best performance from Tableau Server.

## Tableau and your data

When you install Tableau Server into your organisation, it becomes a core component of the analytics pipeline to the data your users need. It's important to understand how Tableau Server interacts with your business data. Specifically, Tableau Server can store extracts of data in your organisation. It can also connect to live data sources. How you choose to provide the data to your Tableau users is informed by a number of variables: data source type, user scenario, performance and access requirements, and infrastructure conditions.

Tableau Server has not been architected as a data warehouse server where static, native data files are housed. In fact, using Tableau Server as a traditional data warehouse is a poor use of your investment. Rather, when it comes to data storage, we recommend hosting optimised data extracts on Tableau Server. While a data extract is often a subset of a larger data source in your organisation, you can also create extracts for data sources that are overtaxed during work hours by [scheduling the extract refresh](#) for off-hours.

Extracts are also useful for modelling data or to enable highly-performant visualisation authoring. For example, to improve visualisation authoring and interaction performance you may optimise extracts by filtering the source data to the essential fields for a given department or project. Extracts can be resource intensive. If your organisation plans to make heavy use of extracts, review the topic, [Optimise for Extracts](#).

Tableau Server also provides direct, authorised access to live data sources, allowing users to build and run complex filtered queries against a variety of connected data sources. For this scenario, Tableau requires highly performant network access to the data sources in your organisation and to those in the cloud. Tableau Server and the target data sources also need to be properly sized to handle the processing load required by high-volume, complex data operations. You can optimise performance for live data connections with caching configurations and specifying initial SQL commands.

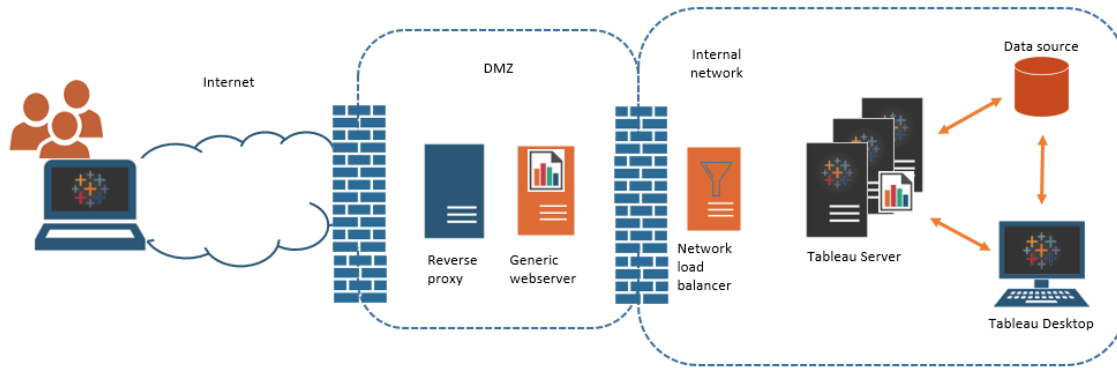
## User access

Tableau Server is also a web-based collaboration platform, where users connect to share, view and interact with data visualisations and data sources from a variety of devices. This means that Tableau Server must be accessible to Tableau users within your local protected network. You can also extend access to data visualisations to desktop, mobile and authenticated web users outside your organisation.

Tableau Server integrates with the following user **authentication** solutions: Active Directory, SAML, OpenId and Kerberos.

## Where should I install Tableau Server in my network?

Because of the highly-sensitive nature of most data that organisations manage with Tableau Server, and because Tableau Server requires access to internal data stores, Tableau Server must be run inside a protected network. Authenticated access from the internet is configured to connect to Tableau Server through a **reverse proxy** or a VPN solution.



Some organisations embed Tableau views in public webpages, or, for internal users, on generic web servers on the internal network.

Tableau Server can be configured to support such scenarios with either authenticated or anonymous access. For authorised access, where users can only view underlying data to which they have permission, you can configure trusted tickets with a generic web server. In this scenario, Tableau Server authorises access to the underlying data in an embedded view. This scheme enables you to host interactive data visualisations on a web server in a DMZ or outside the protected network.

Anonymous access to embedded Tableau views requires that you enable **'guest user'** for Tableau Server. Guest user also requires that you license Tableau Server according to the number of cores you are running, rather than a named-user (interactor) model.

## Sizing and scalability

Depending on the size and data usage in your organisation, you can scale Tableau Server up or out. As you scale your server, you can also selectively allocate resources to meet your data needs and user needs.

When you scale up Tableau Server, you add hardware resources to a single server. For example, you might increase the memory and processing power of the computer running Tableau Server.

When you scale out Tableau Server, you add computers (or nodes). To create a highly available deployment with failover, you need at least three nodes. For example, you might run most CPU-intensive server processes on two nodes and use the third node for the gateway and coordination controller services.

Whether you scale up or scale out, you can selectively allocate resources by configuring the number and type of server processes that run. If your organisation has a lot of data and creates a lot of data extracts, you can increase the number of processes that are dedicated to refreshing and storing extracts. Alternatively, if your organisation wants to optimise for heavy user loads, you can increase the number of processes dedicated to responding to user requests. Additionally, you can integrate Tableau Server into industry-standard network load balancers to further optimise your server for user requests.

## Tableau Server management model

Tableau Server has been designed to support a management scheme with two high-level administrators: server administrator and site administrator. In small organisations, these roles may be assumed by the same person or team, but in larger organisations, the roles often diverge.

In this model, server administrators are IT professionals who maintain and deploy heterogeneous server solutions. Essential areas for server administrators may include networking, hardware tuning and maintenance, security and access, and managing users and directory services. The tools and documentation that we deliver with Tableau Server for the server administrator support these core server IT areas.

Site administrator, on the other hand, is an administrative role specific to Tableau Server or Tableau Cloud deployments. The Tableau site administrator is fundamentally concerned with data content. The site administrator manages users and their access to projects, workbooks and data sources. To learn about sites and how to plan your deployment for them, see [What is a site](#)

## Administrative roles

In some small organisations, a single administrator may manage the entirety of Tableau Server. But for bigger enterprise organisations, Tableau Server usually requires at least three administrative roles for management at scale.

### Tableau Server administrator

The Tableau Server administrator has access to administrative pages for creating and editing sites, adding users and setting roles, and many content-related tasks after the Tableau Server installation is complete. The Tableau Server administrator also creates and manages other server and site administrators, who in turn may manage sites, user groups and projects.

For information about signing in to Tableau Server as a Tableau Server administrator, see [Sign in to the Tableau Server Admin Area](#).

### TSM administrator

Tableau Services Manager (TSM) is a tool that gives server administrators command-line and web-based options for installing, upgrading, configuring and maintaining Tableau Server. The TSM administrator installs the server and performs server-related administrative task like backing up server data, restoring backups, creating log archives and managing multi-node clusters.

The TSM administrator must be an administrator on the local computer. See [Sign in to Tableau Services Manager Web UI](#).

Common tasks performed by the TSM administrator include:

- Initial configuration of Tableau Server after installation
- Ongoing configuration management, including editing settings and changing the server topology
- Running administrative tasks such as backup, restore and ziplogs

To learn more about TSM, see [Tableau Services Manager Overview](#).

## Tableau portal administrator

An important administrative role in a Tableau Server deployment is the Tableau customer portal administrator. The portal administrator manages licensing and the associated keys for the Tableau deployment. As the portal administrator, your first step is to purchase licences on the [Tableau Customer Portal](#). When you purchase licences, the portal will return corresponding product keys. To renew your licence, visit the [Tableau renewal](#) web page.

Tableau has a number of products (Desktop, Server, Prep Builder and more). Each of the Tableau products require that you activate licences by updating the Tableau software with the product keys that are purchased and stored on the Tableau Customer Portal. As the administrator who is tasked with activating Tableau licences, it is important that you understand the relationship between licences and keys. See [Understanding Licence Models and Product Keys](#).

## Management tools

Tableau Server includes a number of toolsets for managing the system:

- **Tableau Server administrator page:** This is the web-based administrative site that is installed on each Tableau Server instance. Tasks performed on the administrator page are day-to-day tasks for both server and site administrators. Server-related tasks include creating sites and site administrator accounts, optionally importing users, setting up synchronisation with directory services, setting up extract refresh schedules, monitoring server performance and usage, and other global settings.

Site-related tasks include managing content and assign permissions, running extract refreshes, create groups and projects, monitoring site activity, optionally adding users and other content-related tasks.

See [Navigate the Admin Areas of the Tableau Web Environment](#).

Permissions required for the Tableau Server administrator page are based on site roles. The site roles are generated and managed by Tableau Server.

- **tsm Command Line Reference** - This is the primary interface for server-wide configurations. Many configurations made with TSM CLI are rarely revisited after initial configuration. For example: SSL, subscriptions, data caching, service account, SMTP alerting, user authentication and single-sign on configuration are all performed with TSM CLI.
- You can also Sign in to Tableau Services Manager Web UI.
- **tabcmd**: You can use the tabcmd command-line utility on a Windows or Linux computer to create scripts to automate administrative tasks on your Tableau Server sites. For example, use tabcmd for creating or deleting users, projects and groups.
- **REST API**: With the Tableau Server REST API you can manage and change Tableau Server resources programmatically, via HTTP. The API gives you simple access to the functionality behind the data sources, projects, workbooks, site users and sites on a Tableau server. You can use this access to create your own custom applications or to script interactions with Tableau Server resources.

## Security

As an application server connecting to data that may be highly-sensitive, Tableau Server supports and implements a number of industry security standards. Our server admin documentation includes best practices and implementation for user authentication, authorisation, data security and network security. While our default installation is secure by design, we also recommend following the [security hardening checklist](#) to further lock down your deployment.

For more information about security audit compliance, vulnerability reporting and other security resources, visit <http://www.tableau.com/en-gb/security>.

## Tableau Services Manager Overview

This article provides an overview of Tableau Services Manager (TSM), which you can use to configure and administer Tableau Server. Beginning with version 2018.2, TSM is available for Tableau Server on Windows, both as a CLI and as a Web UI.

- [Functionality](#)
- [Components](#)



- [Authentication](#)
- [Connecting](#)

## Functionality

TSM gives server administrators command-line and web-based options for configuring and maintaining Tableau Server, including performing administrative task like backing up server data, restoring backups, creating log archives, and managing multi-node clusters. For example, you use TSM to perform the following tasks:

- Initial configuration of Tableau Server after installation
- Ongoing configuration management, including editing settings and changing the server topology
- Running administrative tasks such as backup, restore and ziplogs

For administrators familiar with earlier versions of Tableau Server, TSM replaces the following tools from previous versions of Tableau Server:

- Tableau Server Configuration utility
- tabadmin command line utility
- Tableau Server Monitor

## Components

TSM consists of *services* (called *processes* in this documentation) and *clients*. TSM processes are administrative services which manage Tableau Server processes. TSM processes run continuously after TSM is initialised, even when the rest of Tableau Server is offline.

TSM processes that run, even when Tableau Server is stopped include:

- Administration Agent
- Administration Controller
- Client File Service
- Coordination Service (based on Apache Zookeeper™)
- Service Manager
- Licensing Service

For more information about TSM processes and Tableau Server processes, see [Tableau Server Processes](#).

## TSM Authentication

Whether you use the TSM Web UI, the command line interface, or the TSM API, you need to authenticate to Tableau Server before you can perform administrative tasks. This user account is distinct from Tableau Server user accounts, including Tableau Server administrators and site administrators.

You authenticate to TSM with a user that exists on the Tableau Server computer. The TSM user account must use password-based authentication. By default, the TSM user account must be a member of the Administrators group on the computer where Tableau Server is running. Alternatively, you can specify a Windows group for TSM administration after you have installed Tableau Server. See [Configure a Custom TSM Administration Group](#).

## Connecting TSM clients

As a security measure, you can only connect to TSM with clients (CLI, Web UI, Rest API) over HTTPS. This is because TSM allows you to perform administrative tasks and to connect to TSM from other computers.

When you are connecting with a TSM client, you must connect to the Tableau Server instance running the TSM Administration Controller service.

**Note:** The TSM CLI tool does not require admin credentials in some scenarios. Specifically, if the account you are logged in as is a member of the TSM-authorized group, you do not need to provide credentials to run commands when running tsm CLI locally. For more information, see [Authenticating with tsm CLI](#).

TSM HTTPS connections rely on a self-signed certificate generated by the Tableau Server installer. This certificate is the Tableau installation CA certificate that signs the

SSL certificates Tableau creates for encrypting traffic over HTTP. The Tableau installation CA certificate must be trusted by the systems connecting to TSM Administration Controller.

The TSM CLI client validates certificate trust from a different store than the TSM Web UI uses. The TSM CLI client refers to the trusted store in the local Java keystore to validate trust for CA certificates. Since the TSM Web UI must establish connection with a web browser, trust is validated with the operating system's trusted keystore. The difference in how CA certificates are stored determines different trust configuration scenarios as outlined here:

- For TSM Web UI and CLI communications on Tableau Server, the certificate trust is configured by default as part of the installation, node bootstrap, and upgrade processes. The Tableau installation CA certificate is added to the trusted store in both the Java keystore and in the Windows trusted root keystore. This allows you to access TSM from any computer in the cluster without additional configuration.
- For TSM CLI connections from remote computers, you will be prompted to trust the Tableau installation CA certificate the first time you connect to the Tableau Server running TSM Administration Controller. You can choose to trust the CA certificate, in which case you will not be prompted again on that computer until the certificate expires (default is 3 years). Or you can connect with a one-time trust by running your TSM command with the `--trust-admin-controller-cert` flag.
- For TSM Web UI connections from remote computers, the browser will prompt you to trust the host running TSM Administration Controller service.

## Infrastructure Planning

Before you install Tableau Server, you should review the disk requirements, recommended configurations, user accounts, security and networking requirements.

### Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Before you install...

**Note:** You can find additional information about technical specifications for Tableau Server on the Tableau web site, [here](#).

This topic includes requirements and recommendations that you must consider before you install Tableau Server into a production environment.

- If you are new to Tableau Server, and you want to deploy it in your organisation, we encourage you to deploy Tableau Server as a single server in a test environment first. The easiest way to do a single-server installation is to follow the steps in Jump-start Installation.
- If you are deploying Tableau Server in a distributed cluster, review Distributed Requirements in addition to the requirements and recommendations described in this topic.

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Hardware recommendations for production installations

The following list describes the minimum hardware recommendations for a production use, single-node installation of Tableau Server:

**Important:** These recommendations are minimums and may not reflect the requirements for your installation and organisation. For example, there are a number of factors that can impact disk space requirements, including whether or not you will be publishing extracts, flows and the number of workbooks to Tableau Server. For more information on what might impact free disk space requirements, see [Disk Space Requirements](#).

<i>Install Type</i>	<i>Processor</i>	<i>CPU</i>	<i>RAM</i>	<i>Free Disk Space</i>
Single node	<ul style="list-style-type: none"> <li>64-bit (x86_64 chipsets)</li> <li>Must support SSE4.2 and POPCNT instruction sets</li> <li>ARM-based processors are not supported</li> </ul>	8 cores (16 vCPUs), 2.0 GHz or higher	Version 2022.3 and later: <ul style="list-style-type: none"> <li>128 GB</li> </ul> Version 2021.4.0 to version 2022.1.x: <ul style="list-style-type: none"> <li>64 GB</li> </ul> Version	50 GB

<i>Install Type</i>	<i>Processor</i>	<i>CPU</i>	<i>RAM</i>	<i>Free Disk Space</i>
			2021.3.x and earlier: <ul style="list-style-type: none"><li>• 32 GB</li></ul>	
	If you are adding Tableau Prep Conductor to your Tableau Server installation, we recommend you add a second node and dedicate this to running Tableau Server Prep Conductor. This node should have a minimum of 4 cores (8 vCPUs) and 16 GB of RAM.			
Multi-node and enterprise deployments	<p>Contact Tableau for technical guidance.</p> <p>Nodes must meet or exceed the minimum hardware recommendations, except:</p> <ul style="list-style-type: none"> <li>• Dedicated Backgrounder nodes running up to two instances of backgrounder, where 4 cores may be acceptable.</li> <li>• Dedicated node for Tableau Prep Conductor: Minimum of 4 cores (8 vCPUs), and 16 GB of RAM.</li> <li>• Dedicated node for Independent Gateway: Minimum of 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.</li> </ul>			

**Important:** The disk space requirement cannot be checked until you initialise TSM.

- Free disk space is calculated after the Tableau Server Setup program is unzipped. The Setup program uses about 1 GB of space. You may need to allocate additional disk space depending on various factors like whether you will be using extracts.
- **Network attached storage space requirements for External File Store:** If you are planning to configure [Tableau Server with External File Store](#), you will need to estimate the amount of storage space to dedicate on your network attached storage.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the Option 2: Back up repository separately topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.
  - Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- Core count is based on "physical" cores. Physical cores can represent actual server hardware or cores on a virtual machine (VM). Hyper-threading is ignored for the purposes of counting cores.
- RAM shown is the minimum recommended for a single-node installation. Your installation may function better with more RAM, depending on activity, number of users, and background jobs, for example.

To see the full list of recommendations and to see the minimum requirements, see Minimum Hardware Requirements and Recommendations for Tableau Server. For hardware specifications Tableau uses internally for testing scalability, see Hardware recommendations for production installations.

For public cloud deployments on Amazon Web Services and Google Cloud Platform, their 'vCPU' is actually a CPU hyper-thread, and not a full CPU core. When sizing cloud instances, you will need twice as many vCPU as the Tableau Server CPU core requirements given (8 vCPU required for a minimum trial installation, 16 vCPU recommended for a single-node installation).

## Operating system requirements

The following 64-bit Microsoft Windows Server operating systems are supported

	2019.x	2020.1.0 - 2021.2.x	2021.3.0	2023.3.1+
Windows Server 2008 R2	✓			
Windows Server 2012	✓	✓		
Windows Server 2012 R2	✓	✓		
Windows Server 2016	✓	✓	✓	✓
Windows Server 2019	✓	✓	✓	✓
Windows Server 2022	<b>Note:</b> Windows Server 2022 is <i>not</i> supported in versions prior to 2023.3.1. Beginning in April 2023, installers for all versions of Tableau Server on Windows prior to 2023.3.1 block installation on Windows 2022.			✓



All nodes in a multi-node cluster must have the same type of operating system and the same major version of that operating system. For example, all Windows Server 2022 nodes .

You cannot install a multi-node instance of Tableau Server on a combination of Linux and Windows nodes.

### Installation directory

By default, Tableau Server will install on the system drive. The drive where Windows is installed is the system drive. In most cases, the system drive is the C:\ drive. In this default case, Tableau Server will install into the following directories:

- C:\Program Files\Tableau\Tableau Server\packages
- C:\ProgramData\Tableau\Tableau Server

Do not specify a symbolic link or a data directory location on a Network File System (NFS) volume.

### Non-default installation locations

Rather than install onto the system drive, some organizations install applications on a separate drive. During setup (or with automated installation), you can specify a different installation location. If you select a different installation drive or folder location during setup, then the data directory for Tableau Server will install into the same path. This means that if you install to a non-default location, the default C:\ProgramData\Tableau\Tableau Server path will not be created.

When you install to a non-default location, you must take the following into consideration:

- You may need to configure Run As service account permissions manually. If you do not use the predefined local account, NetworkServices, as the Run As service account, then you will need to set permissions for the account that you will be using. You must set these permissions after you install Tableau Server. See [Verify Folder Permissions](#).

- Log files are stored at <installation path or drive>\data\tabsvc\logs. The C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs path in a default installation is converted to <installation path or drive>\data\tabsvc\logs.
- You may need to specify the same location when you upgrade to newer versions of Tableau Server. For more information on upgrading, see Upgrade Tableau Server Overview.

**Note:** If you run Tableau Server on a VM, either locally, or in the cloud, be aware of the potential for complications related to licensing. This applies whether you are running Tableau Server as a standalone or in a cluster. If you are simply upgrading Tableau Server on the VM, you do not need to take any extra action related to licensing. If you plan to clone the VM to create either a new production or test environment to upgrade, you need to deactivate any Tableau Server licences before cloning. If you do not do this, the new VM environment can end up with an untrusted licence, and any attempts to upgrade will fail.

To clone a VM, make sure the Tableau Server is unlicensed (all licences are deactivated). After cloning the VM, activate the Tableau licence on the cloned VM and proceed with the upgrade.

- When installing a multi-node instance of Tableau Server, the installation location (path) must be the same on every node.

## Tableau Prep Conductor

Tableau Prep Conductor is one of the process on Tableau Server. It runs a flow, checks connection credentials and sends alerts if a flow fails. Tableau Prep Conductor leverages the scheduling and tracking functionality of Tableau Server so you can automate running flows to update the flow output instead of logging into Tableau Prep Builder to manually run individual flows as your data changes.

Tableau Prep Conductor is licensed separately and is available through the Data Management licence. For more information on Tableau Prep Conductor licensing, see Licence Data Management.

We recommend you enable Tableau Prep Conductor on a dedicated node. For more information:

- If you are installing a new Tableau Server, see Step 1 (New Install): Install Tableau Server with Tableau Prep Conductor.
- If you are adding Tableau Prep Conductor to an existing installation of Tableau Server, see Step 1 (Existing Install): Enable Tableau Prep Conductor.

## Additional requirements

Make sure that your environment also meets the following additional requirements:

### Hostname

- Tableau Server must be able to resolve the hostname to an IP address either using the domain name server (DNS) or with a local host file on the computer running Tableau Server. By default, host files are stored at `\Windows\System32\Drivers\etc\hosts`.
- The hostname of the server must not change after you start Tableau Services Manager during the setup process. For example, this might happen if you use the cloud-init package to initialise a virtual machine, and you install Tableau Server on that virtual machine.
- Hostnames that include underscores (`_`) are not supported by Tableau Server.

### Static IP address

The computer where you install Tableau Server must have a static IPv4 or IPv6 address.

If both IPv4 and IPv6 are enabled or multiple network cards (NICs) are being used, unexpected behaviour can result. For more information, see the following:

- **For Tableau Server deployments running on Windows Server 2019:** Changes to Windows Server 2019 IPv6 configuration behaviour can result in IPv6 taking

precedence over IPv4. To verify IPv6 precedence, review the [Tableau Server IPs changed and not all TSM services are coming up correctly](#) article in the Tableau Knowledge Base and update your computer settings.

- **When multiple NICs are being used:** In deployments where multiple NICs are used, review Troubleshoot Inconsistent Process Status for best practices.

## Database drivers

To connect to specific data sources, the computer where you install Tableau Server must have the correct database drivers installed. For more information, see Database Drivers.

## Available ports

TSM and Tableau Server each require an available TCP port in order for you to access them. TSM defaults to port 8850, and the Tableau Server Gateway service defaults to port 80. We strongly recommend that you ensure that both port 8850 and 80 are not in use on your system before installing Tableau Server. If those ports are not available, the TSM and gateway ports may be dynamically remapped to different port numbers, and there is currently no interface for displaying which port they have been remapped to.

If you are installing Tableau Server on a computer that's also running IIS (not a recommended deployment), you should modify the Tableau's gateway port number to avoid conflict with IIS. You can specify a different gateway port number during the setup process.

See Tableau Services Manager Ports.

## Local firewall configuration

If you are running a firewall on the computer where you will be installing Tableau Server, then you will need to open the following default ports for Tableau Server traffic. All port numbers, except 443, can be changed.

Port	TCP/UDP	Used by...	TYPE OF INSTALLATION	
			All	Distributed / High Availability
80	TCP	Gateway	<b>X</b>	
443	TCP	SSL. When Tableau Server is configured for SSL, the application server redirects requests to this port. Do not change this port.	<b>X</b>	
8850	TCP	Tableau Services Manager.	<b>X</b>	
8060	TCP	PostgreSQL database.	<b>X</b>	
8061	TCP	PostgreSQL backup verification port	<b>X</b>	
8000-9000	TCP	Range of ports reserved by default for dynamic mapping of Tableau processes		<b>X</b>
27000-27009	TCP	Range of ports used by Tableau Server for Licence service. This range must be open on the node running the Licence service and accessible from other nodes. By default, the initial node runs the Licence service.	<b>X</b>	

See Tableau Services Manager Ports

For information about configuring the local Windows firewall, refer to the Microsoft product documentation.

### Local administrator

The account that you use to run Setup must be a member of the Local Administrators group on the Windows computer where Tableau Server is installed.

By default, you must also use an account with local administrator rights to run Tableau Services Manager (TSM) Web UI and CLI tools. However, after you have installed Tableau Server, you can specify a Windows group for TSM administration. See [Configure a Custom TSM Administration Group](#).

Use TSM to configure the Tableau Server components that rely on OS-level access, such as processes, authentication, log files, licensing and alerts. See [TSM Authentication](#).

Tableau-specific administration, such as importing users, creating sites, web authoring, etc. is performed by Tableau Server administrators. You can configure these administrative accounts by assigning roles to users after you install. The initial Tableau Server administrator account is created as part of the installation process. See [Add an Administrator Account](#).

### **Run As service account**

A Run As service account for the Tableau Server service to run under is useful if you're using NT Authentication with data sources or if you're planning on doing SQL Server impersonation. For more information, see [Run As Service Account and SQL Server Impersonation](#).

In some organisations, Group Policy or other system management solutions are used to standardise permissions and accounts on application servers. If your organisation runs a such a solution, be sure to configure the system to accommodate the folder permissions required by the Run As service account. See [Verify Folder Permissions](#).

### **Antivirus software**

Antivirus software that scans directories used by Tableau Server can interfere with installation and ongoing use of Tableau Server. In some cases, this can result in installation failures, problems starting Tableau Server or impacts to performance. If you plan to run antivirus software on the computer running Tableau Server, follow the recommendations in the [Knowledge Base](#).

*Continue to the next step: [Install and Configure Tableau Server](#).*

## Disk Space Requirements

In general, when estimating the amount of additional disk space to allocate for Tableau Server for day-to-day usage, you must consider whether or not extracts will be published to Tableau Server, and consider the number of workbooks that you expect to publish to Tableau Server. If you anticipate using extracts, Tableau recommends that you begin with a few hundred gigabytes (GB). If you do not anticipate using extracts, you may only need around 50 GB to fulfill your usage needs. To setup drive space alerts, see [Configure Server Event Notification](#).

Looking for Tableau Server on Linux? See [Disk Space Requirements](#).

It is critical for Tableau Server to have adequate disk space. If you run out of disk space on any node in a Tableau Server installation, you can experience erratic performance, including not being able to access Tableau Server or the TSM Web UI. For troubleshooting steps, see [Troubleshoot Disk Space Usage on Tableau Server Nodes](#) in the Tableau Knowledgebase.

Here are the factors that affect disk space requirements and where you might choose to install Tableau Server:

### Drive size and type of partition

The type of partition used on your Tableau Server drive can impact the amount of space available to your Tableau Server installation.

- Master Boot Record (MBR) partitions support partitions and hard drives up to 2 terabytes (2T) and can be used on boot drives.
- GUID partition table (GPT) partitioning support partitions and hard drives up to 18 exabytes in size but cannot be used on boot drives. These are a good choice when installing Tableau Server on an additional drive because they provide for so much disk space, allowing enterprises to scale up over time.

## Publishing extracts to Tableau Server

Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.

## Refreshing extracts

Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.

## Creating many workbooks

If using workbooks, consider the number of workbooks that will be published to Tableau Server. Individual workbooks tend to take up a small amount of disk space. However, if you anticipate thousands of workbooks being published, you may want to allocate additional disk space to accommodate those workbooks.

## Logging

To assist with daily management and troubleshooting, Tableau Server creates log files as a part of its normal operations. Depending on the level at which the logging is configured, it can significantly impact the amount of disk space necessary on the Tableau Server computer.

## Backup and restore processes

The free disk space required to create a backup varies depending on the amount of data in the Tableau Server repository and file store services, and their collocation with the tabadmincontroller service. During backups, the background tasks for cleaning up old extracts are temporarily paused. This means that, for the duration of the backup, extract refreshes will leave extra files in place, adding to disk space usage. If your backup takes a long time, or if your organisation uses many extracts that are regularly updated, this can result in a



significant amount of temporary disk space usage. These temporary files will be removed after the backup is complete.

The following table lists the disk space requirements for backup based on whether the node hosts the repository, file store, controller or some combination of them. In multi-node Tableau Server environments, you need to estimate the required disk space on each node.

Repository	File Store	Controller	Disk Space Required
✓			<p>3x repository data + 250 MB</p> <p>To obtain an estimate of the repository data, check the size of &lt;data directory&gt;/pgsql/data/base directory.</p> <p>To obtain the exact size of the repository data, open the backup file and use the size of the workgroup.pg_dump file.</p>
	✓		<p>1.5x file store data</p> <p>To obtain an estimate of file store data (extracts, flows, etc.), check the size of &lt;data directory&gt;/dataengine directory.</p>
		✓	3x repository data + 250 MB + 2.5x file store data
✓	✓		3x repository data + 250 MB + 1.5x file store data
	✓	✓	3x repository data + 250 MB + 1.5x file store data

✓		✓	3x repository data + 250 MB + 2.5x file store data
✓	✓	✓	3x repository data + 250 MB + 1.5x file store data

### Restore disk space requirements

You must have adequate disk space for the database restore process to run successfully.

To restore Tableau Server:

- On controller nodes, you need free space equal to at least the size of the backup archive.
- On repository nodes, you need free space equal to at least three times the size of the repository data in the backup archive, plus 250 MB, plus the size of the pgsql data directory.
- On file store nodes, you need free space equal to at least twice the size of the dataengine folder in the backup archive.

## Site Export and Import

Site exports and imports require adequate disk space, just as backup and restore processes do. At a minimum, you must have enough space for the exported file. You can use the requirements for Backup and Restore as a guideline for the amount of disk space necessary when doing site exports and imports.

The export file is generated to the directory defined in the TSM `basefilepath.site_export.exports` variable. For additional details, see `tsm sites export`.

For more information about file paths and how to change them, see `tsm File Paths`.

## Recommended Baseline Configurations

Determining the topology (number of nodes, number of Tableau Server processes) of your Tableau Server deployment requires you to consider these variables: your environment, sources of data and management to provide self-service data access, workload and usage. However you may not have enough information about these variables when you deploy Tableau Server for the first time. This topic describes three baseline architectures that can be used as starting points for your Tableau Server installations.

### Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

### Hardware recommendations for production installations

The hardware recommendations for Tableau Server production installations below are based on the hardware that the Tableau team uses to test Tableau Server scalability. We suggest that you use these recommendations as starting points for your production deployments. For Proof of Concept (PoC) deployments, we recommend you use Tableau Cloud. For more information, see [Minimum installation hardware requirements](#).

<b><i>Install Type</i></b>	<b><i>Processor</i></b>	<b><i>CPU</i></b>	<b><i>RAM</i></b>	<b><i>Free Disk Space</i></b>
Single node	<ul style="list-style-type: none"> <li>• 64-bit (x86_64 chipsets)</li> <li>• Must support SSE4.2 and POPCNT instruction sets</li> <li>• ARM-based processors are not supported</li> </ul>	8 cores (16 vCPUs), 2.0 GHz or higher	<p>Version 2022.3 and later:</p> <ul style="list-style-type: none"> <li>• 128 GB</li> </ul> <p>Version 2021.4.0 to version 2022.1.x:</p> <ul style="list-style-type: none"> <li>• 64 GB</li> </ul> <p>Version 2021.3.x and earlier:</p> <ul style="list-style-type: none"> <li>• 32 GB</li> </ul>	500 GB – 1 TB
<p>If you are adding Tableau Prep Conductor to your Tableau Server installation, we recommend you add a second node and dedicate this to running Tableau Server Prep Conductor. This node should have a minimum of 4 cores (8 vCPUs) and 16 GB of RAM.</p>				

<i><b>Install Type</b></i>	<i><b>Processor</b></i>	<i><b>CPU</b></i>	<i><b>RAM</b></i>	<i><b>Free Disk Space</b></i>
Multi-node and enterprise deployments	<p>Contact Tableau for technical guidance.</p> <p>Nodes must meet or exceed the minimum hardware recommendations, except:</p> <ul style="list-style-type: none"> <li>• Dedicated Backgrounder nodes running up to two instances of backgrounder, where 4 cores may be acceptable.</li> <li>• Dedicated node for Tableau Prep Conductor: Minimum of 4 cores (8 vCPUs) and 16 GB of RAM.</li> <li>• Dedicated node for Independent Gateway: Minimum of 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.</li> </ul>			

**Note:** For deployments using virtual machines, Tableau recommends dedicated CPU affinity. If you are running Tableau Server in a virtual environment, use your VM host's best practices for vCPU allocation in relation to the number of physical CPU cores on the VM host. Typically 2 vCPUs = 1 physical core for Tableau Server. For example, for AWS installations, the 4 core minimum recommendation is equivalent of 8 AWS vCPUs. Similarly, follow the best practices provided by your virtual infrastructure provider to make sure Tableau Server has access to the appropriate compute, memory and data resources. If you are installing Tableau Server in a virtual environment or a cloud-based deployment, see Virtual Machines and Public Cloud Deployments section later in this topic.

### Estimating Disk Space

There are several factors that affect disk space requirements, including whether or not you will be publishing extracts, flows and the number of workbooks to Tableau Server. For more information see Disk Space Requirements.

## Baseline Configurations

- Single Server Installations
- Two Node Installation – Specialised for extract heavy environments
- Two Node Installation – Specialised for flow environments
- High Availability Installations (HA)

### Single Server Installations

#### Recommendations

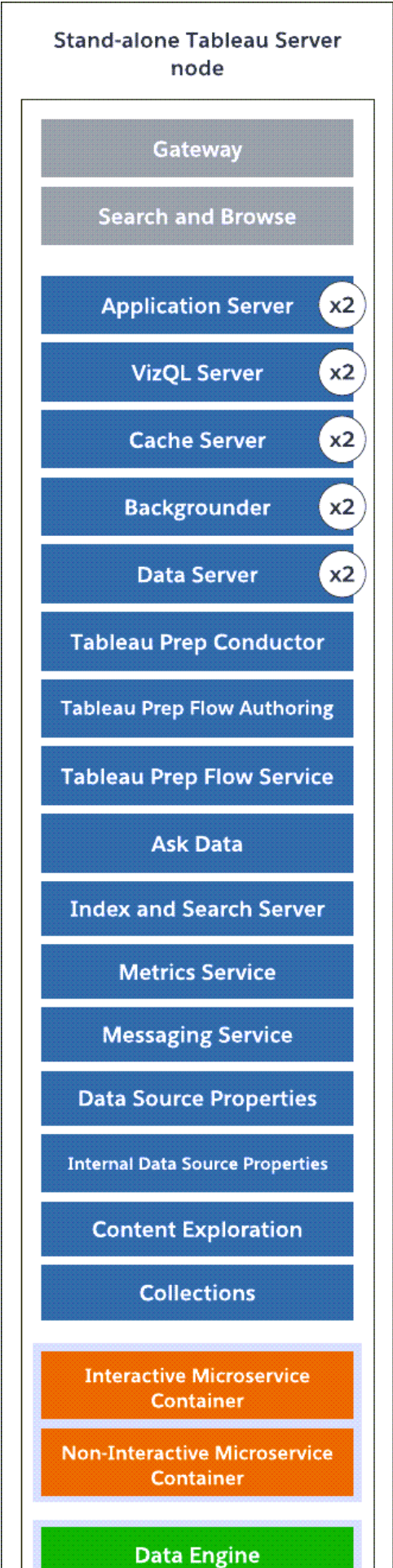
We recommend using a single machine to install Tableau Server for initial deployments with limited usage and which are not mission critical. Single Server installations can also be expanded to multi-node installation as your workloads grow.

Here are some instances when a single server installation may not be right for you:

- If your system is considered mission critical and needs to be highly available. High availability is about minimising the system downtime. It is achieved by eliminating single points of failure, and having a reliable failover mechanism. Tableau Server requires a minimum of a three-node configuration to provide redundancy and eliminate the single points of failure. This is one of the primary reasons to move to a multi-node configuration.
- If you have a lot of active users and a lot of extract refreshes, the two types of loads may be competing for the same resources on the machine. In such a scenario, a single server configuration may not be the right option as you may need additional specialised nodes to isolate the different workloads.

**Note:** Active users represent the interactive, concurrent requests made to Tableau Server, including consuming dashboards on a laptop or mobile device, web authoring and connecting to and querying Published Data Sources.







- Stand-alone single server node with all the processes installed on one machine.
- By default Tableau Server installer configures the number of process instances based on the hardware on the machine. We recommend that you keep the default configuration as your starting point. Below are the number of processes for an 8 core machine.
  - VizQL Server: Set to 2 instances (default calculation: Number of physical cores divided by 4, up to a maximum of 4).
  - Backgrounder, Cache Server and Data Server: Set to 2 instances.
  - All other processes, only one instance of the process is installed, regardless of hardware.

**Note:** One instance of Tableau Prep Conductor is automatically configured with Backgrounder, when you have the Data Management Product Key activated on your server. However, It is recommended that you have a dedicated node for Tableau Prep Conductor. If you plan to have flows on your Tableau Server, we recommended you use two or more nodes and dedicate one of these nodes to run only flows. The example configuration described above does not include Tableau Prep Conductor since it is a single node server.

## Multi-Node Installations

Running Tableau Server on more than one machine is called a multi-node installation, or a cluster. There are various reasons why you might want to have a multi-node installation. For example, you may have heavy extract environments which can mean dedicating some hardware resources to Backgrounder process. For systems that have high availability requirements, you need a multi-node environment that has at least three nodes.

## Two Node Installation – Specialised for extract heavy environments

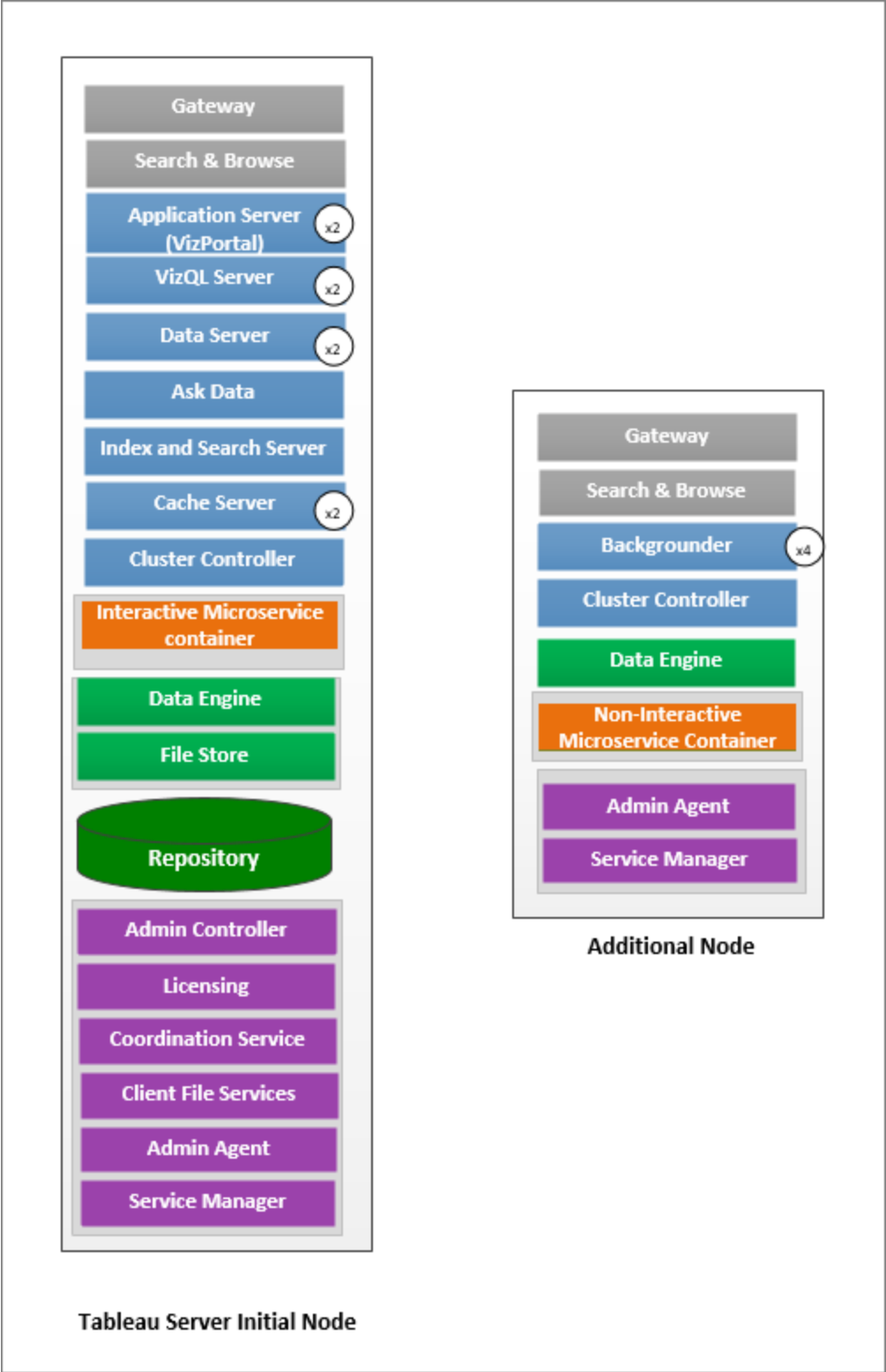
### Recommendations

Start with a two node configuration when the following conditions apply to you:

- **Extract heavy environment:** Majority of your data sources are extracts. Having just a few, extremely large extracts could put your deployment in this category, as would having very many small extracts.
- **Frequent extract refreshes:** Refreshing an extract is a CPU-intensive task. Deployments where extracts are frequently refreshed (for example, several times a day during business hours) are often helped by more emphasis on the background process, which handles refresh tasks.

**Important:** Two-node configurations do not meet the minimum requirements for high availability. If you need a system that is highly available, see High Availability Installations (HA).





## Tableau Server on Windows Help

- On the initial node, install all the processes except for the backgrounder. Below is the number of instances of the processes for an 8 core machine:
  - VizQL Server: Set to 2 instances. (default calculation: Number of physical cores divided by 4, up to a maximum of 4).
  - Cache Server, and Data Server: Set to 2 instances. One instance of Ask Data is automatically configured on the node that has Data Server.
  - Index and Search Server: Index and Search Server memory can be configured to improve performance by using the `indexandsearchserver.vmopts` TSM configuration option. For more information, see [tsm configuration set Options](#).
  - All other processes, only one instance of the process is installed, regardless of hardware. One instance of Interactive Microservice Container is installed on a node that has Application Server enabled, and one instance of Non-Interactive Microservice Container is installed on a node that has Backgrounder enabled.
- Isolate backgrounder on the additional node. To calculate the minimum number of backgrounder processes to run on this node, divide the computer's total number of physical cores by 4. To calculate the maximum number, divide the computer's total physical cores by 2. In the example shown above, both the nodes are on machines with 8 physical cores. When you install the backgrounder, Tableau Server automatically installs one instance of the Data Engine.

**Note:** This configuration assumes that you do not have Tableau Prep Conductor enabled on your Tableau Server. If are using Tableau Prep Conductor to schedule and manage flows, and have an extract heavy environment, we recommend that you have at least 3 nodes and use the 3 node configuration described later in this topic.

As you monitor and gather data about the performance and usage, you can fine tune and configure the number of instances for these processes. For example, on the node dedicated to running backgrounder you can initially set the number of backgrounders to the recommended

minimum (total number of cores divided by four), and increase the number of backgrounder processes later if you find that:

- Extract refreshes are taking a long time to complete
- Subscriptions and alerts are not completing on time

For dedicated backgrounder nodes, depending on workload and system resources, you may be able to increase the number of backgrounder instances beyond the maximum recommended above. Increasing backgrounder instances on the node can impact node functionality in positive and negative ways. You are responsible for carefully monitoring RAM and CPU resources, and other aspects of Tableau Server to determine the best configuration for your environment.

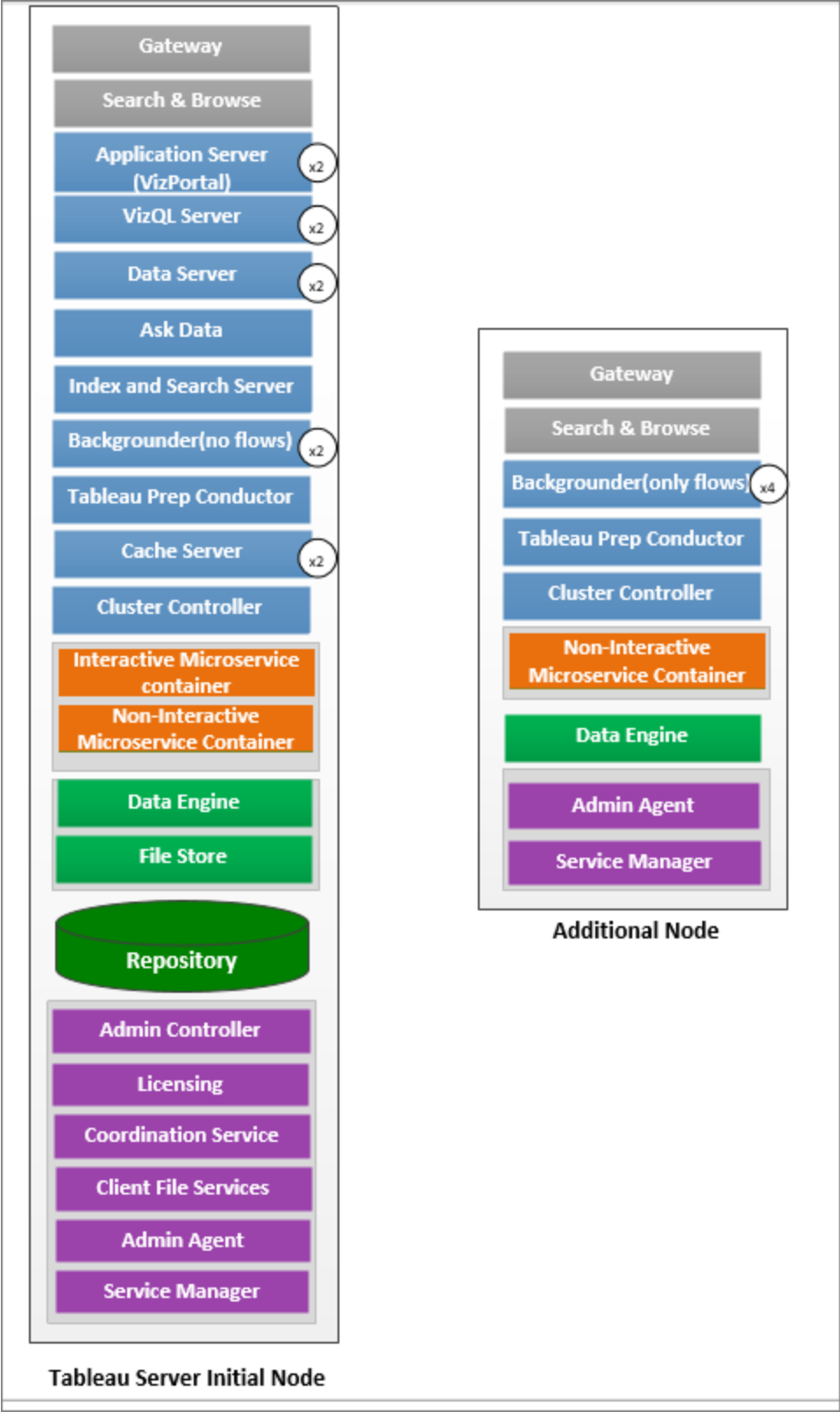
For more information on performance tuning, see [Performance Tuning](#) topic.

#### Two Node Installation – Specialised for flow environments

Start with a two node configuration if you are planning to publish, schedule and manage flows on your Tableau Server.

**Important:** Two-node configurations do not meet the minimum requirements for high availability. If you need a system that is highly available, see [High Availability Installations \(HA\)](#).







- On the initial node, install all the processes. Below is the number of instances of the processes for an 8 core machine:
  - VizQL Server: Set to 2 instances. (default calculation: Number of physical cores divided by 4, up to a maximum of 4).
  - Cache Server, and Data Server: Set to 2 instances. One instance of Ask Data is automatically configured on the node that has Data Server.
  - Backgrounder: Minimum 2, maximum 4. The diagram above shows the maximum for an 8 core node. Tableau Prep Conductor is automatically configured on the node where you have backgrounder installed. On the initial node, set the Backgrounder node role to run all job types including flows using the `tsm topology set-node-role` tsm configuration. For more information, see [tsm topology set-node-role](#)
  - Index and Search Server: Index and Search Server memory can be configured to improve performance by using the `indexandsearchserver.vmopts` TSM configuration option. For more information, see [tsm configuration set Options](#).
  - All other processes, only one instance of the process is installed, regardless of hardware. One instance of Interactive Microservice Container is installed on a node that has Application Server enabled, and one instance of Non-Interactive Microservice Container is installed on a node that has Backgrounder enabled.
- Isolated the backgrounder on the additional node to run only flows. Use the `tsm topology set-node-role` tsm configuration to configure this setting. For more information, see [tsm topology set-node-role](#)

**Note:** If you have both a heavy extract environment, and schedule and manage flows on your server, we recommend that you use the 3 node configuration described below.

## High Availability Installations (HA)

### Recommendations

A highly available installation of Tableau Server is a distributed installation that is designed to maximise the availability of Tableau Server. High availability basically means that the system is available with minimal amount of downtime. To build in redundancy for HA related items such as repository, file redundancy and failover, you need a **minimum of three nodes**. The tolerance for downtime will vary for each organisation and depends on the SLAs you have established in your organisation.

High availability is achieved by eliminating single points of failure and detecting failures and setting up a reliable failover system. HA in Tableau Server is mainly achieved by:

- File redundancy with multiple File Store/Data Engine instances.
- Active/Passive Repository across two nodes.
- Index and Search Server across all the three nodes.
- Adding an external load balancer to make sure your installation is robust to Gateway failures and make sure that requests only get routed to functioning Gateway processes.

### Server Configuration

Three-node configuration:



- To build in redundancy, you need to add additional nodes to host instances of the repository and File Store/Data Engine processes. You can add instances of other processes, including multiple instances of a process on a node.

- To build redundancy for the type of backgrounder jobs, have one of the nodes (initial node in this example) run all type of jobs. Backgrounders run all types of jobs by default. On one of the additional nodes, set the backgrounder to run only flows, and the other additional node to run all jobs except for flows.
- The successful functioning of Tableau Server depends on a properly functioning Coordination Service. For server installations of three or more nodes, we recommend that you add additional instances of the Coordination Service by deploying a new Coordination Service ensemble. This provides redundancy and improved availability in the event that one instance of the Coordination Service has problems. For more information, see [Deploy a Coordination Service Ensemble](#).
- Index and Search Server memory is added to all three nodes for redundancy and can be configured to improve performance by using the `index-andsearchserver.vmopts` TSM configuration option. For more information, see `indexandsearchserver.vmopts`.
- To reduce the system's vulnerability, you can run multiple gateways and additional instances of some of the server processes. The fewest number of computers required to achieve this configuration is three.
- The repository has also been moved from the initial node to one of the additional nodes, and a second, passive instance has been added to the other new node.
- One instance of Interactive Microservice Container is installed on a node that has Application Server enabled, and one instance of Non-Interactive Microservice Container is installed on a node that has Backgrounder enabled.

**NOTE:** In certain circumstances you may want to limit the processes running on your initial node. Reasons for doing this include wanting to run as few processes as possible on the node to limit processing requests on the node. You might also remove licensed Tableau Server processes from the node if you have a core-based licence and do not

want the initial node cores to count against your core use. For more information on Tableau Server licensed processes, see [Tableau Server Processes from the node](#).

### Virtual Machines and Public Cloud Deployments

In general, the considerations and recommendations described in this topic apply to virtual environment and cloud deployments.

If you are running Tableau Server in a virtual environment, use your VM host's best practices for vCPU allocation in relation to the number of physical CPU cores on the VM host. Typically 2 vCPUs = 1 physical core for Tableau Server. For example, for AWS installations, the 4 core minimum recommendation is equivalent of 8 AWS vCPUs.

For more information on cloud-based deployments, see:

- [Self-Host Tableau Server in a Public Cloud Service](#).

### Beyond Baseline Configurations

If you are planning a system whose configuration is beyond the limits documented here, contact [Tableau Professional Services](#).

### High VizQL Peak Usage Considerations

For optimal performance for Tableau Server we recommend isolating the repository on a dedicated node in your deployment. If you have an Advanced Management licence, consider running the repository as an external database.

If your organisation has a peak load of more than 1000 VizQL sessions per hour, we also recommend running Tableau Server on Linux. In this scenario, VizQL sessions refer to any user actions that display or generate visualisations from Tableau Server.

For more information, see [Tableau Server External Repository](#).

## Disaster Recovery Considerations

While HA configurations reduce downtime, you may still encounter failures in case of a disaster or hardware failures. In addition to the above considerations, you should evaluate the importance of disaster recovery in your organisation and plan for a deployment that helps you meet your disaster recovery goals and objectives.

When planning for disaster recovery (DR) in your Tableau environment, there are two main factors to consider:

- Recovery Time Objective (RTO), a measure of how much downtime your business can accept before a full recovery.
  - Influences how often you restore your backups to an alternative cluster and the amount of infrastructure investment.
- Recovery Point Objective (RPO), a measure of how much data loss your business can tolerate.
  - Influences how often you will need to take backups of your system.
  - For Tableau Server the RPO cannot be shorter than the time it takes to complete a full backup of your server.

The diagram below illustrates how to plan for a range of RTO requirements:

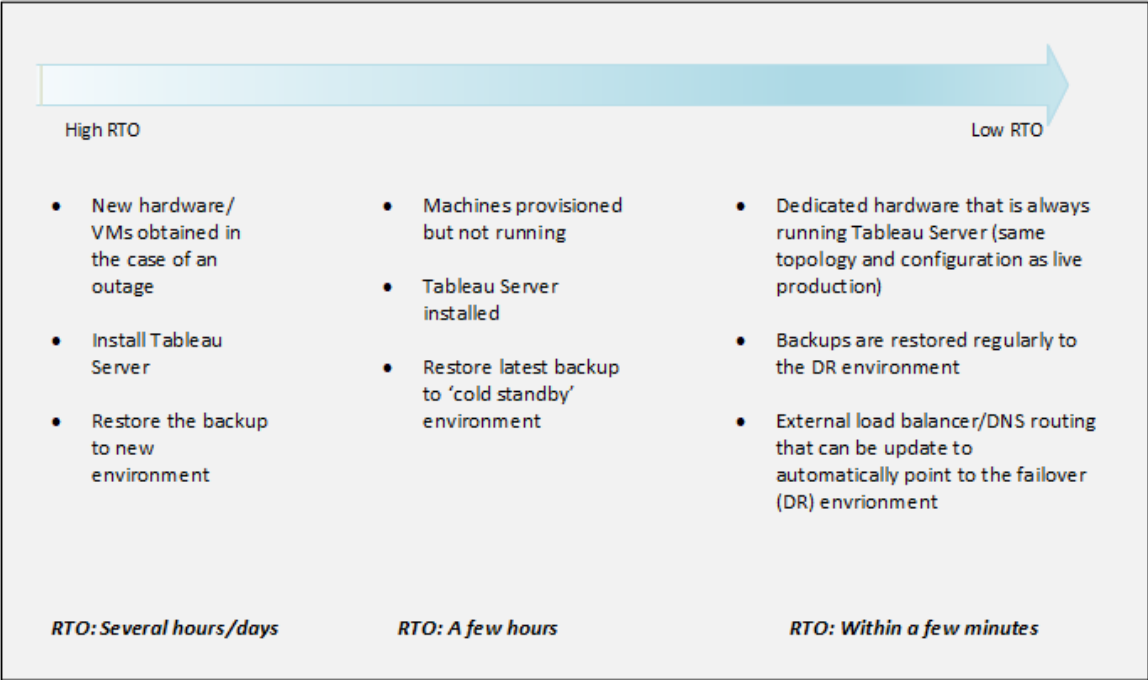
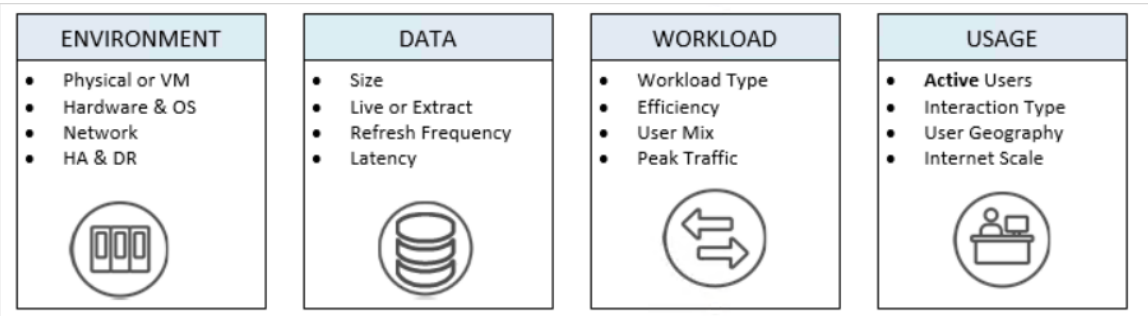


Tableau Server Scalability

These baseline configurations may not be enough as your needs change and grow, and you might need to scale your Tableau Server beyond these configurations. Like other enterprise platforms, Tableau Server scales up by adding processor, memory and disk to existing node, and scales out by adding more nodes to a cluster. However, scalability and performance are heavily dependent on external systems and user activity. The configuration of your Tableau Server can be different depending on your requirements and variables:



For more information on Tableau Server scalability and the variables affecting scalability, see [Tableau Server Scalability whitepaper](#).





## Run As Service Account

The *Run As* service account is a Windows account that Tableau Server uses ("runs as") when it accesses resources. For example, Tableau Server reads and writes files on the computer where Tableau Server is installed. From the perspective of Windows, Tableau Server is doing this as the Run As service account. In some cases, Tableau Server may use the Run As service account to access data from external sources, such as databases or files on a shared network directory.

As you plan your Tableau Server deployment, you need to determine if the default Run As service account, configured to run under the context of the local Network Service account (NT Authority\Network Service), will suffice for your needs. If it does not, then you will need to update the Run As service account to run under a domain account that has access to the resources in your Active Directory domain(s).

**Note:** Starting in Tableau Server version 2023.3.x, if the Run As service account is configured to use a domain account, administrators must also configure a server allowlist for file access using the `tsm configuration set` command. The allowlist limits file-based data source access to specified local or shared directory paths. For more information and steps to configure a server allowlist, see Security Hardening Checklist.

In either case, it's important to understand the security implications of the account that Tableau Server uses for the Run As service account. Specifically, if Tableau Server needs to access other servers, file shares, or databases that use Windows authentication, then the account that is configured for Run As service account will be used to access those resources. The account that is configured for Run As service account must also have elevated permissions to the local Tableau Server. A general best security practice is to limit the scope of all user accounts to the minimum required permissions. We make the same recommendation to you as you plan Run As service account. For more information, see Data Access with the Run As Service Account

The account you use for the Run As service account should not be a member of the Local Administrators or Domain Administrators account. Instead, we recommend using a domain user account that is not an administrator for the Run As service account. Using a domain account that is not a member of these administrator groups is a good security practice and can help avoid access to certain data sources and folders. For information on best practices when creating a Run As service account, see [Creating the Run As service account](#).

You can set the Run As service account during Tableau Server installation, or you can update the Run As service account using the TSM Web UI. Tableau Services Manager sets permissions for the Run As service account, but if you are unsure if the account you want to use for Run As service account satisfies the requirements, or if you have changed the Run As service account and are getting permission errors, see [Required Run As Service Account Settings](#).

The screenshot shows a configuration window titled 'Run As Service Account' with three tabs: 'Run As Service Account' (selected), 'External SSL', and 'Repository SSL'. Under the 'Run As Service Account' tab, there are two radio button options: 'NT AUTHORITY\NetworkService' and 'User Account'. The 'User Account' option is selected. Below these options are two text input fields: 'Username' and 'Password'. The 'Username' field contains the text 'EXAMPLE\runas-user'. The 'Password' field contains a series of dots. At the bottom of the window are two buttons: 'Cancel' and 'Save'.

## Default Run As service account: Network Service

The Network Service account is a predefined local account with limited permissions that exists on all Windows computers. While it has limited administrative access to the local computer on which it runs, it does have more access to resources than members of the Active Directory default Users group. For example the Network Service group can write to the registry, the event log, and has special rights to log on for application services.

By default, the Run As service account is set to a local account called Network Service. Use the default Network Service account when:

- You are using local authentication for Tableau Server.
- All users in your organisation include extracted data in the workbooks that they are uploading to Tableau Server.
- You are running Tableau Server in a single-server deployment.
- External data sources that your users access through Tableau Server do not require Windows NT integrated security or Kerberos. In most data-access scenarios, Microsoft SQL Server, MSAS, Teradata and Oracle databases require Windows NT integrated security.

While the Network Service account can be used to access resources on remote computers within the same Active Directory domain we do not recommend using the default account for such scenarios. Instead, configure a domain account for Run As service account if Tableau Server must connect to data sources in your environment. See [Change the Run As Service Account](#).

### Run As service account: Domain user

For all Active Directory scenarios, we recommend updating the Tableau Server Run As service account with a domain user account. Update the Run As service account to a domain user account when data sources accessed through Tableau Server require Windows NT integrated security or Kerberos.

If you have deployed a distributed deployment of Tableau Server, then you can update the Run As service account with either a domain user or a Windows workgroup user. In either case, you must use the same user account for all server nodes. See [Distributed Requirements](#) for more information.

To configure your environment to use a domain account, see [Change the Run As Service Account](#).

## Data Access with the Run As Service Account

When Windows Authentication is configured, the Run As service account requires read and query permissions to the databases that are accessed by Tableau Server. As designed, Run As service account permissions result in access to the same databases by Tableau Server users with the *Creator* role or the *Explorer (Can Publish)* role. Users with these roles can access and view the databases with the same level of access as the Run As service account when connecting to the databases using Windows Authentication option on Tableau Server.

For example, a user with the Creator role can view all databases that have been granted access to the Run As service account.

If the Creator-user specifies the database host name and selects Windows Authentication when creating a new data source from a web browser, then the user will be able to view the databases that have been permissioned for the Run As service account.

View access to database assets are not restricted to users who connect to Tableau Server with a web browser. Sophisticated users, who have the same roles noted above and who have knowledge of database server names, can also craft workbooks with Tableau Desktop that can view the databases that have been permissioned for the Run As service account.

The functionality described here is universal for all data sources that are accessed by the Run As service account, regardless of how users authenticate with Tableau Server. For example, even if users authenticate to Tableau Server with Kerberos or SAML, their access to all Run As-configured data sources will be the same. Users with Creator or Explorer (Can Publish) are able to access all data that is permissioned for the Run As service account.

### Recommendations

Whether user access to databases in these scenarios is acceptable must be assessed by your organisation. Generally, reducing the usage and scope of the Run As service account will reduce the likelihood of inadvertent user access to database content. However, reducing the usage and scope of the Run As service account may also impose more credential management to you and your users.

Evaluate the following recommendations in context of your business needs and data access policies.

- Firstly, be sure that you trust all users who have Creator roles or Explorer (Can Publish) roles. You will rely on these users to perform actions in Tableau with integrity.
- If you cannot trust all of your users who have publishing rights on data sources that are accessed by the Run As service account, then you should consider embedding credentials for those data sources.
- If a data source is not set up for automated extract refreshes, that is, the data source is primarily accessed as a live connection, then you may be able to use Kerberos Delegation. For requirements, see [Enable Kerberos Delegation](#).

## Configure Data Source Connection Settings

To automatically authenticate your users when the workbook they're accessing connects to a live, Windows-authenticated data source, configure your Tableau data connection with the

**Use Windows Authentication** option selected:

### Windows Authentication

Authenticates with the server's Run As user service account

### Username and Password

Each Tableau Server user is prompted for database credentials

Windows Authentication	Username and Password
<div> <div>Microsoft SQL Server</div> <div> Server: <input type="text" value="mssql.example.com"/> </div> <div> Database: <input type="text" value="Optional"/> </div> <div> Enter information to sign in to the database: </div> <div> <input checked="" type="radio"/> Use Windows Authentication (preferred) </div> <div> <input type="radio"/> Use a specific username and password: </div> <div> Username: <input type="text"/> </div> <div> Password: <input type="text"/> </div> <div> <input type="checkbox"/> Require SSL </div> <div> <input type="checkbox"/> Read uncommitted data </div> <div> <a href="#">Initial SQL...</a> </div> </div>	<div> <div>Microsoft SQL Server</div> <div> Server: <input type="text" value="mssql.example.com"/> </div> <div> Database: <input type="text" value="Optional"/> </div> <div> Enter information to sign in to the database: </div> <div> <input type="radio"/> Use Windows Authentication (preferred) </div> <div> <input checked="" type="radio"/> Use a specific username and password: </div> <div> Username: <input type="text" value="jsmith"/> </div> <div> Password: <input type="password" value="••••••••"/> </div> <div> <input type="checkbox"/> Require SSL </div> <div> <input type="checkbox"/> Read uncommitted data </div> <div> <a href="#">Initial SQL...</a> </div> <div> <a href="#">Sign In</a> </div> </div>

It's important to understand how the Run As service account accesses data on behalf of the users in your organisation. In some cases, users may inadvertently access data that their users accounts are not explicitly permissioned for. Before allowing users to access data with the Run As service account, review Data Access with the Run As Service Account.

## Change the Run As Service Account

Depending on your environment and data access requirements, you may want or need to change the Run As service account. There are two main scenarios where you change the Run As service account:

- Replacing the default Run As local account (NetworkService) with a domain account. If you are operating in an environment where a majority of your data sources are authenticated in the context of Active Directory (Windows NT integrated security) then you will need to configure the Run As service account to use a domain account, not the local account (NetworkService).
- Changing an existing domain Run As service account to a different account.

This topic describes both scenarios and describes how to update the Run As service account password.

The account you use for the Run As service account should not be a member of the Local Administrators or Domain Administrators account. Instead, we recommend using a domain user account that is not an administrator for the Run As service account. Using a domain account that is not a member of these administrator groups is a good security practice and can help avoid access to certain data sources and folders. For information on best practices when creating a Run As service account, see [Creating the Run As service account](#).

**Note:** Starting in Tableau Server version 2023.3.x, if the Run As service account is configured to use a domain account, administrators must also configure a server allowlist for file access using the `tsm configuration set` command. The allowlist limits file-based data source access to specified local or shared directory paths. For more information and steps to configure a server allowlist, see [Security Hardening Checklist](#).

### Replacing the default Run As local account (NetworkService) with a domain account

If you are going to replace the default NetworkService account with a domain account, we recommend using a dedicated account for the Run As service account. Follow these steps:

1. Create the Run As service account in Active Directory
2. Configure Tableau Server to use the Run As service account

### Creating the Run As service account

Follow these best practices:

- It's important to understand how the Run As service account accesses data on behalf of the users in your organisation. In some cases, users may inadvertently access data that their users accounts are not explicitly permissioned for. Before you create a Run As service account, review [Data Access with the Run As Service Account](#).
- Create a dedicated account in Active Directory for the Tableau Server Run As service account. In other words, don't use an existing account. By using a dedicated account you can be sure that the data resources that you permission for Tableau Server are only accessible by Tableau Server Run As service account.
- The Run As service account is used to query users and group membership in Active Directory. By default, the NetworkServices account and default domain users have permission to query Active Directory. Do not restrict read or query permissions for the Run As service account.
- Do not use an account with any kind of domain administrative permissions. Specifically, when you create an account in Active Directory, create an account in the domain User Group. Do not add the account that you create to any Active Directory security groups that needlessly elevate the permissions for the account.
- Permission the data sources in your directory for this one account. The account that you'll use for Run As service account only needs Read access to the appropriate data sources and network shares.
- If users in your organisation authenticate with smart cards, disable the smart card logon option for the Run As service account.
- If you have installed Tableau Server on a drive other than the system drive, then you will need to configure the system drive to allow the Run As service account additional permissions. The system drive is the drive where Windows is installed. For example, if you have installed Windows on the C:/ drive, then C:/ is your system drive. If you install Tableau Server on any other drive (D:/, E:/, etc), then you will need to configure permissions for the Run As service account on the system drive. See [Required Run As Service Account Settings](#) for more information.

### Configuring the Run As service account in Tableau Server

After you have created the Run As service account in Active Directory, configure Tableau Server to use that account.

Use the TSM Web UI to configure the Run As service account for the first time.

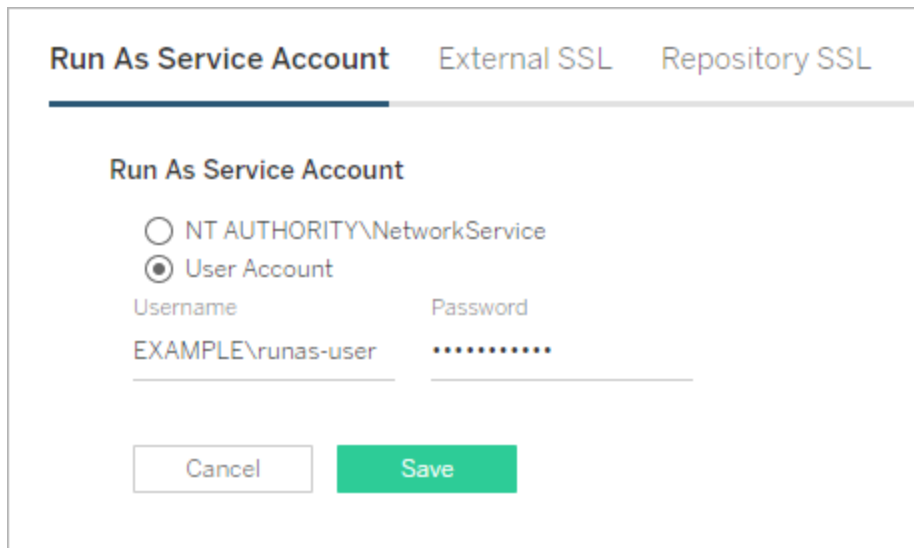
### To configure the Run As service account



1. Open TSM in a browser:

<https://<tsm-computer-name>:8850>. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Security** tab, and then click the **Run As Service Account** tab.
3. Select **User Account** and then enter the user name and password for the service account. Specify the domain name as `domain\account`, where domain name is the NetBIOS name of the domain where the user resides:



The screenshot shows the 'Run As Service Account' dialog box. It has three tabs: 'Run As Service Account', 'External SSL', and 'Repository SSL'. The 'Run As Service Account' tab is active. Inside this tab, there are two radio buttons: 'NT AUTHORITY\NetworkService' and 'User Account'. The 'User Account' radio button is selected. Below the radio buttons, there are two text input fields: 'Username' and 'Password'. The 'Username' field contains the text 'EXAMPLE\runas-user'. The 'Password' field contains masked characters '.....'. At the bottom of the dialog, there are two buttons: 'Cancel' and 'Save'.

4. Click **Save** to verify the user name and password.
5. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.

After you update the Run As service account, Tableau Server will automatically configure permissions on the local computer for the account that you have entered.

#### Changing an existing domain Run As service account to a different account

To change an existing domain Run As service account to a different account, you must apply permissions to that new account. To apply permissions to your new Run As service account,

you must first reset permissions by applying them to the default NetworkService account.

Before you begin, verify that the new account that you will be using for the Run As service account complies with the best practices noted previously in the section, Creating the Run As service account.

This procedure requires you to restart Tableau Server services twice, so run this procedure during off hours.

## Use the TSM web interface

1. Open TSM in a browser:

<https://<tsm-computer-name>:8850>. For more information, see Sign in to Tableau Services Manager Web UI.

2. Click the **Security** tab, and then click the **Run As Service Account** tab.
3. Under **User Account**, select **NT Authority\NetworkService**.
4. Click **Save**.
5. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.
6. After the server restarts, open TSM and navigate to the **Run As Service Account** tab.
7. Select **User Account** and then enter the user name and password for the service account. Specify the domain name as `domain\account`, where domain name is the NetBIOS name of the domain where the user resides:

**Run As Service Account** External SSL Repository SSL

**Run As Service Account**

☐ NT AUTHORITY\NetworkService

☒ User Account

Username Password

EXAMPLE\runas-user .....

Cancel Save

8. Click **Save** to verify the user name and password.
9. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.
10. Revoke the permissions for the previous account. See [Revoke Run As Service Account Permissions](#).

## Use the TSM CLI

1. Reset the Run As service account to NetworkService. Run the following command:

```
tsm configuration set -k service.runas.username -v "NT  
AUTHORITY\NetworkService"
```

2. Run the following command to save this change and restart:

```
tsm pending-changes apply
```

3. Set the Run As service account to the new account. Run the following commands:

```
tsm configuration set -k service.runas.username -v <domain\user-  
name>
```

```
tsm configuration set -k service.runas.password -v "<password>"
```

Enclose the password with double quotes to ensure special characters in the string are processed correctly. To view the password as it will be stored, run the following command:

```
tsm pending-changes list
```

The password will be validated with Active Directory. If valid, then the password will be encrypted and saved. TSM will not report success or failure.

4. Run the following command to save and restart:

```
tsm pending-changes apply
```

Troubleshooting:

- Verify that the server has started. If it is in a degraded state, then you may have entered an incorrect password. View the stored password by running the `configuration get` command. This command will decrypt and display the password in the shell. Run the following command:

```
tsm configuration get -k service.runas.password
```

If the previous password is displayed, then you have not entered a valid password.

- Enter the correct password (see Step 3), and then run the following command to save and restart:

```
tsm pending-changes apply
```

5. Revoke the permissions for the previous account. See [Revoke Run As Service Account Permissions](#).

### Updating the Run As service account password

If the Run As service account password has been updated in Active Directory you must update it for Tableau Server. The Run As service account password is encrypted and stored on Tableau Server. For more information, see [Manage Server Secrets](#).

If you are running Tableau Server in a distributed deployment, then you only need to update the password with TSM on the initial node in the cluster. TSM will distribute this configuration to each node automatically.

## Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Security** tab, and then click the **Run As Service Account** tab.
3. Under **User Account**, enter the password for the service account.
4. Click **Save** to verify the password.
5. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.

## Use the TSM CLI

1. Set the new password. Run the following command:

```
tsm configuration set -k service.runas.password -v "<password>"
```

Enclose the password with double quotes to ensure special characters in the string are processed correctly. To validate that special characters were escaped correctly, run the following command to view the password as it will be stored:

```
tsm pending-changes list
```

The password will be validated with Active Directory. If valid, then the password will be encrypted and saved. TSM will not report success or failure.

2. Run the following command to save and restart:

```
tsm pending-changes apply
```

Troubleshooting:

- Verify that the server has started. If it is in a degraded state, then you may have entered an incorrect password. View the stored password by running the `configuration get` command. This command will decrypt and display the password in the shell. Run the following command:

```
tsm configuration get -k service.runas.password
```

If the previous password is displayed, then you have not entered a valid password.

- Enter the correct password (see Step 1), and then run the following command to save and restart:

```
tsm pending-changes apply
```

Troubleshooting: Update the password in the Microsoft Services console

In some cases, you may see service failures after updating the Run As service account password. If so, then you may need to manually update the password for the **Tableau Server Services Manager** service. Update the password in the Microsoft Services management console.

## Tableau Server on Windows Help

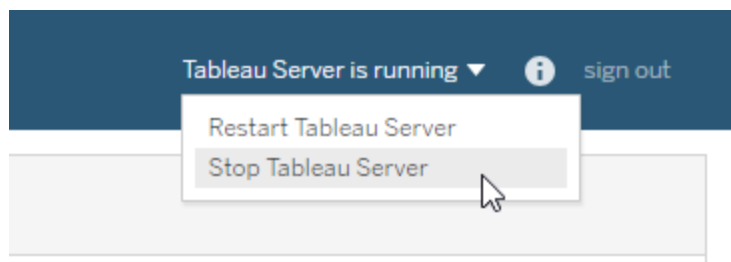
If you are running Tableau Server in a distributed deployment, then you must perform the following procedure on each node in the cluster.

1. Stop Tableau Server.

- To use the TSM CLI, run the following command:

```
tsm stop
```

- To use the TSM Web UI, on the top-right of the page, click the drop-down list next to the status, and then click **Stop Tableau Server**:



2. Open the Services MMC snap-in on the Windows computer that is running Tableau Server.
3. Double-click the **Tableau Server Services Manager** service to open the properties page.
4. On the **Tableau Server Services Manager Properties** page, click the **Log On** tab, and then enter the password for the service account.
5. Click **Apply**, then click **OK**.
6. Restart the **Tableau Server Services Manager** service by right-clicking on the service name and then clicking **Restart**.
7. Start Tableau Server.

- To use the TSM CLI, run the following command:

```
tsm start
```

- To use the TSM Web UI, on the top right of the page, click the drop-down list next to the status, and then click **Start Tableau Server**.

## Related tasks

The Run As service account is central to many operations on Tableau Server, especially those that are involved with remote data access. To avoid access errors, review the tasks here and follow the links for those that apply to your scenario.

- If you are running Tableau Server in an organisation with multiple Active Directory domains, see [Domain Trust Requirements for Active Directory Deployments](#).
- Enabling Kerberos single sign-on requires additional configuration related to the Run As service account. To enable Kerberos single sign-on with Tableau Server, see [Kerberos](#).
- Enabling impersonation requires additional configuration related to Run As service account. To deploy and enable impersonation with Microsoft SQL Server, see [Impersonate with Embedded SQL Credentials](#).
- If you have installed Tableau Server onto the non-system drive, then you will need to manually set some permissions for the Run As service account. See [Required Run As Service Account Settings](#) for more information.
- If you have changed the Run As service account, then we recommend revoking the permissions for the previous account. See [Revoke Run As Service Account Permissions](#).
- If your organisation uses a forward proxy solution, then you may need to reconfigure the local LAN settings on the Tableau Server with the Run As service account. See [Configure a forward proxy server](#) for more information. In this scenario, the Run As service account must also be temporarily configured as the log on account for Tableau Server Administrative Controller for product key operations. See [Configure Product Key Operations with Forward Proxy](#).
- If you are using the Resource Monitoring Tool in your enterprise, the Run As service account may be used to authenticate and gather hardware information. When updating a Run As account, confirm connectivity between RMT and Tableau Server in the RMT Environment Settings:



1. Sign in to RMT as an administrator.
2. Navigate to the Environments page (Admin > Environments).
3. Click **Edit** for the environment that was updated.
4. In the **Servers** list, confirm that each server shows the Agent Service as Connected. Hover over the Connected status to see a timestamp of the last heartbeat message received.

## Troubleshoot Run As User

As discussed in the topic, Run As Service Account, Tableau Server requires administrative-like access to the machine on which it is installed. Therefore, when you update the Run As service account, a background process will configure permissions on the Tableau computer for that account. However, in some complex deployment scenarios you may need to verify or manually configure the Run As service account permissions on the local Tableau Server computer. Use this section to verify how permissions are configured on the machines running Tableau Server in your deployment. This section also includes procedures that describe how to set permissions and configure security policies for the Run As service account.

### Required Run As Service Account Settings

The Run As service account needs permissions that allows it to modify files and registry settings. In addition, because the Run As service account is used as the security context for the Tableau Server Application Manager service (tabsvc), the account must also be given rights to log on as a service.

These permissions are set automatically when you update the Run As service account in Tableau Server Configuration as described in the topic, Change the Run As Service Account.

If you have changed the Run As service account, then we recommend revoking the permissions for the previous account. See Revoke Run As Service Account Permissions.

The account you use for the Run As service account should not be a member of the Local Administrators or Domain Administrators account. Instead, we recommend using a domain user account that is not an administrator for the Run As service account. Using a domain account that is not a member of these administrator groups is a good security practice and can

help avoid access to certain data sources and folders. For information on best practices when creating a Run As service account, see [Creating the Run As service account](#).

If you have recently changed Run As service account or are getting permission errors, use this section to confirm that Tableau Server meets the permission requirements that are detailed here. If you're running a distributed installation, all Run As service account permission configurations must be the same across all nodes.

**Note:** Do not hide the files created by the Tableau Server installer.

### Verify Folder Permissions

The account the Tableau Server service runs under is referred to as the Run As service account. The Run As service account needs permission to specific folder resources on the Windows computer.

This topic provides:

- An accounting of the permissions that are required by the Run As service account.
- Information about installing Tableau Server in non-default locations.
- How to reapply permissions on an existing Run As service account using TSM.

This topic refers to the drive where Windows is installed as the *system drive*. The system drive is equivalent to the Windows environmental variable, %WINDIR%. The drive where Tableau Server is installed is referred to as the *install drive*.

Resource	System or install drive	File Path	Permissions required
folder	system	SYSTEMROOT:\windows\system32	Read, List folder contents
executable	system	SYSTEMROOT:\windows\system32\cmd.exe	Read & execute

Drive root	install	root, for example, Local Disk (C:)	Read, List folder con- tents
folder	install	PROGRAMFILES\Tableau\Tableau Server	Modify
folder	install (on sys- tem drive)	\ProgramData\Tableau\Tableau Server\	Modify
folder	install (on non- system drive)	\Tableau\Tableau Server\data\	Modify

When you update the Run As service account in TSM, a background process will configure the folder permissions on the Tableau computer for the Run As service account that you specify.

In this case, where you are installing on the system drive into the default folder (C:\Program Files\Tableau), the configuration of folder permissions will be handled by TSM. You do not need to verify or change any folder permissions for this scenario. If you install Tableau Server onto a different drive, you will need to manually configure some permissions.

## Installing in a non-default location

If you are installing Tableau Server in a non-default location on a different drive, then you will need to configure permissions on the installation folder for Run As service account as well as the predefined local accounts: Network Service, Local Service and System.

The following table describes the permissions that are applied if you install Tableau Server in a non-default location. All of these permissions are set on the installation folder and are inherited by the subfolders and files in the installation folder. These permissions are configured by the Tableau Setup program and are also reconfigured whenever you upgrade Tableau Server to a new version. Changing permissions on these folders may impair functionality.

For more information about different accounts used by Tableau Server, see [Windows Accounts and Permissions](#).

Set permissions for this account:	Permissions required
The user account that is used to install and upgrade Tableau Server	Full control
The user account that is used to run TSM commands	Full control
System account	Full control
Run As service account, Network Service and Local Service	Read & execute

## Reapplying folder permissions

In some organisations, Group Policy or other system management solutions are used to standardise permissions and accounts on application servers. If your organisation runs a such a solution, be sure to configure the system to accommodate the folder permissions required by the Run As service account. If the folder permissions for the Run As service account have been changed, you can use TSM to reapply the permissions. See [Changing an existing domain Run As service account to a different account](#).

### Verify Registry Permissions

The account the Tableau Server service runs under needs permission to modify the registry on the local machine.

In a multi-node cluster, the registry permissions are only granted on the tsm node in the cluster.

When you update the Run As service account, TSM will configure the registry permissions on the Tableau computer for the account you specify. It's unlikely that you will need to apply these permissions manually.

Verify that the Run As service account has been granted permissions to the `HKEY_LOCAL_MACHINE\Software\Tableau` registry branch. If the account that you have specified as the Run As service account is a member of the local administrative group or a member of the Domain Admins security group, then the account will not be displayed on the Permissions page.

## Permissions

TSM will grant Read permission and the following Special permissions to these branches:

- Query Value
- Set Value
- Create Subkey
- Enumerate Subkeys
- Notify
- Write DAC
- Write Owner
- Read Control

To view or edit permissions on registry directories:

1. Open the Registry Editor by entering `regedit` in Windows Run, and then clicking **OK**.
2. In Registry Editor, navigate to the directory where you want to view or edit permissions. Right-click the directory, and then click **Permissions...**
3. In Permissions, on the Security tab, select the Run As service account, and then click **Advanced**.  
If you are adding your Run As service account, then click **Add** and follow the Windows process for adding a user account to the Security tab. After you have added the account, then select the Run As service account, and then click **Advanced**
4. In Advanced Security Settings, on the Permissions tab, select the Run As service account, and then click **Edit**.
5. On the Permission Entry, under Basic permissions, verify that **Read** and **Special permissions** are selected. Verify that **Only apply these permissions to objects and/or containers within this container** is not selected.
6. To view or edit Special permissions, click **Show advanced permissions**.

7. Under Advanced permissions, verify that the permissions enumerated at the beginning of this topic are selected. Verify that **Only apply these permissions to objects and/or containers within this container** is not selected.
8. If you have set new permissions, then click **OK** through the multiple windows to finish. If you have viewed permissions and not edited anything, then click **Cancel** to close all windows.

### Verify the Local Security Policy

After you specify a Run As service account in Tableau Services Manager (as described in the topic, [Change the Run As Service Account](#)), TSM will update the local security policy on the computer running Tableau Server. TSM will update the local security policy to give "log on as a service" and "log on locally" permissions to the Run As service account. This elevated policy is required because the Run As service account is used as the security context for the Tableau Server Application Manager service (tabsvc).

**Note:** If the Run As service account that you specify in TSM is a member of the local administrators or a domain administrator, then TSM may not update the local security policy. Updating the Run As service account with an account that is a member of local administrators or domain administrators is not a good security practice. We recommend using a domain User account for the Run As service account.

In some cases, you may need to manually set security policy for your Run As service account. For example, some organisations run Windows Group Policy that remove "Log on as a service" or "Allow log on locally" rights that have been set on user accounts. Or an organisation may run a policy that creates a permission conflict by specifying "Deny log on as a service." If your organisation does this, then you will need to disable or edit such Group Policies so that your Run As service account is not affected. For details on best practices when creating a Run As service account, see [Creating the Run As service account](#).

The following procedure describes how to configure security policies, **Log on as a service** and **Allow log on locally**, manually. You can also use the procedure below to verify that your Run As service account is appropriately configured with local security policy rights. For

example, you should verify that the Run As service account is not specified on the **Deny log on as a service** policy.

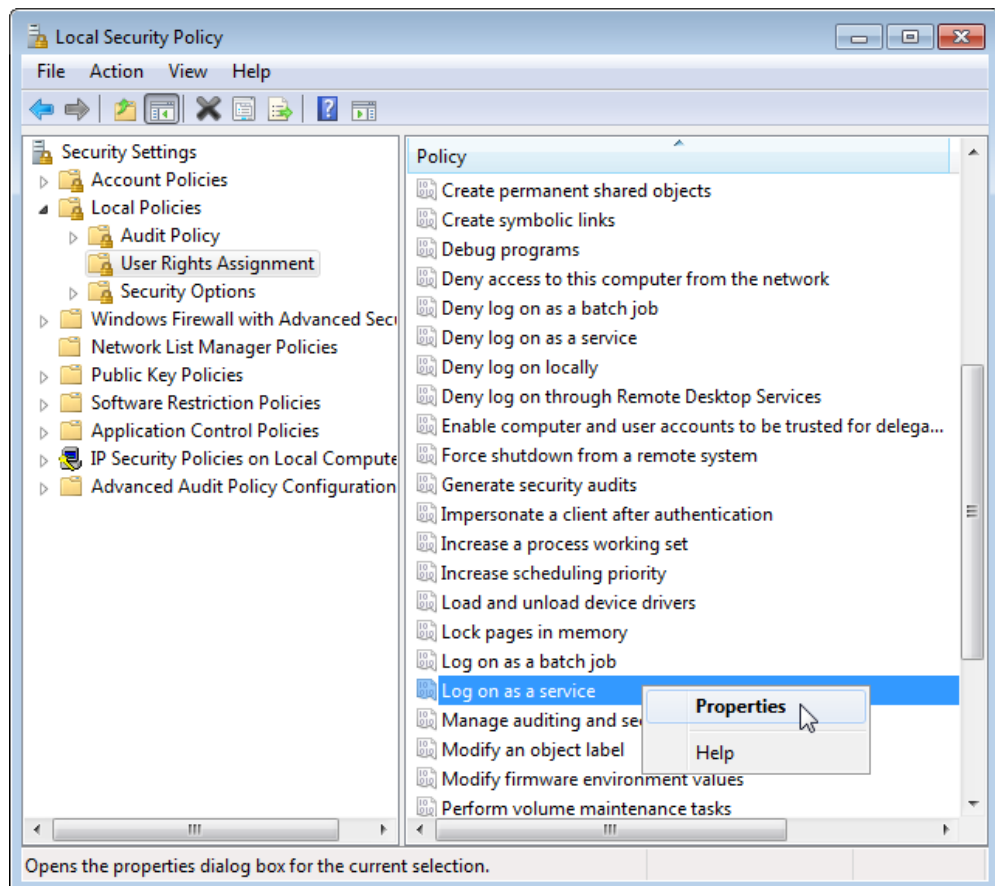
If you are running a distributed installation, then configuration must be the same across the initial and all additional nodes.

To verify or update the local security policy:

1. Select **Start > Control Panel > Administrative Tools > Local Security Policy**.
2. In Local Security Policy, open **Local Policies**, select **User Rights Assignments**.

**To verify or set Log on as a service policy:**

- a. Right-click **Log on as a service** policy and then click **Properties**.



- b. In **Log on as a service Properties**, click **Add User or Group**.
- c. Type the <domain>\<username> for the Tableau Server Run As service account (for example: MYCO\tableau\_server), and click **Check Names**.
- d. When the account resolves correctly, it is underlined. Click **OK**.

**To verify or set Allow log on locally policy:**

- a. Right-click **Allow log on locally** policy and then click **Properties**.
- b. Verify that the Run As service account is specified. If it is not, follow the procedure above to add the Run As service account.

**To verify Run As service account is not specified in the Deny log on as a service policy:**

- a. Right-click **Deny log on as a service** policy, and then click **Properties**.
- b. In **Deny log on as a service Properties**, verify that the Run As service account is not listed. If it is, remove it. When you are finished, click **OK**.

3. Click **OK** to close the Local Security Settings windows.

### Verify Tableau Service Settings

Confirm that Tableau services are assigned the correct Log On and Startup values. If you are running a **distributed installation** of Tableau Server, perform these steps on all nodes in the cluster.

**Note:** The Startup Values for TSM services changed in these maintenance releases: 2020.215, 2020.3.10, 2020.4.6 and 2021.1.3. Values changed from "Automatic" to "Automatic (Delayed Start)" for the following TSM services: Tableau Server Administration Agent, Tableau Server Administration Controller, Tableau Server Client File Service, Tableau Server Coordination Service, Tableau Server Licence Manager and Tableau Server Service Manager. If you are running older versions of Tableau Server, you do not have to change these values from "Automatic" but can do so without negative impact.



## Tableau Server on Windows Help

1. Log on as administrator to the computer running Tableau Server.
2. On the Tableau Server computer, select **Start > Control Panel > Administrative Tools > Computer Management > Services and Applications > Services**.
3. Open Services and Applications, then click **Services**. Confirm that the following services have the correct settings:

Service Name	Logon Value	Startup Value
FLEXnet Licensing Service 64	Local System	Automatic
Secondary Logon	Local System	Manual
Tableau Server Administration Agent	Local System	Automatic (Delayed Start)
Tableau Server Administration Controller	Network Service	Automatic (Delayed Start)
Tableau Server Client File Service	Network Service	Automatic (Delayed Start)
Tableau Server Coordination Service	Network Service	Automatic (Delayed Start)
Tableau Server Licence Manager (Runs on initial node only)	Local Service  The Licence Manager relies on default Windows folder permissions that are applied to the Local Service. In more secure environments, you must modify the permissions on the Tableau install-	Automatic (Delayed Start)

Service Name	Logon Value	Startup Value
	<p>ation directory. Otherwise, you may encounter licensing errors.</p> <p>See Verify Folder Permissions for more information.</p>	
Tableau Server Service Manager	<domain>\<username> This is the Run As service account. See below. If you have not specified a Run As service account, then the Network Service system account is used.	Automatic (Delayed Start)

**Note:** Do not change the default settings on the **Recovery** tab of the **Tableau Server Service Manager Properties** dialog box; leave the settings for failure recovery as **Restart the Service**.

### Changing the Log On Value

To change the **Log On** value for Tableau Server (tabsvc) to the Run As service account, see [Change the Run As Service Account](#).

### Revoke Run As Service Account Permissions

Changing the Run As service account in Tableau Server Configuration Utility does not remove the permissions from the previous account. Therefore, after you change the Run As service account, we recommend manually revoking permissions from the previous account as a secure best practice. Follow the procedure below to revoke permissions from the previous Run As service account.

If you have changed your Run As service account and your organisation uses a forward proxy solution, then you may need to reconfigure the local LAN settings with the new Run As service account. See [Configure a forward proxy server](#) for more information.

## Tableau Server on Windows Help

You must be logged onto the Tableau Server computer with an administrator account to perform the following procedures.

### Remove folder permissions

Tableau Server configures permissions on Windows folders according to the location where you install Tableau Server. Before you remove folder permissions, review [Verify Folder Permissions](#) to identify the resources for which you will need to remove permissions. Run the following procedure for each of the resources you have identified:

1. For each resource (drive, folder, executable), right-click the resource, and then click **Properties**.
2. On the resource property page, click the **Security** tab, and then click **Edit** to change permissions.
3. On the Permissions page, select the previous Run As service account and then click **Remove**.
4. Click **OK**.

### Remove registry permissions

Remove the previous Run As service account from the following registry locations:

- HKEY\_CURRENT\_USER\Software\Tableau
- HKEY\_LOCAL\_MACHINE\Software\Tableau

**Warning:** Editing the Windows registry incorrectly can have harmful effects on your computer.

1. Open the Registry Editor by entering `regedit` in Windows Run, and then clicking **OK**.
2. For each registry directory, right-click the **Tableau** folder, and then click **Permissions**.
3. In the **Permissions for Tableau** page, select the previous Run As service account, and then click **Remove**.
4. Click **OK**.

### Remove security policies

Remove the previous Run As service account from the following security policies:

- “Log on as a service” policy
  - “Allow log on locally” policy
1. Select **Start > Control Panel > Administrative Tools > Local Security Policy**.
  2. In **Local Security Policy**, open **Local Policies**, select **User Rights Assignments**.
  3. For each policy:
    - a. Right-click the policy and then select **Properties**.
    - b. On the policy property page, select the previous Run As service account, and then click **Remove**.
    - c. Click **OK**.

## Identity Store

Tableau Server requires an identity store to manage user and group information. There are two kinds of identity stores: local and external. When you install Tableau Server you must configure either a local identity store or an external identity store.

For information about configuration options for the identity store, see [identityStore Entity](#) and [External Identity Store Configuration Reference](#). For more information about adding more flexibility to the single identity store model, see [Provision and Authenticate Users Using Identity Pools](#).

### Local identity store

When you configure Tableau Server with a local identity store, all user and group information is stored and managed in the Tableau Server repository. In the local identity store scenario, there is no external source for users and groups.

### External identity store

When you configure Tableau Server with an external store, all user and group information is stored and managed by an external directory service. Tableau Server must synchronise with the external identity store so that local copies of the users and groups exist in the Tableau Server repository, but the external identity store is the authoritative source for all user and group data.

If you have configured the Tableau Server identity store to communicate with an external LDAP directory, then all users (including the initial admin account) that you add to Tableau Server must have an account in the directory.

When Tableau Server is configured to use an external LDAP directory, you must first import user identities from the external directory into the Tableau Server repository as system users. When users sign in to Tableau Server, their credentials are passed to the external directory, which is responsible for authenticating the user; Tableau Server does not perform this authentication. However, the Tableau user names stored in the identity store are associated with rights and permissions for Tableau Server. Therefore, after authentication is verified, Tableau Server manages user access (authorisation) for Tableau resources.

Active Directory is an example of an external user store. Tableau Server is optimised to interface with Active Directory. For example, when you install Tableau Server on an Active Directory domain-joined computer using the Configure Initial Node Settings, Setup will detect and configure most Active Directory settings. If, on the other hand, you are using TSM CLI to install Tableau Server, you must specify all the Active Directory settings. In this case, be sure to use the LDAP - Active Directory template to configure identity store.

If you are installing into Active Directory, you must install Tableau Server onto a computer that is joined to the Active Directory domain. Additionally, we recommend that you review User Management in Deployments with External Identity Stores before you deploy.

For all other external stores, Tableau Server supports LDAP as a generic way to communicate the identity store. For example, OpenLDAP is one of several LDAP server implementations with a flexible schema. Tableau Server can be configured to query the OpenLDAP server. To do this, the directory administrator must provide information about the schema. During setup, you must use Configure Initial Node Settings to configure a connection to other LDAP directories.

### LDAP bind

Clients that wish to query a user store using LDAP must authenticate and establish a session. This is done by binding. There are multiple ways to bind. Simple binding is authenticating with

a username and password. For organisations that connect to Tableau Server with simple bind, we recommend configuring an SSL encrypted connection, otherwise the credentials are sent over the wire in plaintext. Another type of binding Tableau Server supports is GSSAPI binding. GSSAPI uses Kerberos to authenticate. In Tableau Server's case, Tableau Server is the client and the external user store is the LDAP server.

#### LDAP with GSSAPI (Kerberos) bind

We recommend binding to LDAP directory with GSSAPI using a keytab file to authenticate to the LDAP server. You will need a keytab file specifically for the Tableau Server service. We also recommend encrypting the channel with the LDAP server using SSL/TLS. See [Configure Encrypted Channel to LDAP External Identity Store](#).

If you are installing into Active Directory, and the computer where you are installing Tableau Server is already joined to the domain, then the computer may already have a configuration file and a keytab file. In this case, the Kerberos files are for the operating system functionality and authentication. Strictly speaking, you can use these files for GSSAPI bind, but we don't recommend using them. Instead, contact your Active Directory administrator and request a keytab specifically for the Tableau Server service. See [Understanding Keytab Requirements](#).

Assuming your operating system has a properly configured keytab for authentication to the domain, then the Kerberos keyfile for GSSAPI bind is all you need for the base installation of Tableau Server. If you plan to use Kerberos authentication for users, then [configure Kerberos for user authentication](#) and [Kerberos delegation to data sources](#) after installation is complete.

#### LDAP over SSL

By default, LDAP with simple bind to arbitrary LDAP servers is not encrypted. User credentials that are used to establish the bind session with the LDAP server are communicated in plaintext between Tableau Server and the LDAP server. We strongly recommend that you encrypt the channel between Tableau Server and the LDAP server.

If your organisation uses an LDAP directory other than Active Directory, see [Configure Encrypted Channel to LDAP External Identity Store](#).

## Authenticating clients

Basic user authentication in Tableau Server is by username and password sign-in for both local and external user stores. In the local case, user passwords are stored as a hashed password in the repository. In the external case, Tableau Server passes the credentials to the external user store and awaits a response as to whether the credentials are valid. External user stores can also handle other kinds of authentication like Kerberos or SSPI (Active Directory only), but the concept is still the same: Tableau Server delegates the credentials or user to the external store and awaits a response.

You can configure Tableau Server such that username-password sign-in is disabled. In these scenarios other authentication methods, such as trusted authentication, OpenID, or SAML can be used. See [Authentication](#).

In some cases, you may need to update LDAP external directories to allow bind operations with username + DN format from Tableau Server. See [User binding behaviour on sign-in](#).

## User Management in Deployments with External Identity Stores

This topic describes important technical details that you should be familiar with if you use an external identity store to manage users for Tableau Server. Tableau Server supports connecting to an external directory using LDAP. In this scenario, Tableau Server imports users from the external LDAP directory into the Tableau Server repository as system users.

### Arbitrary LDAP directories

The system username in Tableau is whatever attribute you set as part of LDAP configuration, for example "cn". This is true for both individual user import and group sync functionality. See [External Identity Store Configuration Reference](#).

#### User binding behaviour on sign-in

You may need to update your LDAP configuration to allow binding with usernames appended with the DN. Specifically, you will need to update your LDAP configuration when Tableau

Server is configured with an arbitrary LDAP directory. (e.g. OpenLDAP that uses UPN or email addresses as usernames.)

Tableau Server will search for a given user based on the username that is supplied during sign-in. Tableau Server will then attempt to bind with the username appended with the DN. In the case where Tableau Server has been configured with GSSAPI, then the username@REALM (domain name) will be used.

## Active Directory

This content in rest of this topic assumes that you are familiar with Active Directory user management and basic Active Directory schema and domain concepts.

If you are installing into Active Directory, you must install Tableau Server onto a computer that is joined to the Active Directory domain.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

### Active Directory user authentication and Tableau Server

Tableau Server stores all user names in the Tableau Server identity store, which is managed by the repository. If Tableau Server is configured to use Active Directory for authentication, you must first import user identities from Active Directory to the identity store. When users sign in to Tableau Server, their credentials are passed to Active Directory, which is responsible for authenticating the user; Tableau Server does not perform this authentication. (By default, NTLM is used for authentication, but you can enable Kerberos or SAML for single sign-on functionality – however, in all these cases, authentication is left to Active Directory.) However, the Tableau user names stored in the identity store are associated with rights and permissions for Tableau Server. Therefore, after authentication is verified, Tableau Server manages user access (authorisation) for Tableau resources.



### Active Directory user name attributes and Tableau Server

Active Directory uniquely identifies user objects using several attributes. (For details, see [User Naming Attributes](#) on the MSDN website.) Tableau Server relies on two Active Directory user naming attributes:

- `sAMAccountName`. This attribute specifies the logon name that was originally designed for use with older versions of Windows. In many organisations, this name is combined with the NetBIOS name for authentication, using a format like `example\jsmith`, where `example` is the NetBIOS name and `jsmith` is the `sAMAccountName` value. Due to the original design in Windows, the `sAMAccountName` value must be less than 20 characters.

In the Windows **Active Directory Users and Computers** administrative console, this value is in the field labeled **User logon name (pre-Windows 2000)** on the **Account** tab of the user object.

- `userPrincipalName` (UPN). This attribute specifies a user name in the format `jsmith@example.com`, where `jsmith` is the UPN prefix and `@example.com` is the UPN suffix.

In the Windows **Active Directory Users and Computers** administrative console, the UPN is a concatenation of two fields on the **Account** tab of the user object: the **User logon name** field, and the domain drop-down list next to it.

### Adding users from Active Directory

You can [add users individually](#) from Active Directory, either by typing them in the server environment or by creating a CSV file and importing the users. You can also add Active Directory users by [creating a group via Active Directory](#) and importing all of the group's users. The result can be different depending on which approach you're using.

### Importing UPN prefix as username

You cannot import the whole UPN as a username.

In most cases, the username that Tableau Server will import into the identity store will be the `sAMAccountName` value. For more information about exceptions to this behaviour, see the [Importing UPN Prefix as Username in Non-Standard Scenarios with Active Directory](#) in the Tableau knowledge base.

### Adding user groups

If you import an Active Directory user group, Tableau will import all users from the group using the `sAMAccountName`.

### Sync behaviour when removing users from Active Directory

Users cannot be automatically removed from Tableau Server through an Active Directory sync operation. Users that are disabled, deleted or removed from groups in Active Directory remain on Tableau Server so that you can audit and reassign the user's content before removing the user's account completely.

However, Tableau Server will act upon user objects differently based how the status of that user object changes in Active Directory. There are two scenarios: deleting/disabling users in Active Directory or removing users from synchronised groups in Active Directory.

When you delete or disable a user in Active Directory and then synchronise that user's group on Tableau Server, the following occurs:

- The user is removed from the Tableau Server group you synchronised.
- The user's role is set to 'unlicensed'.
- The user will still belong to the All Users group.
- The user is unable to sign in to Tableau Server.

When you remove a user from a group in Active Directory and then synchronise that group on Tableau Server, the following occurs:

- The user is removed from the Tableau Server group you synchronised.
- The user's role is retained: it is not set to 'unlicensed'.
- The user will still belong to the All Users group.
- The user will still have permission to the Tableau Server with access to everything that the All Users group is granted permission to use.

In both instances, to remove a user from Tableau Server, the server administrator must delete the user from the Server Users page in Tableau Server.

### Domain nicknames

In Tableau Server, domain nickname is equivalent to the Windows NetBIOS domain name. In a Windows Active Directory forest, a fully qualified domain name (FQDN) can have an arbitrary NetBIOS name. The NetBIOS name is used as the domain identifier when a user logs in to Active Directory.

For example, the FQDN `west.na.corp.lan` might be configured with a NetBIOS name (nickname) of `SEATTLE`. The user `jsmith` in that domain could log on to Windows using either of the following user names:

- `west.na.corp.example.com\jsmith`
- `SEATTLE\jsmith`

If you want your users to sign in to Tableau Server with a NetBIOS name instead of the FQDN, then you'll need to verify that the nickname value for each domain where users log in is set. See `editdomain` for information on how to view and set the nickname value for each domain.

### Support for multiple domains

You can add users and groups from a domain that's different from the domain of the Tableau Server computer in these cases:

- Two-way trust has been established between the server's domain and the users' domain.
- The server's domain trusts the users' domain (one-way trust). See [Domain Trust Requirements for Active Directory Deployments](#).

The first time you add a user or group from the non-server domain, you must specify the fully qualified domain name with the user/group name. Any additional users or groups you add from that domain can be added using the domain's nickname, provided that the nickname matches the NetBIOS name. If Tableau Server connects to multiple domains, you must also specify the other domains that Tableau Server connects to by setting the

`wgserver.domain.whitelist` (version 2020.3 and earlier) or `wgserver.domain.accept_list` (version 2020.4 and later) option with TSM. For more information, see `wgserver.domain.allowlist` or `wgserver.domain.accept_list`.

### Duplicate display names

If user display names are not unique across multiple domains, then managing users with the same display name in Tableau can be confusing. Tableau Server will display the same name for two users. For example, consider an organisation with two domains, `example.lan` and `example2.lan`. If user John Smith exists in both domains, then adding that user to groups and other administrative tasks will be confusing in Tableau Server. In this scenario, consider updating the display name in Active Directory for one of the users to differentiate the accounts.

### Sign in to Tableau Server with NetBIOS name

Users can sign in to Tableau Server using the domain nickname (NetBIOS name), for example, `SEATTLE\jsmith`.

Tableau Server cannot query for NetBIOS name for a given FQDN. As a result, Tableau sets the nickname of a given FQDN according to the first entry in the namespace. For example, given the FQDN `west.na.corp.lan`, Tableau sets the nickname to `west`.

Therefore, you might need to update the domain nickname on Tableau Server before users can sign in using the nickname. If you do not update the nickname, users will have to sign in using a fully qualified domain name. For more information, see [Users From New Domain Unable to Log In and Do Not Appear in User List](#) in the Tableau Knowledge Base.

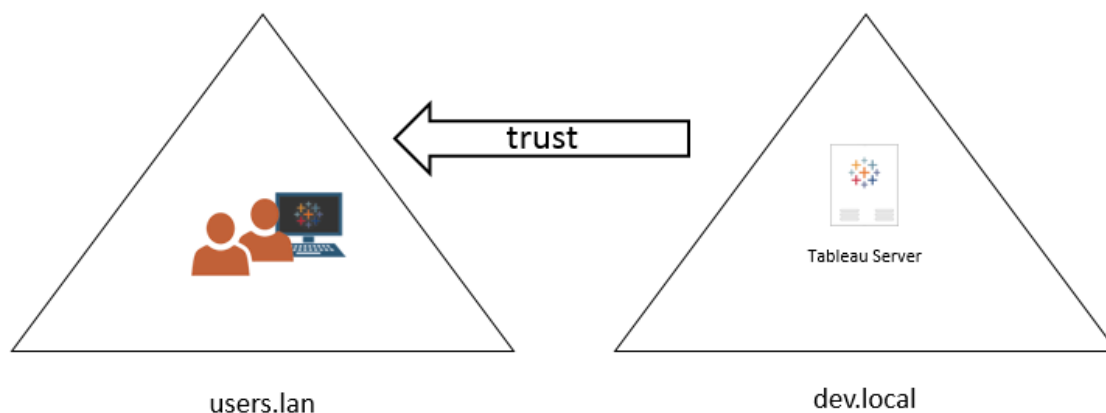
## Domain Trust Requirements for Active Directory Deployments

When you run Tableau Server in an Active Directory environment across multiple domains (either in the same Active Directory forest or in different forests), some Tableau functionality is dependent on the trust relationship between the domains. For example, some administrators manage users in domains that are separate from where they deploy server applications, such as Tableau Server. In other organisations, a Tableau Server deployment might be shared

with external partners or with different partners in the organisation. Finally, Windows-authenticated data sources, such as SQL Server, MSAS, or Oracle, that Tableau Server connects to may also be in other domains.

If it's feasible, we recommend configuring two-way trust between all domains that interact with Tableau Server. If this is not possible, Tableau Server can be configured to support user authentication where a one-way trust has been configured. In this case, a one-way trust between domains is supported when the domain in which Tableau Server is installed is configured to trust the domain where user accounts reside.

The following illustration shows one-way trust between the domain where Tableau Server is installed and the domain where user accounts reside:



In this scenario, Tableau Server is in the dev.local domain, and users from the users.lan Active Directory domain are imported into Tableau Server. A one-way trust is required for this scenario; specifically, the dev.local domain is configured to trust the users.lan domain. Users in the users.lan domain can access Tableau Server in the dev.local with their normal Active Directory credentials. However, you may need to update the domain nickname on Tableau Server before users log on with the nickname. Refer to the [Tableau Knowledge Base](#) for more information.

When you configure Tableau Server for this scenario, specify the primary user domain during installation. See [Configure Initial Node Settings](#). To ensure that Tableau Server can connect to

other Active Directory domains, you must also specify other domains that Tableau Server connects to by setting the `wgserver.domain.accept_list` option with TSM. For more information, see `wgserver.domain.accept_list`.

The Run As service account must also have query (Read) access to each domain from which users will be imported.

Kerberos single sign-on is supported in this one-way trust scenario.

Review [User Management in Deployments with External Identity Stores](#) to understand how multiple domains, domain naming, NetBIOS, and Active Directory user name format influence Tableau user management.

### Connecting to live data in one-way trust scenarios

In the one-way trust scenario, users connecting to Tableau Server can connect to live data that's hosted in the cloud or on any other data source on premises that does not rely on Windows authentication.

Data sources that require Windows-authentication might have additional authentication requirements that complicate the scenario, or that can even prevent Tableau Server users from connecting. This is because Tableau Server uses the Run As service account for authentication with such data sources. If you are running Tableau Server in a different domain than data sources that use Windows authentication, verify that the Run As service account that is used for Tableau Server can access the data source.

## Communicating with the Internet

In most enterprises, Tableau Server needs to communicate with the internet. Tableau Server was designed to operate inside a protected internal network. Do not set up Tableau Server directly on the internet or in a DMZ. Instead, communications between your network and the internet should be mediated using proxy servers. If the computer running Tableau Server cannot access the internet directly, then you may need to deploy forward proxy servers to mediate traffic from inside the network to targets on the internet. Tableau Server doesn't support pass-through or manual proxy authentication.

For inbound traffic, we recommend running Tableau Server behind reverse proxy servers.

### How Tableau communicates with the internet

Tableau Server requires outbound access to the internet for these scenarios:

- Working with maps. Tableau uses map data that is hosted externally.

Tableau Server needs to connect to the following internet locations with port 443 to use maps:

- [mapsconfig.tableau.com](https://mapsconfig.tableau.com)
- [api.mapbox.com](https://api.mapbox.com)

If Tableau cannot make these connections, maps may fail to load.

You can test connectivity by accessing each of those addresses in a browser:

<https://mapsconfig.tableau.com/v1/config.json> and <https://api.mapbox.com/> will prompt you to download a json file.

If you use a proxy to connect to the internet and are unable to connect to [api.mapbox.com](https://api.mapbox.com), see [Working with firewalls](#) on the Mapbox website.

For Tableau Server version 2019.1 and earlier, see the documentation for your version:

[Tableau Help](#)

- Connecting to the Tableau send-logs server.

You can upload log files to Tableau when working with Support. See [tsm maintenance send-logs](#). To successfully upload files to Tableau, your Tableau Server must be able to communicate with the send-logs server on port 443:

- [report-issue.tableau.com:443](https://report-issue.tableau.com:443)
- [crash-artifacts-747369.s3.amazonaws.com](https://crash-artifacts-747369.s3.amazonaws.com)

- s3-us-west-2-w.amazonaws.com
- s3-w-a.us-west-2.amazonaws.com
- Sending Basic Product Data.

The domain, prod.telemetry.tableausoftware.com, is used by Tableau to receive the Basic Product Data about process launch and shutdown. It is also used for the more general Product Usage Data.

Traffic to this domain will occur on port 80 (for initial registration of our Product Data clients) and on port 443 (for all subsequent traffic).

prod.telemetry.tableausoftware.com:80

prod.telemetry.tableausoftware.com:443

- Licensing. Tableau products connect to the internet to activate product keys. Unless you activate Tableau software with the [Offline Activation Tool](#), all Tableau products must have access to the internet to validate licences. Specifically Tableau requires internet access during the following licensing operations: activation, deactivation and on the refresh maintenance date. For more information about these operations, see [Manage Licences](#).

Tableau Server needs to connect to the following internet locations for licensing purposes:

- atr.licensing.tableau.com:443
- licensing.tableau.com:443
- register.tableau.com:443
- o.ss2.us
- s.ss2.us



## Tableau Server on Windows Help

- crt.rootca1.amazontrust.com
- crt.sca1b.amazontrust.com
- crt.sca0a.amazontrust.com
- crt.sca1a.amazontrust.com
- crt.sca2a.amazontrust.com
- crt.sca3a.amazontrust.com
- crt.sca4a.amazontrust.com
- \*.digicert.com
- ocsp.\*.amazontrust.com
- crl.\*.amazontrust.com

Requests to the above domains may be on port 80 or 443. Port 80 is used for certificate validation (revocation, certificate chain, etc). Port 443 is used for SSL connections.

Requests to the `ocsp.*.amazontrust.com` and `crl.*.amazontrust.com` domains are managed by Amazon for certificate revocation information. See [ACM certificate characteristics](#) for more information.

If Tableau Server cannot make a connection while attempting to activate its licence, you will be prompted to do an offline activation.

To diagnose connectivity to Tableau's licensing server, paste the following URL into a browser or at a curl command prompt on the Tableau Server computer:

```
https://atr.licensing.tableau.com/_status/healthz
```

If Tableau Server is able to access the licensing server, it displays an "OK" message. Otherwise, an error such as "Can't reach this page" may be displayed. To resolve this

issue, work with your networking team to unblock access to `atr.licensing.tableau.com:443` on the Tableau Server computer.

Specifically, for deployments where ATR is configured, see Step 4: Verify proxy settings do not conflict with Windows environment variables.

- Working with external or cloud-based data.

Tableau Server needs to connect to the following internet location for Anaplan, Box, Dropbox, Google Drive, Google Sheets, OneDrive and Snowflake services:

```
galop.connectors.tableau.com:443
```

- Working with Tableau dashboard extensions.

Tableau Server needs to connect to the following internet location to use Sandboxed dashboard extensions:

```
extensions.tableauusercontent.com: 443
```

For more information, see [Manage Dashboard and Viz Extensions in Tableau Server](#).

- Working with Slack.

If you are integrating Tableau with a Slack workspace, there are a number of steps you need to take, including adding specific URLs to the Tableau allowlist. These are listed [here](#). For complete details on how to do this, see [Integrate Tableau with a Slack Workspace](#).

Tableau Server can run without internet access. For more information about deploying Tableau Server in organisations without access to the internet, see [Install Tableau Server in a Disconnected \(Air-Gapped\) Environment](#).

In many enterprises, users also need to access Tableau Server from outside the network (that is, from the internet). For example, in many enterprises, users want to be able to reach Tableau Server from their mobile devices in order to interact with views that are stored on the

server. To configure access to Tableau Server from the internet or from mobile devices, you should use a reverse proxy. See [Configuring Proxies and Load Balancers for Tableau Server](#).

## Configuring Proxies and Load Balancers for Tableau Server

In most enterprises, Tableau Server needs to communicate with the internet. Tableau Server was designed to operate inside a protected internal network. Do not set up Tableau Server directly on the internet or in a DMZ. Instead, communications between your network and the internet should be mediated using proxy servers. Forward proxy servers mediate traffic from inside the network to targets on the internet. Reverse proxy servers and load balancers mediate traffic from the internet to targets inside the network.

### Who should read this article?

This article is for IT professionals who are experienced with general networking, load balancing and gateway proxy solutions. The article describes how and when Tableau requires internet access and describes how to configure your network and Tableau to use proxy servers and load balancers for access to and from the internet. There are many third-party solutions available, so some of the content in the article is necessarily generic.

Before you configure a proxy server, see [Communicating with the Internet](#).

### Configure a forward proxy server

To enable communication from Tableau Server to the internet, deploy Tableau Server behind a forward proxy server. When Tableau Server needs access to the internet, it doesn't send the request directly to the internet. Instead, it sends the request to the forward proxy, which in turn forwards the request. Forward proxies help administrators manage traffic out to the internet for tasks such as load balancing, blocking access to sites, etc.

If you use a forward proxy, you must configure the computers that run Tableau Server inside the network to send traffic to the forward proxy. Tableau Server doesn't support pass-through or manual proxy authentication.

If you are running OpenID authentication with a forward proxy solution, additional configurations are required. See [Configure OpenID to work with a forward proxy](#).

### Configuring Tableau Server on Windows to work with a forward proxy

The steps for configuring internet options on the Tableau Server computer depend on which of these scenarios describes your enterprise:

- **Your organisation doesn't use a forward proxy solution.** If your organisation is not running a proxy solution and the computer where you are installing Tableau Server can communicate with the internet, you don't need to follow the procedures here.
- **A proxy solution is deployed, and automatic configuration files define connection settings.** If your organisation uses automatic configuration files (such as PAC or `.ins` files) to specify internet connection information, you can use this information in the Local Area Network (LAN) Settings dialog box in Windows. For more information, see [Enable Automatic Detection and Configuration of Browser Settings](#) on the Microsoft support site.
- **A proxy solution is deployed, but automatic configuration files are not deployed.** For this scenario, you must configure LAN settings on the Windows computer that is running Tableau Server so that connections to your proxy server are run under the security context of the Run As User account. You must also configure `localhost` and other internal Tableau Server instances as exceptions.

The following procedure describes the steps for the last scenario – a proxy solution without automatic configuration files, where Tableau Server is running on Windows Server.

**Note:** If you are using a distributed installation of Tableau Server, perform the following procedures on the initial server node and on each additional node.

### Step 1: Add the Run As service account to the Local Administrators group

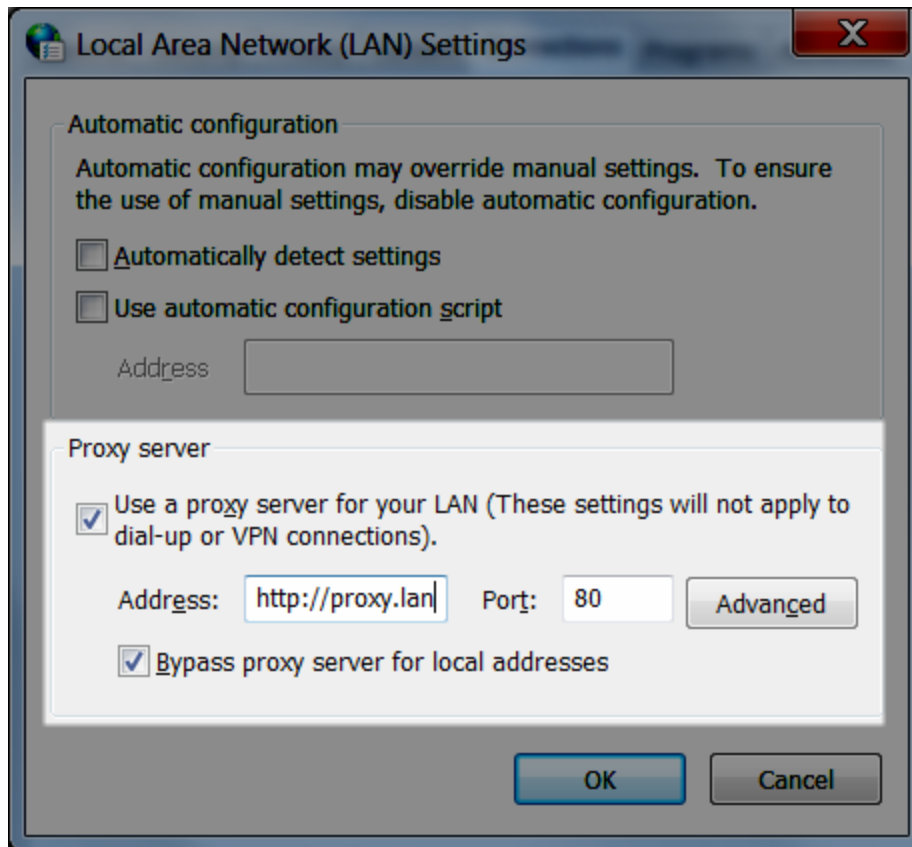
To perform this procedure, you must log onto the Tableau Server computer with the as the Run As service account. By default, the “log on locally” policy is not applied to the Run As service account. Therefore, you must temporarily add the Run As service account to the Local Administrators group.

If you haven't installed Tableau Server on the computer yet, see [Change the Run As Service Account](#). If you already installed Tableau Server and configured the Run As service account, then you can determine the Run As service account name by signing into TSM Web UI. The Tableau Server Run As service account is listed on the **Security** tab of the **Configuration** window. See [Sign in to Tableau Services Manager Web UI](#).

Add the Run As service account to the Local Administrators group using steps in [Add a member to a local group](#) on the Microsoft website. When you've finished configuring the forward proxy information, you'll remove the Run As service account from the Local Administrators group.

### Step 2: Configure the proxy server in Windows LAN Settings

1. Using the Run As service account, log onto the computer where Tableau Server is installed or will be installed.
2. Open the **Local Area Network (LAN) Settings** dialog box. (A quick way to get to this dialog box is to search for `Internet Options` in the Windows Start menu. In the **Internet Properties** dialog box, click the **Connections** tab and then click **LAN settings**.)
3. Under **Proxy server**, select **Use a proxy server for your LAN**, enter the proxy server address and port, and then select **Bypass proxy server for local addresses**.



Leave this dialog box open and continue to the next step.

### Step 3: Add exceptions to bypass the proxy server

You add exceptions to this proxy configuration to guarantee that all communications within a local Tableau Server cluster (if you have one now or will have one later) do not route to the proxy server.

1. In the LAN settings dialog box, click **Advanced**. (This button is available only if you've selected the option to use a proxy server for your LAN.)
2. In the **Proxy Settings** dialog box, in the **Exceptions** field, enter the following:
  - localhost
  - Server host names and IP addresses of other Tableau Server computers in the same cluster.

Use semicolons to separate items.

3. Close the proxy settings dialog box and the Local Area Network (LAN) Settings dialog box.
4. In the **Internet Properties** dialog box, click **OK** to apply the settings.

Stay logged onto the computer and continue to the next step.

#### Step 4: Verify proxy settings do not conflict with Windows environment variables

Some organisations configure forward proxy settings as environment variables in the Windows operating system. If such settings are configured on the computer that is running Tableau Server, then you must verify that they do not conflict with the configurations you've completed here.

This verification is important if your Tableau Server is enabled for ATR licensing. ATR licensing is enabled by default on Tableau Server version 2021.4 and later.

1. On the computer that is running Tableau Server, enter 'advanced system settings' in the search box and then click Enter to open the **System Properties** box.
2. On the **Advanced** tab, click **Environment Variables**.
3. Scroll through the **System variables** field.

If `http_proxy` or `https_proxy` are specified, verify that the values do not conflict with the proxy server address that you configured in the previous step.

- If the existing settings do not conflict, then go to 'Step 5: Test the proxy configuration'.
- If the existing settings do conflict, then create a new variable named `no_proxy`, and enter:

- the host name,
- IP address

For example, `localhost`, `192.168.0.10`. For more information see the Microsoft MSDN article, [Set Environment Variables](#).

4. Click **OK**.

Step 5: Verify that the WinHTTP proxy settings do not conflict with Windows LAN settings

If Server ATR is enabled (it is enabled by default in Tableau Server 2021.4 or later), verify that the WinHTTP proxy is configured and does not conflict with Windows LAN Settings.

1. Using the Run As service account, log onto the computer where Tableau Server is installed or will be installed.
2. Open the command prompt and use the following command to confirm the current configuration:

```
netsh winhttp show proxy
```

3. Configure the proxy for WinHTTP using either of the following methods:

- Use the following command if you import the configuration from Windows LAN Settings:

```
netsh winhttp import proxy source=ie
```

- Use the following command to configure WinHTTP proxy separately:

```
netsh winhttp set proxy <proxy server> <proxy bypass list>
```

For more information, see [Configure the proxy server manually using netsh command](#) at the Microsoft website.

4. Confirm that the proxy settings do not conflict with other Windows proxy configurations.



### Step 6: Test the proxy configuration

To test the new configurations, while still logged in with the Run As service account on the Tableau Server computer, open a web browser and test the following Tableau URLs:

<https://mapsconfig.tableau.com/v1/config.json> and <https://api.mapbox.com/> will prompt you to download a json file.

### Step 7: Remove the Run As service account from the Local Administrator group

After you have tested the proxy settings, remove the Run As service account from the Local Administrators group. Leaving the Run As service account in the administrator group elevates the permissions of the Run As service account and is a security risk.

Restart Tableau Server to ensure that all changes are implemented.

## Server crash reporter

If your organisation uses a proxy server to connect to the Internet then you must configure Tableau Server's crash reporter to use the proxy. Even if you have already configured Tableau Server to use a proxy, you must also configure server crash reporter separately. To configure proxy for server crash reporter, see [Configure Server Crash Reporter](#).

## How a reverse proxy and a load balancer works with Tableau Server

Reverse proxies and load balancers are servers that receive requests from external (internet) clients and forward them to Tableau Server. These solutions make Tableau Server available to the internet without having to expose the individual IP address of that particular Tableau Server to the internet. They may also act as authentication and pass-through devices so that no data is stored where people outside the company can get to it. This requirement can be important for organisations that are subject to various privacy regulations such as PCI, HIPAA or SOX.

The following diagram illustrates the communication path when a client makes a request to Tableau Server that is configured to work with a reverse proxy and/or load balancer (LB).



1. An external client initiates a connection to Tableau Server. The client uses the public URL that's been configured for the reverse proxy server/LB, such as `https://tableau.example.com`. (The client doesn't know that it's accessing a reverse proxy/LB.)
2. The reverse proxy maps that request in turn to a request to Tableau Server. In some scenarios, the reverse proxy may be configured to authenticate the client (using SSL/TLS) as a precondition to passing the request to Tableau Server.
3. Tableau Server gets the request and sends its response to the reverse proxy/LB.
4. The reverse proxy/LB sends the content back to the client. As far as the client is concerned, it just had an interaction with Tableau Server and has no way to know that the communication passed through intermediary server(s).

## TLS/SSL

Depending on your gateway scenario, you should consider configuring your reverse proxy and load balancing servers to use TLS/SSL for any traffic that's external to your network. This helps to ensure privacy, content integrity and authentication. Unless you've deployed other security measures to protect traffic between your internet gateway and Tableau Server, we also recommend configuring SSL between the gateway proxy and Tableau Server. You can use internal or self-signed certificates to encrypt traffic between Tableau Servers and other internal computers.

## Mobile access

Tableau Server adds an X-header to all HTTP responses for Tableau Mobile sessions. By default, most proxy solutions will preserve X-headers. If your gateway solution does not preserve X-headers, then you will need to configure your proxy server and load balancer to preserve the following header to all HTTP responses for Mobile client sessions: `X-Tableau: Tableau Server`.

If you have configured authentication at the gateway, then your proxy server/LB must respond to Tableau Mobile HTTP requests with an HTTP 302 response. The 302 must include a redirect to the identity provider login page. To view a diagram that describes the 302 authentication sequence, see [Tableau Mobile Authentication Sequence](#) in the Tableau Community.

## Reverse proxy, load balancer and user authentication

Tableau Server will always authenticate users. This means that even if you are authenticating inbound connections at the gateway for your organisation, Tableau Server will still authenticate the user.

However, not all clients will support user authentication with a gateway solution:

- For supported web browsers, you can use SAML, OpenID Connect, Kerberos, Trusted Tickets or manual authentication with a reverse proxy/LB.
- Tableau Mobile supports SAML or manual authentication with a reverse proxy/LB. The iOS version of Tableau Mobile additionally supports Kerberos with a reverse proxy/LB. The same recommendation above applies.
- Tableau Prep does not support authentication with a reverse proxy or load balancer. For remote access, use a VPN solution or configure your gateway services to route traffic from Tableau Prep directly to Tableau Server for authentication.
- Tableau Desktop supports authentication with a reverse proxy provided that an authentication module is performing preauthentication on the reverse proxy before traffic is routed to Tableau Server for final authentication. For more information, see [Part 5 -](#)

[Configuring Web Tier](#) of the *Tableau Server Enterprise Deployment Guide* and [Configure Authentication Module with Independent Gateway](#).

If your organisation is authenticating with Active Directory:

- Active Directory with Enable automatic logon (SSPI) is not supported with a reverse proxy.
- Tableau Server must be configured for reverse proxy before configuring Tableau Server for Kerberos. For more information, see [Configure Kerberos](#).

## Configure Tableau Server to work with a reverse proxy server and/or load balancer

Before you configure Tableau Server, you'll need to collect the following information about the proxy server configuration. To configure Tableau Server, you use the `tsm configuration set` command. The information you need to collect corresponds to options you'll need when you run `tsm`.

Most of the following `tsm` options are also used to configure Tableau Server deployments that operate behind a load balancer. For more information, see [Add a Load Balancer](#).

Item	Description	Corresponding <code>tsm configuration set</code> option
IP address or CNAME	<p>You can either enter an IP address or a CNAME for this option.</p> <p>The public IP address or addresses of the proxy and load balancer servers. The IP address must be in IPv4 format, such as <code>203.0.113.0</code>, and it must be a static IP.</p> <p>If you are unable to provide a static IP, or if you are using cloud proxies or external load balancers, you can</p>	<code>gateway.trusted</code>

Item	Description	Corresponding tsm configuration set option
	specify the CNAME (Canonical Name) DNS value that clients will use to connect to Tableau Server. This CNAME value must be configured on your reverse proxy solution to communicate with Tableau Server.	
FQDN	The fully qualified domain name that people use to reach Tableau Server, such as <code>tableau.example.com</code> . Tableau Server doesn't support context switching for this option. For example, the following URL is not supported: <code>example.com/tableau</code> .	<code>gateway.public.host</code>
Non-FQDN	Any subdomain names for the proxy or LB servers. In the example of <code>tableau.example.com</code> , the subdomain name is <code>tableau</code> .	<code>gateway.trusted_hosts</code>
Aliases	Any public alternative names for the proxy or LB servers. In most cases, aliases are designated using CNAME values. An example would be a proxy server <code>big-box.example.com</code> and CNAME entries of <code>ftp.example.com</code> and <code>www.example.com</code> .	<code>gateway.trusted_hosts</code>
Ports	Port numbers for traffic from the client to the reverse proxy server.	<code>gateway.public.port</code>

If you are using a distributed installation of Tableau Server, then run the following `tsm` commands on the initial node in your cluster.

1. Enter the following command to set the FQDN that clients will use to reach Tableau Server through the proxy and/or LB servers, where *name* is the FQDN:

```
tsm configuration set -k gateway.public.host -v "name"
```

For example, if Tableau Server is reached by entering `https://tableau.example.com` in the browser, enter this command:

```
tsm configuration set -k gateway.public.host -v "tableau-  
.example.com"
```

2. Enter the following command to set the address or the CNAME of the proxy and or LB servers, where *server\_address* is the IPv4 address or CNAME value:

```
tsm configuration set -k gateway.trusted -v "server_ip_address"
```

If your organisation uses multiple proxy servers and/or LB servers, enter multiple IPv4 addresses, separating them with commas. IP ranges are not supported. To improve start up and initialisation of Tableau Server, minimise the number of entries for `gateway.trusted`.

3. Enter the following command to specify alternative names for the proxy/LB servers, such as their fully qualified domain names, any not fully qualified domain names and any aliases. If there's more than one name, separate the names with a comma.

```
tsm configuration set -k gateway.trusted_hosts -v "name1,  
name2, name3"
```

For example:

```
tsm configuration set -k gateway.trusted_hosts -v "proxy1.ex-  
ample.com, proxy1, ftp.example.com, www.example.com"
```

4. If the proxy server is using SSL to communicate with the internet, run the following command, which tells Tableau that the reverse proxy server is using port 443 instead of port 80:

```
tsm configuration set -k gateway.public.port -v 443
```

**Note:** If the proxy server is using SSL to communicate with Tableau Server, SSL must be configured and enabled on Tableau Server.

5. Enter the following command to commit the configuration change:

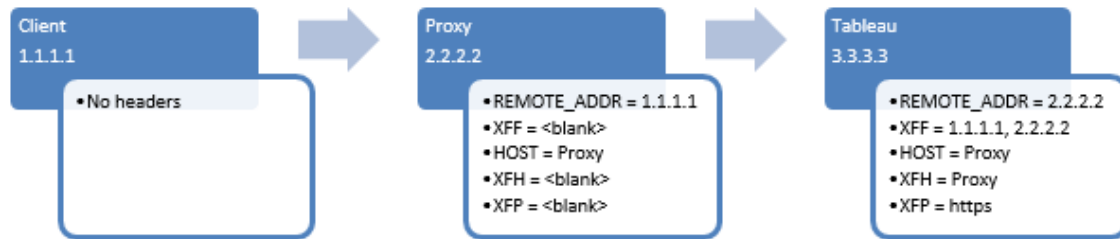
```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

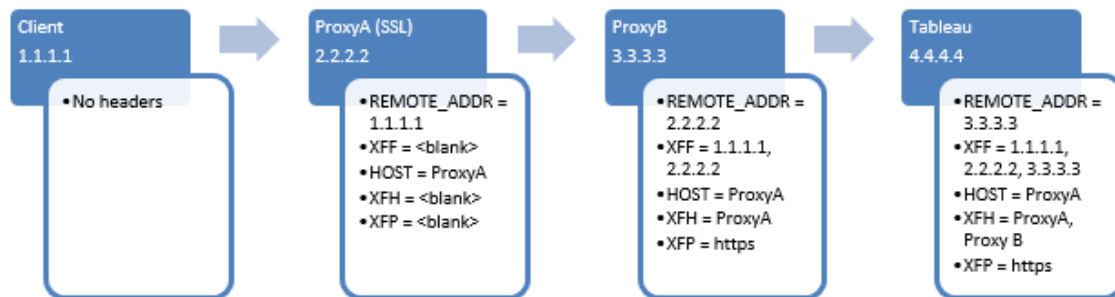
## Configure the reverse proxy or load balancing server to work with Tableau Server

When a client accesses Tableau Server through a reverse proxy or load balancer, specific message headers have to be preserved (or added). Specifically, all servers in the message chain must be represented in the `gateway.trusted` and `gateway.trusted_hosts` settings.

The following graphic shows example headers for a single-hop message chain, where the proxy server is communicating directly with Tableau Server:



The following graphic shows example headers for a multiple-hop message chain, where the message traverses two proxy servers before connecting to Tableau Server:



The following table describes what these headers are and how they relate to the configuration settings on Tableau Server:

Headers	Description	Related Tableau Server settings
REMOTE_ADDR and X-FORWARDED-FOR (XFF)	Tableau Server needs these headers to determine the IP address of origin for requests. X-FORWARDED-FOR header must present IP address chain to Tableau Server in the order the connections have occurred.	The IP address that you set <code>ingateway.trusted</code> must match the IP presented in REMOTE_ADDR. If you sent multiple addresses <code>ingateway.trusted</code> , one of them must match the IP presented in REMOTE_ADDR.
HOST and X-FORWARDED HOST	These headers are used to generate absolute links to Tableau	The host names that are presented in X-



(XFH)	<p>Server when it replies to the client. <code>X-FORWARDED-HOST</code> header must present host names to Tableau Server in the order the connections have occurred.</p>	<p><code>FORWARDED-HOST</code> header must be included in the host names that you specify in <code>gateway.trusted_hosts</code>.</p>
<code>X-FORWARDED-PROTO</code> (XFP)	<p>This header is required if SSL is enabled for traffic from the client to the proxy, but not for traffic from the proxy to Tableau Server.</p> <p>The <code>X-FORWARDED-PROTO</code> headers are important for scenarios where HTTP or HTTPS is not maintained along each hop of the message route. For example, if the reverse proxy requires SSL for outside requests, but traffic between the reverse proxy and Tableau Server is not configured to use SSL, <code>X-FORWARDED-PROTO</code> headers are required. Some proxy solutions add the <code>X-FORWARDED-PROTO</code> headers automatically, while others do not. Finally, depending on your proxy solution, you might have to configure port forwarding to translate the request from port 443 to port 80.</p> <p>Related KB article: <a href="#">"Unable to Sign In" and "Invalid username or password" Error With SAML After</a></p>	<p>Port configuration on reverse proxy (inbound connections from client and outbound connections to Tableau Server) must be specified in the corresponding parameter: <code>gateway.public.port</code>, which is the port clients use to connect to the proxy.</p> <p>If the proxy server is using SSL to communicate with Tableau Server, SSL must be configured and enabled on Tableau Server.</p>

	Upgrading.	
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## Validate reverse proxy and load balancer configuration

To validate your gateway-to-Tableau Server configuration, publish workbooks and data-sources using Tableau Server web authoring or Tableau Desktop. If you are connecting with a web browser to Tableau Server from the internet, verify that you are using a [recommended browser](#). Publish and view workbooks that use existing datasources as well as a datasource that you've published . Use the links below to familiarise yourself with connecting with Tableau Server as an end-user.

Task	Documentation
Overview of web authoring.	<a href="#">Use Tableau on the Web</a>
Log in to Tableau Server from Tableau Desktop or a web browser.	<a href="#">Sign in to Tableau Server or Online</a>
Publish a workbook to Tableau Server.	<a href="#">Publish a Workbook</a>
Publish a data source.	<a href="#">Publish a Data Source</a>
Open workbook from Tableau Server.	<a href="#">Opening Workbooks from the Server</a>
Log out Server (with Desktop).	<a href="#">Sign in to Tableau Server or Online</a>
Download workbook from a web browser.	<a href="#">Download Workbooks</a>
Check to make sure tabcmd (from a non-server client) works.	<a href="#">tabcmd</a>

## Related topics

- [Tableau Desktop Internet Access Requirements](#)
- [Add a Load Balancer](#)

# Deploy

The topics in this section provide information on installing, configuring and upgrading Tableau Server on Windows.

Looking for Tableau Server on Linux? See [Install and Configure Tableau Server](#).

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Install and Configure Tableau Server

The topics referenced at the bottom of this page describe the steps to install and configure Tableau Server. If you are installing a distributed deployment (cluster), use the steps in this

topic to install the initial node, then, to install additional nodes, see [Distributed and High Availability Tableau Server Installations](#).

After you run the installation, you must then continue setup by activating a licence, registering Tableau Server, and configuring various settings including authentication.

## What version are you installing or upgrading to?

Beginning with Tableau Server on Windows version 2019.4.0, a new Setup program is used to install and upgrade Tableau Server. If you are installing or upgrading **to** version 2019.3.x or earlier, see the 2019.3 Server Help for instructions.

## Other installation methods

There are a few alternative methods that you can use to install Tableau Server.

- If you want a quick start procedure to install Tableau Server in a non-production environment, see [Jump-start Installation](#).
- The topics included in this installation section describe how to install Tableau Server on Windows using the interactive installer. If you want to install Tableau Server using a command line, see [Automated Installation of Tableau Server](#).
- If you are installing Tableau Server in an environment without a connection to the internet, see [Install Tableau Server in a Disconnected \(Air-Gapped\) Environment](#).
- You can also install Tableau Server onto various cloud platforms. See [Self-Host Tableau Server in a Public Cloud Service](#).

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting

Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

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If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Before you begin

To install Tableau Server you must have a computer that satisfies the hardware requirements. You will get an informational message if your computer meets the minimum requirements but does not satisfy the recommended minimum requirements. In this case, your computer hardware can handle a trial installation of Tableau but is not adequate for a production environment. For more information, see [Before you install](#)....

## Installation steps

The following steps describe how to install Tableau Server on a single computer. Use the steps to install Tableau Server in a single server deployment. Use the steps to install the initial node in a multi-node Tableau Server deployment. Run the steps sequentially.

1. Install TSM
2. Activate and Register Tableau Server
3. Configure Initial Node Settings
4. Add an Administrator Account

## Before you install...

**Note:** You can find additional information about technical specifications for Tableau Server on the Tableau web site, [here](#).

This topic includes requirements and recommendations that you must consider before you install Tableau Server into a production environment.

- If you are new to Tableau Server, and you want to deploy it in your organisation, we encourage you to deploy Tableau Server as a single server in a test environment first. The easiest way to do a single-server installation is to follow the steps in Jump-start Installation.
- If you are deploying Tableau Server in a distributed cluster, review Distributed Requirements in addition to the requirements and recommendations described in this topic.

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Hardware recommendations for production installations

The following list describes the minimum hardware recommendations for a production use, single-node installation of Tableau Server:

**Important:** These recommendations are minimums and may not reflect the requirements for your installation and organisation. For example, there are a number of factors that can impact disk space requirements, including whether or not you will be publishing extracts, flows and the number of workbooks to Tableau Server. For more information on what might impact free disk space requirements, see [Disk Space Requirements](#).

<i><b>Install Type</b></i>	<i><b>Processor</b></i>	<i><b>CPU</b></i>	<i><b>RAM</b></i>	<i><b>Free Disk Space</b></i>
Single node	<ul style="list-style-type: none"> <li>64-bit (x86_64 chipsets)</li> <li>Must support SSE4.2 and POPCNT instruction sets</li> <li>ARM-based processors are not supported</li> </ul>	8 cores (16 vCPUs), 2.0 GHz or higher	Version 2022.3 and later: <ul style="list-style-type: none"> <li>128 GB</li> </ul> Version 2021.4.0 to version 2022.1.x: <ul style="list-style-type: none"> <li>64 GB</li> </ul> Version 2021.3.x and earlier: <ul style="list-style-type: none"> <li>32 GB</li> </ul>	50 GB
If you are adding Tableau Prep Conductor to your Tableau Server installation, we recommend you add a second node and dedicate this to running Tableau Server Prep Conductor. This node should have a minimum of 4 cores (8 vCPUs) and 16 GB of RAM.				

<i><b>Install Type</b></i>	<i><b>Processor</b></i>	<i><b>CPU</b></i>	<i><b>RAM</b></i>	<i><b>Free Disk Space</b></i>
Multi-node and enterprise deployments	<p>Contact Tableau for technical guidance.</p> <p>Nodes must meet or exceed the minimum hardware recommendations, except:</p> <ul style="list-style-type: none"> <li>• Dedicated Backgrounder nodes running up to two instances of backgrounder, where 4 cores may be acceptable.</li> <li>• Dedicated node for Tableau Prep Conductor: Minimum of 4 cores (8 vCPUs), and 16 GB of RAM.</li> <li>• Dedicated node for Independent Gateway: Minimum of 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.</li> </ul>			

**Important:** The disk space requirement cannot be checked until you initialise TSM.

- Free disk space is calculated after the Tableau Server Setup program is unzipped. The Setup program uses about 1 GB of space. You may need to allocate additional disk space depending on various factors like whether you will be using extracts.
- **Network attached storage space requirements for External File Store:** If you are planning to configure [Tableau Server with External File Store](#), you will need to estimate the amount of storage space to dedicate on your network attached storage.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the [Option 2: Back up repository separately](#) topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You



can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.

- Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- Core count is based on "physical" cores. Physical cores can represent actual server hardware or cores on a virtual machine (VM). Hyper-threading is ignored for the purposes of counting cores.
- RAM shown is the minimum recommended for a single-node installation. Your installation may function better with more RAM, depending on activity, number of users, and background jobs, for example.

To see the full list of recommendations and to see the minimum requirements, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#). For hardware specifications Tableau uses internally for testing scalability, see [Hardware recommendations for production installations](#).

For public cloud deployments on Amazon Web Services and Google Cloud Platform, their 'vCPU' is actually a CPU hyper-thread, and not a full CPU core. When sizing cloud instances, you will need twice as many vCPU as the Tableau Server CPU core requirements given (8 vCPU required for a minimum trial installation, 16 vCPU recommended for a single-node installation).

## Operating system requirements

The following 64-bit Microsoft Windows Server operating systems are supported

	2019.x	2020.1.0 - 2021.2.x	2021.3.0	2023.3.1+
Windows Server 2008 R2	✓			
Windows Server 2012	✓	✓		
Windows Server 2012 R2	✓	✓		
Windows Server 2016	✓	✓	✓	✓
Windows Server 2019	✓	✓	✓	✓
Windows Server 2022	<b>Note:</b> Windows Server 2022 is <i>not</i> supported in versions prior to 2023.3.1. Beginning in April 2023, installers for all versions of Tableau Server on Windows prior to 2023.3.1 block installation on Windows 2022.			✓

All nodes in a multi-node cluster must have the same type of operating system and the same major version of that operating system. For example, all Windows Server 2022 nodes .

You cannot install a multi-node instance of Tableau Server on a combination of Linux and Windows nodes.

## Installation directory

By default, Tableau Server will install on the system drive. The drive where Windows is installed is the system drive. In most cases, the system drive is the C:\ drive. In this default case, Tableau Server will install into the following directories:

- `C:\Program Files\Tableau\Tableau Server\packages`
- `C:\ProgramData\Tableau\Tableau Server`

Do not specify a symbolic link or a data directory location on a Network File System (NFS) volume.

### Non-default installation locations

Rather than install onto the system drive, some organizations install applications on a separate drive. During setup (or with automated installation), you can specify a different installation location. If you select a different installation drive or folder location during setup, then the data directory for Tableau Server will install into the same path. This means that if you install to a non-default location, the default `C:\ProgramData\Tableau\Tableau Server` path will not be created.

When you install to a non-default location, you must take the following into consideration:

- You may need to configure Run As service account permissions manually. If you do not use the predefined local account, `NetworkServices`, as the Run As service account, then you will need to set permissions for the account that you will be using. You must set these permissions after you install Tableau Server. See [Verify Folder Permissions](#).
- Log files are stored at `<installation path or drive>\data\tabsvc\logs`. The `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs` path in a default installation is converted to `<installation path or drive>\data\tabsvc\logs`.

- You may need to specify the same location when you upgrade to newer versions of Tableau Server. For more information on upgrading, see [Upgrade Tableau Server Overview](#).

**Note:** If you run Tableau Server on a VM, either locally, or in the cloud, be aware of the potential for complications related to licensing. This applies whether you are running Tableau Server as a standalone or in a cluster. If you are simply upgrading Tableau Server on the VM, you do not need to take any extra action related to licensing. If you plan to clone the VM to create either a new production or test environment to upgrade, you need to deactivate any Tableau Server licences before cloning. If you do not do this, the new VM environment can end up with an untrusted licence, and any attempts to upgrade will fail.

To clone a VM, make sure the Tableau Server is unlicensed (all licences are deactivated). After cloning the VM, activate the Tableau licence on the cloned VM and proceed with the upgrade.

- When installing a multi-node instance of Tableau Server, the installation location (path) must be the same on every node.

## Tableau Prep Conductor

Tableau Prep Conductor is one of the process on Tableau Server. It runs a flow, checks connection credentials and sends alerts if a flow fails. Tableau Prep Conductor leverages the scheduling and tracking functionality of Tableau Server so you can automate running flows to update the flow output instead of logging into Tableau Prep Builder to manually run individual flows as your data changes.

Tableau Prep Conductor is licensed separately and is available through the Data Management licence. For more information on Tableau Prep Conductor licensing, see [Licence Data Management](#).

We recommend you enable Tableau Prep Conductor on a dedicated node. For more information:

- If you are installing a new Tableau Server, see Step 1 (New Install): Install Tableau Server with Tableau Prep Conductor.
- If you are adding Tableau Prep Conductor to an existing installation of Tableau Server, see Step 1 (Existing Install): Enable Tableau Prep Conductor.

## Additional requirements

Make sure that your environment also meets the following additional requirements:

### Hostname

- Tableau Server must be able to resolve the hostname to an IP address either using the domain name server (DNS) or with a local host file on the computer running Tableau Server. By default, host files are stored at `\Windows\System32\Drivers\etc\hosts`.
- The hostname of the server must not change after you start Tableau Services Manager during the setup process. For example, this might happen if you use the cloud-init package to initialise a virtual machine, and you install Tableau Server on that virtual machine.
- Hostnames that include underscores (`_`) are not supported by Tableau Server.

### Static IP address

The computer where you install Tableau Server must have a static IPv4 or IPv6 address.

If both IPv4 and IPv6 are enabled or multiple network cards (NICs) are being used, unexpected behaviour can result. For more information, see the following:

- **For Tableau Server deployments running on Windows Server 2019:** Changes to Windows Server 2019 IPv6 configuration behaviour can result in IPv6 taking precedence over IPv4. To verify IPv6 precedence, review the [Tableau Server IPs changed and not all TSM services are coming up correctly](#) article in the Tableau Knowledge Base and update your computer settings.
- **When multiple NICs are being used:** In deployments where multiple NICs are used, review Troubleshoot Inconsistent Process Status for best practices.

### Database drivers

To connect to specific data sources, the computer where you install Tableau Server must have the correct database drivers installed. For more information, see [Database Drivers](#).

### Available ports

TSM and Tableau Server each require an available TCP port in order for you to access them. TSM defaults to port 8850, and the Tableau Server Gateway service defaults to port 80. We strongly recommend that you ensure that both port 8850 and 80 are not in use on your system before installing Tableau Server. If those ports are not available, the TSM and gateway ports may be dynamically remapped to different port numbers, and there is currently no interface for displaying which port they have been remapped to.

If you are installing Tableau Server on a computer that's also running IIS (not a recommended deployment), you should modify the Tableau's gateway port number to avoid conflict with IIS. You can specify a different gateway port number during the setup process.

See [Tableau Services Manager Ports](#).

### Local firewall configuration

If you are running a firewall on the computer where you will be installing Tableau Server, then you will need to open the following default ports for Tableau Server traffic. All port numbers, except 443, can be changed.

Port	TCP/UDP	Used by...	TYPE OF INSTALLATION	
			All	Distributed / High Availability
80	TCP	Gateway	X	
443	TCP	SSL. When Tableau Server is configured for SSL, the application server redirects requests to this port. Do not change this port.	X	

Port	TCP/UDP	Used by...	TYPE OF INSTALLATION	
			All	Distributed / High Availability
8850	TCP	Tableau Services Manager.	X	
8060	TCP	PostgreSQL database.	X	
8061	TCP	PostgreSQL backup verification port	X	
8000-9000	TCP	Range of ports reserved by default for dynamic mapping of Tableau processes		X
27000-27009	TCP	Range of ports used by Tableau Server for Licence service. This range must be open on the node running the Licence service and accessible from other nodes. By default, the initial node runs the Licence service.	X	

See Tableau Services Manager Ports

For information about configuring the local Windows firewall, refer to the Microsoft product documentation.

### Local administrator

The account that you use to run Setup must be a member of the Local Administrators group on the Windows computer where Tableau Server is installed.

By default, you must also use an account with local administrator rights to run Tableau Services Manager (TSM) Web UI and CLI tools. However, after you have installed Tableau Server, you can specify a Windows group for TSM administration. See [Configure a Custom TSM Administration Group](#).

Use TSM to configure the Tableau Server components that rely on OS-level access, such as processes, authentication, log files, licensing and alerts. See [TSM Authentication](#).

Tableau-specific administration, such as importing users, creating sites, web authoring, etc. is performed by Tableau Server administrators. You can configure these administrative accounts by assigning roles to users after you install. The initial Tableau Server administrator account is created as part of the installation process. See [Add an Administrator Account](#).

### **Run As service account**

A Run As service account for the Tableau Server service to run under is useful if you're using NT Authentication with data sources or if you're planning on doing SQL Server impersonation. For more information, see [Run As Service Account and SQL Server Impersonation](#).

In some organisations, Group Policy or other system management solutions are used to standardise permissions and accounts on application servers. If your organisation runs a such a solution, be sure to configure the system to accommodate the folder permissions required by the Run As service account. See [Verify Folder Permissions](#).

### **Antivirus software**

Antivirus software that scans directories used by Tableau Server can interfere with installation and ongoing use of Tableau Server. In some cases, this can result in installation failures, problems starting Tableau Server or impacts to performance. If you plan to run antivirus software on the computer running Tableau Server, follow the recommendations in the [Knowledge Base](#).

*Continue to the next step: [Install and Configure Tableau Server](#).*

## **Minimum Hardware Requirements and Recommendations for Tableau Server**

The following minimum hardware requirements and recommendations apply to all computers running Tableau Server, including physical hardware and virtual machines (VMs):



- **Minimum requirements for installation** reflect the minimum hardware your computer must have in order to install Tableau Server. We do not recommend you attempt to run Tableau Server on servers with these values, even if you are just testing. Depending on the features you have licensed and are using, you may experience poor performance and have an unrealistic experience. In certain cases, Tableau Server may not start without at least 20GB of memory.

For prototyping and Proof of Concept (PoC) testing, we recommend you use Tableau Cloud. This will give you an opportunity to experience Tableau Server on appropriately sized hardware.

- **Minimum recommendations for production** go beyond minimum installation requirements and represent the minimum hardware configuration you should use for installation on most production nodes. If your computer meets the minimum installation requirements but does not meet these recommendations, the Setup program will warn you but you can continue the installation. For certain nodes dedicated to specific tasks and processes such as backgrounder, or Prep, you may be able to use servers that do not meet this minimum recommendation.

The minimum recommendations listed here are intended as general guidance. However the recommendations for your environment may vary. For more information, see the [Hardware recommendations section](#) of the [Recommended Baseline Configurations](#) topic.

In addition, Tableau Server should not be installed on a physical computer or on a VM instance that is also running resource-intensive applications such as databases or application servers, or on a VM instance that is using shared resources.

**Note:** If you install Tableau Server on a computer that meets the minimum requirements but does not have at least 8 cores and 16 GB of system memory, the default number of all processes installed is reduced to one of each process by design. For more information about processes, see [Server Process Limits](#)

Looking for Tableau Server on Linux? See [Minimum Hardware Requirements and Recommendations for Tableau Server](#).

### Minimum installation hardware requirements

We strongly recommend any Proof of Concept (PoC) testing or prototyping be done using Tableau Cloud. This guarantees you will be running on systems with adequate resources.

The computer on which you are installing or upgrading Tableau Server must meet the minimum hardware installation requirements. If the Setup program determines that your computer does not meet the following requirements, you will not be able to install Tableau Server. Meeting these requirements does not guarantee you a good experience testing Tableau Server

For more information on how the Setup program determines hardware, see Determining Computer Hardware.

### Minimum Hardware Requirements

These minimum requirements are for installing Tableau Server. They do not guarantee successful testing or use. For production minimum recommendations, see Minimum production hardware recommendations.

<i><b>Processor</b></i>	<i><b>CPU</b></i>	<i><b>RAM</b></i>	<i><b>Free Disk Space</b></i>
<ul style="list-style-type: none"><li>• 64-bit ( x64 chipsets)</li><li>• Must support SSE4.2 and POPCNT instruction sets</li><li>• ARM-based processors are not supported</li></ul>	4 cores (8 vCPUs)	Version 2022.3 and later: <ul style="list-style-type: none"><li>• 64 GB - initial node</li><li>• 16 GB - additional nodes</li></ul>	15 GB

<b><i>Processor</i></b>	<b><i>CPU</i></b>	<b><i>RAM</i></b>	<b><i>Free Disk Space</i></b>
		Version 2022.1 and earlier: <ul style="list-style-type: none"><li>• 16 GB - all nodes</li></ul>	

- Free disk space is calculated after the Tableau Server Setup program is unzipped. The Setup program uses about 1 GB of space. You may need to allocate additional disk space depending on various factors like whether you will be using extracts.
- Core count is based on "physical" cores. Physical cores can represent actual server hardware or cores on a virtual machine (VM). Hyper-threading is ignored for the purposes of counting cores.

## Minimum production hardware recommendations

For production use, the computers on which you install or upgrade Tableau Server should, in most cases, meet or exceed the minimum hardware recommendations. These recommendations are general. Actual system needs for Tableau Server installations can vary based on many factors, including the number of users and the number and size of extracts, as well as the features you have licensed. If the Setup program determines that your computer does not meet the following recommendations, you will get a warning, but you can continue with the installation process. For more information, see the Hardware recommendations for production installations.

<b><i>Install Type</i></b>	<b><i>Processor</i></b>	<b><i>CPU</i></b>	<b><i>RAM</i></b>	<b><i>Free Disk Space</i></b>
Single node	<ul style="list-style-type: none"> <li>• 64-bit (x86_64 chipsets)</li> <li>• Must support SSE4.2 and POPCNT</li> </ul>	8 cores (16 vCPUs), 2.0 GHz or higher	Version 2022.3 and later: <ul style="list-style-type: none"><li>• 128 GB</li></ul> Version	50 GB

<i>Install Type</i>	<i>Processor</i>	<i>CPU</i>	<i>RAM</i>	<i>Free Disk Space</i>
	instruction sets <ul style="list-style-type: none"> <li>ARM-based processors are not supported</li> </ul>		2021.4.0 to version 2022.1.x: <ul style="list-style-type: none"> <li>64 GB</li> </ul> Version 2021.3.x and earlier: <ul style="list-style-type: none"> <li>32 GB</li> </ul>	
	If you are adding Tableau Prep Conductor to your Tableau Server installation, we recommend you add a second node and dedicate this to running Tableau Server Prep Conductor. This node should have a minimum of 4 cores (8 vCPUs) and 16 GB of RAM.			
Multi-node and enterprise deployments	Contact Tableau for technical guidance.  Nodes must meet or exceed the minimum hardware recommendations, except: <ul style="list-style-type: none"> <li>Dedicated Backgrounder nodes running up to two instances of backgrounder, where 4 cores may be acceptable.</li> <li>Dedicated node for Tableau Prep Conductor: Minimum of 4 cores (8 vCPUs), and 16 GB of RAM.</li> <li>Dedicated node for Independent Gateway: Minimum of 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.</li> </ul>			

**Important:** The disk space requirement cannot be checked until you initialise TSM.

- Free disk space is calculated after the Tableau Server Setup program is unzipped. The Setup program uses about 1 GB of space. You may need to allocate additional disk

space depending on various factors like whether you will be using extracts.

- **Network attached storage space requirements for External File Store:** If you are planning to configure [Tableau Server with External File Store](#), you will need to estimate the amount of storage space to dedicate on your network attached storage.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the Option 2: Back up repository separately topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.
  - Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- Core count is based on "physical" cores. Physical cores can represent actual server hardware or cores on a virtual machine (VM). Hyper-threading is ignored for the purposes of counting cores.
- RAM shown is the minimum recommended for a single-node installation. Your installation may function better with more RAM, depending on activity, number of users, and

background jobs, for example.

To see the full list of recommendations and to see the minimum requirements, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#). For hardware specifications Tableau uses internally for testing scalability, see [Hardware recommendations for production installations](#).

For hardware recommendations for Tableau Server in the cloud, see the following:

- Selecting an AWS Instance Type and Size in the [Tableau Server on Windows in the AWS Cloud Administrator Guide](#)
- Selecting a Google Compute Engine Virtual Machine Type and Size in the [Tableau Server on Windows in the Google Cloud Platform Administrator Guide](#)
- Selecting a Microsoft Azure Virtual Machine Type and Size in the [Tableau Server on Windows in Microsoft Azure Administrator Guide](#)

## Determining Computer Hardware

To determine how many physical cores a computer has, the Tableau Server setup program queries the operating system. To view hardware information that the setup program detected on your computer, open the `app-install.log` file in the following folder on the computer where you are installing Tableau Server:

```
<install_directory>\ProgramData\Tableau\Tableau Server\logs\app-  
install.log
```

In the `app-install.log` file, look for lines similar to the following. These lines provide information about the physical cores that the setup program detected and that it used to determine the core count that is being used for licensing, as well as the amount of system memory that was detected.

```
2020-11-24 17:40:43.842 +0000 main : DEBUG com.t-  
ableau-  
soft-
```

## Tableau Server on Windows Help

```
ware.tabadmin.configuration.builder.BootstrapConfigurationBuilder -  
System processor count = 8  
  
2020-11-24 17:40:43.842 +0000 main : DEBUG com.t-  
ableau-  
soft-  
ware.tabadmin.configuration.builder.BootstrapConfigurationBuilder -  
System memory = 64383MB
```

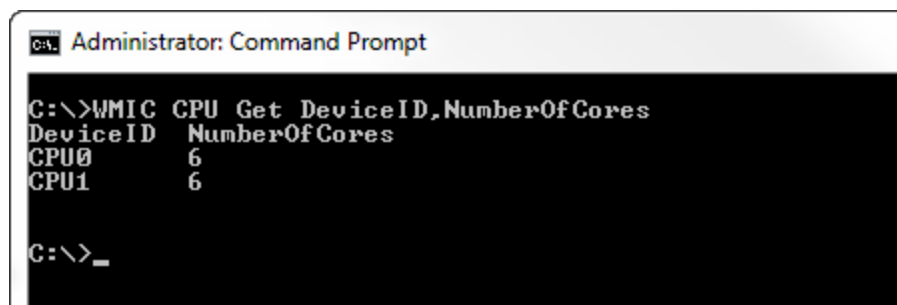
### Manually determining the number of cores on your computer

To determine manually how many physical cores your server has, you can use the Windows Management Instrumentation Command-line tool (WMIC). This is useful if you do not know whether your computer will meet the minimum hardware requirements for installing Tableau Server.

1. Open a command prompt.
2. Enter the following command:

```
WMIC CPU Get DeviceID,NumberOfCores
```

The output will display the device ID or IDs and the number of physical cores the computer has.

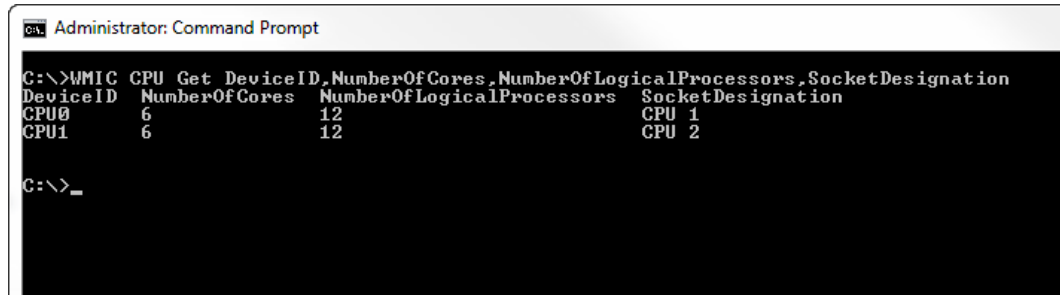


```
C:\>WMIC CPU Get DeviceID,NumberOfCores  
DeviceID  NumberOfCores  
CPU0      6  
CPU1      6  
  
C:\>_
```

In this example, there are two CPUs, each with six cores, for a total of twelve physical cores. This computer would satisfy the minimum hardware requirements for installing Tableau Server.

The following command shows a longer version that lists the logical processors as well as the physical cores.

```
WMIC CPU Get DeviceID,NumberOfCores,NumberOfLogicalProcessors,SocketDesignation
```



```
Administrator: Command Prompt
C:\>WMIC CPU Get DeviceID,NumberOfCores,NumberOfLogicalProcessors,SocketDesignation
DeviceID      NumberOfCores  NumberOfLogicalProcessors  SocketDesignation
CPU0          6              12                         CPU 1
CPU1          6              12                         CPU 2
C:\>_
```

In the above example, the server has a total of twelve physical cores, resulting in 24 logical cores.

## Install TSM

This topic guides you through the process of installing Tableau Server Tableau Services Manager (TSM).

**Important:** Do not install a beta version of Tableau Server in your production environment. You should also never restore a production Tableau Server installation using a backup of a beta version.

## Prerequisites

Before proceeding, review the topic, [Before you install...](#)

## Use the TSM web interface

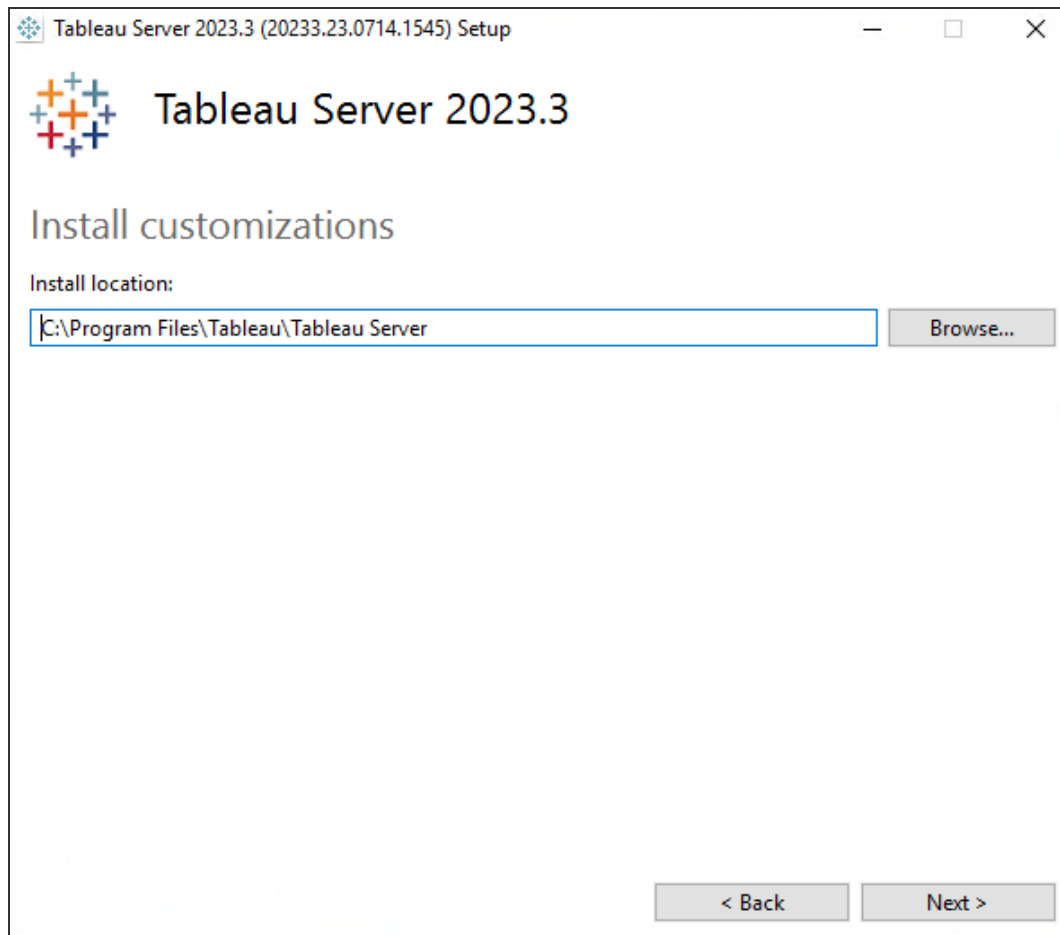


## Running Setup

After you download the Tableau Server installation file, follow the instructions below to install the server.

**Important:** Do not install a beta version of Tableau Server in your production environment. You should also never restore a production Tableau Server installation using a backup of a beta version.

1. Sign in as a user with administrator access to the computer where you want to install Tableau Server and double-click the installation file.
2. Follow the on-screen instructions to complete Setup and install the application.

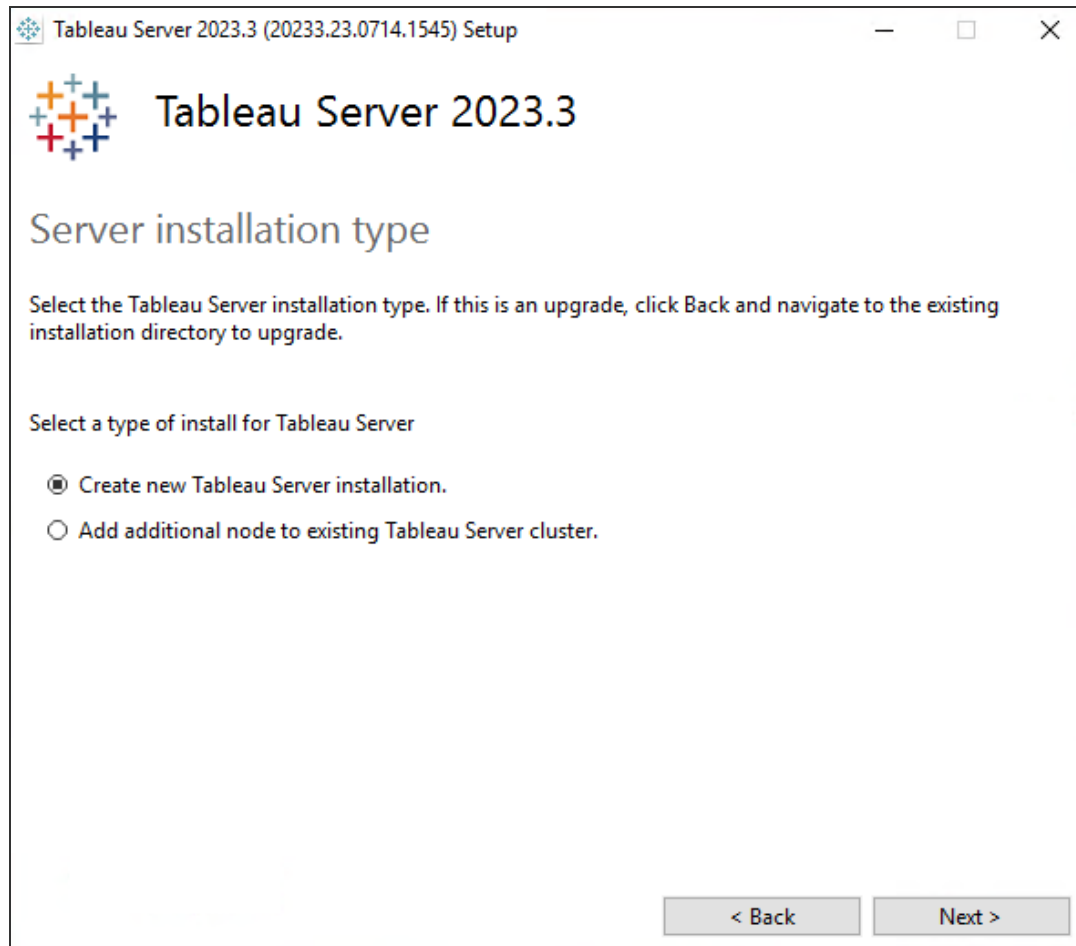


The default installation path is `C:\Program Files\Tableau\Tableau Server-<version>`. The Setup program displays the install path without the version, like this: `C:\Program Files\Tableau\Tableau Server`. You can choose a different location, including a different drive, by either browsing to or typing in a new path. Be aware that if you browse to a location, the Setup program appends `\Tableau Server` to the end of the path. You can remove this if it is not the location you want.

If you are upgrading from Tableau Server version 2018.1 or earlier and Tableau was installed to a non-default location, you need to specify the location of your existing version. Upgrade steps vary depending on your target version and install location. See [Upgrade Tableau Server Overview](#) for information on how to choose your upgrade steps.

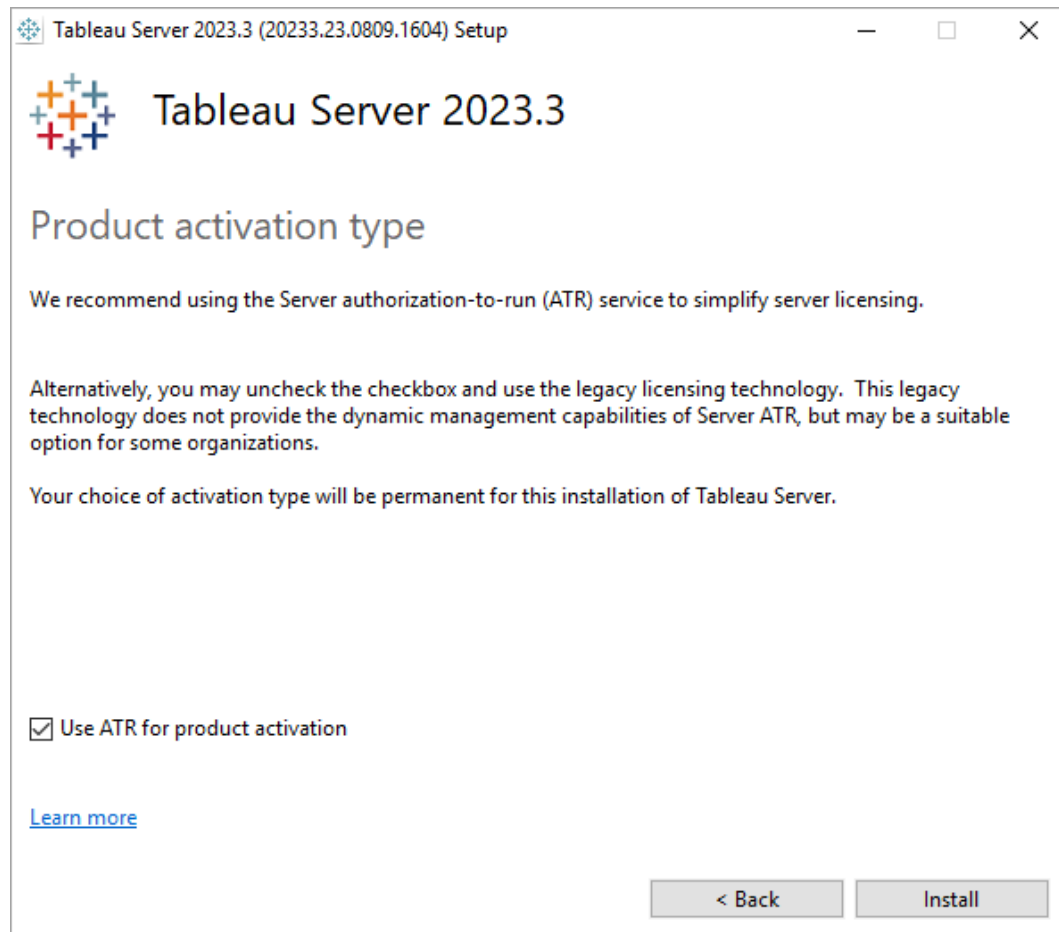
**Note:** If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

3. Click **Next**.



On the **Server installation type** page, you can specify whether you are installing the first node of a Server installation, or additional nodes in a multi-node installation. You do not need to change this from the default (Create new Tableau Server installation.) unless you are installing a multi-node Tableau Server. If you are installing a multi-node Tableau Server, see [Install and Configure Additional Nodes](#).

4. Click **Next**.



On the **Product activation type** page, select whether you want to use the Tableau authorisation-to-run (ATR) service to activate Tableau Server (the default), and then click **Install**. For more information about the Tableau authorisation-to-run (ATR) service, see [Activate Tableau Server using the authorisation-to-run \(ATR\) service](#).

5. After the installation completes, click **Finish**. Setup will then open the TSM configuration web page on the computer where you are installing Tableau Server.

If you need to support characters that are not the Latin-1 set, install the Windows Language Packs via **Control Panel > Regional and Language Options**. The language packs will need to be installed on the initial server as well as any additional nodes.

## Use the TSM CLI

### Install Tableau Server

1. Open a command prompt as a user with administrator access to the computer where you want to install Tableau Server.
2. Download the Setup program from the [Tableau Server Downloads](#) page.
3. Navigate to the directory where you copied the Setup program.
4. Run the Setup program from the command line using the `/silent` flag (run unattended and silently with no UI prompts), `ACCEPTTEULA` (accept the End User Licence Agreement), and `ACTIVATIONSERVICE` (use Server ATR to activate Tableau Server) properties:

```
TableauServer-64bit-<version>.exe /silent ACCEPTTEULA=1  
ACTIVATIONSERVICE="1"
```

**Note:** There are a number of different installation options you can specify during CLI installation, for example, to change installation and logging paths, or to specify the TSM controller port. For a complete list of switches that you can specify during CLI installation, see [Install Switches and Properties for Tableau Server](#).

5. Close the command window and open a new one, then confirm that TSM is installed and running:

```
tsm status -v
```

The status will be `STOPPED` but the tsm-specific processes will be running:

```
node1: localhost
Status: STOPPED
'Tableau Server Coordination Service 0' is running.
'Tableau Server Administration Agent 0' is running.
'Tableau Server Administration Controller 0' is running.
'Tableau Server License Manager 0' is running.
'Tableau Server Client File Service 0' is running.
```

### Configure Tableau Server for a forward proxy

If your organisation uses a forward proxy solution to access the internet, then configure Tableau Server to use the proxy server. Tableau Server must access the internet for map data and for default licensing functionality.

We recommend configuring Tableau Server for a forward proxy solution at this point of the installation process. See [Configuring Tableau Server on Windows to work with a forward proxy](#).

### Next step

- [Activate and Register Tableau Server](#)

## Activate and Register Tableau Server

Before you can use Tableau Server, you must activate and register it.

Tableau Server requires at least one product key that both activates the server and specifies the number of licence levels you can assign to users. You can access your product keys from the [Customer Portal](#).

If you need to activate Tableau Server on a computer that is offline, see [Activate Tableau Server Offline](#). If you need to activate additional product keys to add capacity to an existing Tableau Server installation, see [Add Capacity to Tableau Server](#).

## Prerequisite

Before proceeding with the procedures in this topic, complete the following prerequisites as outlined in [Install and Configure Tableau Server](#):

- Install TSM
- TSM uses port 8850. If you are running a local firewall, open port 8850.
- Configure Product Key Operations with Forward Proxy

## Use the TSM web interface

1. If the computer where you are installing Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.

2. Sign in to Tableau Services Manager Web UI.

The account you use must have administrative privileges on the computer where TSM is installed.

3. On the **Activate** page, Enter or paste your product key and click **Activate Product Key**.

**Note:** In versions prior to 2023.3.0 an option to activate a trial licence displays. This option was retired (removed) starting version 2023.3.0. To learn about options for trying Tableau Server, contact your account representative.

After your product key is activated, it appears under **Activated Product Keys**.

Activate Register Setup Initialize

Enter your license product key to get started with Tableau Server.

**Product Key**

The key has 20 characters

0000-0000-0000-0000-000

[I can't find my product key.](#)

Enter your product key and click Activate Product Key. If activating multiple keys, do this for every key. When you have added all keys, click Next. You can access your product keys from the [Tableau Customer Portal](#).

**Activated Product Keys**  
No product key currently activated

Activate Product Key Next

4. To activate another product key, type over the key you just entered to add the new product key, and then click **Activate Product Key**. After your product key is activated, it appears under **Activated Product Keys**. Continue adding product keys in this manner until you're done.
5. When you're finished activating product keys, click **Next**.

**Note:** If the product keys you have activated don't have the necessary capacity, such as not enough cores or only a Viewer role product key, Tableau Services Manager displays the **Insufficient licences applied** dialog box. Click **Activate Another Product Key** to add another product key and increase capacity on your Tableau Server installation.



## Tableau Server on Windows Help

Insufficient licenses applied

*You have not activated enough product keys for your Tableau Server deployment.*

If you try to activate Tableau Server using these licenses, it may not run properly. We recommend that you activate additional licenses to support this Tableau Server deployment

[Tableau Customer Portal](#)  
[Troubleshooting](#)

[Activate Another Product Key](#)

6. On the **Register** page, enter your information into the fields and click **Register**.



Register with Tableau. All fields are required.

**Contact Information**

First Name	Last Name
<input type="text"/>	<input type="text"/>
Phone Number	Email
<input type="text"/>	<input type="text"/>

**Company Information**

Organization	
<input type="text"/>	
Industry	Company Size
<input type="text"/>	<input type="text"/>
Department	Job Role
<input type="text"/>	<input type="text"/>

**Region Information**

City	Postal Code
<input type="text"/>	<input type="text"/>
Country/Region	State/Province
<input type="text"/>	<input type="text"/>

## Use the TSM CLI

### Configure for forward proxy

If the computer where you are installing Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.

### Activate Tableau Server

To activate Tableau Server for production use, you must have a product key.

To activate a product key, run the following command:

```
tsm licenses activate -k <product key>
```

To activate a two-week trial, run the following command:

```
tsm licenses activate -t
```

If you are unable to activate Tableau, for example, if you get an error like this:

```
License Server not available
```

see [Activate Tableau Server Offline](#).

### What if I get an access denied error when I attempt to run TSM commands?

Verify that the account you are using is a member of the Local Administrators group on the Windows computer where you are installing Tableau Server.

### Register Tableau Server

After activation, you need to register Tableau Server. To do this, create a registration file and then pass it as an option with the `tsm register` command.

1. Generate a template that you can edit by running the following command:

```
tsm register --template > /path/to/<registration_file>.json
```

2. Edit the template file to create your completed registration file.

Here is an example of a registration file in the required format:

```
{
  "first_name" : "Andrew",
  "last_name" : "Smith",
  "phone" : "311-555-2368",
  "email" : "andrew.smith@mycompany.com",
  "company" : "My Company",
  "industry" : "Finance",
  "company_employees" : "500",
  "department" : "Engineering",
  "title" : "Senior Manager",
  "city" : "Kirkland",
  "state" : "WA",
  "zip" : "98034",
  "country" : "United States",
  "opt_in" : "true",
  "eula" : "true"
}
```

3. After saving changes to the file, pass it with the `--file` option to register Tableau Server:

```
tsm register --file /path/to/<registration_file>.json
```

For example:

```
tsm register --file C:\Users\mwatson\Documents\tableau-reg-
file.json
```

If you have a product key for Data Management or Advanced Management, you must activate that key to use the additional functionality. Product keys for these licences should only be activated after at least one capacity product key has been activated on the server.

- For licence information on Tableau Data Management, see Licence Data Management.

- For licence information on Tableau Advanced Management, see About Tableau Advanced Management on Tableau Server.

## Next step

- Configure Initial Node Settings

## Activate Tableau Server Using the Authorisation-To-Run (ATR) Service

You can use the Server authorisation-to-run (ATR) service to activate Tableau Server deployed in on-premises, cloud, container or virtual environments without running out of licence activations. The ATR service achieves this by providing short-term leases of configurable duration (ATR duration) which ties the licence to the device until product key expiry date is met. ATR handles activation capacity tracking so if there is an underlying hardware change, maximum activation errors don't occur. This option is recommended for all Tableau Server installations.

If you are activating Tableau Server online (this is the default), Tableau Server connects to various internet locations for licensing purposes. For more information, see [Communicating with the Internet](#).

If you are activating Tableau Server offline, you can still use ATR service to activate, however there are slight differences in how ATR duration works with offline activations. For more information, see [ATR Duration for Offline Activations](#).

We recommend using the Server authorization-to-run (ATR) service to simplify server licensing. If you chose not to use Server ATR, you will use the legacy licensing technology which does not provide the dynamic management capabilities of Server ATR.

Your choice of activation type will be permanent for this installation of Tableau Server. To change this later, you must backup, remove and then reinstall Tableau Server.

### How Tableau Server ATR works

When ATR service is enabled, Tableau Server periodically contacts a Tableau-hosted authorization-to-run (ATR) service to verify that Tableau is authorised to run, based on its licence and

the length of the authorisation window (ATR duration or lease). As long as this communication is successful, Tableau runs without any impact to the user.

When Tableau Server is activated offline and ATR is enabled, Tableau Server can not periodically contact the ATR service to verify Tableau is authorised to run. Instead, Tableau Server internally tracks the ATR Duration from when the product key was first activated offline.

#### ATR Duration

By default, an instance of Tableau Server is given a 5 day ATR lease (duration) to successfully contact the ATR service for verification. This means that after the initial authorisation, Tableau Server could be used for 5 days without network connection before the activation expired. The authorisation checks between Tableau Server and ATR service are attempted regularly, and each time a check is successful, the ATR duration is reset to its full length.

The authorisation check frequency varies, and is dependent on the ATR duration:

<b>ATR duration</b>	<b>Authorisation check frequency</b>
< 4 hours	every 15 minutes
< 24 hours	every 1 hour
< 7 days	every 12 hours
> 7 days	every 24 hours

For example: If the ATR duration is 48 hours, Tableau Server will contact the ATR service every 12 hours to complete an authorisation check and the ATR duration is reset to 48 hours after each successful authorisation check. The ATR duration will then begin to count down to 0 until the next authorisation check. If the Tableau Server machine is shut down or there is no internet access, Tableau Server can no longer contact ATR service. If this happens, the ATR duration will not be reset to 48 hours and will continue to count down to 0. If Tableau Server is

not started or cannot communicate with the ATR service before the ATR duration reaches 0, the licence will expire and you must activate the licence again.

**Note:** You should keep your Tableau Server running as much as possible. If Tableau Server cannot successfully complete an authorisation check within the ATR duration period, ATR service will reclaim the license lease and then you'll need to reactivate your licence.

To view the ATR duration, see [tsm licenses atr-configuration get](#).

### ATR Duration for Offline Activations

When Tableau Server is activated offline, the ATR duration is set to either one year from the day the product key was activated offline, or to the renewal date of the product key, whichever comes first. Once the ATR duration reaches the set date, the product key will become deactivated. Since Tableau can not communicate with the ATR service in offline environments, there are no authorisation checks.

If you use the `tsm licenses atr-configuration get` command to view the ATR duration for offline activations, the result will be 0, which is expected. To view ATR duration for offline activations, use the `ATRDiaG -product "Tableau Server"` command instead. For more information, see [ATRDiaG.exe Command Line Reference](#). In the resulting output, the `TTL End` date is the date the ATR duration ends.

### Set or change the Server ATR duration

When using Server authorisation-to-run (ATR) to activate Tableau Server, you can change the ATR duration and use a setting different than the default of 432000 seconds (5 days). If you're creating a test server or virtual machine (VM) that will have a short lifespan, you might want to shorten the ATR duration. Similarly, if you have a server that you plan to keep for a long time, you might want to lengthen the ATR duration.

If you start up new VMs frequently, reducing the ATR duration can allow older VMs to release their capacity, allowing it to be used by new VMs. On the other hand, if you increase the ATR duration, renewal cycles will be longer but capacity is not released as often.

To change the ATR duration, you use the `tsm licenses atr-configuration set --duration <value_in_seconds>` command. For more information, see [tsm licences atr-configuration set](#).

ATR duration in seconds	Minimum	Maximum	Default
Tableau Server (non-container)	3600 (1 hour)	7776000 (90 days)	432000 (5 days)

To set ATR duration and manually start the Activation Service, run the following commands:

**Note:** You must run these commands as an administrator from a command prompt. Depending on how your computer is configured, you may need to run them in the C:\Windows\System32 folder.

1. On the initial node, open a command prompt as administrator, and then use the following commands.
2. `tsm licenses atr-configuration set --duration <value_in_seconds>`
3. `tsm pending-changes apply`
4. `net stop activation-service_0`
5. `net start activation-service_0`

### Move a Server ATR product key to another Tableau Server

If you want to stop using your product key on an existing Tableau Server and use it on a new installation of Tableau Server, you can move your Server ATR product key. You might want to move product keys when:



## Tableau Server on Windows Help

- Switching between development or pre-production environments.
- Moving Tableau Server to upgraded hardware.
- Moving Tableau Server to cloud infrastructure.
- Using an ephemeral Tableau Server, such as a virtual machine (VM) or container.

### Deactivate a product key for reuse on another Tableau Server

#### Deactivate a product key in version 2021.4 and later

You can remove product key(s) that were activated using Server ATR when you want to reclaim licence capacity from one Tableau Server installation and use it on another. For more information about reclaiming a product key, see [Deactivate Product Key](#).

#### Deactivate a product key in version 2021.3 and earlier

When ATR service is used to activate a Tableau Server licence you cannot manually deactivate the licence. You can have one production and two non-production installations per licence. If you have unused activations on a licence, you can activate the same licence on another Tableau Server. If you're out of activations, you can still activate the licence after the ATR lease expires by taking the following steps:

1. Disable the existing Tableau Server from refreshing its leased activation. You can do this using any of the following methods:
  - Shut down your existing Tableau Server.
  - Uninstall the existing Tableau Server.
  - Disconnect the existing Tableau Server from the Internet by unplugging the ethernet cable or disconnecting Wi-Fi.
2. After the ATR lease expires, you can reuse the licence on another Tableau Server.

3. On the new computer, install Tableau Server.

When prompted, activate Tableau Server using the same licence.

## Activate Tableau Server Offline

When you install Tableau Server, you have to activate at least one product key, but we recommend that you activate all Tableau Server licences found in the Tableau Customer Portal.

Doing this activates the server, and specifies the number of licence levels you can assign to users. For offline activations, you should activate the product key listed in the **Offline Activation ID** field in the Tableau Customer Portal. For information about finding the right key, see the [Find the Correct Key to Activate on Tableau Server](#) Knowledge Article.

There are also times you may need to activate licences after Tableau Server is installed, for example, if you add capacity to your server, or get a new product key. If you don't have your product key, you can get it from the [Tableau Customer Account Centre](#).

**Note:** Activating any product key after Tableau Server has already started will require a Tableau Server restart for the changes to take effect.

In most cases, you can activate your key directly from Tableau Server, either during installation, or later, using the Tableau Services Manager (TSM) Licences page, but there are some circumstances that don't allow you to do this. If your computer is not connected to the internet for example, or has a firewall that restricts access outside your intranet. In these cases you need to do an offline activation.

### Offline activation and login-based licence management (LBLM)

Beginning in Tableau Server version 2023.1.0, offline activation is supported for LBLM when your server is configured to use the Authorisation-to-Run (ATR) service. You can only configure Tableau Server to use the ATR service during a new installation. Upgrading customers with existing server installations need to install a new instance of Tableau Server version 2023.1.0 or later and restore a backup of their existing installation to that new instance. For

information on this process, see [Using a Blue/Green approach for upgrading Tableau Server](#). For more information about ATR service, see [Activate Tableau Server Using the Authorisation-To-Run \(ATR\) Service](#).

### Offline activation and updateable subscription licences (USL)

Offline activation of updateable subscription licences requires special steps. For details, see [Activating USL in Offline or Disconnected Environments](#).

There are two scenarios in which you may need to do an offline activation:

- Offline activation during installation – To complete an offline activation when you are installing Tableau Server.
- Offline activation of licences after install – To complete an offline activation after your server is installed and running.

### Offline activation overview

Offline activation of Tableau Server involves the following steps:

1. Generate an offline activation request file.
2. Copy the offline activation request file to a computer with internet access.
3. Upload the offline activation request file to the [Tableau activation website](#).
4. Download the resulting offline activation response file from the website. You'll use this file to activate Tableau Server

### Offline activation file name changes

Beginning in Tableau Server version 2023.1, the Tableau licensing system supports two underlying licensing technologies. From an administrative perspective, the only configuration difference between the two systems is the file types that are generated and consumed for offline activation. The licensing technology is determined during the initial installation of Tableau Server and cannot be changed after installation.

We refer to the legacy (and still supported) version of licensing technology as FlexNet. The latest version of the technology is referred to as Server ATR. For more information, see [Activate Tableau Server Using the Authorisation-To-Run \(ATR\) Service](#). The following table describes the file naming nomenclature for each technology. The table also includes the generic reference.

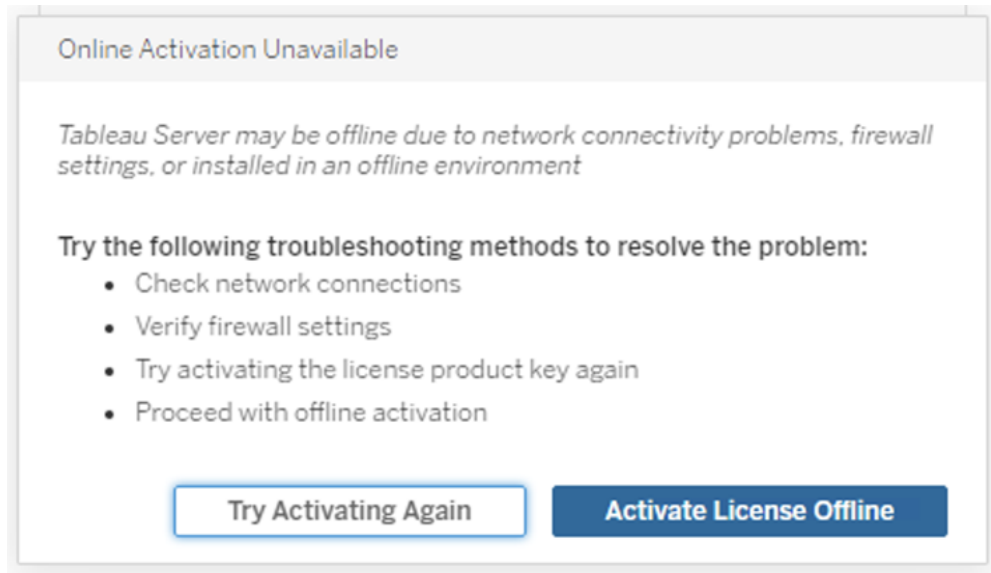
Generic file name	Server ATR file names	FlexNet file names
Off-lineActivationRequest	Off-lineActivationRequestFile_YYYYMMdd.hhmmss.json	Tableau-OfflineActivationRequest.tlq
Off-lineActivationResponse	Off-lineActivationLicensingAtrs.zip	activation.tlf

**Note:** Since this documentation supports multiple versions of Tableau Server, we will use the generic file name references (OfflineActivationRequest and Off-lineActivationResponse) for the rest of this topic. You can identify the licensing technology your Tableau Server installation uses according to the file type generated in the steps that follow.

#### Use the TSM web interface

If you attempt to activate your product key from the TSM licences page and see a dialog that says online activation is unavailable, you can activate the key offline. The offline activation process must be completed once for each product key.

1. Click **Activate Licence Offline**.



2. Create an offline activation request file (OfflineActivationRequest) for the product key.

Create an OfflineActivationRequest file you will upload to the Tableau activation website. If your product key is not pre-filled in the form, enter your key and click **Create Offline File** to generate an OfflineActivationRequest file on the local computer.

The screenshot shows a form titled "Step 1: Create, Upload, and Submit an Offline File". The instructions read: "Enter a product key then create, save, and move the Tableau Offline Activation Request file to a computer connected to the Internet. You will then need to upload and submit the offline file to Tableau (Step 2).". Below the instructions, it says "The key has 20 characters" followed by a text input field. To the right of the input field is a button labeled "Create Offline File". At the bottom, there is a note: "Access a computer connected to the Internet and go to [http://www.tableau.com/support/activation](\"http://www.tableau.com/support/activation\"). Upload and submit the Tableau Offline Activation Request file created above. This will generate the first Offline Activation file to upload in Step 2."

Copy the OfflineActivationRequest file to a computer with internet access. You need to upload this file to the Tableau activation website to generate an activation response file.

3. Upload and submit the OfflineActivationRequest file.

You will upload and submit the OfflineActivationRequest file to the Tableau activation website. This automatically generates an activation response file (OfflineActivationResponse) that you can download and copy back to the Tableau Server computer.

- a. On the computer where you copied the OfflineActivationRequest file, open a browser and go to <http://www.tableau.com/en-gb/support/activation> to open the Tableau Support Activation page.
- b. On the Offline Activation page, click **Choose File** to select the OfflineActivationRequest file.
- c. Click **Upload Activation File** to submit the file to the Tableau activation website.
- d. Click the [here](#) link to download the OfflineActivationResponse file to your computer.

## Offline Activation

The activation was successful. Please click [here](#) to download your activation file.

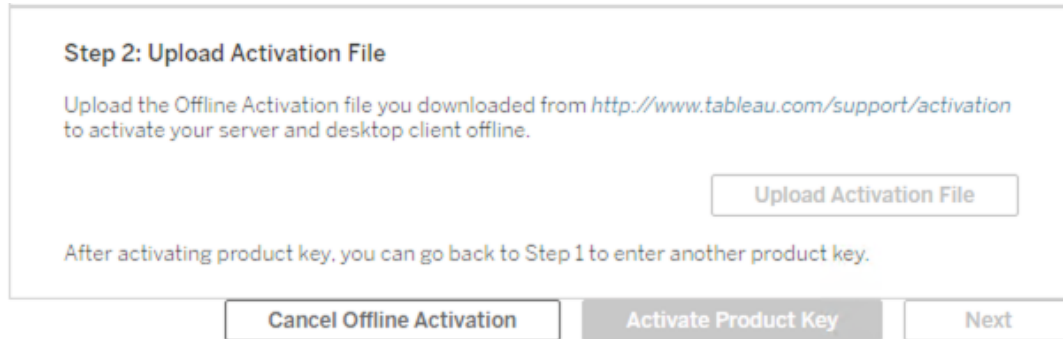
For help creating the offline activation file, see [Activate Tableau Desktop Offline](#) or Activate Tableau Server Offline. ([Linux](#))

- e. Copy the OfflineActivationResponse file to the computer where Tableau Server is installed.

4. Upload the OfflineActivationResponse file.

## Tableau Server on Windows Help

On the Tableau Server computer, click **Upload Activation File** to upload the OfflineActivationResponse file to Tableau Server. When you do this successfully, the **Activate Product Key** button is enabled.



The screenshot shows a dialog box titled "Step 2: Upload Activation File". Inside the dialog, there is a text instruction: "Upload the Offline Activation file you downloaded from <http://www.tableau.com/support/activation> to activate your server and desktop client offline." Below this text is a button labeled "Upload Activation File". At the bottom of the dialog, there is a note: "After activating product key, you can go back to Step 1 to enter another product key." Below the dialog box, there are three buttons: "Cancel Offline Activation", "Activate Product Key" (which is highlighted in grey), and "Next".

5. Click **Activate Product Key** to complete the offline activation.
6. (Skip this step if you are installing Tableau Server for the first time.)

Restart Tableau Server for licensing changes to take effect.

### Use the TSM CLI

#### Step 1. Log in to Tableau Services Manager

Before you can proceed you must log in to Tableau Services Manager (TSM). To log in to TSM, run the following command:

```
tsm login -u <username>
```

### What if I can't log in?

Verify that the account you are using is a member of the Local Administrators group on the Windows computer where you are installing Tableau Server.

**Step 2. Generate an offline activation request file**

1. On the initial node, open a command prompt as administrator.
2. Type this command to get your offline activation file:

```
tsm licenses get-offline-activation-file -k <product-key> -o  
<target-directory>
```

You can get your product key from the [Tableau Customer Portal](#). The target directory must already exist.

3. Copy the offline activation file (OfflineActivationRequest) from the target directory to a computer that has internet access.

**Step 3. Upload the offline activation request to the Tableau activation website**

1. On the computer that has internet access, go to the Tableau [Product Activations](#) page.
2. Complete the instructions to upload your OfflineActivationRequest file.

This creates an activation response file (OfflineActivationResponse).

3. Download the OfflineActivationResponse file from the Tableau activation website.

**Step 4. Initialise or activate your licence**

1. Copy the OfflineActivationResponse file to a location accessible from the Tableau Server computer.
2. Run the following command:

```
tsm licenses activate -f <path-and-activation-file>
```

**Note:** When using ATR to activate Tableau Server, <path-and-activation-file> should point to the packaged OfflineActivationResponse .zip file. Do not unzip the OfflineActivationResponse file prior to running this command.

3. (Skip this step if you are installing Tableau Server for the first time.)



Restart Tableau Server for licensing changes to take effect:

```
tsm restart
```

4. (Optional) To verify that all licences are activated, you can run this command:

```
tsm licenses list
```

If you have completed the steps above, you should see a success message:

```
Activation successful.
```

Tableau Server is activated. If you need additional assistance, contact [Tableau Technical Support](#).

## Configure Product Key Operations with Forward Proxy

If the computer where Tableau Server is installed has been configured to connect with a forward proxy server, then you must run the procedure in this topic to activate, refresh or deactivate product keys for Tableau Server.

Alternatively, you can activate a product key offline, see [Activate Tableau Server Offline](#).

To access and subsequently configure product key information for your Tableau Server installation, the Windows service, **Tableau Server Administrative Controller**, must run under the Run As service account. For normal operation, this service runs under the Network Service system account. This procedure describes how to specify the Run As service account as the temporary account used to log on for the **Tableau Server Administrative Controller** service. After you have successfully run the product key operation, you must then change the log on credentials back to the Network Service system account.

Before you begin

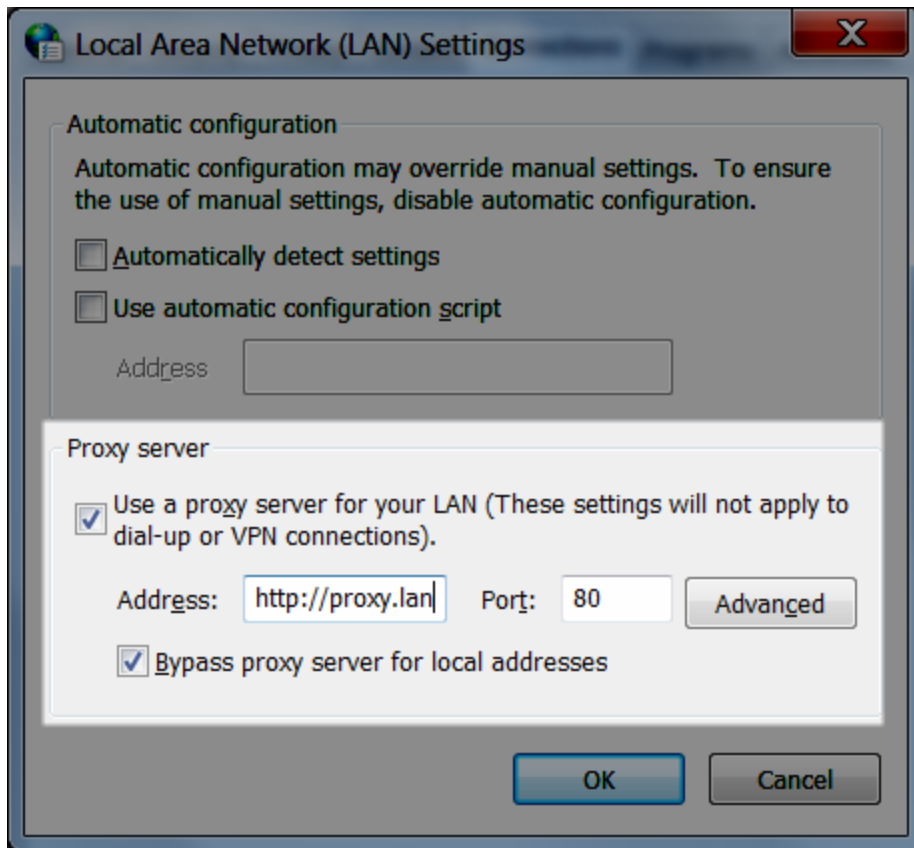
- If you are running a distributed deployment of Tableau Server, run the procedure in this topic on the initial node in the cluster.
- To run this procedure, you must know the Run As service account name and password. See [Change the Run As Service Account](#).

- Review your forward proxy configuration. The procedures below are for organisations that have set up the forward proxy using the "Internet Properties" on the Windows computer where Tableau Server is running. See [Configuring Proxies and Load Balancers for Tableau Server](#).

#### Step 1: Verify proxy configuration

1. Log onto the computer where Tableau Server is installed or will be installed.
2. Open the **Local Area Network (LAN) Settings** dialog box. (A quick way to get to this dialog box is to search for `Internet Options` in the Windows Start menu. In the **Internet Properties** dialog box, click the **Connections** tab and then click **LAN settings**.)
3. Under **Proxy server**, verify that **Use a proxy server for your LAN** is selected and

that the proxy server address and port has been specified.



Step 2: Temporarily change log on account for Tableau Server Administrative Controller service

1. Log onto the same computer that you verified in Step 1 above,
2. Open the **Services (Local)** Microsoft Management Console. (A quick way to get to this console is to search for `Services` in the Windows Start menu.)
3. Right-click **Tableau Server Administrative Controller**, click **Properties**. On **Tableau Server Administrative Controller Properties** page, click the **Log On** tab.
4. On the **Log On** tab, change `Network Service` to your Run As service account. Enter the password and then click **OK**.

5. In the **Services (Local)** Microsoft Management Console, right-click **Tableau Server Administrative Controller** and then click **Restart**.

Step 3: Temporarily change log on account for Tableau Server Activation service

**Note:** This step applies to versions: 2023.1.3 or later, 2022.3.7 or later, 2022.1.15 or later. Beginning with these versions, the Activation Service is installed even if you are using the Legacy activation method.

1. Log onto the same computer that you verified in Step 1 above,
2. Open the Microsoft Management Console. (A quick way to get to this console is to search for `Services` in the Windows Start menu.)
3. Right-click **Tableau Server Activation Service**, click **Properties**.
4. On the **Tableau Server Activation Service Properties** page, click the **Log On** tab.
5. On the **Log On** tab, change `Local System account` to your Run As service account. Enter the password and then click **OK**.
6. In the **Services (Local)** Microsoft Management Console, right-click **Tableau Server Activation Service**, and then click **Restart**.

Step 4: Activate, refresh, or deactivate Tableau product keys

While the Tableau Server Administrative Controller is running under your Run As service account, you can activate, refresh or deactivate your Tableau product key.

- To activate as part of the setup process, see [Activate and Register Tableau Server](#).
- To refresh a product key, see [Refresh Expiration Date and Attributes for the Product Key](#).
- To deactivate a product key, see [tsm licences deactivate](#).

Step 5: Revert the log on account back to Network Service (Administrative Controller)

After you have completed your product key operation, you must change the log on account for Tableau Server Administrative Controller back to the `Network Service` account.

Revert the log on account for Administrative Controller:

1. Open the **Services (Local)** Microsoft Management Console.
2. Right-click **Tableau Server Administrative Controller**, click **Properties**. On **Tableau Server Administrative Controller Properties** page, click the **Log On** tab.
3. On the **Log On** tab, click the **Browse** button.
4. On the **Select User** dialog box, enter `Network Service`, and then click **OK** to resolve the name and return to the **Log On** tab.
5. On the **Log On** tab, clear the passwords from the `Network Service` account, and then click **OK**.
6. In the **Services (Local)** Microsoft Management Console, right-click **Tableau Server Administrative Controller** and then click **Restart**.

Step 6: Revert the log on account back to Local System account (Activation service)

If you changed the log on account for the Tableau Server Activation service (Step 3 above), after you have completed your product key operation, you must change the log on account back to the `Network Service` account.

Revert the log on account for Activation service:

1. Open the **Services (Local)** Microsoft Management Console.
2. Right-click **Tableau Server Activation Service** and click **Properties**.
3. On the **Tableau Server Activation Service Properties** page, click the **Log On** tab.
4. On the **Log On** tab, select **Local System account** and click **OK**.

5. In the **Services (Local)** Microsoft Management Console, right-click **Tableau Server Activation Service**, and then click **Restart**.

## Configure Initial Node Settings

This topic describes how to configure essential server settings as part of the initial Tableau Server installation process.

### Prerequisite

Before proceeding with the procedures in this topic, complete the following prerequisites as outlined in *Install and Configure Tableau Server*:

- Install TSM
- Activate and Register Tableau Server

### Use the TSM web interface

After you have activated and registered Tableau Server, the installation program will display the Setup page.

**Note:** If you need to configure Tableau Server to connect to an LDAP directory that is not Active Directory, then you must use the TSM CLI.

The settings below are all you need to get started.

### Identity Store

You cannot change the identity store after initializing.

- ☐ Local
- ☐ Active Directory

### Run As Service Account

- ☒ NT AUTHORITY\NetworkService
- ☐ User Account

### Gateway Port

Port Number:  (Default)

### Product Usage Data

- ☐ Disable sending usage data to Tableau

### Include samples

- ☒ Include sample workbooks

Initialize

## Identity store settings

You must configure the identity store settings for the Tableau Server computer. The identity store manages Tableau Server accounts. You can configure the identity store to synchronise with an external directory (for example, OpenLDAP or Active Directory) or you can configure the identity store to manage and store accounts on Tableau Server. If you will be using a single sign on solution (OpenID, SAML, Kerberos, etc.) then review the following topics before configuring the identity store:

- Identity Store
- Authentication

**Important:** After you have configured and applied settings for the identity store, it cannot be changed.

### Identity Store

You cannot change the identity store after initializing.

☐ Local

☒ Active Directory

Domain	NetBIOS (Nickname)
<input type="text" value="example.lan"/>	<input type="text" value="EXAMPLE"/>

☐ Allow unencrypted communication with Active Directory if an encrypted session cannot be established (Not recommended)



If you select **Active Directory**, Tableau Server will populate the **Domain** and **NetBIOS** fields from the computer on which you are running Setup. In some cases, Setup may not display these attributes. For more information about how Tableau Server connects and communicates with Active Directory, see *User Management in Deployments with External Identity Stores*.

### **Allow unencrypted communications with Active Directory**

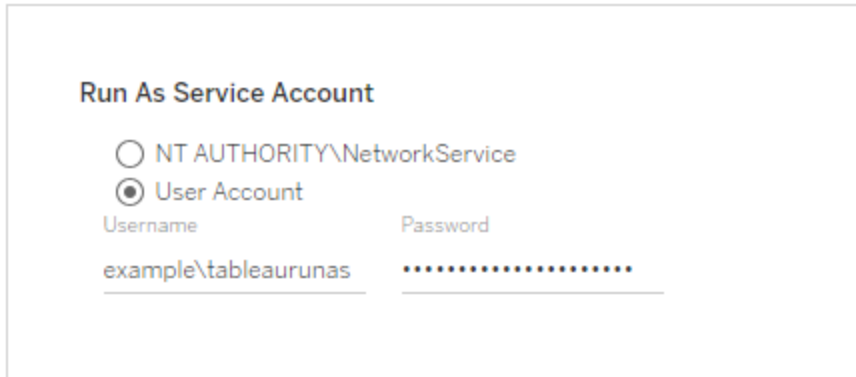
Your Active Directory infrastructure should manage certificates and trust with domain-joined computers. As such, the channel communication between Tableau Server and Active Directory resources should be encrypted. By default, Tableau Server requires an encrypted channel to Active Directory. We do not recommend allowing unencrypted communications with Active Directory, as this configuration is vulnerable to man-in-the-middle attacks. However, in some deployment scenarios, organisations do not encrypt the channel during initial configuration. Should you need to temporarily allow unencrypted communication with Active Directory, you can re-enable enforcement of encrypted communication later by running the tsm command, `wgserver.domain.allow_insecure_connection`, or by logging into TSM UI and toggling the setting under **User Identity & Access > Identity Store**.

### **Run As service account**

By default, Tableau Server runs under the Network Service account. To use an account that will accommodate NT authentication with data sources, specify a user name and password. See *Run As Service Account* to learn more about creating and using a specific user account.

**Important:** Include the domain name with the user name – for example, `example\tableaurunas`.

Enter the password that you created for this account.

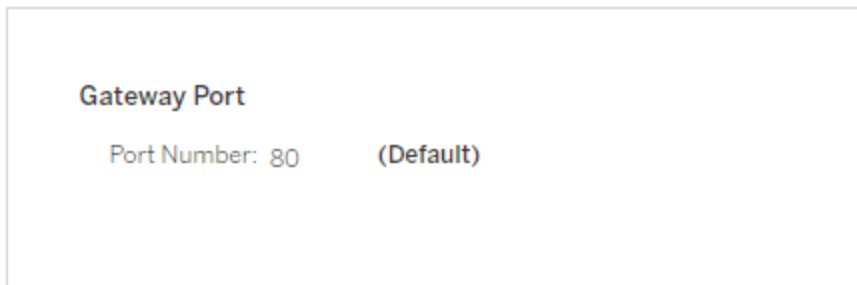


The image shows a 'Run As Service Account' dialog box. It has two radio buttons: 'NT AUTHORITY\NetworkService' (unselected) and 'User Account' (selected). Below the radio buttons are two text input fields. The first field is labeled 'Username' and contains the text 'example\tableaurunas'. The second field is labeled 'Password' and contains a series of dots representing a masked password.

### Gateway port

The default port for web access to Tableau Server (via HTTP) is port 80. If the installation program determines that port 80 is in use when you first install Tableau Server, an alternative port (for example 8000) is used and is shown in the Port number box.

You may need to change the port for other networking needs, for example, if you have a hardware firewall or proxy in front of the Tableau Server host, this might make running a back-end system on port 80 undesirable.



The image shows a 'Gateway Port' dialog box. It contains a label 'Port Number: 80' followed by the text '(Default)' in parentheses.

### Product usage data

By default, Tableau Server shares usage data with Tableau that helps us better understand how you use our products, improve your overall experience and build highly intelligent features that make Tableau even more powerful.

Clear this option if you do not want usage data sent to Tableau.

**Product Usage Data**  
☐ Disable sending usage data to Tableau

You can also change this setting after installation, on the TSM Maintenance tab in the TSM Web UI, or using the TSM CLI. For more information, see [Server Usage Data](#).

### Sample workbook installation

By default, Tableau Server will install sample workbooks in the Default site when you initialise the server.

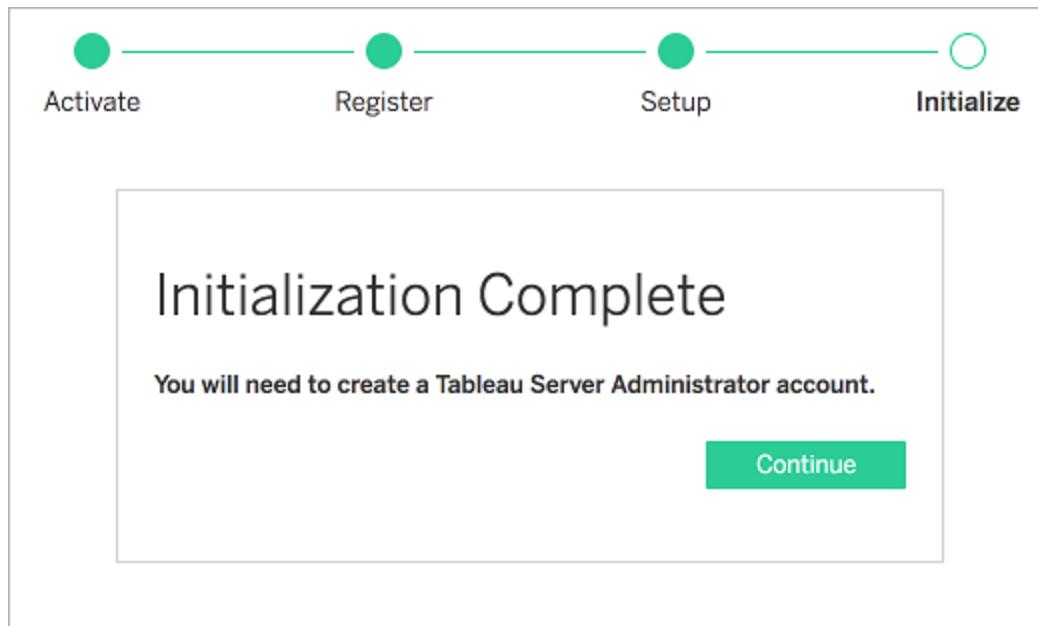
**Include samples**  
☒ Include sample workbooks

Alternatively, you can publish samples after installation by using the `publishsamples tabcmd` command.

### Initialising install

After you have configured the options on this page, click **Initialise**.

The initialisation process can take a while. When initialisation is complete, the following page is displayed:



## Use the TSM CLI

First, configure identity store, gateway settings, and sample workbook installation. Then apply the changes, optionally verify your LDAP connection, and then initialise Tableau Server

### Configure identity store settings

You must configure the identity store settings for the Tableau Server computer.

**Important:** After you have configured and applied settings for the identity store, it cannot be changed.

Use the json template in identityStore Entity to create a json file. After you have filled in the options with the appropriate values, you can then pass the json file with this command:

```
tsm settings import -f path-to-file.json.
```

## Tableau Server on Windows Help

### Configure gateway settings (optional)

Depending on your network requirements, you may need to configure the gateway settings for the Tableau Server computer. For example, if you are enabling SSL or configuring access to Tableau Server with a reverse proxy, you may need to configure gateway settings. See `gatewaySettings` Entity for more information.

Use the json template in `gatewaySettings` Entity to create a json file. After you have filled in the options with the appropriate values, you can then pass the json file with this command:

```
tsm settings import -f path-to-json-file.json.
```

### Configure product usage data (optional)

By default, Tableau Server shares usage data with Tableau to help us better understand how you use our products. This allows us to improve your overall experience and build highly intelligent features that make Tableau even more powerful.

Tableau collects only behavioural and usage data, never any of your confidential database values, and your usage data will never be shared or sold; its sole purpose is to improve your Tableau experience.

If you do not want to share product usage data, use the json template in `shareProductUsageDataSettings` Entity to create a json file, and specify a value of `false`. Then pass the json file with this command:

```
tsm settings import -f path-to-json-file.json.
```

You can also change this setting after installation, on the TSM Maintenance tab or using the TSM CLI. For more information, see [Server Usage Data](#).

### Configure sample workbook installation (optional)

By default, Tableau Server will install sample workbooks in the Default site when you initialise the server.

If you do not want to install sample workbooks during installation, run the following command:

```
tsm configuration set -k install.component.samples -v false
```

You can publish samples after installation by using the `publishsamples tabcmd` command.

### Apply pending configuration changes

Now that you've created and set initial configuration, you must apply them. When you apply configuration changes, tsm will verify the settings you've set before committing them.

To apply configuration changes to Tableau Server, run this command:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Once this command has completed, TSM processes are running, and Tableau Server is configured but is not running.

### Verify LDAP configuration (Optional)

If your identity store uses LDAP, then we recommend verifying LDAP connectivity before proceeding.

To do so, run the following commands before you initialise the server:

```
tsm user-identity-store verify-user-mappings -v <user name>
```

```
tsm user-identity-store verify-group-mappings -v <group name>
```

User and group names must be valid names that exist in the LDAP server that you are connecting to. If your LDAP connection is set up correctly, then the user or group attributes will be returned to the shell. If your connection is not set up correctly, then an error will be returned.

## Tableau Server on Windows Help

### Initialise and start Tableau Server

- To initialise and start Tableau Server, use the `--start-server` option:

```
tsm initialize --start-server --request-timeout 1800
```

This saves time by starting the server running after initialisation.

- If you intend to reconfigure Tableau Server after initialisation, leave the `--start-server` option off:

```
tsm initialize --request-timeout 1800
```

This stops the server after initialisation.

Start Tableau Server. If you did not use the `--start-server` option during initialisation and have finished configuring Tableau Server, use this command to start the server:

```
tsm start --request-timeout 900
```

## Next Step

Once initialisation is complete, create the Tableau Server administrator user account. See [Add an Administrator Account](#).

## Configuration File Example

This article provides an example of a complete JSON configuration file, with `gatewaySettings` and `identityStore` entities specified. In addition, a configuration key sets the gateway timeout to 900 seconds.

Your configuration file will look different depending on the options you need to set.

You might set multiple .json configuration files during installation. To set the values for each file in Tableau Server, you run the following command, once for each configuration file:

```
tsm settings import -f path-to-file.json
```

After you set the configuration files, run `tsm pending-changes apply` to apply the changes from all of the `.json` files you've set.

```
{
  "configEntities": {
    "gatewaySettings": {
      "_type": "gatewaySettingsType",
      "port": 80,
      "publicHost": "localhost",
      "publicPort": 80
    },
    "identityStore": {
      "_type": "identityStoreType",
      "type": "local",
      "domain": "example.lan",
      "nickname": "EXAMPLE"
    }
  },
  "configKeys": {
    "gateway.timeout": "900"
  }
}
```

### Entities vs keys

As shown in the example above, there are two classes of configuration parameters: `configEntities` and `configKeys`.

### **configEntities**

Certain types of configuration are done through entity sets that map to specific scenarios, such as the identity store and gateway configurations. When you pass a set of `configEntities` with the `tsm settings import -f path-to-file.json` command, TSM validates the configuration. If values passed are invalid, TSM will provide an error. This enables you to make changes during the configuration process, rather than experience a configuration failure at initialisation or run time.



Entities can be set only by including a `configEntities` block in a `.json` file.

**Important:** All files that are referenced in `configEntities` must be located on the local computer. Do not specify UNC paths.

## **configKeys**

Entities cover only a small portion of the configuration values that can be set. Hundreds of keys correspond to parameters stored in `.yaml` files. Tableau Server uses these parameters to store all of the configuration information for all services.

You can set individual keys with the `tsm configuration` command. But during deployment, setting them along with other configuration scenarios in JSON files, as shown above, is more convenient.

Unlike `configEntities`, `configKeys` are not validated.

**Note:** We do not recommend setting parameters that are not documented in `tsm configuration set Options`.

## **Server Usage Data**

The Tableau Server administrator can control whether or not usage data from Tableau Server is sent to Tableau. By default this option is enabled, and can be disabled at initial install, or after installing Tableau Server, using the TSM Web UI or command line. For details about this usage data, see [Tableau Product Usage Data](#).

In addition to product usage data, Tableau products send Basic Product Data to Tableau. This data is sent whether or not you have disabled the sending of product usage data. You can disable the sending of Basic Product Data separately. For details, see [Basic Product Data](#).

## Disable Usage Data Sharing

You can disable the sharing of usage data when you install Tableau Server, or at any time after installation.

### Disabling the sharing of usage data at install

To disable the sharing of usage data with Tableau when you are installing Tableau Server, clear the option during the initial configuration of server. For details, see Product usage data.

### Disabling the sharing of usage data after install

Use the TSM web interface

1. Open TSM in a browser:

<https://<tsm-computer-name>:8850>. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Maintenance** tab.
3. Under Other Maintenance Tasks, in Server Usage Data, clear **Send usage data to improve Tableau features**:

### Product Usage Data

Help us improve your Tableau experience by sharing how you use the product. Tableau collects information about your feature usage. All usage data will be handled according to our Privacy Policy - <http://www.tableau.com/privacy>

[Learn more](#)

☐ Disable sending usage data to Tableau

4. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.

### Use the TSM CLI

If you do not want to share product usage data, disable the option using this tsm configuration command:

```
tsm configuration set -k shareproductusagedata.enabled -v false  
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Basic Product Data

By default Tableau products send usage data to Tableau so that we can understand how customers use our software, and gain insights into where they are successful and where they might run into problems that we can address. For example, this data can help us learn where upgrades are commonly failing and allow us to make product changes to address those issues, or identify what portion of our user base needs informed about a security issue that applies to a specific version of Tableau Server. You can disable the sending of this data at installation time, or later. For details on how to do this, see the instructions for [Tableau Desktop](#) or [Tableau Server](#).

Even when you disable the sending of product usage data, certain basic product data is sent to Tableau. This Basic Product Data includes information about products and their processes, including which product or process is running, when they start up, what operating system they are running on, licensing information, which machine or cluster of machines has sent the data (using unique pseudonymised identifiers), and whether the product is configured to send product usage data.

You can disable the sending of Basic Product Data at the machine level, or at the enterprise level, by blocking traffic sent to **prod.telemetry.tableausoftware.com**.

#### Disabling sharing of Basic Product Data on individual computers

**Important:** This procedure involves modifying your local `hosts` file. If you do not know what this is, you should not change it. You should only make this change if you understand the implications of making changes to the file, know how to change the file, and have made a backup of the file for safety.

Modifying `hosts` files changes network behavior for computers. Detailed instructions for modifying `hosts` files are provided by operating system providers such as Microsoft, Apple or Linux Distributions.

1. Make a copy of your existing `hosts` file and save it to a computer that is not your Tableau computer. This is your backup, in case you need to reverse your changes. Do not start modifying the file until you have made a backup copy of it.
2. Modify your computer's `hosts` file to include these lines:

```
# Stops sending Product Usage to Tableau (prod.telemetry.tableausoftware.com) .
# Learn more here: http:\\tableau.com\\derived-data
127.0.0.1    prod.telemetry.tableausoftware.com
```

The first and second lines are comments, explaining the third line.

The third line prevents all traffic to `prod.telemetry.tableausoftware.com` (`http://-prod.telemetry.tableausoftware.com/`) from leaving your local machine by sending it to the Internal host loopback address. The data does not get sent outside the computer.

#### Disabling the sharing of Basic Product Data at the enterprise level

To disable sending of Basic Product Data on an enterprise level, modify your Network Firewall to prevent outbound traffic to `prod.telemetry.tableausoftware.com`.

This domain is used by Tableau to receive the Basic Product Data about process launch and shutdown. It is also used for the more general Product Usage Data. Blocking traffic to this domain it you will prevent both kinds of data from being sent.

Traffic to this domain will occur on Ports 80 (for initial registration of our Product Data clients) and on Port 443 (for all subsequent traffic). To completely prevent product data from being sent, block all traffic to this domain.

For details on how to configure your network firewall, refer to your vendor or your internal IT department. Tableau cannot provide these instructions.

## Add an Administrator Account

The final step in activating Tableau Server is to add the initial administrator account. The administrator will have all access to the server including the ability to manage users, groups and projects.

The server must be running when you create the initial admin user.

If you have configured the Tableau Server identity store to use LDAP or Active Directory, then the initial administrative user that you specify must be an account in the directory. The initial administrative user is generally distinct from the user account on the Tableau Server computer that you use to run `t-sm`.

However, these accounts can be the same if you have configured the Tableau Server identity store to use Active Directory and the initial admin user is a member of the local administrator group on the Tableau Server computer.

## Prerequisites

Before proceeding with the procedures in this topic, complete the following prerequisites as outlined in *Install and Configure Tableau Server*:

- Install TSM
- Activate and Register Tableau Server

- Configure Initial Node Settings

## Use web UI

After Tableau Server is finished initialising, the installation program will display a page to create the Tableau Server administrator.

- If you configured a local identity store during setup, then specify a name and password that you want to use.
- If you configured a LDAP or Active Directory identity store during setup, then you must specify a user account that is a member of the directory.
- The `username` value cannot include an at sign (@) unless the username suffix matches Tableau Server's primary domain. For example, if Tableau Server connects to domain "myco.com", a username of "user@example.com@myco.com" cannot be used.

If you are installing remotely, then you must sign in to TSM on the physical computer where Tableau Server is installing, or you can access the computer remotely and run the `tabcmd initialuser` command from a shell.

## Use tabcmd CLI

You must create the initial administrative account for Tableau Server.

- If you configured a local identity store during setup, then specify a name and password that you want to use.
- If you configured a LDAP or Active Directory identity store during setup, then you must specify a user account that is a member of the directory.
- The `username` value cannot include an at sign (@) unless the username suffix matches Tableau Server's primary domain. For example, if Tableau Server connects to domain "myco.com", a username of "user@example.com@myco.com" cannot be used.

To create the initial user, run the following `tabcmd` command:

## Tableau Server on Windows Help

```
tabcmd initialuser --server http://localhost --username "<new-admin-username>"
```

For example:

```
tabcmd initialuser --server http://localhost --username "tableau-admin"
```

If you are running the HTTP protocol on a port other than 80, specify the port after the host name, for example: `--server http://localhost:8080`.

After you run the command, the shell will prompt for an administrative password.

### Next steps

After you have created the Tableau Server administrator account, continue your deployment by working through the configuration topics at Post Installation Tasks.

## Initial Node Installation Defaults

By default, the Tableau Server installer configures the number of process instances that Tableau Server runs based on the hardware detected by the installer. The default configuration applies to single-server installations and to the initial server of a multi-node installation.

You can calculate the default configuration based on the following rules for each process, where the "number of cores" refers to the number of physical processors:

Process Name	Number of Processes
VizQL Server	Equal to the number of cores divided by four, up to a maximum of four process instances.
Backgrounder	Set to two unless the number of cores is fewer than eight.
Cache Server	Set to two unless the number of cores is fewer than eight.
Data Server	Set to two unless the number of cores is fewer than eight.

For all other process types, the number of process instances is set to one, regardless of the hardware.

Here's an example default configuration for a computer with 16 cores:

Process Name	Number of Processes
VizQL Server	4
Application Server	1
Backgrounder	2
Cache Server	2
Data Server	2
File Store	1
Data Engine	1

## Jump-start Installation

This topic provides all of the steps required to perform a basic, quick-start installation of Tableau Server. The purpose of the configuration described here is to provide the quickest, simplest path to a Tableau Server installation. Use this procedure as practice, to try out the Tableau Server installation, management and user experience before your actual server deployment.

**Important:** Do not use this procedure as a stand-alone resource for deploying Tableau Server into a production environment. To deploy Tableau Server into a production environment, refer to the content at [Install and Configure Tableau Server](#).

The procedures in this topic will install an instance of Tableau Server for Windows using a local identity store.



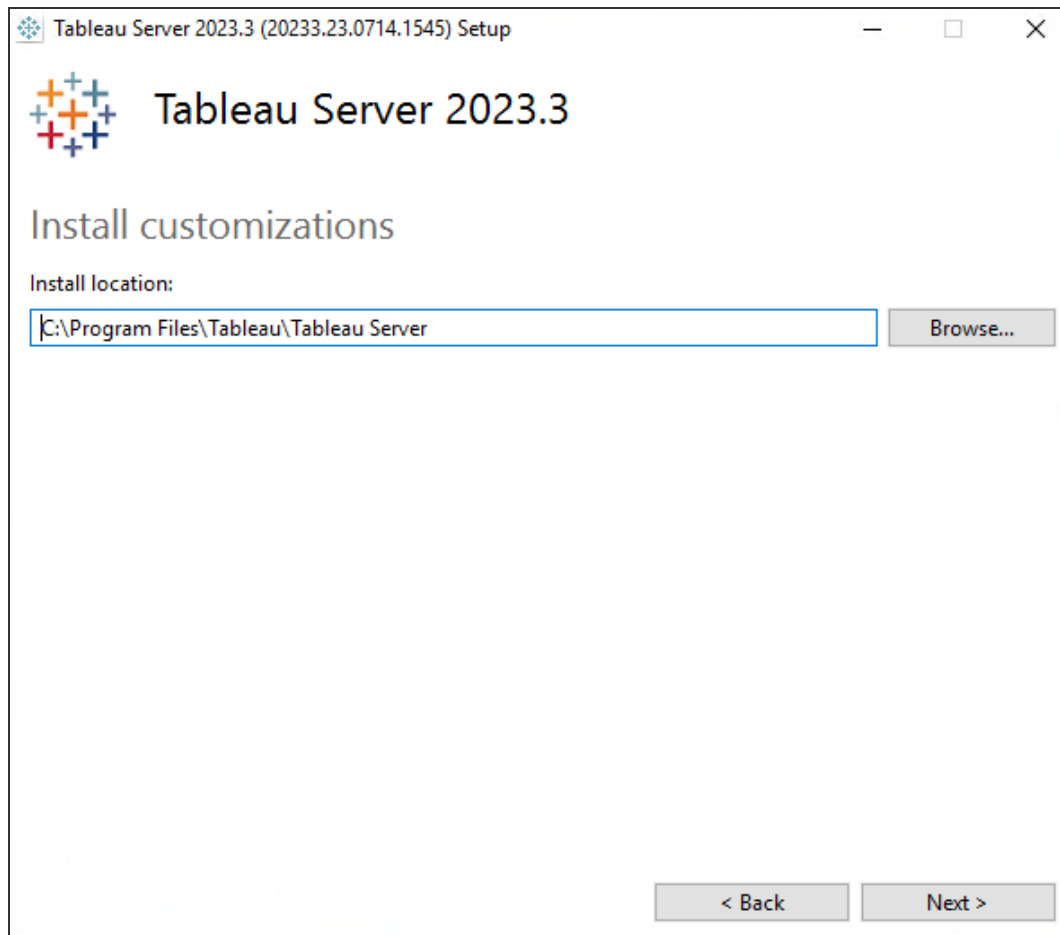
## Before you begin

Review the topic, [Before you install....](#) The procedure here assumes that you have installed Windows on conforming hardware and according to the environmental requirements specified in that topic.

Note that the computer you install on must meet the minimum hardware requirements specified in [Minimum Hardware Requirements and Recommendations for Tableau Server](#). The setup program will not install Tableau Server onto systems that do not meet the minimum hardware requirements.

## Step 1: Install Tableau Server and start Tableau Services Manager

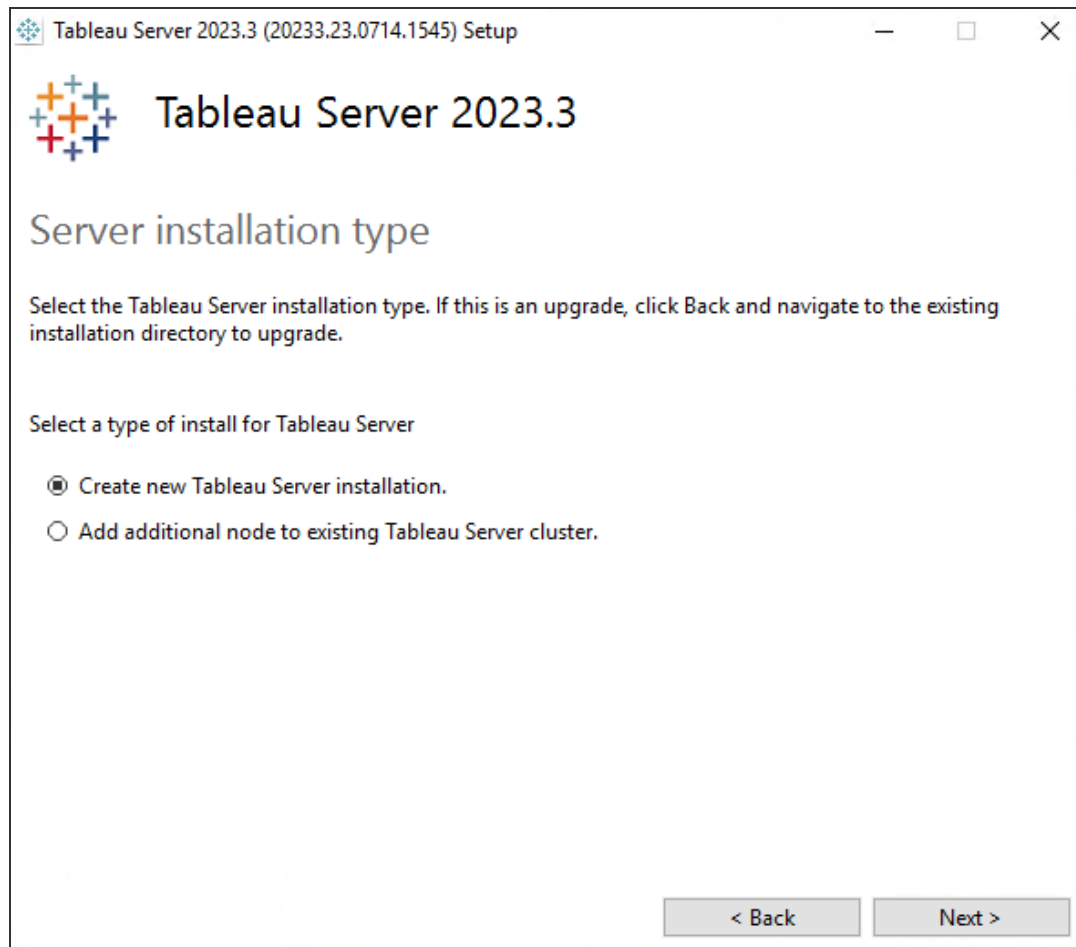
1. Double-click the installation file.
2. Follow the on-screen instructions to complete Setup and install the application.



The default installation path is `C:\Program Files\Tableau\Tableau Server`. You can choose a different location, including a different drive, by either browsing to or typing in a new path.

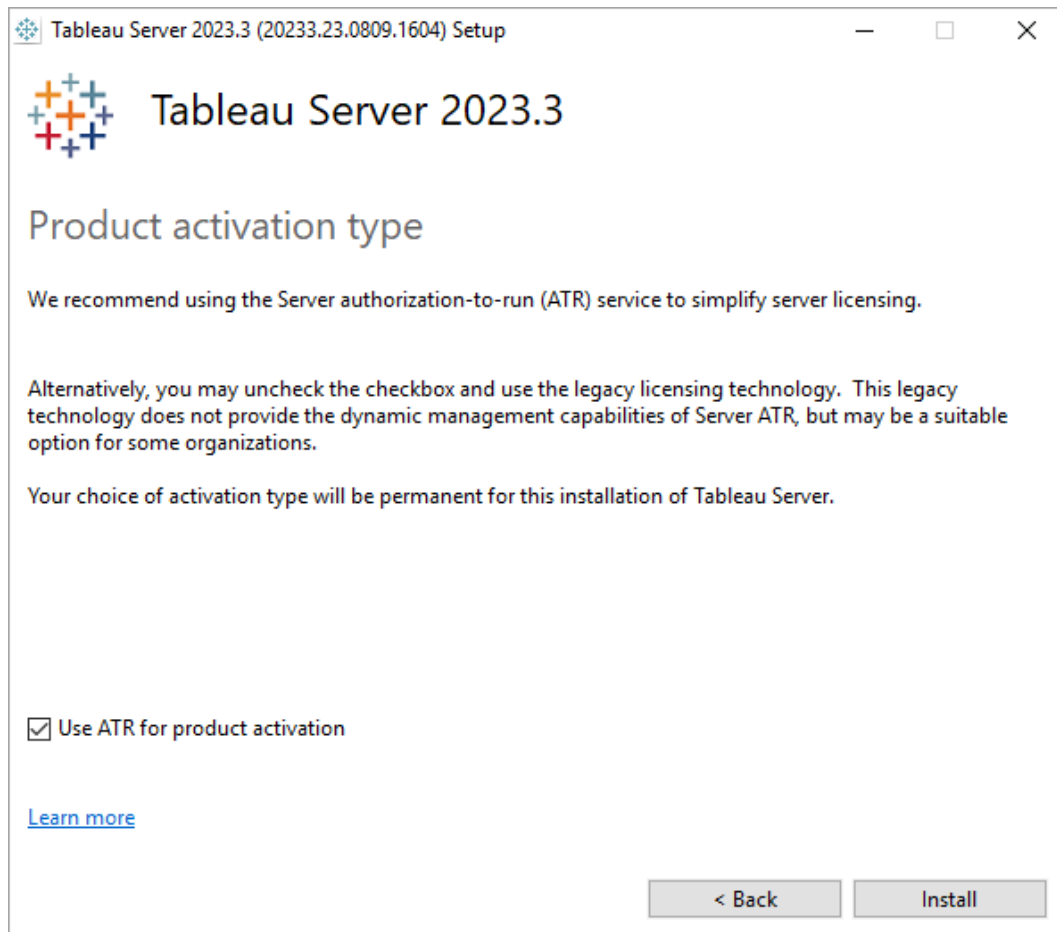
If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

3. Click **Next**.



On the **Server installation type** page, you can specify whether you are installing the first node of a Server installation, or additional nodes in a multi-node installation. You do not need to change this from the default (Create new Tableau Server installation.) unless you are installing a multi-node Tableau Server. If you are installing a multi-node Tableau Server, see [Install and Configure Additional Nodes](#).

4. Click **Next**.



On the **Product Activation Type** page, select whether you want to use the authorisation-to-run (ATR) service to activate Tableau Server, and then click **Install**.

5. After the installation completes, click **Finish**. Setup will then open the TSM configuration web page on the computer where you are installing Tableau Server.

## Step 2: Activate and register Tableau Server

Before you can configure Tableau Server, you must activate a licence and register. For more details, see [Activate and Register Tableau Server](#).

## Tableau Server on Windows Help

1. Sign in to Tableau Services Manager Web UI.
2. On the **Activate** page, enter or paste your product key and click **Activate Product Key**.

After your product key is activated, it appears under **Activated Product Keys**.

Activate   Register   Setup   Initialize

Enter your license product key to get started with Tableau Server.

**Product Key**

The key has 20 characters

0000-0000-0000-0000-000

[I can't find my product key.](#)

Enter your product key and click Activate Product Key. If activating multiple keys, do this for every key. When you have added all keys, click Next. You can access your product keys from the [Tableau Customer Portal](#).

**Activated Product Keys**  
No product key currently activated

Activate Product Key   Next

3. To activate another product key, enter the new product key, and then click **Activate Product Key**. After your product key is activated, it appears under **Activated Product Keys**.
4. When you're finished activating product keys, click **Next**.

**Note:** If the product keys you have activated don't have the necessary capacity, such as not enough cores or only a Viewer role product key, Tableau Services Manager displays the **Insufficient licences applied** dialog box. Click **Activate Another Product Key** to add another product key and increase capacity on your Tableau Server installation.

Insufficient licenses applied

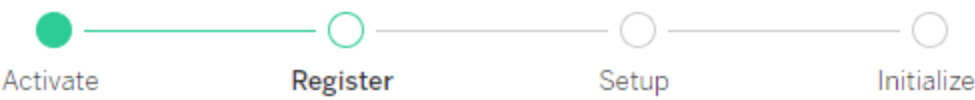
*You have not activated enough product keys for your Tableau Server deployment.*

If you try to activate Tableau Server using these licenses, it may not run properly. We recommend that you activate additional licenses to support this Tableau Server deployment

[Tableau Customer Portal](#)  
[Troubleshooting](#)

[Activate Another Product Key](#)

5. On the **Register** page, enter your information into the fields and click **Register**.



Register with Tableau. All fields are required.

Contact Information

First Name

Last Name

Phone Number

Email

Company Information

Organization

Industry

Company Size

Department

Job Role

Region Information

City

Postal Code

Country/Region

State/Province

## Step 3: Configure local identity store

You must configure the identity store settings. This procedure simplifies installation by setting the identity store to local authentication. For more details on customising these defaults, see [Configure Initial Node Settings](#).



The settings below are all you need to get started.

### Identity Store

You cannot change the identity store after initializing.

- ☐ Local
- ☐ Active Directory

### Run As Service Account

- ☒ NT AUTHORITY\NetworkService
- ☐ User Account

### Gateway Port

Port Number:  (Default)

### Product Usage Data

- ☐ Disable sending usage data to Tableau

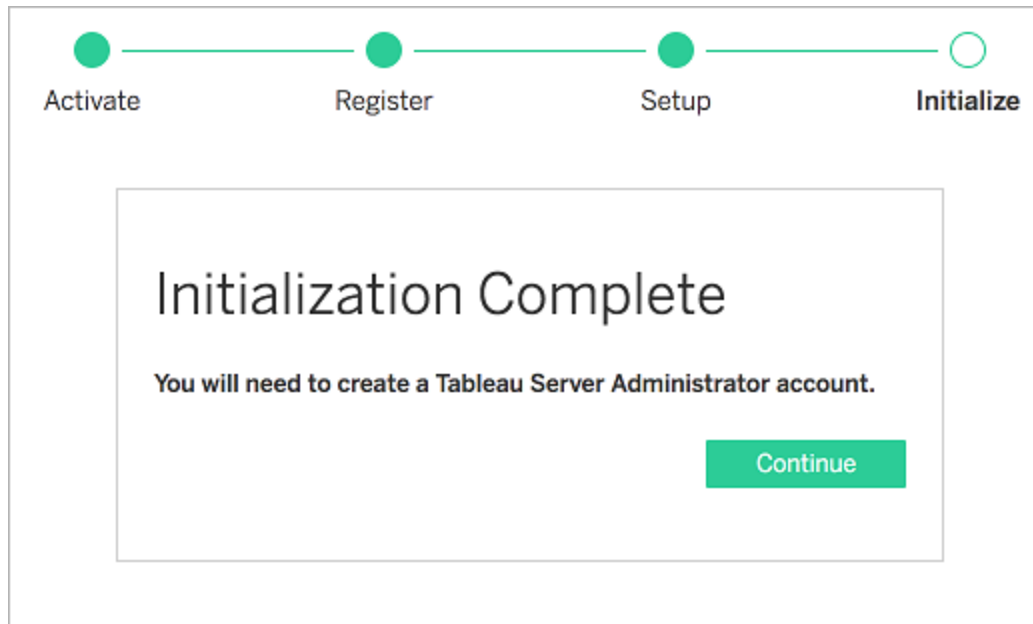
### Include samples

- ☒ Include sample workbooks

Initialize

After you have configured the options on this page, click **Initialise**.

The initialisation process can take a while. When initialisation is complete, the following page is displayed:



## Step 4: Add administrator account

The final step in activating Tableau Server is to add the initial administrator account. The administrator will have all access to the server including the ability to manage users, groups and projects. More details are at [Add an Administrator Account](#).

After Tableau Server is finished initialising, the installation program will display a page to create the Tableau Server administrator.

Specify a name and password that you want to use for the administrative account.

If you are installing remotely, then you must sign in to TSM on the physical computer where Tableau Server is installing, or you can connect remotely to the computer and run the `tabcmd initialuser` command from a shell.

Use the administrator account that you created in this step to access the Tableau Server admin web pages. See [Sign in to the Tableau Server Admin Area](#).

## Step 5: Validate your installation

This is an optional step, but a good way to validate that Tableau Server is installed and running properly is to look at the built-in Administrative Views in Tableau Server.

## Install Switches and Properties for Tableau Server

You can use the following installer switches when installing Tableau Server on Windows from the command line.

Switch	Description	Comments
<code>/install   /repair   /uninstall   /layout "&lt;directory&gt;"</code>	Run Setup to either install, repair, or uninstall Tableau Server, or with <code>/layout</code> , create a complete local copy of the installation bundle in the directory specified.	Default is to install, displaying UI and all prompts. If no directory is specified on a fresh install, <code>C:\Program Files\Tableau\Tableau Server</code> is assumed. If Tableau Server is already installed, Setup will assume the same location as the current installation.
<code>/passive</code>	Run Setup with minimal UI and no prompts.	Tableau Server does not start automatically when installed in <code>/passive</code> mode. To start Tableau Server, use <code>tsm start</code> .
<code>/quiet   /silent</code>	Run Setup in unattended, fully silent mode. No UI or prompts are displayed.	Tableau Server does not start automatically when installed in <code>/silent</code> or <code>/quiet</code> mode. To start Tableau Server, use <code>tsm start</code> .

		<p><b>Note:</b> Use either <code>/silent</code> or <code>/quiet</code>, not both.</p>
<code>/norestart</code>	Run Setup without restarting Windows, even if a restart is necessary.	<p><b>Note:</b> In certain rare cases, a restart cannot be suppressed, even when this option is used. This is most likely when an earlier system restart was skipped, for example, during installation of other software.</p>
<code>/log "&lt;drive&gt;\&lt;path&gt;\&lt;-log-file&gt;.&lt;ext&gt;"</code>	<p>Log information to the specified file and path.</p> <p><b>Note:</b> The behaviour when using the <code>/log</code> option changed starting in version 2021.2.0. For more information, see Tableau Server Release Notes.</p>	<p>Use this switch with a path and log file name to make the log available after installation is complete.</p> <p>If this switch is used with a log file name but no path, the log file is written to a temporary location and deleted at the end of the installation.</p> <p>If this switch is used but no log file name is specified, the switch is ignored and the file is written to <code>%TEMP%</code>.</p> <p>If this switch is not used, the log file is written to <code>%TEMP%</code>.</p>

Properties	Description	Comments
ACCEPTTEULA=1   0	Accept the End User Licence Agreement (EULA). Required for quiet, silent and passive install on both initial and additional nodes. 1 = true, accept the EULA, 0 = false, do not accept the EULA.	<p>If not included when using <code>/passive</code>, <code>/silent</code> or <code>/quiet</code>, Setup fails silently.</p> <p>If included but set to 0, Setup fails.</p>
ACTIVATIONSERVICE-E="1"   "0"	Activate Tableau Server using the authorisation-to-run (ATR) service. "1" = use Server ATR. "0" = don't use Server ATR.	<p>This option is for new installs only, not upgrades. Select this option if:</p> <ul style="list-style-type: none"> <li>• You plan to activate Tableau Server online</li> <li>• You plan to install Tableau Server in the cloud</li> <li>• You plan to install Tableau Server on a virtual machine or other non-persistent environment</li> </ul> <p>Do not use this option if:</p> <ul style="list-style-type: none"> <li>• You plan to activate Tableau Server offline</li> <li>• You plan to install Tableau Server in an air-gapped environment</li> </ul> <p>For more information, see <a href="#">Activate Tableau Server Using the Author-</a></p>

		isation-To-Run (ATR) Service.
BOOTSTRAPFILE- ="<path\to- o\bootstrap\file>"	Required when adding a node to a cluster. The boot- strap file contains the configuration used by additional nodes.	Example: <Setup file> /silent ACCEPTTEULA=1 BOOTSTRAPFILE- ="C:\Use- rs\t- ableau- admin\Down- loads\bootstrap.json"
CONTROLLERPORT=	Optional. The port on which the Tableau Services Manager (TSM) Controller should run.	If not included, defaults to 8850.
COORDINATIONSERVICEC- LIENTPORT=	Optional. The port on which the Tableau Services Manager (TSM) Coordination Ser- vice client should run.	If not included, defaults to a dynam- ically mapped port. For more inform- ation, see Tableau Services Manager Ports.
COORDINATIONSERVICEP- EERPORT=	Optional. The port on which the Tableau Services Manager (TSM) Coordination Ser- vice peer should run.	If not included, defaults to a dynam- ically mapped port. For more inform- ation, see Tableau Services Manager Ports.
COORDINATIONSERVICEC- EADERPORT=	Optional. The port on which the Tableau Services	If not included, defaults to a dynam- ically mapped port. For more inform- ation, see Tableau Services Manager Ports.

	Manager (TSM) Coordination Service Leader should run.	
DATADIR= <code>"&lt;path\to\data-a\directory&gt;"</code>	Optional. The location where the Tableau Server software configuration and data are stored. If you don't provide a data directory path and Tableau Server is being installed to the default location (INSTALLDIR is not specified), the default data directory is used: <code>C:\ProgramData\Tableau\Tableau Server</code> . If you don't provide a data directory path and INSTALLDIR is specified, DATADIR is also set to the INSTALLDIR location.	Example: DATADIR= <code>R="D:\TableauServerData"</code>

<p>EMBEDDED CREDENTIAL=1   0</p>	<p>Required when adding a node to a cluster and the bootstrap file contains the embedded credentials of an administrator on the TSM computer.</p> <p>1=true, 0=false. Default is 0.</p>	<p>Must be used with /silent or /quiet and with BOOTSTRAPFILE</p> <p>Example: &lt;Setup file&gt; /silent ACCEPTTEULA=1 BOOTSTRAPFILE="C:\Users\tableau-admin\Downloads\bootstrap.json" EMBEDDED CREDENTIAL=1</p>
<p>INSTALLDIR="&lt;path\to\installation\directory&gt;"</p>	<p>Install to the specified non-default install location.</p>	<p>Specifies the location to install server. If not used, Tableau Server is installed to C:\Program Files\Tableau\Tableau Server</p> <p>Example: &lt;Setup file&gt; /silent INSTALLDIR="D:\Tableau\Tableau Server"</p>
<p>LICENSESERVICEVENDOR-DAEMONPORT=</p>	<p>Optional. The port on which the Licence service vendor daemon should run. This is used in multi-node installations for licensing-related communication between nodes.</p>	<p>If not included, defaults to a dynamically mapped port. For more information, see Tableau Services Manager Ports.</p>



<code>SKIPPYTHONINSTALL-</code> <code>L=1   0</code>  Added in version 2021.3.0	<p>Optional. If set to 0 (the default), the Setup program installs the included Python package. If set to 1, specifies that the Setup program should not install the Python package as part of Tableau Server.</p> <p><b>Note:</b> Python will be used in future releases of Tableau Server to support advanced analytics features. If you choose to skip installation of Python, Tableau Server users will not have access to those advanced analytics features when those features are available.</p>	If not included, defaults to installing Python as part of Tableau Server.
--	---	---

# Automated Installation of Tableau Server

You can use `SilentInstaller.py`, a **community supported** Python script, to automate a new install of Tableau Server. You can download the script and use it as written, or modify it for your specific needs.

## Benefits of using the automated installer

- With a single command, you can install, configure, and run a working instance of Tableau Server.
- The `SilentInstaller.py` script can be run without user input making it suitable for automation.
- The configuration can be set once and used for all your installations, making this a repeatable process.

## When not to use the automated installer

- If you are installing Tableau Server for the first time, we recommend that you manually test your installation before automating the process. Any issues that block installation are easier to resolve interactively. After you have resolved these issues, you can perform an automated installation of Tableau Server using the `SilentInstaller.py` script.
- If you are testing or trying new configuration parameters such as authentication methods, we recommend that you manually run the installation first. Tableau Services Manager (TSM) validates configuration entities and rejects configuration parameters that are not valid. Once you have the correct parameters identified, you can use the automated installer.
- If you are unable to or do not want to enter passwords into the secrets file, using the automated installer might not be an option for you.

## Before you begin

Review [Before you install...](#) to make sure you have installed Microsoft Windows Server on a computer that meets the operating system requirements and the minimum hardware requirements for Tableau Server.

**Note:** If you are installing Tableau Server in a production environment, review the minimum hardware **recommendations**. The recommendations represent the minimum hardware configuration you should use for a production installation of Tableau Server.

To perform an automated installation, you use the `SilentInstaller.py` script, which relies on the Tableau Server install package as an input. Before you begin, we recommend that you download the following packages:

1. Download [Python 3.5](#) or later and install it on the computer on which you want to install Tableau Server.
2. Download both the `SilentInstaller.py` script and the Tableau Server installer package:
  - a. Download the `SilentInstaller.py` script from [GitHub](#), along with `config.template.json`, `registration.template.json`, `secrets.template.json`, and the three bootstrap templates (`bootstrap.template.json`, `topologyBootstrap.template.json`, and `workerBootstrap.template.json`).
  - b. Select and download the appropriate **Tableau Server installer package** from the [Tableau Server Product Downloads](#) page. The one you choose depends on the version of Microsoft Windows Server you want to use.
3. Copy the packages and templates to a location on or accessible from the computer on which you are going to install Tableau Server.

## How to use the SilentInstaller.py script

The `SilentInstaller.py` script installs the Tableau Server installer package, creates the directories, sets the permissions required to run Tableau Server, and starts the Tableau Services Manager (TSM) setup. After TSM setup is complete, the `SilentInstaller.py` script runs `tsm` commands to install, configure, and start Tableau Server. By default, the `SilentInstaller.py` script activates a trial licence during installation. If you have an actual product key, you can provide the product key at the command line or activate the product key after you run the `SilentInstaller.py` script. Most of the command line options in the automated installer are the same as the options used by the `tsm initialise` command.

You can run the `SilentInstaller.py` script in three modes: install the initial node, install additional nodes, and update cluster topology. When doing an installation for a distributed cluster, you'll run `SilentInstaller.py` with the options to install the initial node on the initial node. You'll run `SilentInstaller.py` with the options to install additional nodes on each additional node. Lastly, you'll run `SilentInstaller.py` with the options to update cluster topology on the initial node.

The `SilentInstaller.py` script is meant to be run without user interaction, so you must input all parameters into the required arguments that are passed to the `SilentInstaller.py` script. Alternatively, you can also put the required arguments into the bootstrap file. You can use the Configuration, registration, and secrets file templates provided.

Use the following steps to perform an unattended installation:

### Step 1: Install the automated installer

1. Log onto the computer as a user with administrator access.
2. Download and install the `SilentInstaller.py` script, templates, and bootstrap files.

## Step 2: Create files to provide additional configuration information required to run the automated install

Since the `SilentInstaller.py` script is meant to run without user interaction, you must provide the following additional information:

1. Copy the templates, **config.template.json**, **registration.template.json**, and **secrets.template.json**, to another directory, such as your home directory. We don't recommend that you edit the template files directly.
2. Edit the **config.template.json** file and provide the initial node configuration settings. You must provide identity store settings for the Tableau Server computer. Depending on your network requirements, you may need to also provide the gateway settings. The caching option is set to cache and reuse data for as long as possible. Sample workbooks are installed by default. The template includes the minimum required information, so the template is a starting point. For more information on configuration settings, see [Configure Initial Node Settings](#).
3. Edit the **registration.template.json** file and provide the information needed to register Tableau Server. For more information, see [Activate and Register Tableau Server](#).
4. Edit the **secrets.template.json** file and provide the user name and password for the TSM administrator and Tableau Server administrator accounts.
  - The TSM administrator account should be the same user as the Windows administrator running the script.
  - The Tableau Server administrator account is the initial account that is created by the installer and is used to administer Tableau Server.

## Step 3: Run the automated install

1. Log onto the computer as a user with administrator access.

Install the initial node

The `SilentInstaller.py` script runs the proper commands to install, activate licence, configure, and start Tableau Services Manager. Run `SilentInstaller.py -h` and `SilentInstaller.py install -h` to see the full list of options and their default values.

**To install the initial node:**

On the initial node, at a Python prompt, type:

```
SilentInstaller.py install --secretsFile secrets.json --configFile myconfig.json --registrationFile registration.json
TableauServer-64bit-<version>.exe
```

Or alternatively:

```
SilentInstaller.py --bootstrapFile <bootstrap file path>
```

Script Option	Description
<b>Required switches</b>	
<code>--configFile &lt;file path&gt;</code>	The relative or absolute path to the <b>Server Configuration</b> JSON file.
<code>--secretsFile &lt;file path&gt;</code>	The relative or absolute path to the <b>Secrets File</b> that describes the credentials of the Windows account to authenticate to Tableau Services Manager (TSM), and the username/password of the initial administrator user for Tableau Server. The secrets file also includes the

Script Option	Description
	<p>product key you want to use to activate Tableau Server. By default, the secrets file template contains a trial licence.</p> <div> <p><b>Note:</b> Providing the password in the secrets file is optional. However, if passwords are not found in the secrets file, you will be prompted to provide them during installation.</p> </div> <p>The automated installer package includes the template for the secrets file.</p>
--registrationFile <file path>	<p>The relative or absolute path to the <b>Server Registration</b> file containing the Tableau Server registration information.</p> <p>The automated installer package includes the template for the registration file.</p>
<installer executable file path>	The relative or absolute path to the Tableau Services Manager (TSM) installer.
<b>Optional switches</b>	
--installDir <file path>	<p>The Tableau Server installation directory. If you don't provide a path, the default directory <b>C:\Program Files\Tableau\Tableau Server</b> will be used.</p>
--dataDir <file path>	The location where the Tableau Server soft-

Script Option	Description
	ware configuration and data are stored. If you don't provide a path, the default directory <b>C:\ProgramData\Tableau</b> is used for the configuration and data files.
<code>--installerLog &lt;file path&gt;</code>	The existing directory where the installer's log files are written. If you don't provide a path, the log files will be written to your TEMP directory.
<code>--controllerPort &lt;port number&gt;</code>	The port on which the Tableau Services Manager (TSM) Controller should run.
<code>--coordinationServiceClientPort &lt;port number&gt;</code>	The ZooKeeper client port.
<code>--coordinationServicePeerPort &lt;port number&gt;</code>	The ZooKeeper peer port.
<code>--coordinationServiceLeaderPort &lt;port number&gt;</code>	The ZooKeeper leader port.
<code>--start</code>	Whether the server should be started when setup is complete.

### Install additional nodes

The `SilentInstaller.py` script runs the proper commands to install Tableau Services Manager (TSM) on the additional node. Run `SilentInstaller.py installWorker -h` to see the full list of options and their default values.

### To install additional nodes:

On each additional node, at a Python prompt, type:



## Tableau Server on Windows Help

```
SilentInstaller.py workerInstall --secretsFile secrets.json --  
nodeConfigurationFile nodeConfiguration.json TableauServer-  
64bit-<version>.exe
```

Option	Description
<code>--secretsFile &lt;file path&gt;</code>	<p>Required. The relative or absolute path to the <b>Secrets File</b> that describes the credentials of the Windows account to authenticate to Tableau Services Manager (TSM), and the username/password of the initial administrator user for Tableau Server. The secrets file also includes the product key you want to use to activate Tableau Server. By default, the secrets file template contains a trial licence.</p> <div><p><b>Note:</b> Providing the password in the secrets file is optional. However, if passwords are not found in the secrets file, you will be prompted to provide them during installation.</p></div> <p>The automated installer package includes the template for the secrets file.</p>
<code>--nodeConfigurationFile &lt;file path&gt;</code>	<p>Required. Path to the node configuration file for installing the additional node.</p>
<code>(installer executable) &lt;file path&gt;</code>	<p>Required. The final argument to the script is simply the path, absolute or relative, to the Tableau Services Manager installer executable, acquired through usual channels such as downloaded from the Tableau Website. This script is only supported for use with Tableau Services</p>

Option	Description
	Manager.
<code>--installDir &lt;file path&gt;</code>	Optional. The Tableau Server installation directory. If blank, the default directory <b>C:\Program Files\Tableau\Tableau Server</b> will be used.
<code>--dataDir &lt;file path&gt;</code>	Optional. The location where the Tableau Server software configuration and data are stored. If blank, the default directory <b>C:\ProgramData\Tableau</b> is used for the configuration and data files.
<code>--installerLog &lt;file path&gt;</code>	Optional. The existing directory where the installer's log files are written. If blank, the log files will be written to the user's TEMP directory.

**Note:** The node configuration file is automatically saved after installing the first node using `SilentInstaller.py`. You can find it under the working directory of the script.

### Update cluster topology

The `SilentInstaller.py` script runs the proper commands to update the cluster topology as desired for Tableau Services Manager (TSM). Run `SilentInstaller.py updateTopology -h` to see the full list of options and their default values.

### To update cluster topology:

On the initial node, at a Python prompt, type:

```
SilentInstaller.py updateTopology --secretsFile secrets.json --
configFile myconfig.json
```

Option	Description
<code>--secretsFile</code> <file path>	<p>Required. The relative or absolute path to the <b>Secrets File</b> that describes the credentials of the Windows account to authenticate to Tableau Services Manager (TSM), and the username/password of the initial administrator user for Tableau Server. The secrets file also includes the product key you want to use to activate Tableau Server. By default, the secrets file template contains a trial licence.</p> <div><p><b>Note:</b> Providing the password in the secrets file is optional. However, if passwords are not found in the secrets file, you will be prompted to provide them during installation.</p></div> <p>The automated installer package includes the template for the secrets file.</p>
<code>--configFile</code> <file path>	<p>Required. The relative or absolute path to the <b>Server Topology</b> file describing the Tableau Server topology to update. Only the topologyVersion part of the file will be applied, other configurations will be ignored.</p>

Configuration, registration, and secrets file templates

You can use the following example templates to pass data to the `SilentInstaller.py` script.

## Secrets file template example

```
{
  "local_admin_user": "",
  "local_admin_pass": "",
  "content_admin_user": "",
  "content_admin_pass": "",
  "product_keys": ["trial"]
}
```

The `local_admin_user` is the Windows account to authenticate to the Tableau Services Manager.

The `content_admin_user` is the initial administrative user, who acts as a superuser for all of Tableau Server with respect to creating and managing users, sites, etc.

When installing additional nodes or updating the cluster topology, these credentials are ignored because the initial admin user was already created when the initial node was installed.

The `product_keys` is the key used to activate Tableau Services Manager. If multiple keys are specified, they will be activated one by one. In the case of non-install mode, these keys are ignored because the licences have already been activated.

## Server Configuration file template example

```
{
  "configEntities": {
    "runAsUser": {
      "_type": "runAsUserType",
      "name": "NT AUTHORITY\\NetworkService"
    },
    "gatewaySettings": {
      "_type": "gatewaySettingsType",
```

## Tableau Server on Windows Help

```
    "port":80,
    "firewallOpeningEnabled":true,
    "sslRedirectEnabled":true,
    "publicHost":"****replace me****",
    "publicPort":80,
    "sslEnabled":false,
    "sslPort":443
  },
  "identityStore":{
    "_type":"identityStoreType",
    "type":"local",
    "domain":"****Domain Name Here****",
    "nickname":"****Domain Nickname Here****"
  }
},
"topologyVersion":{
  "nodes":{
    "****insert nodeId (lowercase) here****": {
      "services": {
        "filestore": {
          "instances":[
            {
              "instanceId":"0"
            }
          ]
        },
        "tabadmincontroller": {
          "instances":[
            {
              "instanceId":"0"
            }
          ]
        }
      }
    }
  }
}
```

```

    ]
  },
  "clientfileservice": {
    "instances":[
      {
        "instanceId":"0"
      }
    ]
  },
  "dataserver": {
    "instances":[
      {
        "instanceId":"0"
      },
      {
        "instanceId":"1"
      }
    ]
  },
  "cacheserver": {
    "instances":[
      {
        "instanceId":"0"
      },
      {
        "instanceId":"1"
      }
    ]
  },
  "vizqlserver": {
    "instances":[

```

```
        {
          "instanceId":"0"
        },
        {
          "instanceId":"1"
        }
      ]
    },
    "backgrounder": {
      "instances":[
        {
          "instanceId":"0"
        },
        {
          "instanceId":"1"
        }
      ]
    },
    "appzookeeper": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    },
    "pgsql": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    }
  ]
}
```

```

},
"dataengine": {
  "instances":[
    {
      "instanceId":"0"
    }
  ]
},
"licenseservice": {
  "instances":[
    {
      "instanceId":"0"
    }
  ]
},
"searchserver": {
  "instances":[
    {
      "instanceId":"0"
    }
  ]
},
"clustercontroller": {
  "instances":[
    {
      "instanceId":"0"
    }
  ]
},
"tabsvc": {
  "instances":[

```



```
        {
          "instanceId":"0"
        }
      ]
    },
    "vizportal": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    },
    "tabadminagent": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    },
    "clientfileservice": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    },
    "gateway": {
      "instances":[
        {
          "instanceId":"0"
        }
      ]
    }
  }
}
```



# Install Tableau Server in a Disconnected (Air-Gapped) Environment

You can install Tableau Server in a disconnected environment that has no outside network access of any kind. Such disconnected environments, commonly referred to as air-gapped, are used when high security is needed to prevent data breaches or to guard against hacking. Air-gapped environments have no internet access, no outside network access, no outside wireless access, etc. The only means of getting software and data into or out of an air-gapped environment is by using removable media such as USB sticks or writable optical CDs or DVDs.

Installing Tableau Server in an air-gapped environment is an advanced task for IT administrators who are familiar with the security considerations, best practices, and pitfalls of installing software in air-gapped environments.

The following Tableau Server features will be unavailable or will have reduced functionality in an air-gapped environment:

- **Maps** – Tableau Server uses externally hosted map data by default. Beginning with version 2020.4.0, you can configure Tableau Server to use offline maps. With earlier versions of Tableau, maps are unavailable in an air-gapped environment unless you also install a map server in your air-gapped environment. For more details, see [Displaying Maps in an Air-Gapped Environment](#).
- **Licensing** – Tableau Server needs to connect to the internet in order to activate product keys. However, you can [manually activate](#) the product keys.
- **External data** – Any data located outside your air-gapped environment is unavailable.

## Prerequisites

In order to install Tableau Server in an air-gapped environment, you'll need the following:

- A trusted computer with limited access to the internet that you can use to download the installation packages and resources required by Tableau Server. A trusted computer has been scanned and cleared of any viruses and malware.
- Trusted removable media that you can use to transfer the downloaded software to your air-gapped environment. Trusted removable media is removable media that is new and previously unused and comes from a reputable or known source. Trusted removable media has been scanned to verify that it does not contain any viruses or malware.
- Air-gapped environment with computers and storage that meet the [requirements](#) for installing Tableau Server.

## Installing Tableau Server on an Air-Gapped Computer Running Windows

The easiest way to install Tableau Server on a computer in an air-gapped environment is to do so before the computer is placed into the air-gapped environment. If that is not possible you'll need to download the required packages to a trusted computer outside the air gap and transfer them to the air-gapped computer:

1. On a trusted computer outside the air gap with internet access, download the Tableau Server installation package.
2. Transfer the package to your removable media.
3. On your air-gapped computer, insert the removable media containing the Tableau Server installation package, and then [run the installer](#).

**Note:** Server ATR is the default activation method for Tableau Server 2021.4 and later. As of Tableau Server 2023.1 and later, you can use Server ATR to install into an air-gapped environment.

4. After installation is complete, you can activate the Tableau Server product keys. For more information, see [Activating Tableau Server in an Air-Gapped Environment](#).

## Activating Tableau Server in an Air-Gapped Environment

Because an air-gapped computer is not connected to the internet, you'll need to perform the Tableau Server activation process manually.

### Offline activation overview

Offline activation of Tableau Server involves the following steps:

1. Generate an offline activation request file.
2. Copy the offline activation request file to a computer with internet access.
3. Upload the offline activation request file to the [Tableau activation website](#).
4. Download the resulting offline activation response file from the website. You'll use this file to activate Tableau Server

### Offline activation file name changes

Beginning in Tableau Server version 2023.1, the Tableau licensing system supports two underlying licensing technologies. From an administrative perspective, the only configuration difference between the two systems is the file types that are generated and consumed for offline activation. The licensing technology is determined during the initial installation of Tableau Server and cannot be changed after installation.

We refer to the legacy (and still supported) version of licensing technology as FlexNet. The latest version of the technology is referred to as Server ATR. For more information, see [Activate Tableau Server Using the Authorisation-To-Run \(ATR\) Service](#). The following table describes the file naming nomenclature for each technology. The table also includes the generic reference.

Generic file name	Server ATR file names	FlexNet file names
Off-lineActivationRequest	Off-lineActivationRequestFile_YYYYMMdd.hhmmss.json	Tableau-OfflineActivationRequest.tlq
Off-lineActivationResponse	Off-lineActivationLicensingAtrs.zip	activation.tlf

**Note:** Since this documentation supports multiple versions of Tableau Server, we will use the generic file name references (OfflineActivationRequest and Off-lineActivationResponse) for the rest of this topic. You can identify the licensing technology your Tableau Server installation uses according to the file type generated in the steps that follow.

## Step 1. Log in to Tableau Services Manager

- To log in to Tableau Services Manager (TSM), run the following command:

```
tsm login -u <username>
```

### What if I can't log in?

Verify that the account you are using is a member of the Local Administrators group on the Windows computer where you are installing Tableau Server.

## Step 2. Determine your Tableau Server licensing type

How you activate Tableau Server will be different depending on which licensing type you are running. Run the following command to determine the licensing type your Tableau Server deployment is configured with:

```
tsm configuration get -k serverauthorizationtorun.enabled
```

If this command returns `true`, then your deployment is configured with Server ATR licensing type.

If this command returns `false`, then your deployment is configured with legacy licensing type.

Go to the step 3 that matches your licensing type.

### Step 3 (Server ATR licensing type) Generate and copy json content to Activation page.

Follow these steps if your Tableau Server deployment is configured with Server ATR licensing type. If your server is configured with the legacy licensing type, skip to the following section.

1. On your Tableau Server in the air-gapped environment, use TSM to obtain the offline activation file. At a command prompt:

```
tsm licenses get-offline-activation-file -k <product-key> -o  
<target-directory>
```

The `<target-directory>` must exist. You can obtain your product key in the [Tableau Customer Portal](#).

2. Copy the JSON file contents.
3. From the internet connected computer, navigate to the [Tableau Offline Activation](#) website, select **Option B - Manually Enter Information from Activation File**, copy the JSON contents into the requested fields and then click **Submit**.
4. The website should say `The activation was successful. Please click here to download your activation file.`

Download the `OfflineActivationResponse` file from Tableau, and proceed to step 4.

### Step 3 (Legacy licensing type) Transcribe data from your air-gapped system into an activation request template.

Follow these steps if your Tableau Server deployment is configured with the legacy licensing type. If your server is configured with the Server ATR licensing type, run the above procedure.

1. On your Tableau Server in the air-gapped environment, use TSM to obtain the offline activation file. At a command prompt:

```
tsm licenses get-offline-activation-file -k <product-key> -o
<target-directory>
```

The `<target-directory>` must exist. You can obtain your product key in the [Tableau Customer Portal](#).

2. If you can copy the offline request file (OfflineActivationRequest) from the target directory to a computer that has Internet access, skip to step 5.

Otherwise, if you cannot copy the file to another computer due to security reasons, continue with step 3.

3. Download and open the `server_windows.tlq` file in an XML text editor such as Notepad++ on a trusted computer that has Internet access.

You'll need to write down the values listed in step 4 from the air-gapped computer in order to copy them to the offline template (`server_windows.tlq`).

4. Update the following XML elements in the appropriate `server_windows.tlq` file with the values for the same elements listed below from the air-gapped computer.

All the Machine / Hash values in the `.tlq` files are Hex values. The only valid characters are 0 - 9 and A - F. Use all caps for any letters.

Do not add any additional spaces or carriage controls and only modify the "X" characters found in the template. The format of the file must not change.



## Tableau Server on Windows Help

Line 2 - <EntitlementId>

Line 5 - <ClientVersion>

Line 5 - <RevisionType> (This value is present in the server\_windows.tlq file.)

Line 5 - <MachineIdentifier> (This value is present in the server\_windows.tlq file.)

Line 11 - <Value> (If the value is not present, remove the "X" place holder, leaving <Value></Value>.)

Line 12 - <Value> (If the value is not present, remove the "X" place holder, leaving <Value></Value>.)

Line 14 - <SequenceNumber>

Line 60 - <Hash>

5. Upload the offline request file (OfflineActivationRequest) to the [Tableau Offline Activation](#) website.
6. The website should say The activation was successful. Please click here to download your activation file.

Download the OfflineActivationResponse file from Tableau.

## Step 4. Initialise or activate your licence

1. Move the OfflineActivationResponse file to your air-gapped computer using trusted removable media.
2. Run the following command:

```
tsm licenses activate -f <path-and-activation-file>
```

You should see the message "Activation successful.", which indicates that Tableau Server is activated.

## Displaying Maps in an Air-Gapped Environment

In an air-gapped environment, maps in Tableau Server will be unavailable by default due to the lack of internet access. Instead, you can configure Tableau to use local maps in an air-gapped environment using the steps below.

### Configuring Tableau Server to use offline maps:

1. Open a command prompt as administrator.
2. Configure Tableau to use locally available offline maps:

```
tsm configuration set -k vizqlserver.force_maps_to_offline -v true  
  
tsm pending-changes apply
```

## Clone Tableau Server

Beginning with version 2022.3 of Tableau Server, a new tsm command enables you to create a copy of the configuration and topology of a Tableau Server deployment and use that to create an exact replica of the original deployment. The command `tsm settings clone` creates a set of files (the "clone payload"), which includes settings, secrets, configuration and topology, including ports being used and information about external services.

### Security considerations

The `tsm settings clone` command generates a set of files (the "clone payload") that contain all the secrets generated by Tableau Server, as well as those provided by the server administrator during configuration, including a keystore containing keypairs and certificates. It is extremely important for security that you keep the clone payload and the output location secure. To facilitate this:

- If the output directory does not exist, tsm will create it with access restricted to the user running the `tsm settings clone` command.
- If the output directory exists when you run the command, tsm will confirm that it is owned by the user running the command and that permissions are limited to only that user. If the directory does not have the expected permissions, a message displays:

```
The output directory '<path/to/directory>' exists, but must be
restricted to owner only.
```

## Limitations of the clone payload

- The version of Tableau Server being cloned must match the version being created. You cannot install a newer version of Server using a clone payload from an older version.

## Using the clone command to create a copy of Tableau Server

Creating a cloned copy of Tableau Server is a multi-step process, with the two high-level steps being:

1. Create a clone payload from the Tableau Server installation you want to duplicate.
2. Use the clone payload to install a second deployment of Tableau Server. You are responsible for matching the topology of the two installations, adding additional nodes to match the original deployment.

## Creating the clone payload

To generate a set of files (clone payload) that contain the configuration and topology settings for Tableau Server, use the `tsm settings clone` command. The command takes a single argument, the output directory where the set of files should be saved:

```
tsm settings clone --output-directory <output_directory>
```

Once the clone payload is created, you can use this when installing a new instance of Tableau Server with the identical configuration and topology of the source installation.

## Using the clone payload to create a copy of Tableau Server

When installing Tableau Server on Windows, server administrator should take the following steps:

1. Set the `CLONE_ARTIFACT_DIR` environment variable to point to the clone payload location.
2. Run the Tableau Server Setup program as Administrator.

Do not initialise Tableau Server if your topology includes additional nodes. You need to add those nodes before completing the process of initialising Tableau Server.

3. Optional: Add worker nodes

After TSM is initialised (but before initialising Tableau Server), the administrator should add additional nodes if original topology had more than 1 node.

This should be done following the standard process for adding new nodes, i.e. generating a bootstrap file and running `initialize-tsm` script on worker nodes providing the bootstrap file.

For details, see [Install and Configure Additional Nodes](#).

4. Initialise Tableau Server using TSM web interface or command line interface:

```
tsm initialize
```

5. Wait for Tableau Server to initialise on all nodes.

## Post Installation Tasks

After you install Tableau Server, you can perform other configuration tasks, such as reviewing the security hardening checklist, configuring server event notifications, configuring the data cache for views and configuring server crash reporting.

## Security Hardening Checklist

The following list provides recommendations for improving the security ('hardening') of your Tableau Server installation.

Looking for Tableau Server on Linux? See [Security Hardening Checklist](#)

### Installing security updates

Security updates are included in the latest versions and maintenance releases (MR) of Tableau Server. You cannot install security updates as patches. Rather, you must upgrade to a current version or MR to update Tableau Server with the latest security fixes.

Always reference the most current version of this topic after upgrading. The current version includes `/current/` in the topic URL.

For example, the US version URL is: [https://help.tableau.com/current/server/en-gb/security\\_harden.htm](https://help.tableau.com/current/server/en-gb/security_harden.htm).

#### 1. Update to the current version

We recommend that you always run the latest version of Tableau Server. Additionally, Tableau periodically publishes maintenance releases of Tableau Server that include fixes for known security vulnerabilities. (Information regarding known security vulnerabilities can be found on the Tableau [Security Bulletins](#) page and the [Salesforce Security Advisories](#) page.) We recommend that you review maintenance release notifications to determine whether you should install them.

To get the latest version or maintenance release of Tableau Server, visit the [Customer Portal](#) page.

## 2. Configure SSL/TLS with a valid, trusted certificate

Secure Sockets Layer (SSL/TLS) is essential for helping to protect the security of communications with Tableau Server. Configure Tableau Server with a valid, trusted certificate (not a self-signed certificate) so that Tableau Desktop, mobile devices and web clients can connect to the server over a secured connection. For more information, see [SSL](#).

## 3. Disable older versions of TLS

Tableau Server uses TLS to authenticate and encrypt many connections between components and with external clients. External clients, such as browsers, Tableau Desktop and Tableau Mobile connect to Tableau using TLS over HTTPS. Transport layer security (TLS) is an improved version of SSL. In fact, older versions of SSL (SSL v2 and SSL v3) are no longer considered to be adequately secure communication standards. As a result, Tableau Server does not allow external clients to use SSL v2 or SSL v3 protocols to connect.

We recommend that you allow external clients to connect to Tableau Server with TLS v1.3 and TLS v1.2.

TLS v1.2 is still regarded as a secure protocol and many clients (including Tableau Desktop) do not yet support TLS v1.3.

TLS v1.3 capable clients will negotiate TLS v1.3 even if TLS v1.2 is supported by the server.

The following `tsm` command enables TLS v1.2 and v1.3 (using the "all" parameter) and disables SSL v2, SSL v3, TLS v1 and TLS v1.1 (by prepending the minus [-] character to a given protocol). TLS v1.3 is not yet supported by all components of Tableau Server.

```
tsm configuration set -k ssl.protocols -v "all -SSLv2 -SSLv3 -TLSv1
-TLSv1.1"
```

```
tsm pending-changes apply
```

To modify the protocols that govern SSL for the Tableau Server PostgreSQL repository, see [pgsql.ssl.ciphersuite](#).

You can also modify the default list of cipher suites that Tableau Server uses for SSL/TLS sessions. For more information see the *ssl.ciphersuite* section at tsm configuration set Options.

## 4. Configure SSL encryption for internal traffic

Configure Tableau Server to use SSL to encrypt all traffic between the Postgres repository and other server components. By default, SSL is disabled for communications between server components and the repository. We recommend enabling internal SSL for all instances of Tableau Server, even single-server installations. Enabling internal SSL is especially important for multi-node deployments. See [Configure SSL for Internal Postgres Communication](#).

## 5. Enable firewall protection

Tableau Server was designed to operate inside a protected internal network.

**Important:** Do not run Tableau Server, or any components of Tableau Server on the internet or in a DMZ. Tableau Server must be run within the corporate network protected by an internet firewall. We recommend configuring a reverse proxy solution for internet clients that need to connect to Tableau Server. See [Configuring Proxies and Load Balancers for Tableau Server](#).

A local firewall should be enabled on the operating system to protect Tableau Server in single and multi-node deployments. In a distributed (multi-node) installation of Tableau Server, communication between nodes does not use secure communication. Therefore, you should enable firewalls on the computers that host Tableau Server.

To prevent a passive attacker from observing communications between nodes, configure a segregated virtual LAN or other network layer security solution.

See [Tableau Services Manager Ports](#) to understand which ports and services Tableau Server requires.

## 6. Restrict access to the server computer and to important directories

Tableau Server configuration files and log files can contain information that is valuable to an attacker. Therefore, restrict physical access to the machine that is running Tableau Server. In addition, make sure that only authorised and trusted users have access to the Tableau Server files in the `C:\ProgramData\Tableau\directory`.

## 7. Update the Tableau Server Run As User account

By default, Tableau Server runs under the predefined Network Services (NT Authority\Network Service) Windows account. Using the default account is acceptable in scenarios where Tableau Server does not need to connect to external data sources that require Windows authentication. However, if your users require access to data sources that are authenticated by Active Directory, update the Run As User to a domain account. It's important to minimise the rights of the account that you use for the Run As User. For more information, see [Run As Service Account](#).

## 8. Generate fresh secrets and tokens

Any Tableau Server service that communicates with repository or the cache server must first authenticate with a secret token. The secret token is generated during Tableau Server setup. The encryption key that internal SSL uses to encrypt traffic to Postgres repository is also generated at during setup.

We recommend that after you install Tableau Server, you generate new encryption keys for your deployment.

These security assets can be regenerated with the `tsm security regenerate-internal-tokens` command.

Run the following commands:

```
tsm security regenerate-internal-tokens
```

```
tsm pending-changes apply
```



## 9. Disable services that you're not using

To minimise the attack surface of the Tableau Server, disable any connection points that are not needed.

### JMX Service

JMX is disabled by default. If it's enabled but you're not using it, you should disable it by using the following:

```
tsm configuration set -k service.jmx_enabled -v false  
  
tsm pending-changes apply
```

## 10. Verify session lifetime configuration

By default, Tableau Server does not have an absolute session timeout. This means that browser-based client (Web authoring) sessions can remain open indefinitely if the Tableau Server inactivity timeout is not exceeded. The default inactivity timeout is 240 minutes.

If your security policy requires it, you can set an absolute session timeout. Be sure to set your absolute session timeout in a range that allows the longest-running extract uploads or work-book publishing operations in your organisation. Setting the session timeout too low may result in extract and publishing failures for long-running operations.

To set the session timeout run the following commands:

```
tsm configuration set -k wgserver.session.apply_lifetime_limit -v  
true  
  
tsm configuration set -k wgserver.session.lifetime_limit -v value,  
where value is the number of minutes. The default is 1440, which is 24 hours.  
  
tsm configuration set -k wgserver.session.idle_limit -v value, where  
value is the number of minutes. The default is 240.  
  
tsm pending-changes apply
```

Sessions for connected clients (Tableau Desktop, Tableau Mobile, Tableau Prep Builder, Bridge and personal access tokens) use OAuth tokens to keep users logged in by re-establishing a session. You can disable this behaviour if you want all Tableau client sessions to be solely governed by the browser-based session limits controlled by the commands above. See [Disable Automatic Client Authentication](#).

## 11. Configure a server allowlist for file-based data sources

As of October 2023 Tableau Server releases, default file-based access behaviour has changed. Previously, Tableau Server allowed authorised Tableau Server users to build workbooks that use files on the server as file-based data sources (such as spreadsheets). With the October 2023 releases, access to files stored on Tableau or on remote shares must be specifically configured on Tableau Server using the setting described here.

This setting allows you to limit access by the Run As Service Account only to those directories that you specify.

To configure access to shared files, you must configure allowlist functionality. This lets you limit the Run As service account to just the local directory paths, or shared directories where you host data files.

1. On the computer running Tableau Server, identify the directories where you will host data source files.

**Important** Make sure the file paths you specify in this setting exist and are accessible by the service account.

2. Run the following commands:

```
tsm configuration set -k native_api.allowed_paths -v "path",
```

where *path* is the directory to add to the allowlist. All subdirectories of the specified path will be added to the allowlist. You must add a trailing backslash to the specified

path. If you want to specify multiple paths, separate them with a semicolon, as in this example:

```
tsm configuration set -k native_api.allowed_paths -v "c:\data-sources;\\HR\data\"
```

```
tsm pending-changes apply
```

## 12. Enable HTTP Strict Transport Security for web browser clients

HTTP Strict Transport Security (HSTS) is a policy configured on web application services, such as Tableau Server. When a conforming browser encounters a web application running HSTS, then all communications with the service must be over a secured (HTTPS) connection. HSTS is supported by major browsers.

For more information about how HSTS works and the browsers that support it, see The Open Web Application Security Project web page, [HTTP Strict Transport Security Cheat Sheet](#).

To enable HSTS, run the following commands on Tableau Server:

```
tsm configuration set -k gateway.http.hsts -v true
```

By default, HSTS policy is set for one year (31536000 seconds). This time period specifies the amount of time in which the browser will access the server over HTTPS. You should consider setting a short max-age during initial roll-out of HSTS. To change this time period, run `tsm configuration set -k gateway.http.hsts_options -v max-age=<seconds>`. For example, to set HSTS policy time period to 30 days, enter `tsm configuration set -k gateway.http.hsts_options -v max-age=2592000`.

```
tsm pending-changes apply
```

## 13. Disable Guest access

Core-based licences of Tableau Server include a Guest user option, which allows any user in your organisation to see and interact with Tableau views embedded in web pages.

Guest user access is enabled by default on Tableau Servers deployed with core-based licensing.

Guest access allows users to see embedded views. The Guest user cannot browse the Tableau Server interface or see server interface elements in the view, such as user name, account settings, comments and so on.

If your organisation has deployed Tableau Server with core licensing and Guest access is not required, then disable Guest access.

You can disable Guest access at the server or site level.

You must be a server administrator to disable the Guest account at either the server or the site level.

#### To disable Guest access at the server level:

1. In the site menu, click **Manage All Sites** and then click **Settings > General**.
2. For **Guest Access**, clear the **Enable Guest account** check box.
3. Click **Save**.

#### To disable Guest access for a site:

1. In the site menu, select a site.
2. Click **Settings**, and on the Settings page, untick the **Enable Guest account** box.

For more information, see Guest User.

## 14. Set referrer-policy HTTP header to 'same-origin'

Beginning in 2019.2, Tableau Server includes the ability to configure Referrer-Policy HTTP header behaviour. This policy is enabled with a default behaviour that will include the origin URL for all "secure as" connections (`no-referrer-when-downgrade`), which sends origin

referrer information only to like connections (HTTP to HTTP) or those that are more secure (HTTP to HTTPS).

However, we recommend setting this value to `same-origin`, which only sends referrer information to same-site origins. Requests from outside the site will not receive referrer information.

To update the `referrer-policy` to `same-origin`, run the following commands:

```
tsm configuration set -k gateway.http.referrer_policy -v same-origin  
  
tsm pending-changes apply
```

For more information about configuring additional headers to improve security, see [HTTP Response Headers](#).

## 15. Configure TLS for SMTP connection

Beginning in 2019.4, Tableau Server includes the ability to configure TLS for the SMTP connection. Tableau Server only supports STARTTLS (Opportunistic or Explicit TLS).

Tableau Server can be optionally configured to connect to a mail server. After configuring SMTP, Tableau Server can be configured to email server administrators about system failures, and email server users about subscribed views and data-driven alerts.

To configure TLS for SMTP:

1. Upload a compatible certificate to Tableau Server. See `tsm security custom-cert add`.
2. Configure TLS connection using TSM CLI.

Run the following TSM commands to enable and force TLS connections to the SMTP server and to enable certificate verification.

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_  
enabled -v true
```

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_
required -v true
```

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_
check_server_identity -v true
```

By default, Tableau Server will support TLS versions 1, 1.1 and 1.2, but we recommend that you specify the highest TLS version that the SMTP server supports.

Run the following command to set the version. Valid values are `SSLv2Hello`, `SSLv3`, `TLSv1`, `TLSv1.1`, and `TLSv1.2`. The following example sets the TLS version to version 1.2.:

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_ver-
sions -v "TLSv1.2"
```

For more information about other TLS configuration options, see [Configure SMTP Setup](#).

3. Restart Tableau Server to apply changes. Run the following command:

```
tsm pending-changes apply
```

## 16. Configure SSL for LDAP

If your Tableau Server deployment is configured to use a generic LDAP external identity store, we recommend configuring SSL to protect authentication between Tableau Server and your LDAP server. See [Configure Encrypted Channel to LDAP External Identity Store](#).

If your Tableau Server deployment is configured to use Active Directory, we recommend enabling Kerberos to protect authentication traffic. See [Kerberos](#).

## 17. Scope permissions for non-default installation locations

If you install Tableau Server on Windows to a non-default location then we recommend manually scoping the permissions on the custom installation directory to reduce access.

## Tableau Server on Windows Help

By default, Tableau Server will install on the system drive. The drive where Windows is installed is the system drive. In most cases, the system drive is the C:\ drive. In this default case, Tableau Server will install into the following directories:

- C:\Program Files\Tableau\Tableau Server\packages
- C:\ProgramData\Tableau\Tableau Server

However, many customers install onto a non-system drive or into a different directory. If you selected a different installation drive or directory location during Setup, then the data directory for Tableau Server will install into the same path.

To scope permissions on the custom installation directory, only the following accounts should have the corresponding permissions on the installation folder and all subfolders:

Set permissions for this account:	Permissions required
The user account that is used to install and upgrade Tableau Server	Full control
The user account that is used to run TSM commands	Full control
System account	Full control
Run As service account, Network Service and Local Service	Read & execute

A procedure for setting these permissions can be found at [Installing in a non-default location](#).

## Change List

Date	Change
May 2018	Added clarification: Do not disable REST API in organizations that are running Tableau Prep.

May 2019	Added recommendation for referrer-policy HTTP header.
June 2019	Removed recommendation to disable Triple-DES. As of version 2019.3, Triple-DES is no longer a default supported cipher for SSL. See What's Changed - Things to Know Before You Upgrade.
January 2020	Added recommendation to configure TLS for SMTP.
February 2020	Added recommendation to configure SSL for LDAP server.
May 2020	Added TLS v1.3 to the disabled list of TLS ciphers. Added clarification to introduction about topic versioning.
August 2020	Added scoped permissions for non-default installations on Windows
October 2020	Added TLS v1.3 as a default supported cipher.
January 2021	Added clarification: All products enabled by the Data Management license require REST API.
February 2021	Removed recommendation to disable REST API. The API is now used internally by Tableau Server and disabling it may limit functionality.

## Configure SMTP Setup

Tableau Server can email server administrators about system failures, and email server users about subscribed views and data-driven alerts. First, however, you need to configure the SMTP server that Tableau Server uses to send email. After configuring SMTP, complete the steps to configure notifications (Configure Server Event Notification), then when you start or restart the server, it will trigger an email notification, which confirms that you have set up notifications correctly.

Configuring SMTP requires that you restart Tableau Server services.



## Secure SMTP

To enable and configure TLS for SMTP, you must use the TSM CLI as described in this topic. Tableau Server only supports STARTTLS (Opportunistic or Explicit TLS).

If your organisation does not use public certificates for verifying TLS connections, then you can upload a private certificate to Tableau Server to verify trusted connections. For more information, see the `tsm security custom-cert add` command.

You may also configure SMTP TLS for encryption-only by disabling the certificate validation process. For more information, see the section, *Configuration file reference*, in the *Use the TSM CLI* tab below.

## Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see *Sign in to Tableau Services Manager Web UI*.

2. Click **Notifications** on the **Configuration** tab and click **Email Server**.
3. Enter the SMTP configuration information for your organisation:

**Notifications**  
Configure Tableau Server to send email notifications about critical events, processes and server health. Email notifications must be sent through an email (SMTP) server. [Learn more](#)

**Email Server** Events

**Configure email server**  
Tableau Server must connect to an email server using SMTP (Simple Mail Transfer Protocol) to send email notifications. Contact your organization's IT department to determine what SMTP information you need to configure Tableau Server to send email configurations. [Learn more about configuring SMTP for Tableau Server.](#)

SMTP server address:

Username:

Password:

Port Number:

Send all emails from:   
Type an email address that all emails will be sent from (example: no-reply@example.com)

Send server health email to:   
Type email addresses, separated by a comma, that will receive Tableau Server health emails. Tableau Server health emails are typically sent to server administrators or other IT admins.

Tableau Server URL:   
Choose a footer link to embed in all email alerts and subscriptions. This link is typically the sign-in page of Tableau Server.

4. Click **Save Pending Changes** after you've entered your configuration information.
5. Click **Pending Changes** at the top of the page:



6. Click **Apply Changes and Restart**.
7. Run the `tsm email test-smtp-connection` to view and verify the connection configuration. See [tsm email test-smtp-connection](#).

## Use the TSM CLI

For the initial configuration of SMTP, we recommend that you use the configuration file template below to create a json file. You can also set any single configuration key listed below with the syntax described in [tsm configuration set](#).

1. Copy the following json template to a file.

**Important:** The template below includes common options for most deployments. After you copy the template to a text file, you must edit the option values for your SMTP server requirements. You may need to remove or add options. See the reference section that follows for more information about all supported SMTP key options.

```
{
  "configKeys": {
    "svcmonitor.notification.smtp.server": "SMTP server host
name",
    "svcmonitor.notification.smtp.send_account": "SMTP user name",
    "svcmonitor.notification.smtp.port": 443,
    "svcmonitor.notification.smtp.password": "SMTP user account
password",
    "svcmonitor.notification.smtp.ssl_enabled": true,
    "svcmonitor.notification.smtp.from_address": "From email
address",
    "svcmonitor.notification.smtp.target_addresses": "To email
address1,address2",
    "svcmonitor.notification.smtp.canonical_url": "Tableau Server
URL"
  }
}
```

2. Run the `tsm settings import -f file.json` to pass the json file with the appropriate values to Tableau Services Manager to configure Tableau Server for SMTP. Tableau Services Manager will validate the entity values.
3. Run the `tsm pending-changes apply` command to apply the changes. See `tsm pending-changes apply`.

4. Run the `tsm email test-smtp-connection` to view and verify the connection configuration. See `tsm email test-smtp-connection`.

### SMTP CLI configuration reference

This table lists all of the options that can be used to configure SMTP with TSM CLI.

Option	Description
<code>svc-mon-itor.notification.smtp.server</code>	Address of SMTP server.  Example:  "svc-monitor.notification.smtp.server": "mail.example.com"
<code>svc-monitor.notification.smtp.send_account</code>	User name for SMTP account.
<code>svc-monitor.notification.smtp.port</code>	Port number for SMTP server. The default is 25.
<code>svc-monitor.notification.smtp.password</code>	Password for SMTP server account.  Example:  "svc-monitor.notification.smtp.password": "password"
<code>svc-monitor</code>	Specifies whether the connection to the SMTP server is encrypted. The default is false.

Option	Description
<code>itor.notification.smtp.ssl_enabled</code>	
<code>svc-mon-itor.notification.smtp.ssl_required</code>	<p>If enabled, Tableau Server will refuse to connect to SMTP servers without using TLS. The <code>svc-monitor.notification.smtp.ssl_enabled</code> option must also be set to true.</p> <p>The default is false.</p>
<code>svc-mon-itor.notification.smtp.ssl_check_server_identity</code>	<p>If set to true, Tableau Server will check the SMTP server identity as specified by <a href="#">RFC 2595</a>. These additional checks based on the content of the server's certificate are intended to prevent man-in-the-middle attacks.</p> <p>The default is false.</p>
<code>svc-mon-itor.notification.smtp.ssl_trust_all_hosts</code>	<p>When using TLS, trust certificates from all mail servers, ignoring the validity of the certificate's chain of trust. By setting this key to true, TLS will be used only to encrypt the traffic to the SMTP host.</p> <p>The default is false.</p>
<code>svc-mon-itor.notification.smtp.ssl_ciphers</code>	<p>The default and supported sets of cipher suites are defined by the version of JDK that is installed with Tableau Server. See the section below, <a href="#">TLS ciphers</a>, for a list of supported and default ciphers.</p> <p>To update the cipher suites used by Tableau</p>

Option	Description
	<p>Server for SMTP TLS connections, enter a white space-separated list of cipher suites for this value. For example, "TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256 TLS_DHE_DSS_WITH_AES_128_GCM_SHA256 TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384".</p>
<pre>svc- mon- itor.notification.smtp.ssl_ versions</pre>	<p>The default TLS versions enabled on this version of Tableau Server are TLSv1, TLSv1.1, TLSv1.2 and TLSv1.3.</p> <p>TLS version support is defined by the version of JDK that is installed with Tableau Server.</p> <p>Supported versions of TLS are SSLv2Hello, SSLv3, TLSv1, TLSv1.1, TLSv1.2, TLSv1.3.</p> <p>To update the versions used by Tableau Server for SMTP TLS connections, enter a white space-separated list of versions for this value. For example, "TLSv1.2 TLSv1.3".</p>
<pre>svc- mon- itor.notification.smtp.from_ address</pre>	<p>Email address that will send an notification if there's a system failure. The email address must have valid syntax (for example, ITalerts@bigco.-com or noreply@mycompany), but it does not have to be an actual email account on Tableau Server. (Some SMTP servers may require an actual email account, however.)</p>

Option	Description
	<p><b>Note:</b> You can override the system-wide email address on a per-site basis. For more information, see <a href="#">What is a site</a>.</p> <p>Example:</p> <pre>"svcmonitor.notification.smtp.from_address": "donot-reply@example.com"</pre>
<pre>svc- mon- itor.no- tification.smtp.target_ addresses</pre>	<p>Email address to receive notifications. If email notifications are enabled, you need to include at least one address. Separate multiple addresses with commas.</p> <p>Example:</p> <pre>"svc- monitor.notification.smtp.target_ addresses": "iluvdata@example.com"</pre>
<pre>svc- mon- itor.no- tification.smtp.canonical_ url</pre>	<p>URL of the Tableau Server. Enter <code>http://</code> or <code>https://</code>, followed by the name or IP address of the Tableau server. Used in the footer of subscription email.</p> <p>Example:</p> <pre>"svc- mon- itor.notification.smtp.canonical_ url": "http://myserver.example.com"</pre>

## TLS ciphers

The following is a list of TLS ciphers that are supported by the JDK that is included with Tableau Server. In this version of Tableau Server, all of these ciphers are enabled by default. You can specify a custom list of ciphers for your SMTP configuration by entering a white-space separated list with the option, `svcmonitor.notification.smtp.ssl_ciphers`, as described in the table above.

TLS_RSA_WITH_AES_128_CBC_SHA256	TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384
TLS_DHE_DSS_WITH_AES_256_GCM_SHA384	TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256
TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA
TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA	TLS_RSA_WITH_AES_256_CBC_SHA256
TLS_RSA_WITH_AES_128_GCM_SHA256	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384
TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
TLS_DHE_DSS_WITH_AES_128_CBC_SHA256	TLS_DHE_DSS_WITH_AES_256_CBC_SHA
TLS_DHE_RSA_WITH_AES_128_CBC_SHA256	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
TLS_RSA_WITH_AES_256_GCM_SHA384	TLS_EMPTY_RENEGOTIATION_INFO_SCSV
TLS_ECDH_ECDSA_WITH_AES_256_	TLS_ECDHE_ECDSA_WITH_AES_256_



CBC_SHA384	CBC_SHA
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA	TLS_DHE_DSS_WITH_AES_256_CBC_SHA256
TLS_RSA_WITH_AES_256_CBC_SHA	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256
TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
TLS_DHE_DSS_WITH_AES_128_GCM_SHA256	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA
TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256
TLS_ECDH_RSA_WITH_AES_256_CBC_SHA	TLS_DHE_DSS_WITH_AES_128_CBC_SHA
TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
TLS_RSA_WITH_AES_128_CBC_SHA	TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	TLS_AES_256_GCM_SHA384

TLS_AES_128_GCM_SHA256	
------------------------	--

## Configure Server Event Notification

A Tableau Services Manager (TSM) administrator can configure Tableau Server to allow notifications for the following events:

- Content updates
  - Extract failures (enabled by default)
  - Subscription views for users (disabled by default)
- Server health monitoring
  - Server status changes (disabled by default)
  - Desktop Licence reporting (disabled by default)
- Drive space
  - Email alerts when disk space crosses or remains below pre-configured thresholds (disabled by default)
  - Recording usage history (enabled by default)

**Note:** You need to configure SMTP before you can configure subscriptions or notifications. For more information, see [Configure SMTP Setup](#).

## Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850.`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click **Notifications** on the **Configuration** tab and click **Events**.
3. Configure notification settings for your organisation:

- Content updates

- **Send emails for extract refresh failures**

When this option is enabled (the default), a server administrator can configure email notifications to be sent when extract refreshes fail. These messages are configured at the site level, so even if this option is enabled, messages are not sent unless the **Send email to data source and workbook owners when scheduled refreshes fail** option is enabled for a site (this is enabled by default). For details, see [Enable Extract Refresh Scheduling and Failure Notification](#).

- **Allow users to receive email for views that they have subscribed to**

When this option is enabled (by default is it disabled), a server administrator can configure a site to send subscription email. These email messages are configured at the site level and can only be configured when this option is enabled. For details, see [Set Up a Site for Subscriptions](#).

When users subscribe to a workbook or view, a snapshot of the view is emailed to them on a scheduled basis, so they can see the latest updates without having to sign into Tableau Server.

To allow users to attach PDF renderings on subscription emails, select **Let users add attachments to subscribed views**.

- Server health monitoring

- **Send emails for Tableau Server process events (up, down and fail-over)**

Tableau Server sends an email message when the data engine, file store, gateway or repository server processes stop or restart, or when the initial Tableau Server node stops or restarts.

If you are running a single-server installation (all processes on the same computer), health alerts are only sent when Tableau Server is up. No "down" alerts are sent. If you are running a distributed installation that's configured for failover, a DOWN alert means that the active repository or a data engine instance has failed and the subsequent UP alert means that the passive instance (repository) or second instance (data engine) of that process has taken over.

**Note:** Tableau Server is designed to be self-correcting. If a service or process stops responding or goes down, Tableau Server attempts to restart it. This can take 15 to 30 minutes to complete. Because of this, reacting immediately to service or process alerts can be counter-productive, especially in an installation with redundant services that can handle requests while one restarts.

- **Enable Tableau Desktop Licence reporting**

Licence reporting data originates in Tableau Desktop and is sent to Tableau Server. When this option is enabled, Tableau Server will generate and display the administrative report for Desktop Licence reporting. For information on the report, see Desktop Licence Usage.

- **Drive space**

Enable notifications (alerts) for remaining disk space on your Tableau Server.

- **Send emails when unused drive space drops below thresholds**

You can configure Tableau Server to send email notifications when disk space usage on any node crosses a threshold, or remains

below the threshold. And you can configure how often threshold notifications are sent.

There are two thresholds you must set, **Warning threshold** and **Critical threshold**. Thresholds are expressed in percentage of disk space remaining. The critical threshold must be less than the warning threshold.

You also specify the **Send threshold alert every** option. This determines how often, in minutes, warning and critical notifications should be sent. The default value is 60 minutes.

- **Record disk space usage information and threshold violations for use in custom administrative views**

When you configure Tableau Server to record disk space usage, information about free disk space is saved in the repository and you can view the usage history using the Administrative Views.

4. Click **Save Pending Changes** after you've entered your configuration information.
5. Click **Pending Changes** at the top of the page:



6. Click **Apply Changes and Restart**.

## Use the TSM CLI

The various notification values described above can be set individually with the tsm configuration set command. Alternatively, you can construct a json file and pass all configuration values in one operation. Both methods are described in this section.

## Set notification values individually

The following table shows the key/value pairs that map to the notification events described earlier in this topic. Use the `tsm configuration set` command with the following syntax to set a single key/value pair:

```
tsm configuration set -k <config.key> -v <config_value>
```

For example, to enable job failure notifications, run the following command:

```
tsm configuration set -k backgrounder.notifications_enabled -v true
```

Notification option	Key	Value
Extract failures or Flow run failures	<code>backgrounder.notifications_enabled</code>	<code>true   false</code>
Enable subscription views for user	<code>subscriptions.enabled</code>	<code>true   false</code>
Enable PDF attachments for subscriptions	<code>subscriptions.attachments_enabled</code>	<code>true   false</code>
Maximum attachment size (MB) for subscription notifications	<code>subscriptions.max_attachment_size_megabytes</code>	integer value, default is 150
Server status changes	<code>svcmonitor.notification.smtp.enabled</code>	<code>true   false</code>
Licence reporting	<code>features.DesktopReporting</code>	<code>true   false</code>

Remaining space thresholds: enable email notifications	<code>storage.monitoring.email_enabled</code>	<code>true   false</code>
Remaining space thresholds: warning percentage	<code>storage.monitoring.warning_percent</code>	integer value, for example, 20
Remaining space thresholds: critical percentage	<code>storage.monitoring.critical_percent</code>	integer value, for example, 15
Set email interval	<code>storage.monitoring.email_interval_min</code>	integer value, in minutes, for example, 25
Record usage history	<code>storage.monitoring.record_history_enabled</code>	<code>true   false</code>

After you are done setting values, you must run the following command:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Set all notification values with a single json file

To make all notifications settings with a single configuration, you can pass a json file.

Copy and edit the following template to create a file for your configuration.

```
{
  "configKeys": {
    "backgrounder.notifications_enabled": true,
    "subscriptions.enabled": true,
    "subscriptions.attachments_enabled": true,
    "subscriptions.max_attachment_size_megabytes": 150,
    "svcmonitor.notification.smtp.enabled": true,
    "features.DesktopReporting": true,
    "storage.monitoring.email_enabled": true,
    "storage.monitoring.warning_percent": 20,
    "storage.monitoring.critical_percent": 15,
    "storage.monitoring.email_interval_min": 25,
    "storage.monitoring.record_history_enabled": true
  }
}
```

After you have saved the file, pass it with the following command:

```
tsm settings import -f <path-to-file.json>
```

To apply changes, run the following command:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.



## Configure Data Cache

Views published to Tableau Server are interactive and sometimes have a live connection to a database. As users interact with the views in a web browser, the data that is queried gets stored in a cache. Subsequent visits will pull the data from this cache if it is available. By default, Tableau Server will cache and reuse data for as long as possible. You can change this behaviour by configuring the caching option using the `tsm data-access caching set` command.

1. Run this command:

```
tsm data-access caching set -r <value>
```

Where <value> is one of these options:

- **low or empty string ("").** This is the default value and indicates that Tableau Server should configure cache and always use cached data when available.
- **<value>.** "<value>" specifies the maximum number of minutes data should be cached.
- **always or 0 (zero).** These values indicates that Tableau Server should always get the latest data and that the cache should be refreshed each time a page is reloaded.

2. Apply changes with the `tsm pending-changes apply` command. This will restart Tableau Server.

## Database Drivers

Tableau connectors require a driver to talk to the database. Before you can connect to data sources from Tableau Server, you must install drivers for the data sources you want to connect to. You can find driver links and installation instructions for all the supported connectors on the [Driver Download page](#).

**Important:** Beginning with version 2023.1.0 you must install the PostgreSQL driver if you want to use the built-in administrative views. You can find this on the [Driver Download page](#).

## Install drivers in a cluster

You need to install the drivers for your data sources on the initial node in a Tableau Server cluster. If you install Tableau Server on multiple nodes, you must also install drivers on any node that runs any of the following processes:

- Application Server (Vizportal)
- Backgrounder
- Data Server
- VizQL Server

## Tableau Server Pre-Flight Check

Introduced in version 2020.3.0 of Tableau Server on Windows, the pre-flight check (PFC) does basic checks of key system configurations to help avoid common installation and upgrade problems.

- **Install** – During installation of Tableau Server on Windows, a check of permissions on the installation directory and the data directory are done. If this check determines that permissions aren't adequate for Tableau Server to run successfully, the installation will not fail, but any errors are logged to the Administration Controller log.
- **Upgrade** – During upgrade of Tableau Server on Windows, when you run the `upgrade-tsm.cmd` script, checks of permissions on the installation and data directories are done, along with verification that the ports necessary for specific services are available. Any permissions issues are logged to the `app-upgrade.log` but do not block the upgrade. Port conflicts stop the upgrade process before initialisation starts, allowing you to correct the problem. Because this happens *before* initialisation of the new version, you can continue to use your existing version while you investigate the issue, then rerun the `upgrade-tsm` script.

## tsm pre-flight check commands

Two tsm commands gives you the ability to check permissions and ports before running an upgrade, and fix any issues:

```
tsm maintenance preflight-check permissions
```

```
tsm maintenance preflight-check ports
```

## Server Crash Reporter

The Tableau Server administrator can enable an option to allow logs and related files to be sent to Tableau when the server has an issue that results in a crash. These files are used by Tableau to identify and address issues that cause crashes. By default this option is disabled, and it should only be enabled in organisations that are not subject to regulations related to data privacy.

**Important:** Do not enable crash reporting if your data is subject to privacy regulations.

If Tableau Server has a problem that results in a crash, log files and dump files are generated. If the crash data upload feature is enabled, these files are automatically gathered and zipped into an encrypted package that is sent in the background, at the scheduled time. The encrypted package is sent in small pieces to limit impact to network performance. Only one crash report is packaged and uploaded at a time (a new crash report is not packaged until the previous package has been uploaded) and is sent in a "first in, first out" order. You can schedule the sending for a low-use window to further reduce any impact to your users.

The encrypted package is made up crash dump files and logs that include the following:

- Crash/core dump files
- Error log files related to the crash

- Manifest files related to the crash

The files can contain data that includes:

- Machine-specific information (for example: hardware, operating system, domain).
- A snapshot of the contents of memory at the time of the crash, including application activity details like information about data connections, actions taken by the user in Tableau and data being worked on in Tableau.
- Tableau information including customer-identifiable information.

## Configure Server Crash Reporter

Server crash reporting is disabled by default. This topic describes how to enable and configure server crash reporting. Crash reports are encrypted and sent to Tableau. See [Server Crash Reporter](#) for more information.

If your organisation uses a proxy server to connect to the internet then you must configure server crash reporter to use the proxy. Even if you have already configured Tableau Server to use a proxy, you must also configure server crash reporter separately. To configure proxy for server crash reporter you must use TSM CLI procedure as described in this topic.

**Important:** Do not enable crash reporting if your data is subject to privacy regulations.

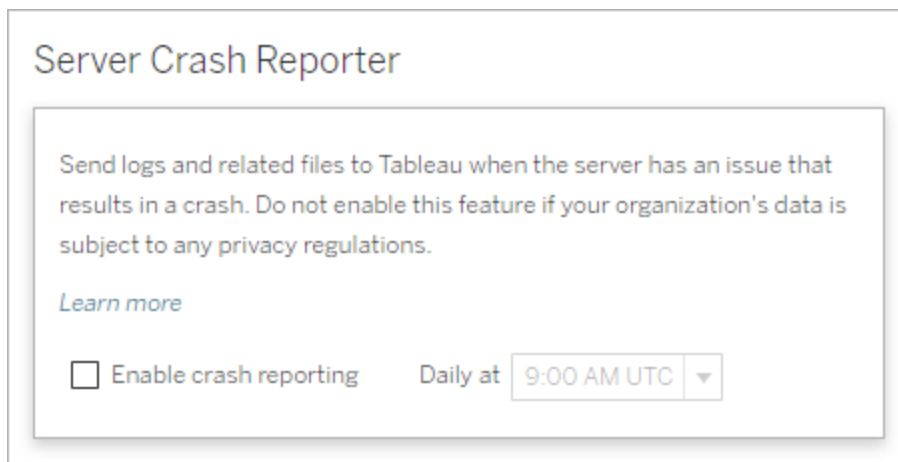
Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Maintenance** tab.

3. Under Other Maintenance Tasks, in Server Crash Reporter, select **Enable crash reporting**:



The screenshot shows a window titled "Server Crash Reporter". Inside, there is a text box with the following text: "Send logs and related files to Tableau when the server has an issue that results in a crash. Do not enable this feature if your organization's data is subject to any privacy regulations." Below this text is a link that says "Learn more". At the bottom of the window, there is a checkbox labeled "Enable crash reporting" which is currently unchecked. To the right of the checkbox, there is a label "Daily at" followed by a time selection dropdown menu showing "9:00 AM UTC" with a downward arrow.

4. Specify the scheduled time of day to upload the crash reports to Tableau.
5. When you are finished, click **Pending Changes**, and then click **Apply Changes and Restart**.

#### Use the TSM CLI

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f path-to-file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Because the configuration file is using `configKey` class, the values that you pass are not validated by TSM as they are when you use `configEntities` class. You can verify and set individual options by using the `tsm` configuration commands.

### Crash reporter settings

The crash reporter settings in the template below specify a range of options for configuring Tableau Server to send crash reports to Tableau.

### Configuration template

Use this template to configure the gateway settings.

For more explanation about configuration files, entities and keys see [Configuration File Example](#).

```
{
  "configKeys": {
    "servercrashupload.enabled": "true",
    "servercrashupload.scheduled_time": "1:00:00 UTC",
    "servercrashupload.proxy_server_host": "",
    "servercrashupload.proxy_server_port": "",
    "servercrashupload.proxy_server_username": "",
    "servercrashupload.proxy_server_password": "",
    "servercrashupload.preserve_upload_packages": "false",
    "servercrashupload.delete_completed_dumps": "false"
  }
}
```

### Configuration file reference

This table includes keys that you can set to configure crash reporting.

`servercrashupload.enabled`

Default: `false`.

Set to `true` to enable crash reporting.

## Tableau Server on Windows Help

`servercrashupload.scheduled_time`

**Default:** 1:00:00 UTC

Specifies the scheduled time that crash uploads will begin. Enter time of day in 24 hour format.

`servercrashupload.proxy_server_host`

If your organisation uses a proxy server to communicate with the internet, specify the host name.

`servercrashupload.proxy_server_port`

If your organisation uses a proxy server to communicate with the internet, specify the port number.

`servercrashupload.proxy_server_username`

If your proxy server requires authentication, specify the user name with this key.

`servercrashupload.proxy_server_password`

If your proxy server requires authentication, specify the password with this key.

`servercrashupload.preserve_upload_packages`

**Default:** false.

To save all packages that are created for a crash reporting, set this key to `true`.

By default, packages are saved to `C:\ProgramData\Tableau\Tableau Server-\data\tabsvc\clustercontroller\tabcrashreporter`.

`servercrashupload.delete_completed_dumps`

**Default:** false.

To delete all dumps after they are sent, set this key to `true`.

## Navigate the Admin Areas of the Tableau Web Environment

As an administrator on Tableau Server or Tableau Cloud, you can access admin settings that aren't available to other users to configure sites, users and projects and to do other content-related tasks.

The settings in this article refer to the Tableau web environment. Tableau Server administrators with appropriate credentials can also change server settings such as processor, caching, authentication, distributed deployment and related configurations using the TSM web environment. For information, see [Sign in to Tableau Services Manager Web UI](#).

### Access based on site role and number of sites

The menus you get when you sign in to Tableau Server or Tableau Cloud depend on the following conditions:

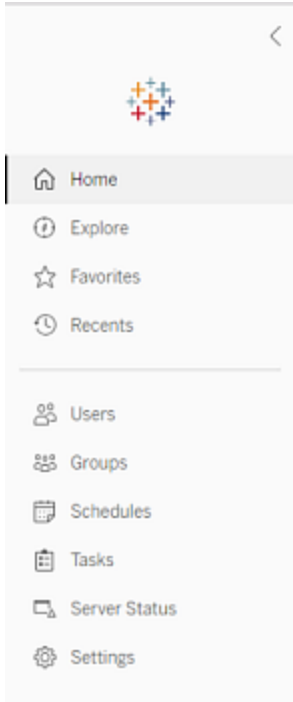
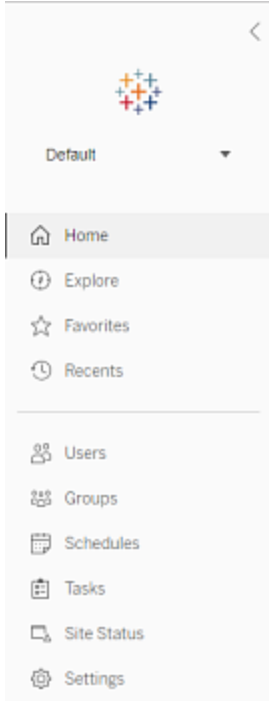
- Whether you're a site or server administrator.

Site administrator access is available on Tableau Cloud and Tableau Server. Server administrator access is only on Tableau Server.

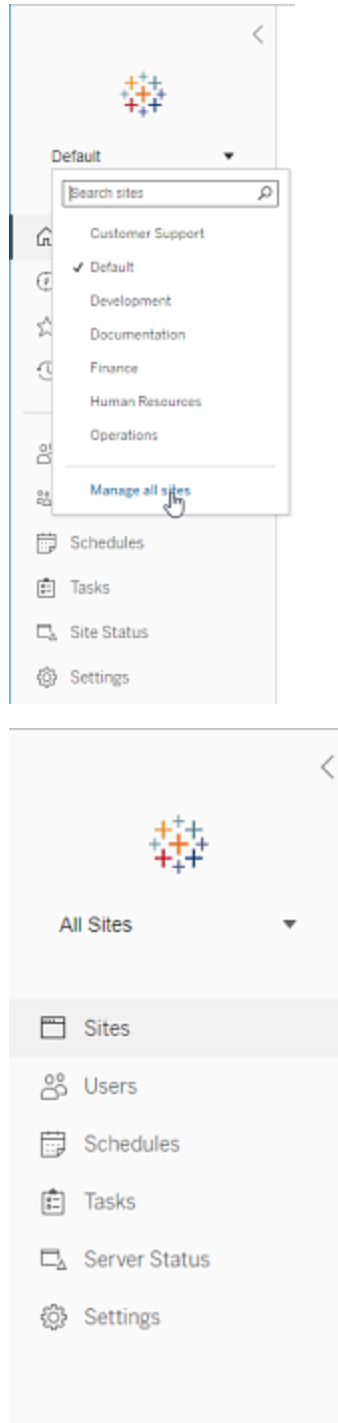
- Whether you have access to only one site or to multiple sites.



Server administrator

<p>On a <b>single-site</b> server, the site selector does not appear, and all other menus are the same.</p>	
<p>In a <b>multi-site</b> environment, menus along the left enable you to modify a specific site or all sites, and to configure users, groups, schedules, tasks and server settings.</p> <p>To access server administrator settings that affect all sites, open the site menu by clicking the arrow next to the current site name, and then select <b>Manage all sites</b>.</p> <p>The <b>Content</b> and <b>Group</b> tabs go away, and the site menu text changes to <b>All Sites</b> to let you know you are managing server-wide settings, and options like <b>Server Status</b> reflect the server-wide view.</p>	

To return to the site administration menus, select **All Sites**, and then select the site you want to manage.

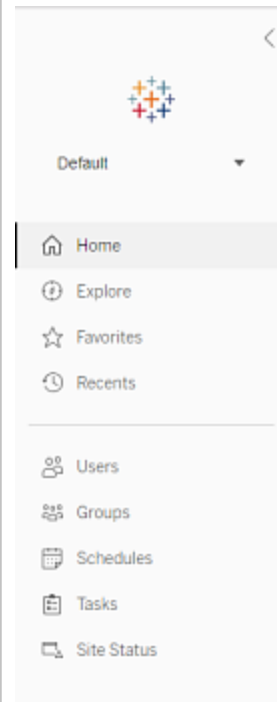


## Site administrator

If you are a site administrator for Tableau Cloud or Tableau Server, and you have access to multiple sites, you'll get menus for selecting which site to manage, for managing that site's content, users, groups, schedules and tasks and for monitoring its status.

The site selector displays the name of the current site. To go to another site, select the site menu, and then select the site name.

If you have access to only one site, the site selector does not appear, but all other menus are the same.



## Server administrator tasks

Server administrators (available with Tableau Server Enterprise only) can do the following:

- Monitor server status and activity.
- Generate log files.
- Add sites and edit site settings. Only server administrators can add sites to the server.
- Add users to the server, and assign users to sites.
- Add and manage site groups.
- Add users to or remove users from **identity pools**.

To manage settings only for a specific site, you must first navigate to the site. Within each site, you can do the following:

- Administer content: Create projects, move content from one project to another, assign permissions, change ownership of a content resource and so on.
- Manage schedules for extract refreshes and subscriptions.
- Monitor site activity and record workbook performance metrics.
- Manage storage space limits for content published by users.
- Allow web authoring.
- Enable revision history.
- Allow site administrators to add and remove users.
- Set the maximum number of licences that site can consume for each licence type (Creator, Explorer, Viewer).
- Allow users to subscribe to workbooks and views, and allow content owners to subscribe others to workbooks and views.
- Enable offline snapshots for favourites (iOS only).

## Site administrator tasks

A site administrator on Tableau Cloud or Tableau Server can do the following tasks:

- Administer content: Create projects, move content from one project to another, assign permissions, change ownership of a content resource and so on.
- View, manage, and manually run schedules for extract refreshes and subscriptions.
- Add and manage site users (if allowed by the server administrator; see Site Settings Reference).
- Add and manage site groups.
- Monitor site activity.

## Move Tableau Server to Another Drive

By default Tableau Server on Windows is installed to the system drive (usually C:\). This means that all program and data files are installed to that drive. If you need to move Tableau Server to a different drive (if a new policy requires you to not have application data on your system drive, for example, or you are running out of space on the original drive), you can do this by following the procedure below. The steps are intended as an example for moving Tableau Server from one drive to another drive on the same computer, and may not exactly reflect your installation and configuration. For instructions on moving Tableau Server to a new computer, see [Migrate to New Hardware](#).

### Before you start

Before starting, make sure you:

- Have a current backup of your data and assets from your existing installation as well as a settings export. You'll need these to restore your installation of Tableau Server on the new drive. For details on creating a backup, see [Perform a Full Backup and Restore of Tableau Server](#).

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

- Have administrative credentials to the Tableau Server computer. This is where you will be working and you need to be logged on to the computer as an administrator.
- Have a copy of the installation program for the version of Tableau Server you are moving. You need this to install Tableau Server to the new drive.
- Know what authentication methods your current installation is using. For example, if Tableau Server is configured for SSL, SAML or Kerberos, you will need to back up the

related certificate or keytab files separately, and then copy them to the new drive after you reinstall Tableau Server.

- Know and understand any initial node settings and configuration in your current installation.

When you are ready to move Tableau Server to another drive and have fully backed up your data and all assets and saved those files in a safe location on a different computer:

1. Open a command prompt as an administrator on the initial Tableau Server computer.
2. Change to the scripts directory (By default: `C:\Program Files\Tableau\Tableau Server\packages\scripts.<version_code>\`) and run the `obliterate` script to completely remove Tableau Server from the computer:

```
tableau-server-obliterate.cmd -a -y -y -y
```

3. Restart the computer.
4. Install Tableau Server to the new drive. Do this by running the Setup program. For details, see [Install TSM](#).
5. Activate and register Tableau Server. See [Activate and Register Tableau Server](#).

At the end of the install process a browser window will open and you will be prompted to create an initial administrative user. Close this without creating the user.

6. Configuring initial node settings. See [Configure Initial Node Settings](#)
7. Copy your backup file `.tsbak` to the folder location specified by the `base-filepath.backuprestore` variable. By default, this is: `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\backups\`

**Note:** You can change the location for the backup file. For more information, see [tsm File Paths](#).

8. Open a command prompt as an administrator.
9. Stop Tableau Server:

```
tsm stop
```

10. Restore your Tableau Server data backup and assets you saved earlier. This includes restoring your database, and any assets that need to be restored manually, and importing the settings you exported from the original installation.

For details, see [Restoring core Tableau Server functionality](#).

11. Start Tableau Server:

```
tsm start
```

## Tableau Server product key activation

You can activate the same Tableau Server product key up to three times. This allows you to test Tableau Server (in a sandbox or QA environments, for example), as well as use Tableau in production. To maximise your activations, you should deactivate your product key when you remove Tableau Server from a computer, unless you will be reinstalling Tableau on the same computer. Doing this gives you the opportunity to use the activation on a different computer. For example, if you move Tableau Server from one computer or VM to another, deactivate the product key, then remove Tableau from the original computer. When you install Tableau on the new computer, you can activate the key there without any conflict. If you use role-based licensing, be sure to activate a Creator or Explorer key or you may lose administrator access to Tableau. If you are removing Tableau Server to reinstall it on the same computer, you don't need to deactivate the key. Tableau will use the key when reinstalled. For example, if you are moving Tableau from one drive on a computer to a different drive on the same computer. For information on how to deactivate a product key, see [tsm licences deactivate](#).

When you remove Tableau Server using the obliterate script, you have the option to have the script deactivate and delete the Tableau product key information by using a "-1" switch. This will deactivate and remove all Tableau licence information, including Tableau Desktop if you have that installed. If you know you want to deactivate the key, we recommend you deactivate

the key *before* running the script. For more information, see [Remove Tableau Server from Your Computer](#).

# Distributed and High Availability Tableau Server Installations

This topic describes different installation deployment types for Tableau Server.

## Validating your server deployment plan

Before you commit to installing a new Tableau Server deployment in your organisation, be sure to carefully evaluate your options. For most organisations, Tableau Cloud will provide a more reliable, performant and cost-effective analytics solution when compared to self-hosting Tableau Server. For information about the viability of Tableau Cloud for your organisation, review this blog post, [Should I move my analytics to the cloud?](#)

Already running Tableau Server and want to migrate to Tableau Cloud? See [Tableau Cloud Manual Migration Guide](#).

If you have determined that you must self-host Tableau Server, we recommend following the prescribed Tableau deployment in the [Enterprise Deployment Guide](#) (EDG). The EDG presents a fully tested and supported, performant, scalable, secure reference architecture based on a tiered data network. Moving forward, we are committed to investing in the EDG reference architecture to ease feature rollouts and improve upgrade scenarios.

## Installation types

The most basic way to run Tableau Server is to install a single node. With this type of installation you have a fully functional Tableau Server, with all Tableau Services Manager (TSM) and Tableau Server processes running on that single node, but this may not be the optimal way to use Tableau Server. You can decide how to install Tableau based on your organisation's needs, and your resources, adding additional nodes and configuring Tableau for high availability. Your installation options include:



- **Single-node installation** – This type of installation is reasonable for testing, running trials, and for environments that can handle occasional downtime and system availability due to lack of redundancy. All server processes are running on a single machine. There is less redundancy and fewer safeguards in the event of a problem with one of the server processes. You also need to make sure the computer you install Tableau Server on has adequate resources to handle the processes and the demands of users and data.
- **Distributed installation** – This type of installation is also called a multi-node installation and requires multiple computers so you can install and run server processes on those distributed nodes. Spreading the server processes out over multiple nodes can extend the reliability and efficiency of Tableau Server by providing redundancy and additional computing power. With the right configuration, a distributed installation can also provide you with automatic repository failover. For more information on failover, see [Repository Failover](#).
- **Highly available (HA) installation** – An HA installation of Tableau Server is a special type of multi-node installation with a minimum of three nodes and multiple instances of key processes (the Repository, File Store/Data Engine (Hyper), Coordination Service and Client File Service) on different computers. With an HA installation, there is built-in redundancy of those key processes, including multiple File Stores, and automatic Repository failover. The goal is to minimise system downtime by eliminating single points of failure, and enabling detection of failures with failover where possible.

Downtime is still possible in the event of an initial node failure, or when a node running Application Server (VizPortal) is recovering from a failure. Dashboards and views may load more slowly than expected, and timeouts are possible, depending on how your system is configured and being used. For more information about initial node failure, see [If an initial node fails](#) below.

The first computer you install Tableau on, the "initial node", has some unique characteristics. Three processes run only on the initial node and cannot be moved to any other node except in a failure situation, the Licence Service (Licence Manager), Activation Service and TSM Controller (Administration Controller). Tableau Server includes a script that automates moving

these processes to one of your other existing nodes so you can get complete access back to TSM and keep Tableau Server running.

Two other processes are initially included on the initial node but can be added or moved to additional nodes, the CFS (Client File Service) and the Coordination Service. Depending on how your installation was configured with CFS and Coordination Service, you may also need to take steps to redeploy these.

For information about moving the Licence service and TSM Controller from the initial node to another node, see [Recover from an initial node failure](#) below.

## External repository

For optimal performance for Tableau Server we recommend isolating the repository on a dedicated node in your deployment. If you have an Advanced Management licence, consider running the repository as an external database.

If your organisation has a peak load of more than 1000 VizQL sessions per hour, we also recommend running Tableau Server on Linux. In this scenario, VizQL sessions refer to any user actions that display or generate visualisations from Tableau Server.

For more information, see [Tableau Server External Repository](#).

## Prerequisite

These instructions assume that your cluster meets the Distributed Requirements.

All nodes in a multi-node cluster must have the same type of operating system and the same major version of that operating system. For example, all Windows Server 2022 nodes .

You cannot install a multi-node instance of Tableau Server on a combination of Linux and Windows nodes.

## Licensing

You must have a valid Tableau Server product key. The type of licence you have may determine how many nodes you can install Tableau on. For more information on licensing, see [Licensing Overview](#).

## Creating a distributed Tableau Server installation

These are the general steps you follow to create a distributed installation of Tableau Server:

1. Begin by installing Tableau Server on your initial node.

For details, see [Install and Configure Tableau Server](#).

2. Generate a node configuration (bootstrap) file on the initial node.

For details, see [Generate the node bootstrap file](#).

3. Install Tableau Server on an additional node using the node bootstrap file.

4. Configure your additional node with the processes you want to run on it.

5. Repeat Steps 3 and 4 for any additional nodes you want to install.

6. Deploy a new Coordination Service ensemble.

For more information, see [Deploy a Coordination Service Ensemble](#).

7. Add Client File Service to every node that is running the Coordination Service.

For more information, see [Configure Client File Service](#).

## Creating a highly available (HA) Tableau Server installation

A high availability Tableau Server installation is a special type of distributed installation, designed to accommodate failure in key server components without loss of complete server functionality. To create an HA installation, follow the same steps you take to create a

distributed deployment but include additional steps to make the deployment highly available. These additional steps include adding at least two additional nodes (for a minimum of three nodes in the cluster), adding a second instance of the repository, and second instances of the data engine/file store, adding additional gateway processes, and deploying a Coordination Service ensemble. You can also add a load balancer to distribute requests among the gateways.

At a high level, these are the steps you follow to create a highly available installation of Tableau Server:

1. Begin by installing Tableau Server on your initial node.

For details, see [Install and Configure Tableau Server](#).

2. Generate a node configuration (bootstrap) file on the initial node.

For details, see [Generate the node bootstrap file](#).

3. Install Tableau Server on at least two additional nodes using the node bootstrap file.

For more information, see [Install and initialise an additional node](#).

4. Configure each additional node with the processes you want to run on it. These must include a second copy of the Tableau Server repository, and a second copy of the data engine and file store, as well as additional instances of the gateway.

For more information, see [Configure the additional node](#).

5. Deploy a Coordination Service ensemble.

For more information, see [Deploy a Coordination Service Ensemble](#).

6. Add Client File Service to every node that is running the Coordination Service.

For more information, see [Configure Client File Service](#).

7. (Optional) Configure a load balancer.

For more information, see [Add a Load Balancer](#).

For details on how to create a three-node HA installation, see [Example: Install and Configure a Three-Node HA Cluster](#).

## If an initial node fails

If there is a problem with the initial node and you have redundant processes on your other nodes, there is no guarantee that Tableau Server will continue to run.

- Tableau Server can continue to run for up to 72 hours after an initial node failure, before the lack of the licensing service impacts other processes. If so, your users may be able to continue to sign in and see and use their content after the initial node fails, but you will not be able to reconfigure Tableau Server because you won't have access to the Administration Controller.
- If you are running a version of Tableau Server 2021.4.2 (or older) that is configured for ATR, then problems with the initial node will render all server functionality unavailable. This is true whether the node has a problem or if you intentionally stop it (for instance, to do a system-level patch).

Even when configured with redundant processes, *it is possible that Tableau Server may not continue to function after the initial node fails*. This is true even when an installation is configured for high availability. This means you should make a point of moving the two unique processes to another of your running nodes as soon as possible. If your initial node fails for reasons that are recoverable in a relatively short amount of time (for example, a hardware failure you can correct), you should first attempt to bring the node back up without using the procedure below.

## Recover from an initial node failure

With a Tableau Server installation, the initial node includes two services that are only installed on that node, the Licence service and the TSM Controller. If there is a problem with the initial node, Tableau Server may not continue to function, even when configured for high availability.

To recover from a situation where the initial node fails, you can move the TSM Controller and the Licence service to one of your already configured nodes. This allows you to recover from the failure while using resources you already have in the cluster. You do not have to configure a standby initial node in case the initial node fails.

For details on how to recover from a failure on the initial node, see [Recover from an Initial Node Failure](#).

## Configure Coordination Service ensemble on additional nodes

Configuring a Coordination Service on multiple nodes provides additional duplication of processes and so reduces the possibility of server downtime due to an issue with one of the Coordination Service nodes. For details on how to deploy a Coordination Service ensemble on your cluster, see [Deploy a Coordination Service Ensemble](#).

## Add Client File Service (CFS) to additional nodes

Tableau Server requires at least one instance of Client File Service (CFS). Adding additional instances of CFS to other nodes provides additional duplication of processes and so reduces the possibility of server downtime due to an issue with one of the CFS nodes. We recommend that you configure an instance of CFS on each of the nodes where you deploy the Coordination Service. For details on how to configure CFS on other nodes, see [Configure Client File Service](#).

## Tableau Server service licence check

A number of processes are installed when you install Tableau Server. Some of these processes are dependent on the existence of a valid Tableau Server licence while other installed processes are not. The subset of Tableau Server that require a valid Tableau Server licence are considered "licensed processes."

When a licensed process starts or restarts, the process checks with the Tableau Server Licence Manager service on the primary node to verify there is a valid licence. When the Licence Manager validates the licence, the process is fully functional and able to respond to requests from other Tableau Server processes. Once a licensed process has received confirmation from the Licence Manager, the process does not need to reconfirm the licence for 72 hours, or until the process restarts. If the process is not able to verify that it is licensed (if the primary node is unavailable, for example) it cannot run, but it continues to check for a valid licence until it confirms the licence. To see when the last licensing check occurred, look at the log files in the `ProgramData\Tableau\Tableau Server-\data\tabsvc\logs\licenseservice` folder. For more information about licensed processes, see [Licensed processes](#).

## Distributed Requirements

Before you start to configure a Tableau Server cluster, make sure you meet the following requirements.

### Hardware

While the computers you use in your cluster must meet the requirements described in [Before you install...](#), they do not need to be identical.

### Hardware Guidelines for High Availability

Here are some guidelines for the systems you use for [failover and high availability](#):

- **Failover – three computers:** To configure a cluster that provides failover support for the file store and repository processes, you need at least three computers or VMs: one for the initial Tableau Server node and two for additional nodes.
- **Multiple gateways – three computers and a load balancer:** Adding multiple Gateway processes to your Tableau Server installation and using a load balancer to

automatically distribute requests to those gateways enhances the reliability of Tableau further. To configure a cluster that provides failover support and multiple gateways, you need to add a load balancer to front your three-node cluster.

- **Failover & multiple gateway support – three computers and a load balancer:** To configure a cluster that provides the above plus support for multiple gateways, you need at least three computers or VMs, and a load balancer to front the cluster.
- **High availability – three computers and a load balancer:** To configure for high availability, you need the resources described above.
- **Initial computers:** If you configure for high availability, the initial Tableau Server node may be running few or no Tableau Server processes. Therefore, the computer that serves as the initial node does not need as many cores as the ones running your additional nodes. You will, however, need adequate disk space for backups because the initial computer is used during the backup and restore processes. In addition to the amount of space needed for the backup file, you need temporary disk space. For details on disk space requirements, see [Disk Space Usage for Backup and Restore](#).

## Software

- All nodes in a multi-node installation must be running the same version of Tableau Server.
- All nodes in a multi-node cluster must have the same type of operating system and the same major version of that operating system. For example, all Windows Server 2022 nodes .

You cannot install a multi-node instance of Tableau Server on a combination of Linux and Windows nodes.



## Installation location

The installation location for Tableau Server must be the same on all nodes in a cluster. This is true whether you install to the default location or to a non-default location.

## Networking and Ports

- **Ports:** As with any distributed system, the computers or VMs you use need to be able to communicate with one another. For information on how Tableau Services Manager handles port mapping, see [Tableau Services Manager Ports](#).
- **Same domain:** If Tableau Server is installed in a Windows Active Directory environment, then all computers in a cluster must be members of the same domain.
- **Latency:** Network latency between server nodes can impact Tableau Server performance. Be aware of possible latency issues, especially if you run into performance problems. To reduce network latency, you can take steps such as locating your gateways and data sources in proximity to Tableau Server.
- **Service account:** The server's Run As Service Account account, which is specified on the initial Tableau Server, must be the same on each computer in the cluster.

If you are running in an Active Directory environment, then we recommend running a domain user account as the Run As service account. While you can leave the default NetworkServices account on each node in the cluster, we do not recommend this as a best security practice.

If you are running a distributed deployment in a Windows workgroup, then you must use the same user account and password on each node in the cluster. In this scenario, specify the Run As service account using a period (.) instead of a computer name in TSM. For example, if the workgroup Run As service account is `tableau-sa`, then specify `.\tableau-sa` in TSM. Windows interprets the `.\` syntax as equivalent to “local host computer name”.

- **Static IP addresses:** Any computer running Tableau Server, whether it's a single server installation or part of a cluster, must have a static IP address.
- **Discoverable:** Each node in the cluster must be discoverable from other node computers using DNS or a local host file.
- **Time zone and time:** Each node in the cluster must be in the same timezone, with their system clocks synchronised. This may happen automatically. For example, if your nodes are all in the Active Directory domain, the domain controller usually handles this. If you are not sure your cluster meets this requirement, consult with your internal IT experts.

## Best Practices

Here are some things to keep in mind before you start to install and configure:

- **IP addresses or computer names:** As mentioned above, each computer in the cluster must use a static IP address.
- **CNAME record:** If you are using a load balancer, it's the load balancer's name that users will be using as the Tableau Server URL, regardless of the gateway that's actually handling the request.
- **User account credentials:** For each computer, you need credentials for a user account with local admin permissions.
- **Backup:** It's a best practice to create a backup prior to making significant system changes. See [Back up Tableau Server Data](#) for steps.
- **Distributed deployment across data centres:** We do not recommend installing Tableau Server nodes across distributed data centres. The following examples describe some issues that are common when nodes are distributed between multiple data centres:

- Disruption in network connectivity between nodes can cause many tasks to fail or for Tableau Server components to become unlicensed.
- Proxies and firewalls between data centres may impede the ability of the Tableau Server nodes to communicate with each other.
- Routing traffic between geographically dispersed data centres, can cause latency or bottleneck data transmission, resulting in poor performance and connection timeouts.

## SSL

If you are planning to configure SSL for a highly available Tableau Server cluster with multiple gateways and a load balancer ([learn more](#)), make sure that the SSL certificate you use was issued for the load balancer's host name. See [Configure SSL for External HTTP Traffic](#) to and from Tableau Server for other details.

## Distributed Installation Recommendations

When you add nodes to a Tableau Server installation, you must decide how many processes to run on each computer. This page provides some general recommendations that are intended only as a starting point.

In addition to these general recommendations, you should also:

- Understand how your organisation uses Tableau Server and tune your configuration for your use case – for example, whether you want to optimise for user response or for extract refreshes.
- Perform thorough performance testing to identify the best places to adjust process configuration.

For more information on tailoring a Tableau Server installation to your organisation's needs, see [Performance Tuning](#).

For more information on the requirements for a distributed installation and for information on configuring additional nodes, see [Distributed and High Availability Tableau Server Installations](#).

## Recommendations for all installations

Although the computers that make up a Tableau Server cluster do not need to have identical hardware, they must all meet the same minimum system requirements. The recommendations on this page assume that the computers where you install Tableau Server have eight cores or more.

The following recommendations apply to all server configurations:

- Run Backgrounder processes on a dedicated computer if you plan on refreshing extracts frequently. Backgrounder processes are generally the most CPU intensive and can slow down other processes on the same computer.
- If you plan to refresh extracts frequently or if you plan to refresh large extracts, increase the number of processes for Backgrounder processes.
- Run VizQL processes on a different computer than Backgrounder processes. Having them on the same machine means that extract refreshes can affect user views.
- The instance of Data Engine installed on the node where File Store is installed is used for querying data for view requests. Consider separating the File Store process from the backgrounder processes to help minimise the backgrounder tasks from affecting user views.
- **Optimising with topology configurations:**
  - Co-locating File Store on the same node as the Administration Controller can reduce the length of time it takes to back up Tableau Server by reducing or eliminating the need to transfer data between nodes during the backup process. This is especially true if your organisation uses many extracts.
  - Co-locating the repository (pgsql) with the Administration Controller node can also help to reduce back up time, but the time savings is less significant than that of the File Store.

The Administration Controller is usually on the initial node, unless you have had an initial node failure and moved the controller to another node.

**Note:** In a distributed installation with three or more nodes, you can have a maximum of two repository instances (active and passive). You can also run Tableau Server with one repository, but doing this means there is no failover available for the repository. For more information, see [Tableau Server Repository](#).

## Install and Configure Additional Nodes

After you install Tableau Server on one computer (or node), the server is functional and ready for use, but it has no redundancy. If there is a problem with a process or a problem with the computer itself, Tableau Server may be unavailable. In addition, all processes are running on a single computer, so there can be contention for resources on that computer.

You can extend your Tableau Server installation by adding Tableau to additional nodes, creating a distributed installation. This article describes the general steps for installing Tableau Server on additional nodes and assumes you have already installed Tableau on an initial node. For more information on installing Tableau on the initial node, see [Install TSM](#).

If you are installing Tableau Server on multiple nodes, you should install and configure one node at a time. This makes it easier to troubleshoot any issues you might run into.

**Important:** You should add and configure additional nodes when you can fully complete the process by applying pending changes. Adding a node without finishing by applying pending changes can result in users being unable to log into Tableau Server.

### Installation location

The installation location for Tableau Server must be the same on all nodes in a cluster. This is true whether you install to the default location or to a non-default location.

## Use the TSM web interface

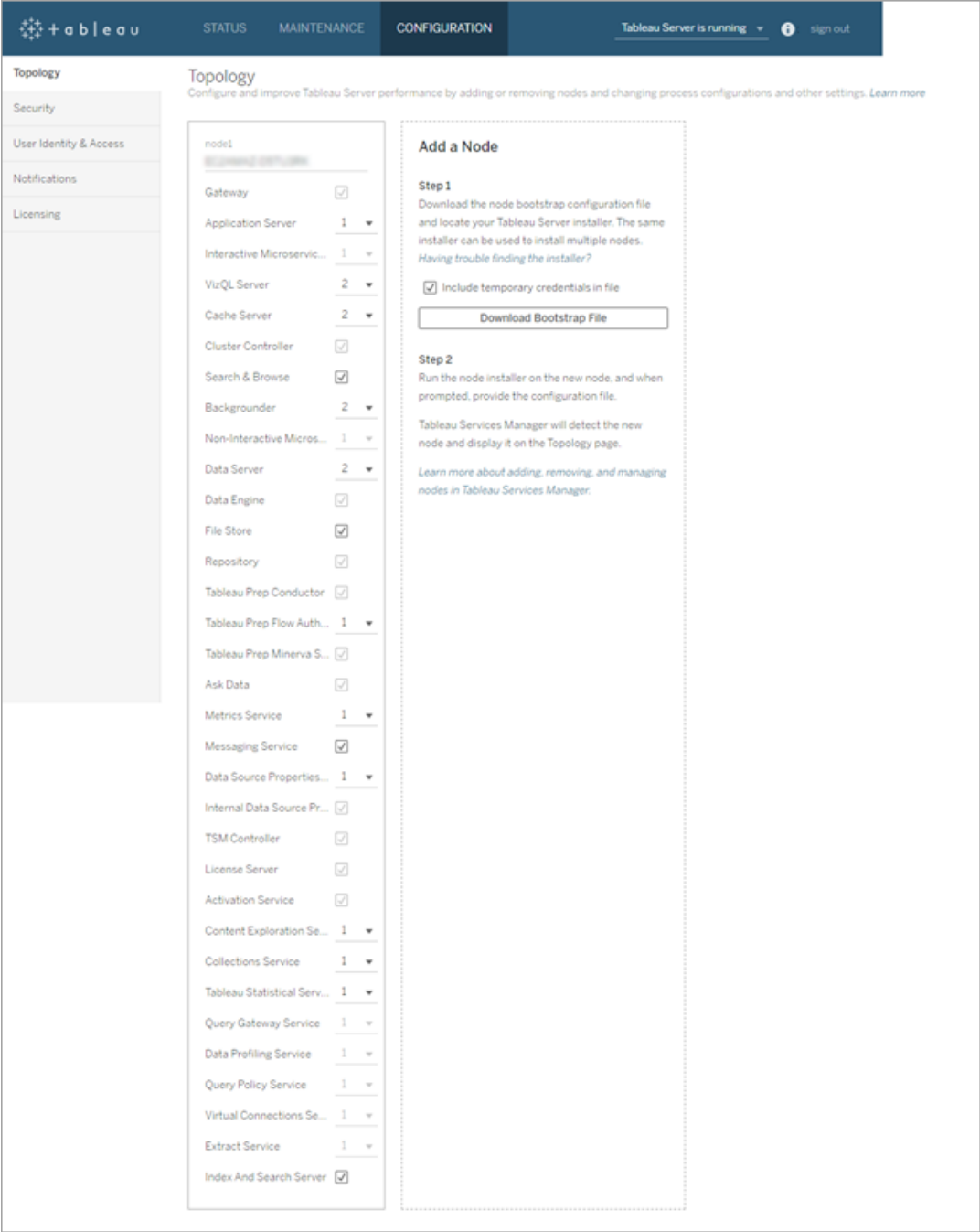
Generate the node bootstrap file

1. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab, and in the Add a Node box, click **Download Bootstrap File**.



The bootstrap file is created and copied to your local computer.

Embedded credentials are included in the bootstrap file by default. If you don't want credentials embedded in the bootstrap file, clear the **Include temporary credentials in**

**file** option. If you want to completely disable the ability to include embedded credentials in node bootstrap files, you can set a configuration option for the server. See `features.PasswordlessBootstrapInit` for more details.

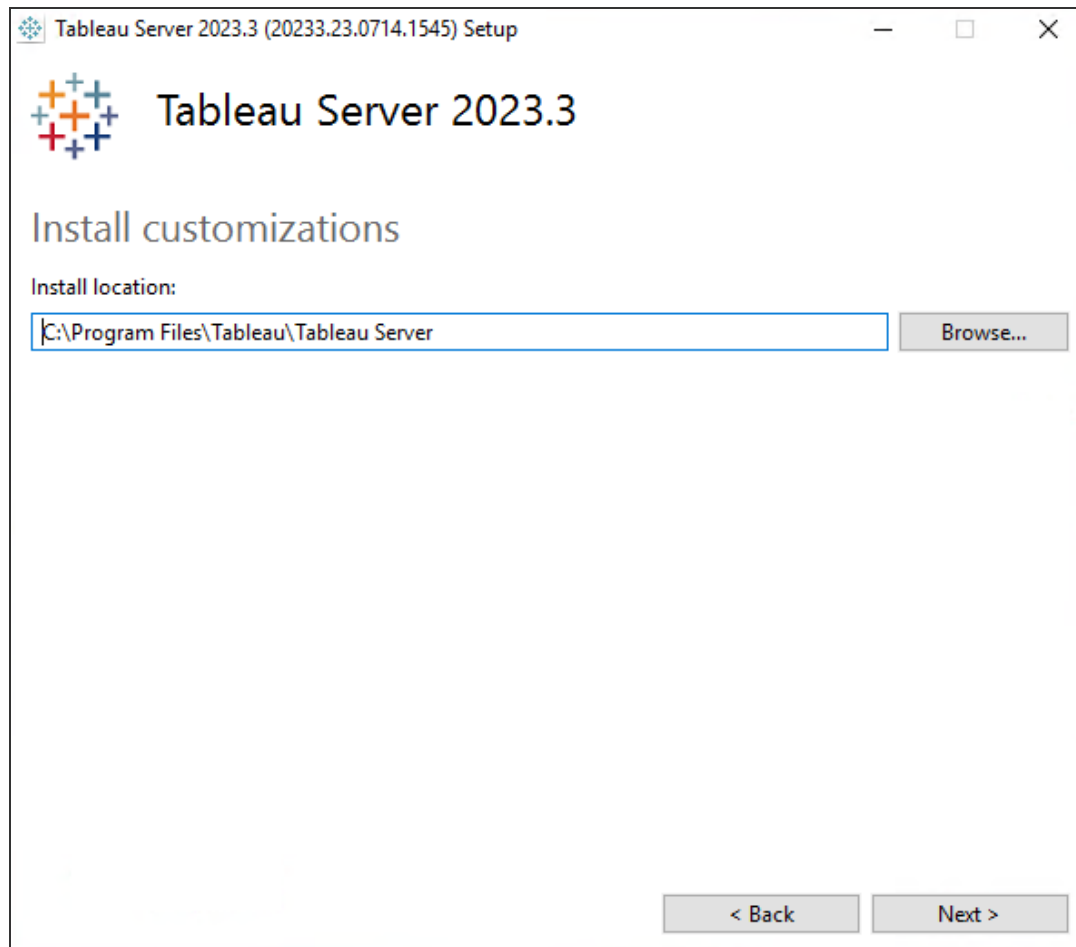
### Install and initialise an additional node

Before you begin, verify that your node bootstrap file is recent. For example, if you have run `tsm security regenerate-internal-tokens` after you generated a bootstrap file, then initialisation will fail.

1. Copy the original installer you used on the first computer along with the bootstrap file you generated and put them in a location accessible from the new computer you are adding Tableau Server to. This could be a mounted network share, or directly on the new computer.
2. If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#).
3. On the new node, run the Tableau Server Setup program. This should be the same installer program you ran on the initial node to install Tableau Server. Accept the terms of the licence agreement and click **Next**.
4. The **Install location** must be the same on every node in the cluster.

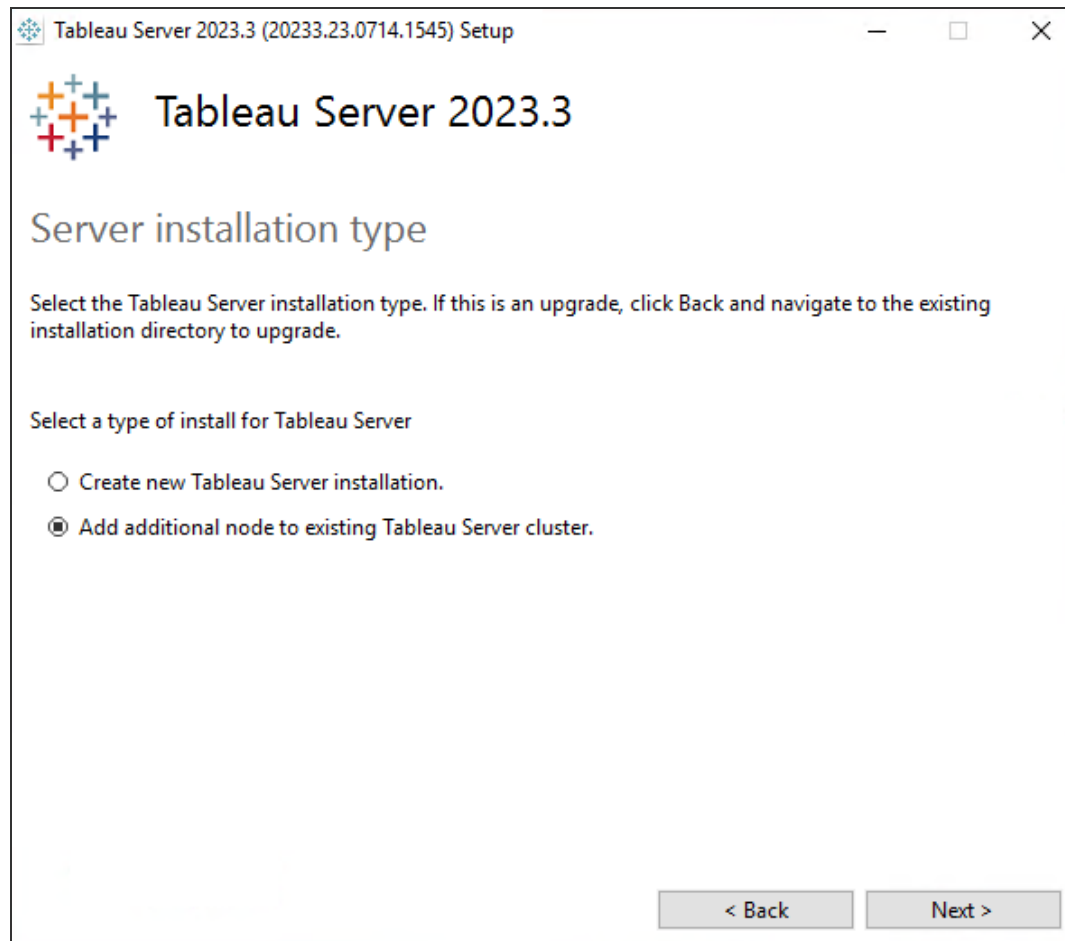
Enter the Installation location, or click **Browse** to navigate to the Installation location. Click **Next** to continue.



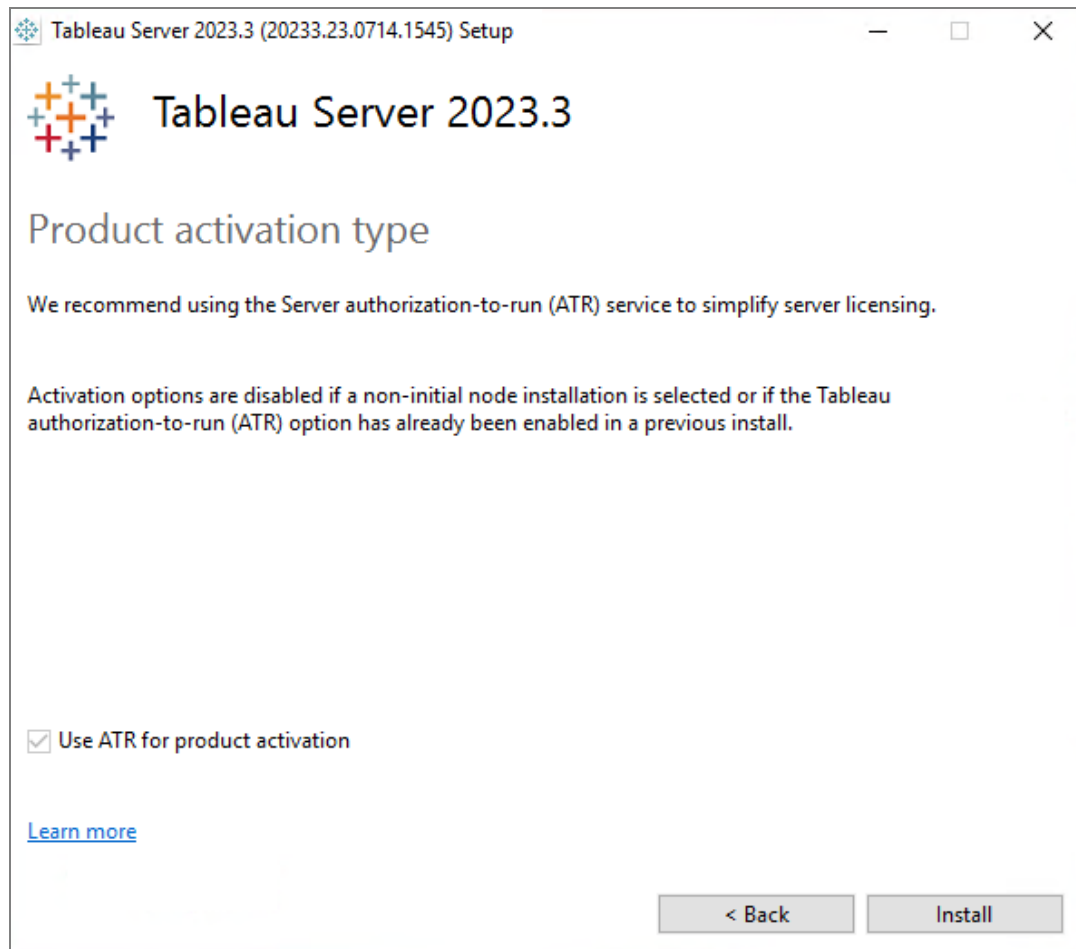


5. During installation you will be asked to select an installation type.

Select **Add additional node to existing Tableau Server cluster** and click **Next** to continue.



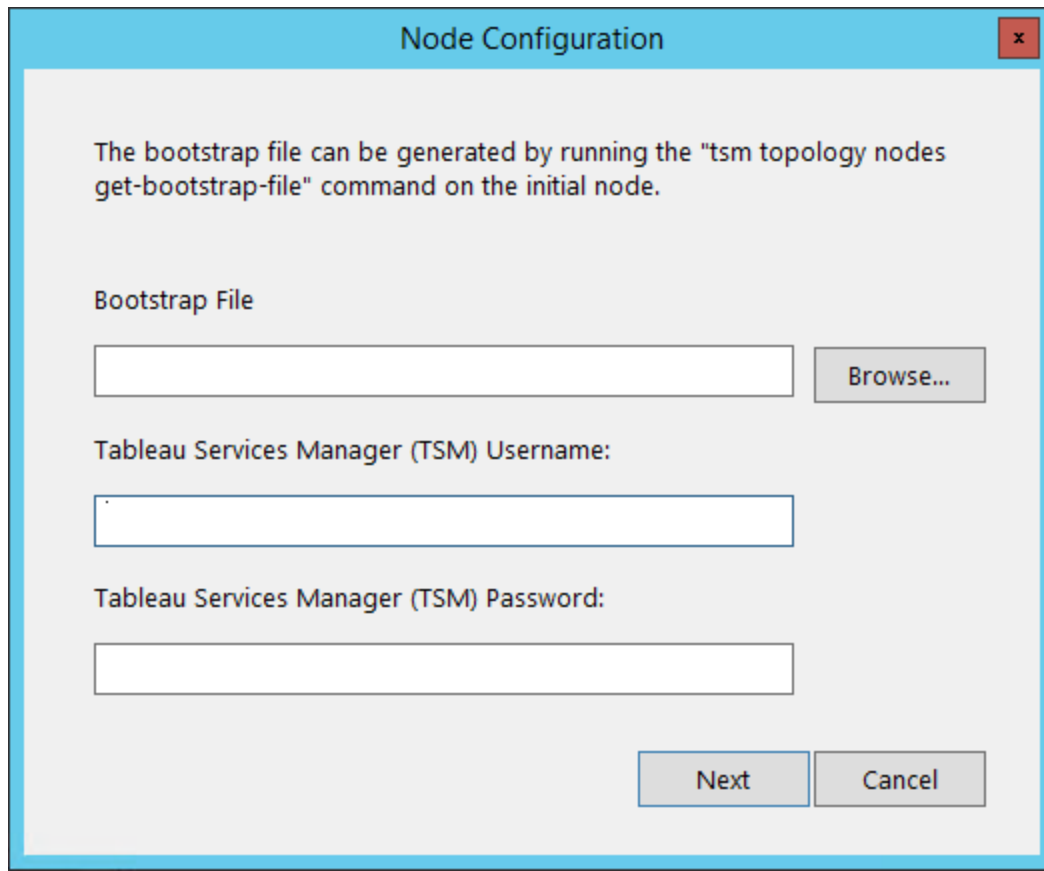
6. The **Use ATR for product activation** option which was set for Node 1 will automatically be selected:



Click **Install** to continue.

If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

7. In the installer, after the Tableau Server files are copied, you will be prompted to provide the bootstrap file and the name and password of the TSM administrator:



The dialog box is titled "Node Configuration" and has a blue header bar. It contains a text instruction at the top, followed by a "Bootstrap File" section with a text input field and a "Browse..." button. Below that is the "Tableau Services Manager (TSM) Username:" section with a text input field, and the "Tableau Services Manager (TSM) Password:" section with a text input field. At the bottom right are "Next" and "Cancel" buttons.

**Node Configuration**

The bootstrap file can be generated by running the "tsm topology nodes get-bootstrap-file" command on the initial node.

Bootstrap File

**Browse...**

Tableau Services Manager (TSM) Username:

Tableau Services Manager (TSM) Password:

**Next** **Cancel**

Enter the location of the bootstrap file, or click **Browse** to navigate to the location. If the bootstrap file does not include embedded credentials, or those credentials have expired, enter the TSM administrator username and password. These credentials must be the credentials of the user that you used during the installation process on the initial node.

Click **Next** to continue.

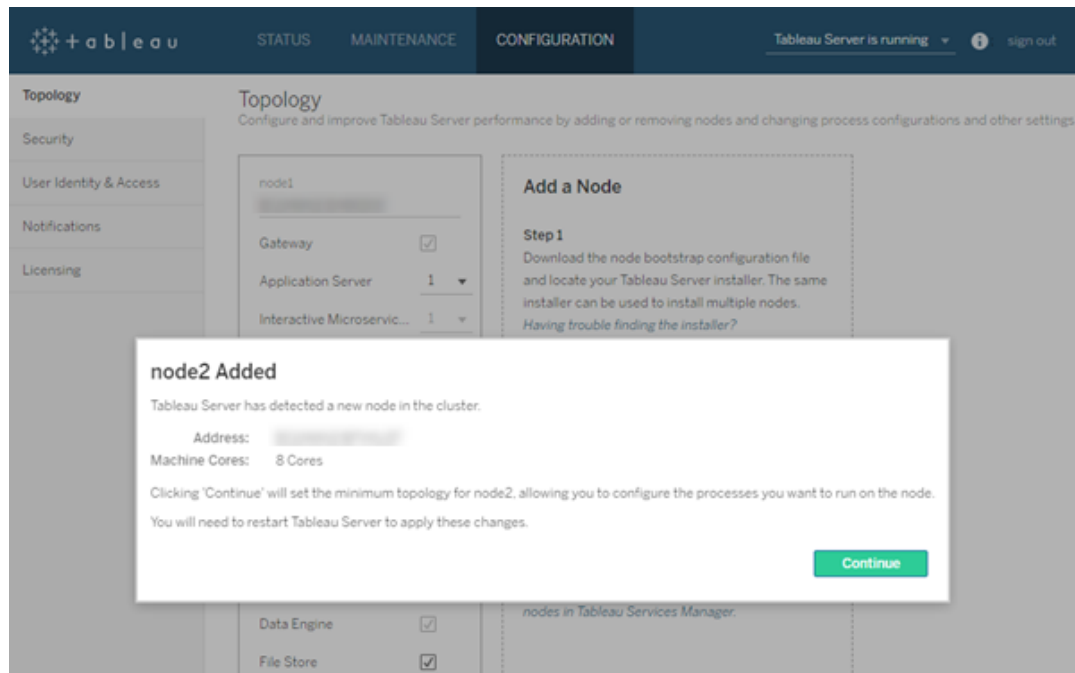
8. A browser window opens and you are prompted to sign in to TSM. Enter the TSM administrator user name and password.

If no browser window opens automatically, open a window and navigate to TSM:

`https://<tsm-computer-name>:8850`

9. In TSM, click **Configuration**.

A message displays, telling you the node was added:



10. Click **Continue**.

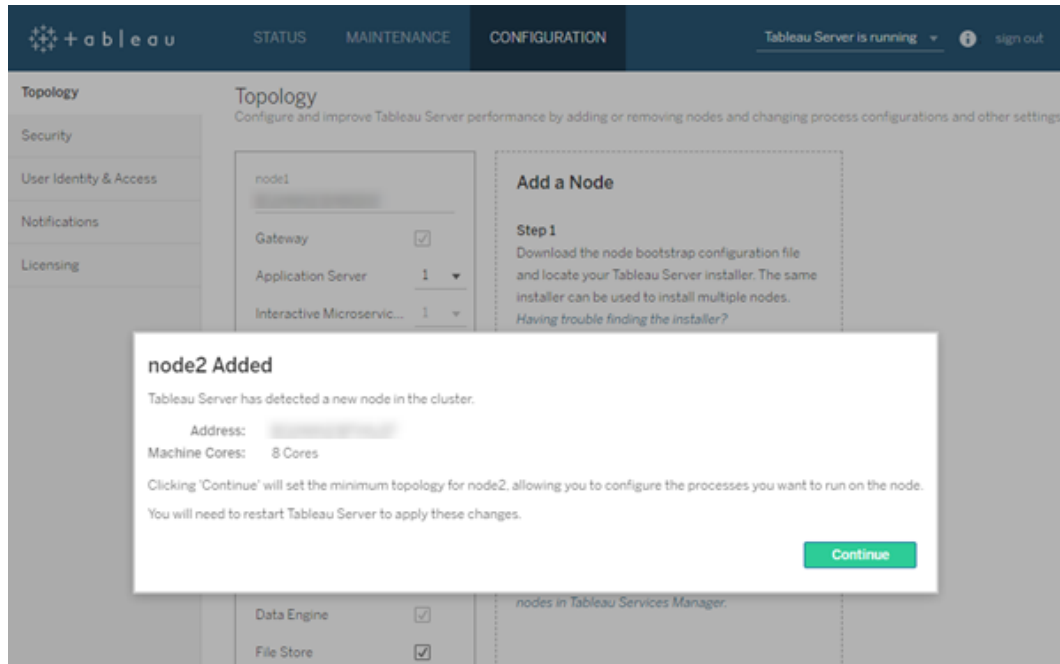
Configure the additional node with Cluster Controller

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab. A message should tell you that the new node was added.



Click **Continue** to dismiss the message.

3. Cluster Controller is part of the minimum topology and is already selected. Each node must run Cluster Controller.

If you only want to set the minimum topology for the node, go to Step 4 below. You might do this if you will be adding additional nodes and are not ready to configure this node beyond the minimum.

If you want to add additional processes to the minimum topology, specify the processes that should run on the node. Do this by selecting the processes you want, or specifying the number of processes that should run on the node.

For example, to add a Gateway and two instances of the Backgrounder on the node:

- a. Select **Gateway**.
- b. Set the **Backgrounder** count to 2.

## Tableau Server on Windows Help

Adding Backgrounder to a node will also add an instance of Data Engine if one is not already on the node.

The specific processes and process counts you set will depend on your organisational environment and needs. Some processes are added automatically when you add another process. For more information, see [Configure Nodes and Tableau Server Processes](#).

**Note:** The TSM Web UI limits you to a maximum of 8 instances of processes that allow you to select the number of instances. To configure more instances than this, use the command line and the `tsm topology set-process` command. For more information, see `tsm topology set-process`.

4. Click **Pending Changes** at the top of the page:



If you are configuring a cluster with three or more nodes, a Coordination Service ensemble warning displays. You can continue. You will deploy a Coordination Service ensemble in a separate step.

5. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

After Tableau Server restarts, the node is included with the minimum topology necessary and any additional processes you configured.

## Use the TSM CLI

**Note:** This method of installation from the command line requires you to set Windows environment variables on each additional node for the username and password of an

administrator on the initial node. For an alternate method of automating Tableau Server installation without including unencrypted credentials, see Automated Installation of Tableau Server.

### Generate the node bootstrap file

To install Tableau Server on additional computers you use the same installer you did for the initial node, along with a "bootstrap" file you generate on the initial node.

**Important:** The bootstrap file contains a copy of the master keystore file used for encrypting the configuration secrets. The file can also embedded credentials which are valid for a pre-determined amount of time (see `tabadmincontroller.auth.expiration.minutes`) and serve as a session cookie. We strongly recommend that you take additional measures to secure the bootstrap file.

1. After installing Tableau Server on the initial node, generate the node bootstrap file.
2. On the initial node, open a command prompt as administrator.
3. Type this command to generate the bootstrap file:

```
tsm topology nodes get-bootstrap-file --file <path\file>.json
```

Embedded credentials are included in the bootstrap file by default. If you don't want the bootstrap file to include credentials, use the `-nec` or `--no-embedded-credentials` option:

```
tsm topology nodes get-bootstrap-file --file <path\file>.json -  
-no-embedded-credentials.
```

If you want to completely disable the ability to include embedded credentials in node bootstrap files, you can set a configuration option for the server. See `features.PasswordlessBootstrapInit` for more details.



## Tableau Server on Windows Help

### Install and initialise an additional node

1. Copy the original installer you used on the first computer along with the bootstrap file you generated and put them in a location accessible from the new computer you are adding Tableau Server to. This could be a mounted network share, or directly on the new computer.
2. If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#).
3. On the new node, run the Tableau Server Setup program. This should be the same installer program you ran on the initial node to install Tableau Server.

```
TableauServer-64bit-<version>.exe /silent /accepteula /embeddedcredential /bootstrapfile="path\bootstrapfile"
```

For more information about switches you can use with the Setup program, see [Install Switches and Properties for Tableau Server](#).

### Configure the additional node

**Note:** This basic example illustrates how to set the topology on a node. For a more detailed, working multi-node example, see [Example: Install and Configure a Three-Node HA Cluster](#).

On the initial (original) node, set the topology for the newly added node. The topology specifies which processes should run on the node, and how many instances of each process should run. The topology for the node will depend on your environment and organisational needs. The below are just examples of setting the topology.

1. On the initial (original) node, open a command prompt.
2. Get the node-id for the new node:

```
tsm topology list-nodes -v
```

The `-v` option lists the nodes and the processes they are currently running. You can identify the newly added node because it will not have any processes on it.

3. Specify the individual processes that should run on this node.

Do this with the following command:

```
tsm topology set-process -n <nodeID> -pr <processname> -c <n>
```

You must add an instance of the Cluster Controller to each node.

For example, to add the Cluster Controller, two instances of the Backgrounder, and a Gateway to node2:

```
tsm topology set-process -n node2 -pr clustercontroller -c 1
tsm topology set-process -n node2 -pr backgrounder -c 2
tsm topology set-process -n node2 -pr gateway -c 1
```

The specific processes and process counts you set will depend on your organisational environment and needs. Some processes are added automatically when you add another process. For more information, see [Configure Nodes and Tableau Server Processes](#).

4. Apply the node configuration. If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

```
tsm pending-changes apply
```

A warning about deploying a Coordination Service ensemble displays if you have deployed a three- or five-node cluster. If this is the only warning, you can safely over-

ride it using the `--ignore-warnings` option to apply the configuration changes in spite of the warning.

```
tsm pending-changes apply --ignore-warnings
```

## Install drivers

You need to install drivers so that Tableau Server can connect to data and run extracts. Install these drivers on nodes that are running any of the following processes:

- VizQL Server (vizqlserver)
- Application Server (vizportal)
- Data Server (dataserver)
- Backgrounder (backgrounder)

### Drivers and administrative views

If you want to use the built-in administrative views in Tableau Server, you also need to install the PostgreSQL driver on any nodes running any of the above processes.

For more information, see Database Drivers.

## Install Tableau Resource Monitoring Tool Agent

If you are using Resource Monitoring Tool to monitor Tableau Server Performance, when you add a new node, you must also install the Resource Monitoring Tool. For more information, see Tableau Server Topology Changes.

## Database Drivers

Tableau connectors require a driver to talk to the database. Before you can connect to data sources from Tableau Server, you must install drivers for the data sources you want to connect to. You can find driver links and installation instructions for all the supported connectors on the [Driver Download page](#).

**Important:** Beginning with version 2023.1.0 you must install the PostgreSQL driver if you want to use the built-in administrative views. You can find this on the [Driver Download page](#).

## Install drivers in a cluster

You need to install the drivers for your data sources on the initial node in a Tableau Server cluster. If you install Tableau Server on multiple nodes, you must also install drivers on any node that runs any of the following processes:

- Application Server (Vizportal)
- Backgrounder
- Data Server
- VizQL Server

## Example: Install and Configure a Three-Node HA Cluster

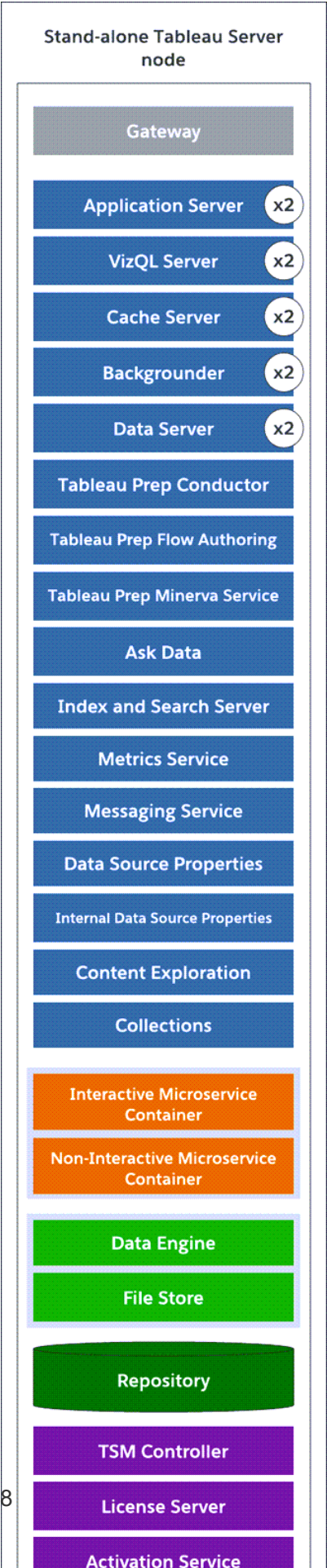
A multi-node high availability installation of Tableau Server can help to maximise the efficiency and availability of Tableau Server. When configuring a multi-node Tableau Server deployment, the steps you perform are designed to build in redundancy, helping to reduce your potential downtime. In addition to simply improving efficiency by moving or adding server processes to additional nodes, you can create a highly available (HA) installation of Tableau Server by satisfying these requirements:

- Add additional nodes for a total of at least three nodes
- Deploy a Coordination Service ensemble on at least three nodes
- Add an instance of Client File Service (CFS) on at least one additional node (we recommend adding an instance on each node running the Coordination Service)
- Add a second instance of the File Store on one of the additional nodes (Data Engine will be installed automatically, if it is not already on the node)
- Add a second instance of the Repository (pgsql) on one of the additional nodes

A Tableau Server installation that includes these additions will have built-in redundancy and can support failover in the event of a problem with the repository. This example shows how to do this, and more.

## A Single Server System

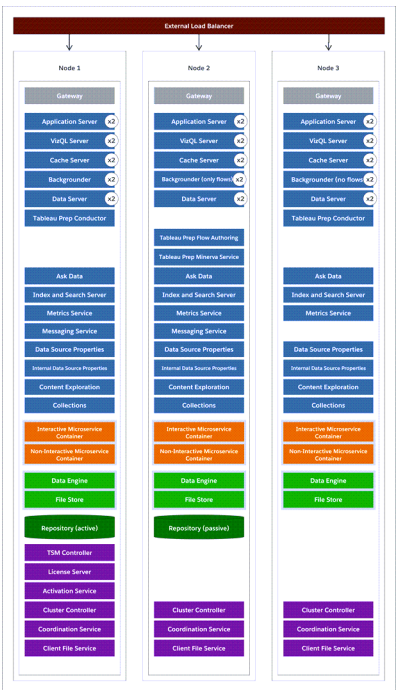
After installing Tableau Server on an initial node, you have a system that is running everything it needs to function. It has at least one instance of all server processes and is the most basic configuration of Tableau Server. It has no redundancy. The server topology looks like this (some TSM-specific processes are not shown):



# A Three-Node System

To build in redundancy, you need to add additional nodes to host instances of the repository and the data engine and file store processes. You can add instances of other processes, including multiple instances of a process on a node. In addition, to reduce the system’s vulnerability, you can run multiple gateways and additional instances of some of the server processes. The fewest number of computers required to achieve this configuration is three.

In the diagram below, the file store process has been added to both additional nodes. A second, passive instance of the repository has also been added to one of the other new nodes. Finally, the server processes (shown in blue) have been added to the additional nodes to provide redundancy.



## Configuration steps

This procedure describes how to configure a three-node HA Tableau Server cluster with two repository instances and two file store/data engine instances on the additional nodes as pictured above.

## Before you begin

Before you install Tableau Server on any additional nodes, ensure that each additional node meets the distributed requirements. See [Distributed Requirements](#) for details.

## Use the TSM web interface

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

### Step 1: Install the initial node

See [Install and Configure Tableau Server](#).

### Step 2: Generate a bootstrap file for the additional nodes

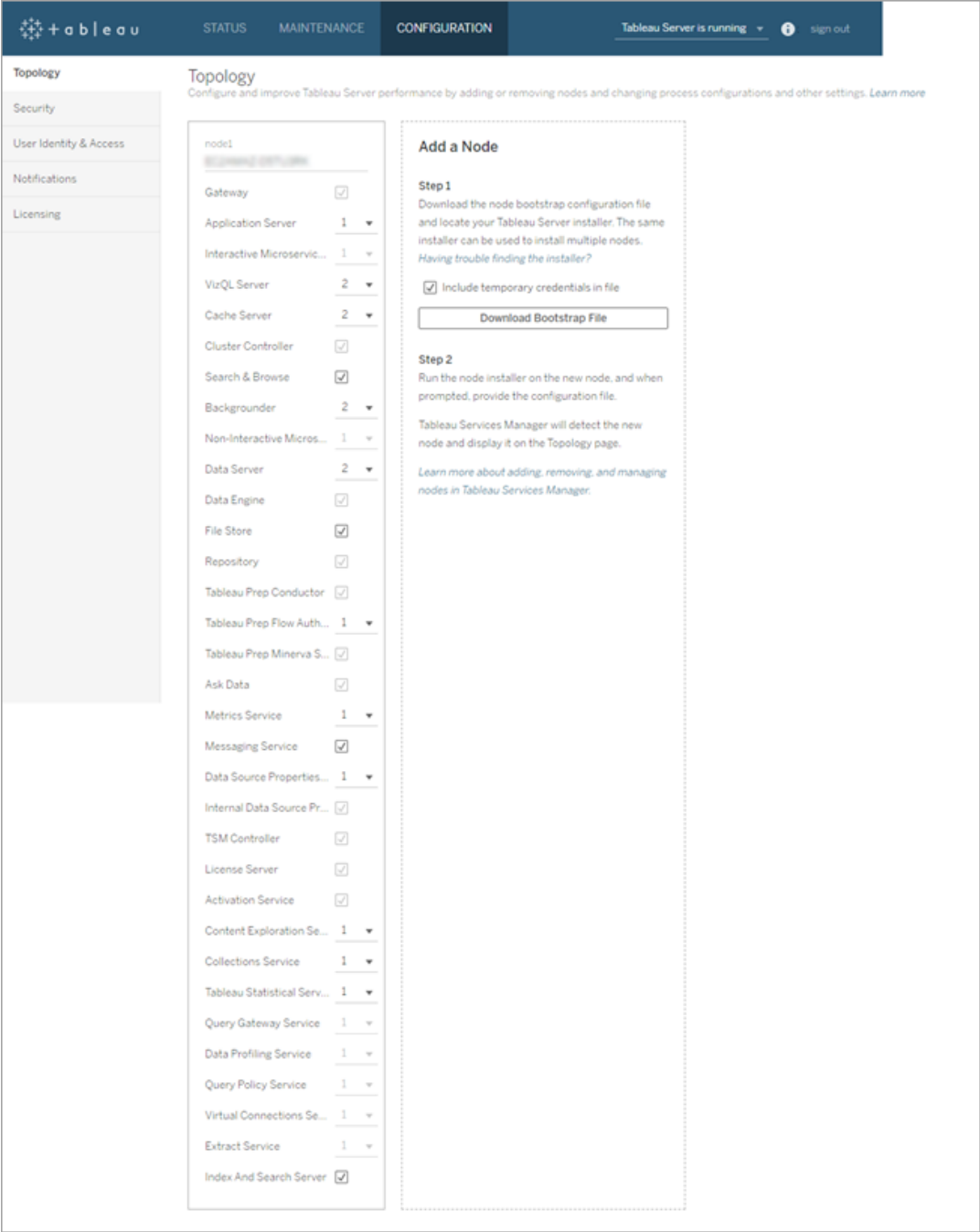
1. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab, and in the Add a Node box, click **Download Bootstrap File**.





The bootstrap file is created and copied to your local computer.

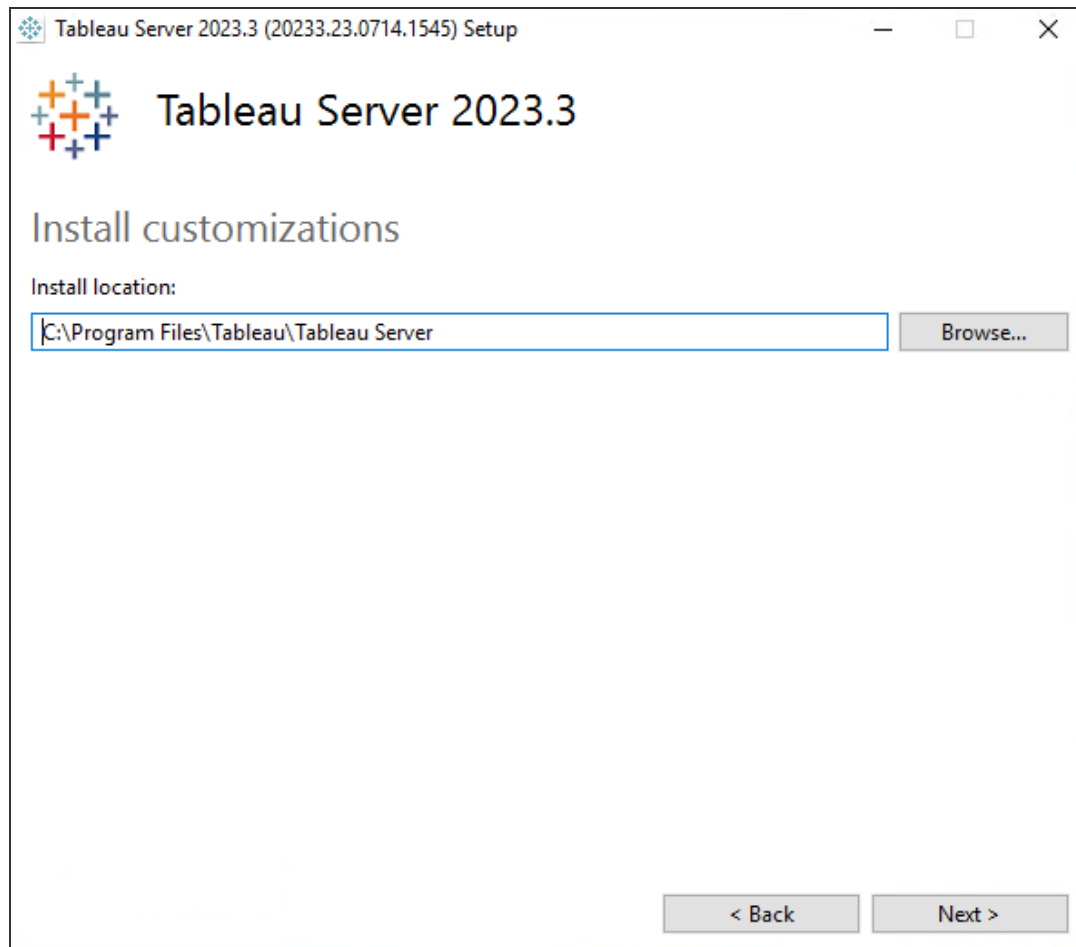
Embedded credentials are included in the bootstrap file by default. If you don't want credentials embedded in the bootstrap file, clear the **Include temporary credentials in**

**file** option. If you want to completely disable the ability to include embedded credentials in node bootstrap files, you can set a configuration option for the server. See `features.PasswordlessBootstrapInit` for more details.

### Step 3: Install and initialise node 2

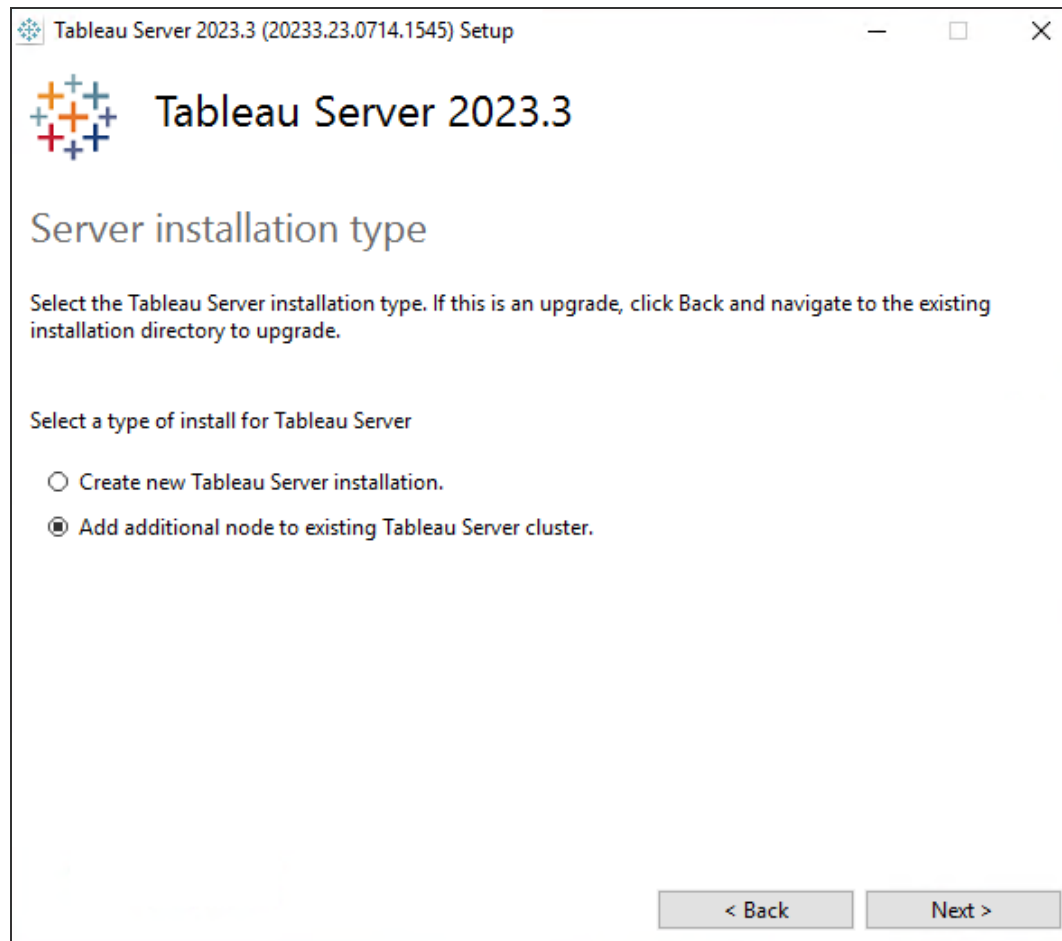
1. Copy the original installer you used on the first computer along with the bootstrap file you generated and put them in a location accessible from the new computer you are adding Tableau Server to. This could be a mounted network share, or directly on the new computer.
2. If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#).
3. On the new node, run the Tableau Server Setup program. This should be the same installer program you ran on the initial node to install Tableau Server. Accept the terms of the licence agreement and click **Next**.
4. The **Install location** must be the same on every node in the cluster.

Enter the Installation location, or click **Browse** to navigate to the Installation location. Click **Next** to continue.

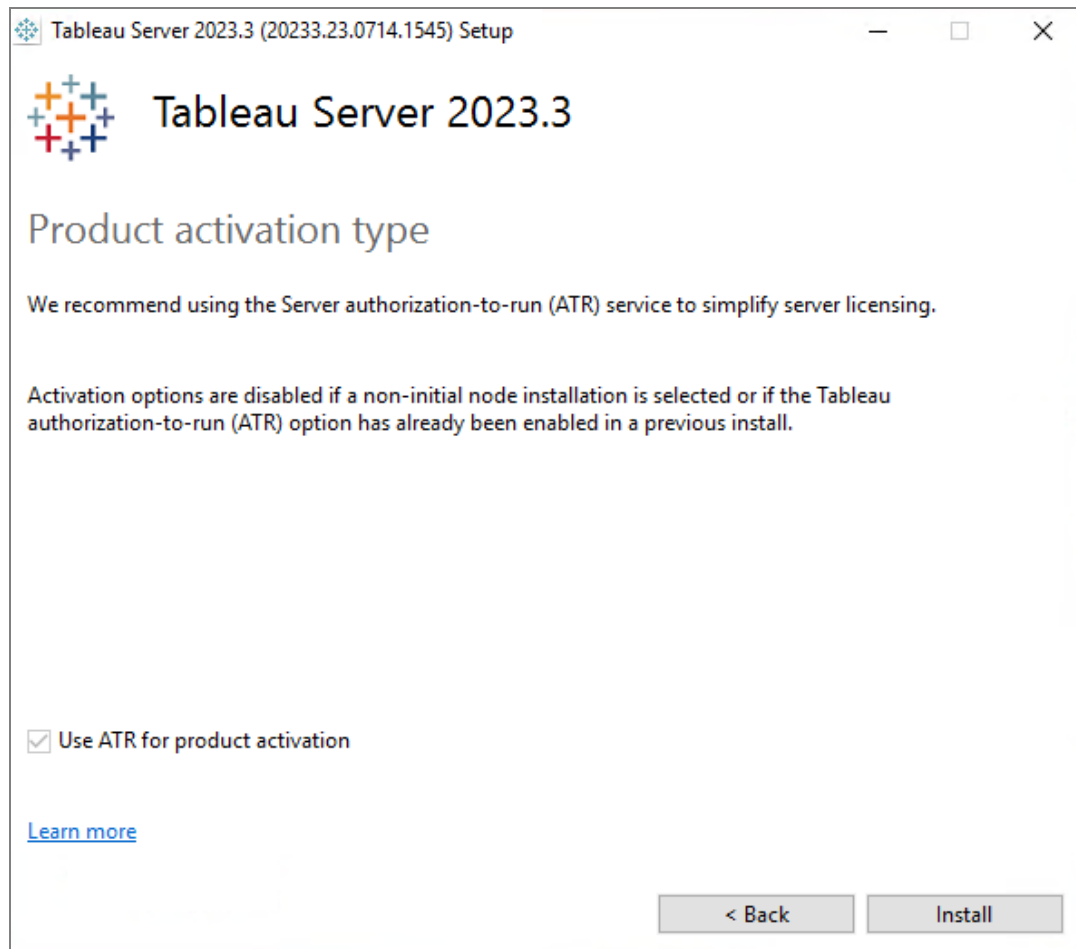


5. During installation you will be asked to select an installation type.

Select **Add additional node to existing Tableau Server cluster** and click **Next** to continue.



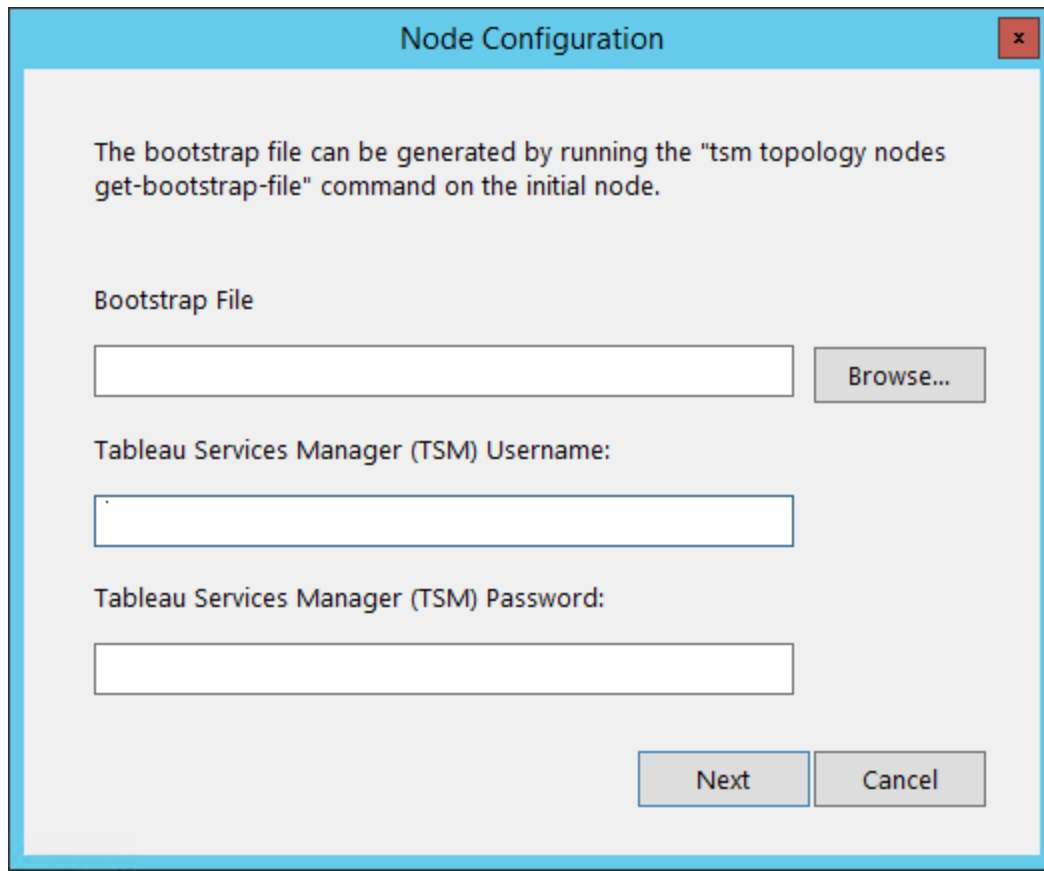
6. The **Use ATR for product activation** option which was set for Node 1 will automatically be selected:



Click **Install** to continue.

If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

7. In the installer, after the Tableau Server files are copied, you will be prompted to provide the bootstrap file and the name and password of the TSM administrator:



The dialog box is titled "Node Configuration" and has a blue header bar. Inside, there is a text instruction: "The bootstrap file can be generated by running the 'tsm topology nodes get-bootstrap-file' command on the initial node." Below this, there are three input fields: "Bootstrap File" with a "Browse..." button to its right, "Tableau Services Manager (TSM) Username:" with a text box containing a single dot, and "Tableau Services Manager (TSM) Password:" with an empty text box. At the bottom right, there are "Next" and "Cancel" buttons.

Enter the location of the bootstrap file, or click **Browse** to navigate to the location. If the bootstrap file does not include embedded credentials, or those credentials have expired, enter the TSM administrator username and password. These credentials must be the credentials of the user that you used during the installation process on the initial node.

Click **Next** to continue.

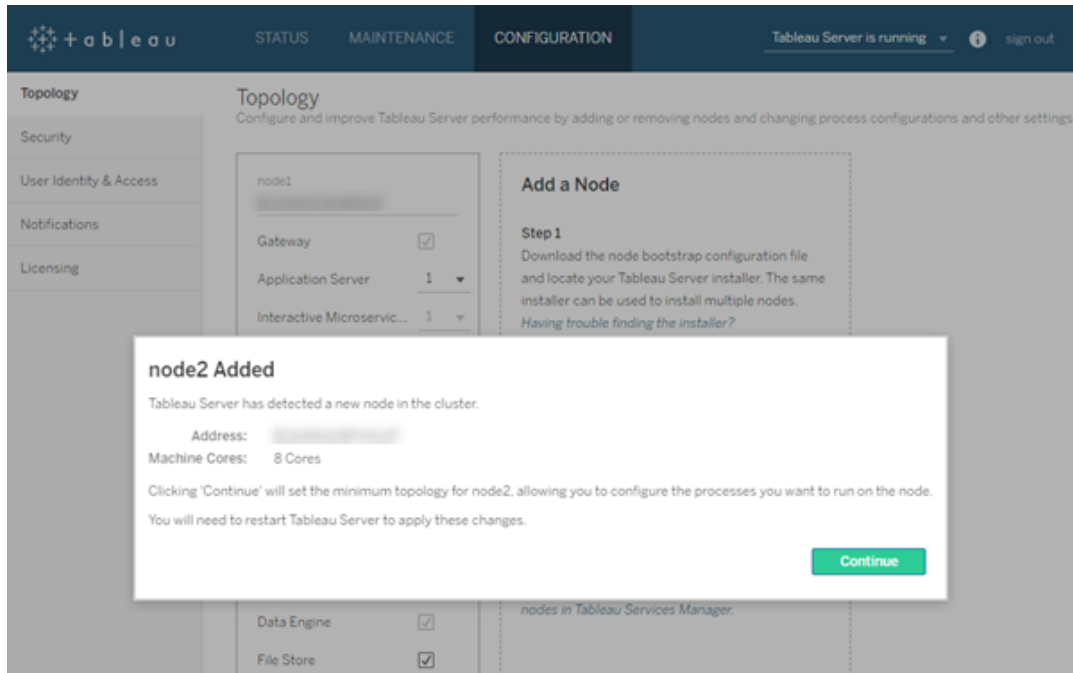
8. A browser window opens and you are prompted to sign in to TSM. Enter the TSM administrator user name and password.

If no browser window opens automatically, open a window and navigate to TSM:

`https://<tsm-computer-name>:8850`

9. In TSM, click **Configuration**.

A message displays, telling you the node was added:



10. Click **Continue**.

Step 4: Install and initialise node 3

Repeat Step 3 above.

Step 5: Configure the new node with a minimum topology

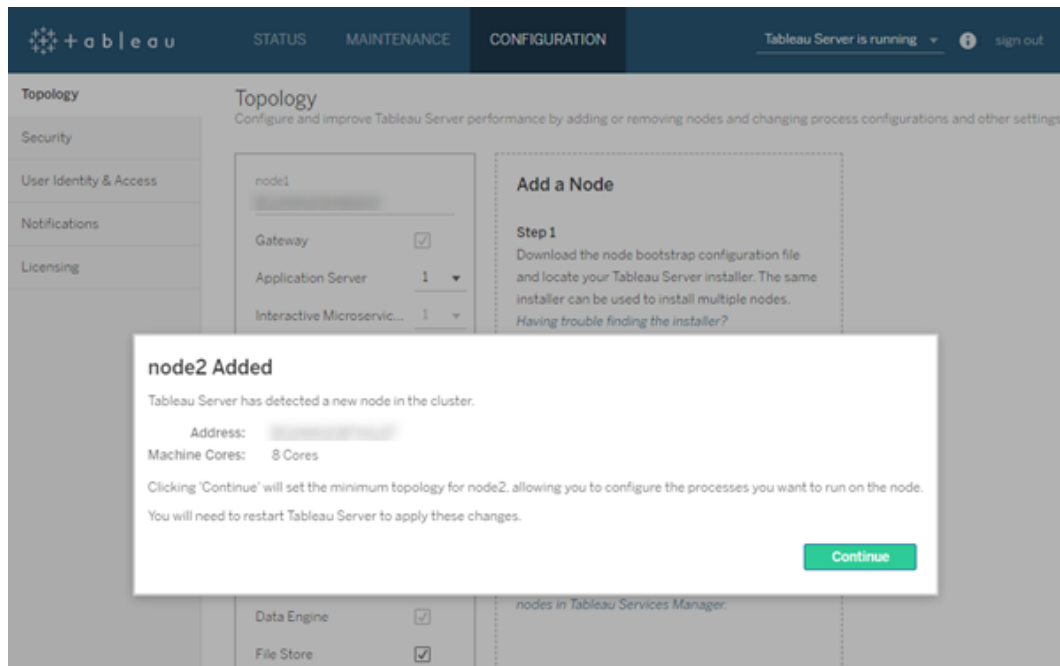
To complete the process of adding new nodes to your cluster, you need to configure them with a minimum topology. With a minimum topology, the only pending change will be the addition of Cluster Controller, which is required on each node. If you want other processes on the nodes you can add most of them at the same time. This example only configures the nodes with Cluster Controller.

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab. A message should tell you that new nodes were added.



Click **Continue** to dismiss the message.

3. Click **Pending Changes** at the top of the page:



If you are configuring a cluster with three or more nodes, a Coordination Service ensemble warning displays. You can continue. You will deploy a Coordination Service ensemble in a separate step.

4. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

When Tableau Server restarts, the nodes are included with the minimum topology necessary.



### Step 6: Deploy a Coordination Service ensemble

If you install a total of three or more nodes, you should also deploy a Coordination Service ensemble. If you do not, you will get a warning message every time you make changes to the server configuration or topology. You can ignore this message, but as a best practice you should deploy a multi-node Coordination Service ensemble.

When you install Tableau Server, a single instance of the Coordination Service is installed on the initial node. TSM and Tableau Server depend on the Coordination Service to function properly, so to provide redundancy and ensure availability on multi-node installations, configure additional instances of the Coordination Service by deploying a Coordination Service ensemble. Coordination Service ensembles are installed with one, three or five instances of the Coordination Service. In a three-node installation of Tableau Server, the recommended number of Coordination Service instances is three, one on each node.

Do not attempt to deploy a Coordination Service ensemble if there are other changes pending. Discard or apply any pending changes before deploying a new Coordination Service ensemble.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

The following steps illustrate how to deploy a new Coordination Service ensemble on an existing three-node Tableau Server cluster and clean up the old ensemble.

1. On the initial node, open a command prompt as administrator.
2. Stop Tableau Server:

```
tsm stop
```

If prompted, sign in as a TSM administrator.

Some TSM processes will continue to run, including the Administration Controller and Administration Agent.

3. Confirm there are no pending changes:

```
tsm pending-changes list
```

If there are pending changes, you need to either discard the changes or apply them.

Applying pending changes will take some time:

- Discard the changes

```
tsm pending-changes discard
```

or

- Apply the changes:

```
tsm pending-changes apply
```

Wait until the command completes and you are returned to the system prompt.

4. Get the node IDs for each node in the cluster:

```
tsm topology list-nodes -v
```

5. Use the `tsm topology deploy-coordination-service` command to add a new Coordination Service ensemble by adding the Coordination Service to specified nodes. You must specify the node(s) that the Coordination Service should be added to, using the actual node ID to identify each node. The command also makes the new ensemble the "production" ensemble (the ensemble in use) and removes the old ensemble, unless the deployment fails. If this happens, see step 6 below.

**Note:** A "y/n" prompt displays confirming that a server restart will take place. To run the command without input, include the `--ignore-prompt` option.

## Tableau Server on Windows Help

For example, deploy the Coordination Service to all three nodes of a three-node cluster, where the nodes are node1, node2 and node3:

```
tsm topology deploy-coordination-service -n node1,node2,node3
```

Wait until the command completes and you are returned to the system prompt.

6. (Optional) If the deployment fails, you need to run the `tsm topology cleanup-coordination-service` command to remove the unsuccessfully deployed ensemble. For details on running the command, see `tsm topology cleanup-coordination-service`.

7. Start Tableau Server:

```
tsm start
```

For more information and details on deploying a new Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

### Step 7: Configure Client File Services (CFS) on additional nodes

Add CFS to additional nodes. We recommend you add CFS to every node running the Coordination Service.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are adding CFS to:

```
tsm topology list-nodes -v
```

3. Add CFS on the node by specifying the node, the process, and a single instance.

For example, this command adds an instance of CFS to node2:

```
tsm topology set-process -n node2 -pr clientfileservice -c 1
```

If you attempt to add an instance of CFS to a node that already is configured with CFS, an error message will let you know there is already an instance on the node.

To add CFS to additional nodes, repeat this step for each node.

4. Apply the changes:

```
tsm pending-changes apply
```

#### Step 8: Configure processes for node 2

1. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab.
3. Specify the processes and number of instances that should run on the first additional node.

In this example:

- a. Select **Gateway**.
- b. Set the **Application Server** (vizportal) count to 2.
- c. Set the **VizQL Server** count to 2.
- d. Set the **Cache Server** count to 2.
- e. Set the **Backgrounder** count to 2.

Adding Backgrounder to a node will also add an instance of Data Engine if one is not already on the node.

- f. Set the **Data Server** count to 2.
- g. Select **File Store**.
- h. Select **Repository** (pgsql).
- i. Select **Metrics Service**. (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).)
- j. Select **Messaging Service**.
- k. Select **Data Source Properties**.
- l. Select **Content Exploration Service**.
- m. Select **Collections Service**.
- n. Select **Search and Index Server**.

The specific processes and process counts you set will depend on your organisational environment and needs. Some processes are added automatically when you add another process. For more information, see [Configure Nodes and Tableau Server Processes](#).

**Note:** The TSM Web UI limits you to a maximum of 8 instances of processes that allow you to select the number of instances. To configure more instances than this, use the command line and the `TSM topology set-process` command. For more information, see [tsm topology set-process](#).

## Step 9: Configure processes for node 3

1. In TSM, on the **Configuration** tab, specify the processes and number of instances that should run on the second additional node.

In this example:

- a. Select **Gateway**.
- b. Set the **Application Server** (vizportal) count to 2.
- c. Set the **VizQL Server** count to 2.
- d. Set the **Cache Server** count to 2.
- e. Set the **Backgrounder** count to 2.

Adding Backgrounder to a node will also add an instance of Data Engine if one is not already on the node.

- f. Set the **Data Server** count to 2.
- g. Select **File Store**.
- h. Select **Metrics Service**. (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).)
- i. Select **Data Source Properties**.
- j. Select **Content Exploration Service**.
- k. Select **Collections Service**.
- l. Select **Search and Index Server**.

2. Click **Pending Changes** at the top of the page:



The Pending Changes list displays.

3. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

## Use the TSM CLI

**Note:** This method of installation from the command line requires you to set Windows environment variables on each additional node for the username and password of an administrator on the initial node. For an alternate method of automating Tableau Server installation without including unencrypted credentials, see Automated Installation of Tableau Server.

Step 1: Install the initial node

See Install and Configure Tableau Server.

Step 2: Generate a bootstrap file for the additional nodes

To install Tableau Server on additional computers you use the same installer you did for the initial node, along with a "bootstrap" file you generate on the initial node.

**Important:** The bootstrap file contains a copy of the master keystore file used for encrypting the configuration secrets. The file can also embed credentials which are valid for a pre-determined amount of time (see `tabadmincontroller.auth.expiration.minutes`) and serve as a session cookie. We strongly recommend that you take additional measures to secure the bootstrap file.

1. After installing Tableau Server on the initial node, generate the node bootstrap file.
2. On the initial node, open a command prompt as administrator.
3. Type this command to generate the bootstrap file:

```
tsm topology nodes get-bootstrap-file --file <path\file>.json
```

Embedded credentials are included in the bootstrap file by default. If you don't want the bootstrap file to include credentials, use the `-nec` or `--no-embedded-credentials` option:

```
tsm topology nodes get-bootstrap-file --file <path\file>.json -  
-no-embedded-credentials.
```

If you want to completely disable the ability to include embedded credentials in node bootstrap files, you can set a configuration option for the server. See [features.PasswordlessBootstrapInit](#) for more details.

### Step 3: Install and initialise node 2

1. Copy the original installer you used on the first computer along with the bootstrap file you generated and put them in a location accessible from the new computer you are adding Tableau Server to. This could be a mounted network share, or directly on the new computer.
2. If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#).
3. On the new node, run the Tableau Server Setup program. This should be the same installer program you ran on the initial node to install Tableau Server.

```
TableauServer-64bit-<version>.exe /silent /accepteula /embed-  
dedcredential /bootstrapfile="path\bootstrapfile"
```

For more information about switches you can use with the Setup program, see [Install Switches and Properties for Tableau Server](#).

### Step 4: Install and initialise node 3

Install Tableau Server on node 3:



## Tableau Server on Windows Help

1. Copy the original installer you used on the first computer along with the bootstrap file you generated and put them in a location accessible from the new computer you are adding Tableau Server to. This could be a mounted network share, or directly on the new computer.
2. If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#).
3. On the new node, run the Tableau Server Setup program. This should be the same installer program you ran on the initial node to install Tableau Server.

```
TableauServer-64bit-<version>.exe /silent /accepteula /embeddedcredential /bootstrapfile="path\bootstrapfile"
```

For more information about switches you can use with the Setup program, see [Install Switches and Properties for Tableau Server](#).

### Step 5: Add a process to the additional nodes

1. On the initial node, configure a cluster controller instance on each additional node:

```
tsm topology set-process -n <nodeID_second-node> -pr cluster-controller -c 1
```

```
tsm topology set-process -n <nodeID_third-node> -pr cluster-controller -c 1
```

2. Apply the node configuration changes:

```
tsm pending-changes apply --ignore-warnings
```

A warning about deploying a Coordination Service ensemble displays because you have deployed a three-node cluster. Use the `--ignore-warnings` option to apply the configuration changes in spite of the warning. You will deploy a new Coordination Service ensemble in the next step.

## Step 6: Deploy a Coordination Service ensemble

If you install a total of three or more nodes, you should also deploy a Coordination Service ensemble. If you do not, you will get a warning message every time you make changes to the server configuration or topology. You can ignore this message, but as a best practice you should deploy a multi-node Coordination Service ensemble.

When you install Tableau Server, a single instance of the Coordination Service is installed on the initial node. TSM and Tableau Server depend on the Coordination Service to function properly, so to provide redundancy and ensure availability on multi-node installations, configure additional instances of the Coordination Service by deploying a Coordination Service ensemble. Coordination Service ensembles are installed with one, three or five instances of the Coordination Service. In a three-node installation of Tableau Server, the recommended number of Coordination Service instances is three, one on each node.

Do not attempt to deploy a Coordination Service ensemble if there are other changes pending. Discard or apply any pending changes before deploying a new Coordination Service ensemble.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

The following steps illustrate how to deploy a new Coordination Service ensemble on an existing three-node Tableau Server cluster and clean up the old ensemble.

1. On the initial node, open a command prompt as administrator.
2. Stop Tableau Server:

```
tsm stop
```

If prompted, sign in as a TSM administrator.

Some TSM processes will continue to run, including the Administration Controller and Administration Agent.

3. Confirm there are no pending changes:

```
tsm pending-changes list
```

If there are pending changes, you need to either discard the changes or apply them.

Applying pending changes will take some time:

- Discard the changes

```
tsm pending-changes discard
```

or

- Apply the changes:

```
tsm pending-changes apply
```

Wait until the command completes and you are returned to the system prompt.

4. Get the node IDs for each node in the cluster:

```
tsm topology list-nodes -v
```

5. Use the `tsm topology deploy-coordination-service` command to add a new Coordination Service ensemble by adding the Coordination Service to specified nodes. You must specify the node(s) that the Coordination Service should be added to, using the actual node ID to identify each node. The command also makes the new ensemble the "production" ensemble (the ensemble in use) and removes the old ensemble, unless the deployment fails. If this happens, see step 6 below.

**Note:** A "y/n" prompt displays confirming that a server restart will take place. To run the command without input, include the `--ignore-prompt` option.

For example, deploy the Coordination Service to all three nodes of a three-node cluster, where the nodes are node1, node2 and node3:

```
tsm topology deploy-coordination-service -n node1,node2,node3
```

Wait until the command completes and you are returned to the system prompt.

6. (Optional) If the deployment fails, you need to run the `tsm topology cleanup-coordination-service` command to remove the unsuccessfully deployed ensemble. For details on running the command, see `tsm topology cleanup-coordination-service`.

7. Start Tableau Server:

```
tsm start
```

For more information and details on deploying a new Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

#### Step 7: Configure Client File Services (CFS) on additional nodes

Add CFS to additional nodes. We recommend you add CFS to every node running the Coordination Service.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are adding CFS to:

```
tsm topology list-nodes -v
```

3. Add CFS on the node by specifying the node, the process, and a single instance.

For example, this command adds an instance of CFS to node2:

```
tsm topology set-process -n node2 -pr clientfileservice -c 1
```

If you attempt to add an instance of CFS to a node that already is configured with CFS, an error message will let you know there is already an instance on the node.

To add CFS to additional nodes, repeat this step for each node.

4. Apply the changes:

```
tsm pending-changes apply
```

#### Step 8: Configure processes for node 2

1. On the initial node, set the topology for node 2. The topology specifies which processes should run on the node, and how many instances of each process should run. For details about configuring nodes, see [Configure Nodes](#). Data engine will be added automatically when you add other processes. For details on when data engine is added, see [Tableau Server Processes](#).

- a. Get the node-id for the new node: `tsm topology list-nodes -v`

- b. Specify individual processes that will run on the new node:

```
tsm topology set-process -n <node-id> -pr gateway -c 1
```

```
tsm topology set-process -n <node-id> -pr vizqlserver -c 2
```

```
tsm topology set-process -n <node-id> -pr vizportal -c 2
```

```
tsm topology set-process -n <node-id> -pr backgrounder -c 2
```

```
tsm topology set-process -n <node-id> -pr cacheserver -c 2
```

```
tsm topology set-process -n <node-id> -pr index-  
andsearchserver -c 1
```

```
tsm topology set-process -n <node-id> -pr dataserver -c 2
```

```
tsm topology set-process -n <node-id> -pr filestore -c 1
```

```
tsm topology set-process -n <node-id> -pr pgsql -c 1
```

```
tsm topology set-process -n <node-id> -pr metrics -c 1
```

```
tsm topology set-process -n <node-id> -pr activemqserver -  
c 1
```

```
tsm topology set-process -n <node-id> -pr tdsservice -c 1
```

```
tsm topology set-process -n <node-id> -pr con-  
tentexploration -c 1
```

```
tsm topology set-process -n <node-id> -pr collections -c 1
```

2. Apply the node configuration changes. You will be prompted with a message that Tableau Server will restart.

```
tsm pending-changes apply
```

### Step 9: Configure processes for node 3

On the initial node, set the topology for node 3. The topology specifies which processes should run on the node, and how many instances of each process should run. Data engine will be added automatically when you add other processes. For details on when data engine is added, see [Tableau Server Processes](#).

1. Get the node-id for the new node:

```
tsm topology list-nodes -v
```

2. Specify individual processes that will run on the new node:

```
tsm topology set-process -n <node-id> -pr gateway -c 1
```

```
tsm topology set-process -n <node-id> -pr vizqlserver -c 2
```

## Tableau Server on Windows Help

```
tsm topology set-process -n <node-id> -pr vizportal -c 2
```

```
tsm topology set-process -n <node-id> -pr backgrounder -c 2
```

```
tsm topology set-process -n <node-id> -pr cacheserver -c 2
```

```
tsm topology set-process -n <node-id> -pr indexandsearchserver  
-c 1
```

```
tsm topology set-process -n <node-id> -pr dataserver -c 2
```

```
tsm topology set-process -n <node-id> -pr filestore -c 1
```

```
tsm topology set-process -n <node-id> -pr metrics -c 1
```

```
tsm topology set-process -n <node-id> -pr tdsservice -c 1
```

```
tsm topology set-process -n <node-id> -pr contentexploration -c  
1
```

```
tsm topology set-process -n <node-id> -pr collections -c 1
```

3. Apply the node configuration. You will be prompted with a message that Tableau Server will restart.

```
tsm pending-changes apply
```

4. Start the server:

```
tsm start
```

### Step 10: Configure firewall rules (optional)

If you are running a local firewall, then you need to configure firewall rules for all the nodes in the cluster. For more information, see [Local firewall configuration](#) .

## Add a Load Balancer

At this point, all three nodes have gateways, which are used to route requests to available server processes. All gateways are active, but to further reduce the potential for downtime in the cluster, you can configure a load balancer. For more information, see [Add a Load Balancer](#).

## Add a Load Balancer

You can enhance the reliability of Tableau Server by running gateways on multiple nodes, and configuring a load balancer to distribute requests across the gateways. Unlike the repository process, which can be active or passive, all gateway processes are active. If one gateway in a cluster becomes unavailable, the load balancer stops sending requests to it. The load balancer algorithm you choose determines how the gateways will route client requests.

- **Kerberos:** If you will be using Kerberos authentication, you need to configure Tableau Server for your load balancer before you configure Tableau Server for Kerberos. For more information, see [Configure Kerberos](#).

Microsoft SSPI authentication is not supported with a load balancer.

- **Tested load balancers:** Tableau Server clusters with multiple gateways have been tested with Apache and F5 load balancers.

If you are using an Apache load balancer and creating custom administrative views, you need to connect directly to the Tableau Server repository. You cannot connect through the load balancer.

- **Tableau Server URL:** When a load balancer is in front of a Tableau Server cluster, the URL that's accessed by Tableau Server users belongs to the load balancer, not the initial Tableau Server node.
- **Single load balancer endpoint:** You must configure your load balancers for a single URL endpoint. You cannot configure different endpoint hosts to redirect to the same



Tableau Server deployment. The single external URL is defined in `gateway.public.host` when you configure Tableau Server, as described in [Configuring Proxies and Load Balancers for Tableau Server](#).

- **Trusted host settings:** The computer running the load balancer must be identified to Tableau Server as a trusted host, as described in [Configuring Proxies and Load Balancers for Tableau Server](#).

## Configure Tableau Server to work with a load balancer

The settings used to identify a load balancer to Tableau Server are the same ones that are used to identify a reverse proxy server. If your Tableau Server cluster requires both a proxy server and a load balancer, both must use a single external URL defined in `gateway.public.host` and all proxy servers and load balancers must be specified in `gateway.trusted` and `gateway.trusted_hosts`. See [Configuring Proxies and Load Balancers for Tableau Server](#).

## Deploy a Coordination Service Ensemble

The Coordination Service is built on [Apache ZooKeeper](#), an open-source project, and coordinates activities on the server, guaranteeing a quorum in the event of a failure, and serving as the source of "truth" regarding the server topology, configuration and state. The service is installed automatically on the initial Tableau Server node, but no additional instances are installed as you add additional nodes. Because the successful functioning of Tableau Server depends on a properly functioning Coordination Service, we recommend that for server installations of three or more nodes, you add additional instances of the Coordination Service by deploying a new Coordination Service ensemble. This provides redundancy and improved availability in the event that one instance of the Coordination Service has problems.

**Important:** The process to deploy a Coordination Service ensemble changed as of version 2020.1.0. If you are running an earlier version of Tableau Server, see the

documentation for that version. You can find documentation for all supported versions here: [Tableau Help](#)

- Hardware requirements
- The Coordination Service Quorum
- Deploy a new Coordination Service ensemble

## Hardware requirements

The hardware you use for Tableau Server can have an effect on how well the Coordination Service runs. In particular:

- **Memory.** The Coordination Service maintains state information in memory. By design, the memory footprint is small, and is typically not a factor in overall server performance.
- **Disk speed.** Because the service stores state information on disk, it benefits from fast disk speed on the individual node computers.
- **Connection speed** between nodes. The service communicates continuously between cluster nodes; a fast connection speeds between nodes helps with efficient synchronisation.

Because the Coordination Service is I/O intensive, if you are running Tableau Server on computers that meet or just exceed the minimum hardware requirements, you may want to configure a Coordination Service ensemble that puts the service on nodes that are not being used for other server processes. This reduces the chance of delays due to I/O contention between server processes. For information on how to deploy an ensemble on dedicated Coordination Service-only nodes, see [Configure Tableau Server for High Availability with Coordination Service-Only Nodes](#).

## The Coordination Service Quorum

To ensure that the Coordination Service can work properly, the service requires a *quorum* – a minimum number of instances of the service. This means that the number of nodes in your

installation impacts how many instances of the Coordination Service you want to configure in your ensemble.

### Number of Coordination Service instances to use

The maximum number of Coordination Service instances you can have in an ensemble on Tableau Server depends on how many Tableau Server nodes you have in your deployment. Configure a Coordination Service ensemble based on these guidelines:

Total number of server nodes	Recommended number of Coordination Service nodes in ensemble (must be 1, 3, or 5)	Notes
1-2 nodes	1 node	This is the default and requires no changes unless you want to move the Coordination Service off your initial node and onto your additional node.
3-4 nodes	3 nodes	
5 or more nodes	3 nodes or 5 nodes	<p>Five is the maximum number of Coordination Service instances you can install. A 3-node Coordination Service ensemble allows for one of the ensemble nodes to fail without causing Tableau Server to fail. A 5-node ensemble allows for two of the ensemble nodes to fail without causing Tableau Server to fail.</p> <p>For most installations, three Coordination Service nodes are adequate, and because of the I/O-intensive nature of the Coordination Service, this is the most performant configuration.</p> <p>If high availability is your absolute priority, you may want to consider deploying a 5-node Coordination</p>

Total number of server nodes	Recommended number of Coordination Service nodes in ensemble (must be 1, 3, or 5)	Notes
		<p>Service ensemble. This provides the most redundancy in the event that one or more nodes fail but will require more system resources. A maximum of two of the ensemble nodes can fail without impacting Tableau Server (as long as any other services on the node also exist on still-functioning nodes).</p> <p>To reduce performance impact, locate the Coordination Service on nodes that are running fewer other services or consider using Coordination Service-only nodes. For details, see <a href="#">Configure Tableau Server for High Availability with Coordination Service-Only Nodes</a>.</p>

## Deploy a new Coordination Service ensemble

If you install a total of three or more nodes, you should also deploy a Coordination Service ensemble. If you do not, you will get a warning message every time you make changes to the server configuration or topology. You can ignore this message, but as a best practice you should deploy a multi-node Coordination Service ensemble.

When you install Tableau Server, a single instance of the Coordination Service is installed on the initial node. TSM and Tableau Server depend on the Coordination Service to function properly, so to provide redundancy and ensure availability on multi-node installations, configure additional instances of the Coordination Service by deploying a Coordination Service ensemble. Coordination Service ensembles are installed with one, three or five instances of

the Coordination Service. In a three-node installation of Tableau Server, the recommended number of Coordination Service instances is three, one on each node.

Do not attempt to deploy a Coordination Service ensemble if there are other changes pending. Discard or apply any pending changes before deploying a new Coordination Service ensemble.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

The following steps illustrate how to deploy a new Coordination Service ensemble on an existing three-node Tableau Server cluster and clean up the old ensemble.

1. On the initial node, open a command prompt as administrator.
2. Stop Tableau Server:

```
tsm stop
```

If prompted, sign in as a TSM administrator.

Some TSM processes will continue to run, including the Administration Controller and Administration Agent.

3. Confirm there are no pending changes:

```
tsm pending-changes list
```

If there are pending changes, you need to either discard the changes or apply them. Applying pending changes will take some time:

- Discard the changes

```
tsm pending-changes discard
```

or

- Apply the changes:

```
tsm pending-changes apply
```

Wait until the command completes and you are returned to the system prompt.

4. Get the node IDs for each node in the cluster:

```
tsm topology list-nodes -v
```

5. Use the `tsm topology deploy-coordination-service` command to add a new Coordination Service ensemble by adding the Coordination Service to specified nodes. You must specify the node(s) that the Coordination Service should be added to, using the actual node ID to identify each node. The command also makes the new ensemble the "production" ensemble (the ensemble in use) and removes the old ensemble, unless the deployment fails. If this happens, see step 6 below.

**Note:** A "y/n" prompt displays confirming that a server restart will take place. To run the command without input, include the `--ignore-prompt` option.

For example, deploy the Coordination Service to all three nodes of a three-node cluster, where the nodes are node1, node2 and node3:

```
tsm topology deploy-coordination-service -n node1,node2,node3
```

Wait until the command completes and you are returned to the system prompt.

6. (Optional) If the deployment fails, you need to run the `tsm topology cleanup-coordination-service` command to remove the unsuccessfully deployed ensemble. For details on running the command, see `tsm topology cleanup-coordination-service`.

7. Start Tableau Server:

```
tsm start
```

## Configure Client File Service

The Client File Service (CFS) manages most shared files in a multinode cluster. For example, authentication related certificates, keys and files (OpenID, mutual SSL, SAML and Kerberos), and customisation files are managed by CFS.

A single instance of CFS is configured on the initial node when you first install Tableau Services Manager (TSM) and Tableau Server. You can and should configure additional instances on other nodes.

In a cluster, if a node that is running your only instance of CFS fails, any files being managed by CFS will be lost, and you will need to repopulate CFS those files by reimporting certs and custom images, and making any related configuration changes. For a list of files managed by CFS, see [Tableau Server Client File Service](#).

Keep in mind these limitations and recommendations:

- There must be at least one instance of CFS for any Tableau Server installation. You cannot remove all instances of CFS.
- We recommend you do not configure more than one instance on any one node. Additional instances would not provide any benefit and would be a waste of resources.
- We recommend you configure a CFS instance on each node where you deploy the Coordination Service. This provides redundancy and helps safeguard Tableau Server from unexpected errors in case a node fails.

This article explains how to add or remove an instance of CFS. You cannot configure CFS from the Web UI. You must use the CLI to add or remove CFS. The procedure is the same one you use for adding a process to a node.

### Configure CFS on additional nodes

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are adding CFS to:

```
tsm topology list-nodes -v
```

3. Add CFS on the node by specifying the node, the process, and a single instance.

For example, this command adds an instance of CFS to node2:

```
tsm topology set-process -n node2 -pr clientfileservice -c 1
```

If you attempt to add an instance of CFS to a node that already is configured with CFS, an error message will let you know there is already an instance on the node.

To add CFS to additional nodes, repeat this step for each node.

4. Apply the changes:

```
tsm pending-changes apply
```

## Repository Failover

In a Tableau Server installation, the repository (pgsql) database is one of the key required processes. The Tableau Server repository stores information about Tableau Server users, groups and group assignments, permissions, projects, data sources and extract metadata and refresh information. Because it is critical to the server functioning, Tableau Server has a built-in automatic "failover" for the repository when server is installed in a distributed environment that meets certain requirements.

### Automatic repository failover

Automatic repository failover means that if there is a problem with the active Tableau Server repository, the server will automatically switch to using the passive repository. This does not happen immediately, to protect against ephemeral issues with the repository that don't justify a switch, but if the repository is unavailable for more than 1–5 minutes, failover occurs. For example, if the underlying PostgreSQL service fails, then failover will occur in about a minute. However other configuration problems may not trigger a failure for up to 5 minutes.

For automatic repository failover to work, your Tableau Server installation needs:



- A minimum of three nodes
- Two instances of the repository installed

Optional but highly recommended:

- A multi-node Coordination Service ensemble deployed

With these conditions satisfied, repository failover will occur if the active repository becomes unavailable, either due to a problem with the process or a problem with the node the process is running on. If the original repository becomes available again (if, for example, the node is restarted and all processes come up properly), it is made the passive repository, available for failover if necessary.

### Manual repository failover

There may be reasons you want to shift back to the original repository after failover occurs. One reason would be if that instance of the repository is installed on a computer with more resources. To do this, use the `tsm topology failover-repository` command to manually switch back to the original repository. For more information, see `tsm topology failover-repository`.

### Preferred active repository

When you configure Tableau Server you have the option to specify a node as the preferred active repository. When Tableau Server is configured for repository failover, the preferred active repository node is the one used for the active repository. This is an optional step, and if you do not specify a preferred active repository node, Tableau Server will select the active repository node on startup.

To configure the preferred active repository, use the `tsm configuration set` command to configure the `pgsql.preferred_host` option:

```
tsm configuration set -k postgresql.preferred_host -v "<host_name>"
```

**Note:** The `host_name` is case-sensitive and must match the node name shown in the output of `tsm status -v`.

Configure a preferred active repository node if you want Tableau Server to select a specific node on startup. You might want to do this if you have a particular server you want to use for your active repository (a computer with more disk space or memory for example), or if you are using custom administrative views. Custom administrative views have embedded connection information that refers to the repository for which you created the views. For more information on connecting to the Tableau Server repository, see [Collect Data with the Tableau Server Repository](#)

## Recover from an Initial Node Failure

The first computer you install Tableau on, the "initial node", has some unique characteristics. Three processes run only on the initial node and cannot be moved to any other node except in a failure situation, the Licence Service (Licence Manager), Activation Service and TSM Controller (Administration Controller). Tableau Server includes a script that automates moving these processes to one of your other existing nodes so you can get complete access back to TSM and keep Tableau Server running.

Two other processes are initially included on the initial node but can be added or moved to additional nodes, the CFS (Client File Service) and the Coordination Service. Depending on how your installation was configured with CFS and Coordination Service, you may also need to take steps to redeploy these.

### If an initial node fails

If there is a problem with the initial node and you have redundant processes on your other nodes, there is no guarantee that Tableau Server will continue to run.

- Tableau Server can continue to run for up to 72 hours after an initial node failure, before the lack of the licensing service impacts other processes. If so, your users may be able to continue to sign in and see and use their content after the initial node fails,

but you will not be able to reconfigure Tableau Server because you won't have access to the Administration Controller.

- If you are running a version of Tableau Server 2021.4.2 (or older) that is configured for ATR, then problems with the initial node will render all server functionality unavailable. This is true whether the node has a problem or if you intentionally stop it (for instance, to do a system-level patch).

Even when configured with redundant processes, *it is possible that Tableau Server may not continue to function after the initial node fails*. This is true even when an installation is configured for high availability. This means you should make a point of moving the two unique processes to another of your running nodes as soon as possible. If your initial node fails for reasons that are recoverable in a relatively short amount of time (for example, a hardware failure you can correct), you should first attempt to bring the node back up without using the procedure below.

**Note:** The steps in this article require server downtime and can be disruptive, and should only be used in the event of a catastrophic failure of the initial node. If you are unable to get your initial node running again, use the following steps to move key TSM processes to another node in your cluster.

## General requirements

The 2021.1 version of Tableau Server has been updated with improved recovery functionality. The procedure in this topic has been written for Tableau Server 2021.1.

If you are attempting to recover a failed node from an earlier version of Tableau Server, you must follow the procedure for that version. To view archived versions of Tableau help, see [Tableau Help](#).

- As part of the process for setting up a multi-node Tableau Server installation you should have deployed a Coordination Service ensemble. The process below assumes there was a Coordination Ensemble deployed before there was a problem with the initial node. For more information about deploying a Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

- This process assumes that you have configured instances of Client File Service (CFS) on every node that is running the Coordination Service. If you did not add additional instances of CFS, your only instance was on the initial node, and you will need to add at least one instance of CFS to another node. You will also need to repopulate CFS. Tableau Server requires at least one instance of the CFS. For more information, see [Configure Client File Service and Tableau Server Client File Service](#).

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

## Move the TSM Controller, Licence Service and Activation Service to another node

If there is a problem with the initial node, the TSM Controller, the Licensing Service, and Activation Service need to be started on another node. Follow these steps to use the provided `move-tsm-controller` script and get the TSM Controller, Licensing Service and Activation Service working on another node.

1. On a node that is still working, run the Controller recovery script. To do this, open a command prompt, navigate to the Tableau Server script directory (By default: `C:\Program Files\Tableau\Tableau Server\packages\scripts.<version_code>\`), and type the following command:

```
move-tsm-controller -n <nodeID>
```

where "nodeID" is the ID for the node you want the TSM Controller to run on. For example:

```
move-tsm-controller -n node2
```

2. Close and reopen the command window and verify the Administration Controller is running on the node by typing this command:

```
tsm status -v
```

3. Stop Tableau Server.

The remainder of this procedure includes some commands with the `--ignore-node-status` option. When a command is run with the `--ignore-node-status` option, the command will run without consideration of the status of the specified node. To use `--ignore-node-status`, specify the failed node:

```
tsm stop --ignore-node-status <nodeID>
```

For example, if node1 has failed, run the command as follows:

```
tsm stop --ignore-node-status node1
```

4. Add the Licence Service to the node:

```
tsm topology set-process -pr licenseservice -n <nodeID> -c 1
```

5. Remove the old Licence Service from the original node, where "nodeID" is the initial node that has failed:

```
tsm topology set-process -pr licenseservice -n <nodeID> -c 0
```

6. If you are running one of the following versions

- 2023.3.0 or later
- 2023.1.3 or later
- 2022.3.7 or later
- 2022.1.15 or later

or you are running an earlier version and using ATR, add the Activation Service to the new node:

```
tsm topology set-process -pr activation-service -n <nodeID> -c 1
```

7. If you are running one of these versions or later

- 2023.3.0 or later
- 2023.1.3 or later
- 2022.3.7 or later
- 2022.1.15 or later

or you are running an earlier version and using ATR, remove the old Activation Service from the original node, where "nodeID" is the initial node that has failed:

```
tsm topology set-process -pr activation-service -n <nodeID> -c 0
```

**Important:** In a cluster, if a node that is running your only instance of CFS fails, any files being managed by CFS will be lost, and you will need to repopulate CFS those files by reimporting certs and custom images, and making any related configuration changes. For a list of files managed by CFS, see [Tableau Server Client File Service](#).

8. If the initial node had been running the Messaging Service, add the Messaging Service to this node:

```
tsm topology set-process -pr activemqserver -n node2 -c 1
```

9. (Optional) You can also add other processes that had been running on the initial node but are not running on this node. For example, to add an cache server:

```
tsm topology set-process -pr cacheserver -n node2 -c 1
```

## 10. Apply the changes:

```
tsm pending-changes apply --ignore-node-status <nodeID>
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## 11. Restart the TSM Administration Controller:

```
net stop tabadmincontroller_0  
  
net start tabadmincontroller_0
```

**Note:** You must run these commands as an administrator from a command prompt. Depending on how your computer is configured, you may need to run them in the `C:\Windows\System32` folder.

**Note:** It may take a few minutes for `tabadmincontroller` to restart. If you attempt to apply pending changes in the next step before the controller has fully restarted, TSM will not be able to connect to the controller. You can verify that the controller is running by using the `tsm status -v` command. Tableau Server Administration Controller should be listed as "is running".

## 12. Apply pending changes (there may not appear to be any, but this step is required):

```
tsm pending-changes apply --ignore-node-status <nodeID>
```

## 13. Activate the Tableau Server licence on the new Controller node:

```
tsm licenses activate -k <product-key>
```

14. Verify the licence is properly activated:

```
tsm licenses list
```

15. If the initial node was running the Coordination Service, you need to deploy a new Coordination Service ensemble that does not include that node. If you have a three node cluster and the initial node was running the Coordination Service, you must deploy a new, single-instance Coordination Service ensemble on a different node and clean up the old ensemble. In this example, a single instance of the Coordination Service is being deployed to the second node:

```
tsm topology deploy-coordination-service -n node2 --ignore-  
node-status node1
```

16. If the initial node was running a File Store instance, you need to remove that instance:

```
tsm topology filestore decommission -n <nodeID> --delete-  
filestore
```

Where `nodeID` is the initial node that has failed.

17. Apply pending changes, using the `--ignore-warnings` flag if the new Coordination Service ensemble you deployed above is a single node ensemble:

```
tsm pending-changes apply --ignore-node-status node1 --ignore-  
warnings
```

18. Remove the initial node, where `nodeID` is the initial node that has failed:

```
tsm topology remove-nodes -n <nodeID>
```

19. Apply pending changes, using the `--ignore-warnings` flag if the new Coordination Service ensemble you deployed above is a single node ensemble:

```
tsm pending-changes apply --ignore-warnings
```



20. Start Tableau Server:

```
tsm start
```

At this point your server should start, and you will be able to use TSM to configure it. The next step is to replace your initial node so your cluster has the original number of nodes. How you do this depends on whether or not you want to reuse the node that failed. We recommend that you only reuse that node if you are able to identify the reason it failed, and take steps to keep the failure from recurring.

21. If you plan to reuse the original node, you first need to completely remove Tableau from it. Do this by running the `tableau-server-obliterate` script. For details on doing this, see [Remove Tableau Server from Your Computer](#).
22. On a fresh computer, or on your original computer after completely removing Tableau, install Tableau using your original Setup program and a bootstrap file generated from the node that is now running the Administration Controller and Licensing Service. This creates an additional node you can configure as part of your cluster. For details on how to add the node, see [Install and Configure Additional Nodes](#).

A best practice is to configure any processes you lost when the original node failed, to make sure your cluster is fully redundant. You may want to move processes from your new initial node to the newly added additional node to duplicate your original configuration. For example, if your initial node was only running gateway and File Store, you may want to configure the new initial node the same way.

23. You should also redeploy a new Coordination Service ensemble, once you have your nodes up and running the way you want. For details, see [Deploy a Coordination Service Ensemble](#).
24. Finally, if you have not already done this, add an instance of CFS to every node that is running the Coordination Service. For more information, see [Configure Client File Service](#)

In a cluster, if a node that is running your only instance of CFS fails, any files being managed by CFS will be lost, and you will need to repopulate CFS those files by reimporting certs and custom images, and making any related configuration changes. For a list of files managed by CFS, see [Tableau Server Client File Service](#).

## Recover from a Node Failure

If there is a problem with one of your server nodes, and you have redundant processes on your other nodes, Tableau Server can continue to run. Your users can continue to sign in and see and use their content after the node fails, but they may experience performance degradation as a result of the failed node. In addition, your server will be at greater risk of catastrophic failure if the bad node was running processes that are no longer redundant. This means you should make a point of removing the bad node and replacing it as soon as you can. If your node fails for reasons that are recoverable in a relatively short amount of time (for example, a hardware failure you can correct), you should first attempt to bring the node back up without using the procedure below.

**Note:** If the failed node is your *initial* node, there are larger implications for your Tableau Server installations. For details on how to recover from the failure of an initial node, see [Recover from an Initial Node Failure](#).

## General requirements

The 2020.1 version of Tableau Server has been updated with improved recovery functionality. The procedure in this topic has been written for Tableau Server 2020.1.

If you are attempting to recover a failed node from an earlier version of Tableau Server, you must follow the procedure for that version. To view archived versions of Tableau help, see [Tableau Help](#).

- There is at least one functioning node with an instance of the File Store on it.
- There is at least one functioning node with a Repository on it.
- There is at least one functioning node with the Client File Service (CFS) on it.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

## Removing a Failed Node

To remove a failed node from a Tableau Server cluster:

1. Identify the failed node:

```
tsm status -v
```

The failed node will have a status of "ERROR" and processes will show as unavailable.

The node ID is listed as "node<n>" with the machine name following it. For example, node3:

```
node3: WIN-00915SFASVH
```

```
Status: ERROR
```

```
'Tableau Server Gateway 0' status is un
```

2. Stop Tableau Server.

The remainder of this procedure includes some commands with the `--ignore-node-status` option. When a command is run with the `--ignore-node-status` option, the command will run without consideration of the status of the specified node. To use `--ignore-node-status`, specify the failed node:

```
tsm stop --ignore-node-status <nodeID>
```

For example, if node3 has failed, run the command as follows:

```
tsm stop --ignore-node-status node3
```

3. Determine any key processes that were running on the node:

- If the failed node was running the Messaging Service, you need to remove the service from the failed node and add it to a working node.

Remove it from the failed node:

```
tsm topology set-process -pr activemqserver -n <nodeID> -c
0
```

Add it to a working node:

```
tsm topology set-process -pr activemqserver -n <nodeID> -c
1
```

- If the failed node was running the Coordination Service, you need to deploy a new ensemble before you can remove the node:

```
tsm topology deploy-coordination-service -n <good_nodeID>
--ignore-node-status <failed_nodeID>
```

- If the failed node was running the only instance of Client File Service (CFS), you need to configure a new instance of CFS on a working node. We recommend that you configure CFS on every node that is running the Coordination Service. For detail steps, see [Configure Client File Service](#).
- If the failed node was running File Store, you need to force-decommission File Store and remove it before you can remove the node.

```
tsm topology filestore decommission -n <nodeID> --delete-
filestore
```

Apply pending changes (use `--ignore-warnings` option if you had a three node cluster and a single Coordination Service instance):

## Tableau Server on Windows Help

```
tsm pending-changes apply --ignore-warnings --ignore-node-status <nodeID>
```

4. If the cluster was a three-node cluster and there are repositories on the remaining working nodes, you need to either remove one repository, or add a new node. This is because you are limited to a single instance of the repository when you have fewer than three nodes.

To remove one repository:

```
tsm topology set-process -n <nodeID> -pr pgsql -c 0
```

5. Run the command to remove the failed node. This adds the change to the pending changes list:

```
tsm topology remove-nodes -n <nodeID>
```

6. Verify the node removal is pending:

```
tsm pending-changes list
```

7. Apply pending changes to remove the node:

```
tsm pending-changes apply
```

8. Start Tableau Server:

```
tsm start
```

9. Install Tableau Server on a new node and configure the node with the processes that the old, failed node had been running.
10. On a fresh computer, or on your original computer after completely removing Tableau, install Tableau using your original Setup program and a bootstrap file generated from the initial node. For details on how to do this, see [Install and Configure Additional Nodes](#).

A best practice is to configure any processes you lost when the original node failed, to make sure your cluster is fully redundant.

11. You should also redeploy a new Coordination Service ensemble, once you have your nodes up and running the way you want. For details, see [Deploy a Coordination Service Ensemble](#).
12. Finally, if you have not already done this, add an instance of CFS to every node that is running the Coordination Service. For more information, see [Configure Client File Service](#)

## Configure Nodes

Use the Tableau Services Manager (TSM) Web UI or CLI commands to configure the topology of a node. The initial node is configured with a default that includes all the processes used by TSM and Tableau Server. When you add additional nodes you need to specify which processes will run on those nodes, and how many instances of those processes will run. You may also want to change the topology of the initial node, either adding instances of existing processes, or moving some of those processes to your additional nodes (this is common when setting up a distributed installation of Tableau Server).

**Note:** You cannot remove the File Store or Repository (pgsql) if this is the only instance of that process in your cluster. You must have at least one instance of each of the processes in your Tableau Server installation, and you must add the second instance and allow it to synchronise with the first before you remove the process on the original node. For more information see [Move the Repository Process](#) and [Move the File Store Process](#).

**Note:** If you have Tableau Resource Monitoring Tool Agent installed on this node, you will need to update the Resource Monitoring Tool Master Server to reflect the changes you make to a Tableau Server node. Changes include adding or removing processes, or changing the number of processes on a node. For more information, see Tableau Server Topology Changes.

## Use the TSM web interface

In most cases, you can make multiple changes to your server configuration. Exceptions are if you are moving or removing a File Store instance or the Repository.

To configure your Tableau Server nodes using the TSM web interface, do the following:

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

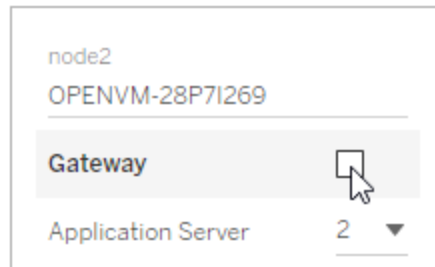
2. Click the **Configuration** tab.

Your next steps depend on the configuration changes you want to make.

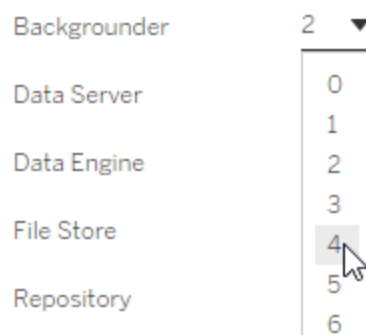
- **Add processes** – Add processes to a node by specifying the number of instances you want on the node, or selecting the box for the process.

For example, to add four instances of the Backgrounder and a Gateway to a node:

- a. Select the **Gateway** box:



- b. Set the **Backgrounder** count to 4:



Adding Backgrounder to a node will also add an instance of Data Engine if one is not already on the node.

**Note:** The TSM Web UI limits you to a maximum of 8 instances of processes that allow you to select the number of instances. To configure more instances than this, use the command line and the `TSM topology set-process` command. For more information, see `tsm topology set-process`.

- **Change process count** – Change the number of processes on a node by specifying the new number, or selecting the box for the process.



- **Remove a process completely** –Remove all instances of a process from a node by clearing the box for the process, or setting the count to 0 (zero).

In most cases you move a process from one node to another by setting the process instance count on the first node to 0 (zero), and setting the count to a non-zero value on the second node.

If you are attempting to make a configuration that is not allowed (if, for example, you try to remove a File Store that has not been decommissioned), a message is displayed to let you know this.

3. Click **Pending Changes** at the top right, and **Apply Changes and Restart** to commit the changes and restart Tableau Server.

## Use the TSM CLI

- Adding processes to a node
- Changing the number of processes on a node
- Removing all instances of a process from a node
- Moving all instances of a process from one node to another node

To configure nodes, run commands from the initial node and use the node ID to specify which node you are configuring. To determine the node ID, use the `tsm topology list-nodes` command. Use the `tsm topology set-process` command to add, update or remove a process on a node. You need to specify the node you are configuring, the process you are adding, updating, or removing, and the number of instances of the process. After setting the topology for a node you need to apply the changes to Tableau Server.

Apply changes using the `tsm pending-changes apply` command. After the changes are applied, Tableau Server is returned to the state it was in before the command was run. This means that if it was running, it will be restarted, and if it was stopped it will remain stopped after pending changes have been applied. In most cases, if Tableau Server is running when you

apply pending changes, the server is stopped so that changes can be applied, and then restarted. The exception is if you are changing the number of instances of Backgrounder, or VizQL Server on an existing node. With changes to those processes on an existing node, Tableau Server does not have to be stopped if it is running.

You need the node ID for a node in order to configure the node. To determine the node ID, use this command:

```
tsm topology list-nodes -v
```

**Note:** Examples here show some process names. For a complete list, see [Tableau Server Processes](#).

### Adding processes to a node

Use the `tsm topology set-process` command to add a process to a node. You need to specify the node you are configuring, the process you are adding, and the number of instances of the process.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are changing:

```
tsm topology list-nodes -v
```

3. Add processes on the node by specifying the process and the number of instances.

For example, this command adds two instances of backgrounder to node1:

```
tsm topology set-process -n node1 -pr backgrounder -c 2
```

4. Apply the changes:

```
tsm pending-changes apply
```

### Changing the number of processes on a node

Change the number of processes on a node by specifying an already configured process and providing a new value for the number of instances.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are changing:

```
tsm topology list-nodes -v
```

3. Change the number of processes on the node by specifying an already configured process and providing a new value for the number of instances.

For example, on a node (node1) that is already running backgrounder, this command changes the number of instances to four:

```
tsm topology set-process -n node1 -pr backgrounder -c 4
```

4. Apply the changes:

```
tsm pending-changes apply
```

### Removing all instances of a process from a node

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are changing:

```
tsm topology list-nodes -v
```

3. Remove a process from a node by specifying a count of 0 instances for that process on the node.

For example, this command removes the backgrounder process from node1:

```
tsm topology set-process -n node1 -pr backgrounder -c 0
```

4. Apply the changes:

```
tsm pending-changes apply
```

### Moving all instances of a process from one node to another node

In most cases you move a process from one node to another by setting the process instance count on the first node to zero, and setting the count to a non-zero value on the second node.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are changing:

```
tsm topology list-nodes -v
```

3. Move a process from one node to another node by specifying a count of 0 instances for that process on the first node and specifying a count of 1 or greater to the second node.

For example, these commands remove Backgrounder from node1 and add two instances of it to node2:

```
tsm topology set-process -n node1 -pr backgrounder -c 0
```

```
tsm topology set-process -n node2 -pr backgrounder -c 2
```

4. Apply the changes:

```
tsm pending-changes apply
```

## Workload Management through Node Roles

Using node roles, you can configure where certain types of workloads are processed on your Tableau Server installation. The node roles features allows you to dedicate and scale resources to specific workloads. You can configure node roles for Backgrounder and File Store.

The Backgrounder node role specifies the type of background tasks that should run on a node, whereas the File Store node role specifies the type extract workload that should run on

a node. Both node roles are specified at a node level. Although these node roles can work independently to optimise selected workload, the two node roles in combination can be used to specialise server nodes to preferentially execute selected workloads to optimise performance extract heavy workloads. This combination is discussed in more detail later in the File Store node roles section.

### Backgrounder node roles

The Backgrounder process runs Tableau Server tasks, including extract refreshes, subscriptions, flow tasks, 'Run Now' tasks and tasks initiated from *tabcmd*. Running all these tasks can use a lot of machine resources. If you have more than one Backgrounder node in your cluster, you can manage your Backgrounder workload by specifying the type of tasks a Backgrounder can run on a node using the Backgrounder node role feature.

This configuration option is currently available only through TSM CLI commands and is only useful on multi-node clusters. If you have only one node, the Backgrounder is set to run all tasks by default and that cannot be changed.

#### Using Backgrounder node roles

The Backgrounder node role feature is intended to give you more control and governance over where certain type of Backgrounder workloads are processed in your Tableau Server installation and allows you to dedicate and scale resources to specific workloads.

For example, if your deployment is heavy on extract and users are running a lot of extract refreshes or encryption jobs, it could be beneficial to dedicate a node to extract refreshes. Similarly, in the case of subscriptions, if your Tableau Server installation processes a lot of subscriptions and you want to ensure that other jobs do not take resources from subscriptions, then you can dedicate a node to subscriptions. In these cases, you would also want to dedicate other backgrounder nodes to workloads other than extract refreshes or subscriptions.

To support high availability, Tableau recommends having multiple nodes that are dedicated towards a specific workload. For example, if you dedicate a node to extract refreshes, you should also configure a second node to process extract refresh workload. This way if a node

dedicated to extract refreshes becomes unavailable, extract refreshes can still be processed by the other node.

#### Configuration options

Configuration	Jobs
all-jobs (default)	All Tableau Server jobs
flows	Flow run jobs.
no-flows	All jobs except flows.
extract-refreshes	Jobs that are created for:  Incremental refreshes, full refreshes, encryption and decryption of all extracts including extracts that flow outputs create.
subscriptions	Subscription jobs
system	System maintenance jobs that interact with other Tableau Server processes. For example, cleaning crashed jobs, reaping database events and syncing Active Directory.
extract-refreshes-and-subscriptions	Extract-refreshes, encryption and decryption of all extracts including extracts that flow outputs generate, and subscription jobs.
no-extract-refreshes	All jobs except extract-refreshes, extract encryption and decryption of all extracts including extracts created from flow outputs.
no-subscriptions	All jobs except subscriptions.
no-extract-refreshes-and-subscriptions	All jobs except extract-refreshes, encryption and decryption of all extracts including extracts created from flow outputs, and subscriptions.
no-system	All jobs except system maintenance jobs.

For more information on how to use the tsm commands to set the node role, see [tsm topology](#).

**Note:** Making configurations to node roles require a restart of the server and will require some downtime. For more information, see [tsm pending-changes](#).

### Licence requirements

Configuring a node to do only a specific type of tasks, like, flows, extract refreshes and subscriptions, you must have one of the following licences activated on your Tableau Server:

- To configure a node to run flows, you must have a valid Data Management licence activated on your server and have Tableau Prep Conductor running on that node. To learn more about Tableau Prep Conductor, see [Tableau Prep Conductor](#).
- To configure a node to run extract refreshes, subscriptions and any combination related to extract refreshes and subscriptions you must have a valid Advanced Management licence activated on your Tableau Server. If the licence expires or is deactivated, you will see an error any time you make a change to the Server configuration. For more information on Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

### Important!

While flows, extract refreshes and subscriptions can be expensive and resource heavy, they are not the only jobs that may require dedicated resources. In the **all jobs** group, there are a variety of System jobs that the Backgrounder executes, such as thumbnail generation for workbooks. Make sure that the nodes that run jobs other than extract refreshes, subscriptions or flows have enough machine resources.

For more information on configuring node roles using TSM commands, see [tsm topology set-node-role](#).

## Considerations

There are some rules you must consider when configuring Backgrounder node roles, which are listed below:

- Only one node role configuration can be set for a node at a time. You cannot configure multiple node roles on a node.
- To configure a node role, there must be at least one Backgrounder process on that node.
- If you have only one Backgrounder node, you must configure this node to run all jobs. This is the default configuration and does not require additional licensing.
- If you have more than one Backgrounder node, combined, they must be configured to handle all jobs. This can be achieved in the following ways:
  - Configure one of the nodes to run all jobs using the all jobs option. This is the easiest and most straightforward way.
  - Using one of the exception configurations on one of the nodes:
    - no-flows
    - no-subscriptions
    - no-extract-refreshes
    - no-extract-refreshes-and-subscriptions

For example, in a cluster where there are three backgrounders, you could have one node configured to run flows, one to run subscriptions and extract refreshes and one to run all jobs except flows, subscription and extract refreshes.

**Note:** The ability to specify node roles to run flows, or run all jobs except flows, or run all jobs was introduced in 2019.1.



## File Store node roles

The Tableau Server File Store controls the storage of extracts. There are three broad categories of workloads that are extract dependent.

Extract Workload	Execution Service
Refresh	Backgrounder
Query	Data Engine
Backup/Restore	Backup/Restore

File Store node role management in combination with Backgrounder node role management gives server admins the ability to specialise server nodes to preferentially execute selected workloads to optimise performance of all categories of extract heavy workloads.

It is possible to specialise a node to execute extract query workloads through a topology that has only stand-alone Data Engine nodes. For more information, see [Optimise for Extract Query-Heavy Environments](#). However, this is at the expense of extract refresh workloads, which are executed by Backgrounder nodes. With the topology-based isolation approach, extract refresh heavy Backgrounder workloads can get slower as none of the Backgrounder nodes have a File Store and thus all extract refresh traffic goes over the network.

With the File Store Node Role configuration option, it is possible to designate certain server nodes that process extract queries to be preferentially selected from the list of server nodes that can do so. This helps speed up workloads such as backup and extract refreshes by allowing server admins to enable File Store on Backgrounder server nodes, which prevents extract queries from running on these nodes. This feature is useful if you have an extract-heavy query workload and an extract-heavy refresh workload and want to achieve optimal extract query and refresh performance.

Guidelines to optimise for extract refresh and backup or restore workloads.

Start from a topology with specialised Data Engine nodes (see Optimise for Extract Query-Heavy Environments).

**Note:** In the below diagram and procedure, node 1 is Initial Node, node 2 is Additional Node 1, node 3 is Additional Node 2 and node 4 is Additional Node 3.

Process	Initial Node	Additional Node 1	Additional Node 2	Additional Node 3
Cluster Controller	✓	✓	✓	✓
Gateway	✓	✓		
Application Server	✓	✓		
VizQL Server	✓ ✓	✓ ✓		
Cache Server	✓ ✓	✓ ✓		
Search & Browse	✓	✓		
Backgrounder	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		
Data Server	✓ ✓	✓ ✓		
Data Engine	✓	✓	✓	✓
File Store			✓	✓
Repository	✓	✓		

### Topology 1 – Dedicated Data Engine Nodes

1. Add File Store to Node 1.

```
tsm topology set-process -n node1 -pr filestore -c 1
```

2. Designate Node 3 and Node 4 to preferentially execute extract-query workloads

```
tsm topology set-node-role -n node3, node4 -r extract-queries
```

3. Designate Node 1 to preferentially execute extract-refresh workloads.

```
tsm topology set-node-role -n node1 -r extract-refreshes
```

4. Designate Node 2 to preferentially execute non-extract-refresh workloads.

```
tsm topology set-node-role -n node2 -r no-extract-refreshes
```

5. Apply pending changes.

```
tsm pending-changes apply
```

Process	Initial Node	Additional Node 1	Additional Node 2	Additional Node 3
Cluster Controller	✓	✓	✓	✓
Gateway	✓	✓		
Application Server	✓	✓		
VizQL Server	✓ ✓	✓ ✓		
Cache Server	✓ ✓	✓ ✓		
Search & Browse	✓	✓		
Backgrounder	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		
Data Server	✓ ✓	✓ ✓		
Data Engine	✓	✓	✓	✓
File Store	✓		✓	✓
Repository	✓	✗		

Topology 2 - Extra File Store Node

**Note:** In your Tableau Server deployment, adding File Store roles to existing nodes will temporarily increase network I/O between all File Store nodes while the new File Store is being synchronised. The duration of this operation is dependent on the volume of data on the File Store and the network bandwidth capacity. The status of synchronisation can be monitored using the TSM Web GUI. If you are adding more than one File Store to your deployment, it is recommended to add them consecutively and wait for the initial synchronisation to complete in between each File Store addition.

Fine tune extract query workload management

When extract queries for email subscriptions and metric alerts are running at the same time that users are interactively viewing extract-based visualisations, users may experience slower than normal viz load times. Use the following node roles to fine tune how these workloads are prioritised.

Node role to use	Type of extract query workload	Example
extract-queries	scheduled	email subscriptions and metric alerts

<code>extract-queries-interactive</code>	<code>interactive</code>	users viewing an extract-based visualisation
--	--------------------------	--

If your server deployment is seeing growth in email subscriptions and metric alerts, you can add nodes and assign the `extract-queries` node role, which makes them more available to handle subscriptions and alerts.

If your server deployment is seeing growth in users viewing extract-based visualisations, you can add nodes and assign the `extract-queries-interactive` node role, which makes them prioritise interactive extract queries to reduce extract-based viz load times. The `extract-queries-interactive` node role is a preference and not strict isolation. This means that queries will be routed to nodes that have the `extract-queries-interactive` node role assigned. If you have multiple nodes with the `extract-queries-interactive` role, queries will be routed based on node health.

For example, add a node and designate it to preferentially execute `extract-queries-interactive` workloads.

- `tsm topology set-node-role -n node4 -r extract-queries-interactive`

### Configuration options

Configuration	Jobs
all-jobs (default)	All Tableau Server jobs
extract-queries	Jobs that are created for extract queries. The nodes selected will run as all-jobs and will prioritise the processing of extract queries.
extract-queries-interactive	Jobs that are created for extract queries. The nodes selected will run as all-jobs and will prioritise the processing of interactive extract queries, such as those that run when a user is looking at their screen and waiting for an extract-based dashboard to load. This is an advanced setting and it should only be used if the cluster has a heavy subscription and alert job workload that causes users to experience

	degraded performance on viz load times that run around the same time as scheduled loads.
--	--

For more information on configuring node roles using TSM commands, see `tsm topology set-node-role`.

### Licence requirements

To configure a node to run extract queries you must have a valid Advanced Management licence activated on your Tableau Server.

## How to see node roles

Use the following command to see what node roles are currently configured on Tableau Server:

```
tsm topology list-nodes -v
```

## Who can do this

Tableau Server Administrators can configure node roles and activate any required product keys.

## Install Tableau Server on a Two-Node Cluster

When you install Tableau Server on a two-node cluster, you can install server processes on one or both nodes. A two-node cluster can improve the performance of Tableau Server, because the work is spread across multiple machines.

Note the following about two-node clusters:

- A two-node cluster does not provide failover or support for high availability.
- You can't install more than one instance of the repository on a two-node cluster, and the repository must be on the initial node.

If you need failover or high availability, or want a second instance of the repository, you must install Tableau Server on a cluster of at least three computers. In a cluster that includes at least three nodes, you can configure two instances of the repository, which gives your cluster failover capability.

## Restart Multi-Node Tableau Server Computers

Restarting the computers running a multi-node installation of Tableau Server requires that you follow a few specific steps.

To restart computers running a multi-node installation of Tableau Server:

1. Stop Tableau Server. To do this:
  - a. On the initial node, open a command prompt as administrator.
  - b. Run this tsm command:

```
tsm stop
```
  - c. Wait until Tableau Server is stopped.
2. Restart the additional node computers. These are all the other computers *except* for the one running TSM Controller.
3. Wait until each of the additional node computers has completely restarted, including the Tableau Services Manager (TSM) processes installed there.
4. Restart the initial node computer (the computer running TSM Controller). When it has completely restarted and Tableau Server is running, connections to each additional node should be restored.

## Maintain a Distributed Environment

After you set up an initial node and one or more additional nodes for a distributed installation, you can perform all subsequent configuration and updates from the initial node, using the TSM CLI or from any computer using a browser and the TSM Web interface.

When you install additional nodes, they are added by computer name. If the computer name of a node changes, you will need to remove and reinstall the node. For details on removing a node, see [Remove a Node](#).

You can monitor the status of the Tableau Server cluster on the TSM Status page. See [View Server Process Status](#) for details.

Additional actions you may need to maintain your distributed environment include:

### Move the Repository Process

Tableau Server relies on the PostgreSQL repository to store server data. There must always be at least one active instance of the repository in any Tableau Server installation, and you can have a maximum of two instances (one active, one passive) if you have at least three nodes in your installation. You cannot remove a repository instance if it is the only instance.

This means that if you want to move the only instance of your repository from one node to another node, you need to add a second instance and synchronise the new repository with the old one before you remove the old one. Synchronise repository instances by starting server. If you've added a new repository, it will automatically synchronise with the existing instance.

If you are deleting a node from your server cluster and that node is hosting the only instance of the repository, you must add a second instance of the repository and synchronise the instances before removing the node.

If you are also moving the file store, you can move the repository at the same time. See [Move the File Store Process](#).

Before making a change to the repository, create a full backup of Tableau Server. For more information, see [tsm maintenance backup](#).

**Important:** You cannot add a second repository instance and remove the first one in the same step. You must have both running so the contents of the first is synchronised with the second, before you remove the original instance.

The steps for moving the repository are:

1. Add a new instance of the repository to another node, start server and wait for it to synchronise with the first repository.
2. Remove the instance of the repository from the original node.

Use the TSM web interface

To move a repository you need to first add a second instance on a second node, and then after the two instances have synchronised all the data in the original repository, remove the original instance. These steps must be done separately to allow for the synchronisation of content between the two instances.

Add a new instance of the repository.

1. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab.
3. For the node you are adding the repository to:  
  
Select **Repository** (pgsql).
4. Click **Pending Changes** at the top of the page:





The Pending Changes list displays.

If you are configuring a three- or five-node cluster and have not deployed a Coordination Service ensemble, a warning will display. You can continue, and deploy a Coordination Service ensemble in a separate step. For details on deploying a Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

5. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.
6. After Tableau Server has restarted, on the **Status** tab, verify that all processes are active.

Remove an instance of the repository.

1. In TSM, on the **Status** tab, verify that all processes are active. When both repositories show as Active, you can remove the first one.
2. Click the **Configuration** tab.
3. For the node you're removing the repository from, clear the **Repository** box.
4. Click **Pending Changes** at the top of the page.

If you are configuring a three- or five-node cluster and have not deployed a Coordination Service ensemble, a warning will display. You can continue, and deploy a Coordination Service ensemble in a separate step. For details on deploying a Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

5. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

Use the TSM CLI

To move a repository you need to first add a second instance on a second node, and then after the two instances have synchronised all the data in the original repository, remove the original

instance. These steps must be done separately to allow for the synchronisation of content between the two instances.

Add a new instance of the repository.

1. Add the repository (pgsql) to another node:

```
tsm topology set-process -n <nodeID> -pr pgsql -c 1
```

2. Apply the changes. If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

```
tsm pending-changes apply
```

3. Wait for the new repository on the second node to synchronise with the repository on the first node.

```
tsm status -v
```

Wait until the new repository status shows as "passive".

Remove an instance of the repository.

Once the new instance of the repository is fully synchronised and shows as "passive" you can remove the original instance:

1. Remove the repository from the first node by setting the process count to 0 (zero):

```
tsm topology set-process -n <nodeID> -pr pgsql -c 0
```

2. Apply the change. If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not

change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

```
tsm pending-changes apply
```

## Move the File Store Process

This topic describes File Store process when configured to run locally on Tableau Server. However, File Store can be run locally as well as external to Tableau Server. For more information on Tableau Server External File Store, see [Tableau Server External File Store](#).

You cannot remove an instance of File Store if it is the only instance on the server. You cannot run Tableau Server without at least one instance of File Store. This means if you need to move the File Store, or if you are deleting a server node that is hosting the only instance of the File Store, you must first move File Store to another node.

Moving the File Store is a two-part process:

- Adding a second instance of File Store (if there is not an existing second instance).
- Decommissioning and removing the original instance of File Store.

This article assumes you have installed Tableau Server on an initial node and at least one additional node. For more information on adding nodes to Tableau Server, see [Install and Configure Additional Nodes](#).

Use the TSM web interface

Adding a second instance of File Store

This procedure assumes you have added an additional node. For more information on adding nodes to Tableau Server, see [Install and Configure Additional Nodes](#).

1. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab.
3. For the node you want to add an instance of File Store on, select **File Store**.

Adding File Store to a node will also add an instance of Data Engine if one is not already on the node.

4. Click **Pending Changes** at the top of the page:



The Pending Changes list displays.

A Coordination Service ensemble warning displays because you are configuring a three-node cluster. You can continue. You will deploy a Coordination Service ensemble in an upcoming step.

5. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

#### Decommissioning and removing an instance of file store

1. In TSM, on the **Status** tab, verify that all processes are active.
2. Click the **Configuration** tab.
3. For the node you're removing File Store from, clear the **File Store** box.




This will generate a warning about decommissioning the File Store before removing it. You cannot remove an instance of File Store unless it has been decommissioned. Click **OK** to decommission and remove the file store. Data Engine will also be removed unless an instance of one of these processes is installed on the node: VizQL Server, Application Server (Vizportal), Data Server or Backgrounder.

4. If you are removing File Store from a node that also has the TSM Administrative Controller (usually the initial node), a warning will caution you about impact to server

backup performance.

Click **Continue** to decommission File Store.

5. Click the **Status** tab to see the status of the decommission. When the instance of File Store is marked "Ready for removal" you can continue.

File Store		Ready for removal		
------------	---	-------------------	---	---

6. Click **Pending Changes** at the top of the page.

Note: If you are configuring a three- or five-node cluster, a Coordination Service ensemble warning will display. You can continue to apply pending changes and deploy a Coordination Service ensemble in a separate step. For information on deploying a Coordination Service ensemble, see [Deploy a Coordination Service Ensemble](#).

7. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

Use the TSM CLI

Adding a second instance of file store

1. Create a full backup of Tableau Server. For more information, see [Back up Tableau Server Data](#).
2. Add the File Store to a second node.

```
tsm topology set-process -n <nodeID> -pr filestore -c 1
```

The File Store is automatically added. Data engine is also added if it is not already on the node.

Apply the configuration changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

3. Check the status of the new file store instance.

```
tsm status -v
```

Wait for the new File Store to synchronise with the File Store on the first node. When synchronisation is complete the new File Store has a status of "running" instead of "synchronising".

### Decommissioning and removing an instance of File Store

Once you have a second instance of File Store installed and synchronised you can decommission and remove the original instance. You must decommission the original instance before you remove it. Doing this guarantees that any unique files on the File Store node are duplicated to another file store node.

1. Decommission the original File Store:

```
tsm topology filestore decommission -n <nodeID> --override
```

2. When the decommission command completes, remove the File Store from the node by applying the pending configuration changes. The File Store is automatically removed. Data Engine is also removed unless an instance of one of these processes is installed on the node: VizQL Server, Application Server (Vizportal), Data Server or Backgroundrunner.

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays

even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Move the Messaging Service Process

This article assumes you have installed Tableau Server on an initial node and at least one additional node. For more information on adding nodes to Tableau Server, see [Install and Configure Additional Nodes](#).

You cannot remove an instance of the Messaging Service if it is the only instance on the server. You cannot run Tableau Server without one instance of the Messaging Service. This means if you need to move the Messaging Service, or if you are deleting a server node that is hosting the Messaging Service, you must first move the service to another node.

Moving the Messaging Service is straightforward process of three steps:

- Remove the original instance of the Messaging Service.
- Add a new instance of the Messaging Service.
- Apply the pending changes.

Use the TSM web interface

Moving the Messaging Service

1. In TSM, on the **Status** tab, verify that all processes are active.
2. Click the **Configuration** tab.
3. For the node you're removing the Messaging Service from, clear the **Messaging Service** box.

This will activate the **Pending Changes** button, but in Pending Changes an error will tell you that the Messaging Service (activemqserver) is not on any node. Until you add it to another node, you cannot apply pending changes.

4. For the node you are adding the Messaging Service to, select the **Messaging Service** box.
5. Click **Pending Changes** at the top of the page.
6. Click **Apply Changes and Restart** and **Confirm** to confirm a restart of Tableau Server.

### Use the TSM CLI

#### Moving the Messaging Service

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the nodes you are changing:

```
tsm topology list-nodes -v
```

3. Remove the Messaging Service from one node:

```
tsm topology set-process -n <nodeID> -pr activemqserver -c 0
```

4. Add the Messaging Service to another node:

```
tsm topology set-process -n <nodeID> -pr activemqserver -c 1
```

5. Apply the configuration changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart



behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

## Remove a Node

If your Tableau Server installation includes a node you no longer need, you can remove it to simplify your installation, and to free up the hardware resources on that node.

**Note:** If you have Tableau Resource Monitoring Tool Agent installed on this node, you must remove it from the Resource Monitoring Tool Master Server Environment. For more information, see [Tableau Server Topology Changes](#).

### Prerequisites for removing a node

There are prerequisites you must satisfy before you can remove a node from your Tableau Server cluster. If your node has one of a number of limitations, you need to address these before you can remove the node. The limitations include confirm that the node has been added with at least one process, and that the node does not include any process that is not also installed on another node.

If one of the following configuration limitations applies, you must take action before you can remove the node:

- If the node was just added using the Web UI, you need to apply pending changes before you can remove it. If you added it using the command line, you need to configure it with at least one process before you can remove it.
- If the node includes the only Repository instance, you need to move the Repository to another node. See [Move the Repository Process](#).
- If the node is running the only instance of the File Store, you need to move the File Store to another node. See [Move the File Store Process](#).

- If the node is running an instance of the Coordination Service, you must deploy a new Coordination Service ensemble that does not include the node. See [Deploy a Coordination Service Ensemble](#).
- If the node is running the Messaging Service, you need to move the Messaging Service to another node. See [Move the Messaging Service Process](#).

**Important:** Do not use the `tableau-server-obliterate.cmd` script to remove a node. First remove the node using the TSM UI or the `tsm topology remove-nodes` command. This leaves the rest of the cluster in a good state. Later, if you want to re-add the node to the cluster, run the `tableau-server-obliterate.cmd` script on the node to completely remove Tableau. After removing Tableau from the node, restart the computer and then re-add the node using the normal steps for adding and configuring a node. For details on running the script, see [Remove Tableau Server from Your Computer](#).

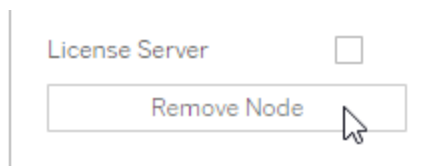
Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Configuration** tab and, under the node you want to remove, click **Remove Node**:



If a configuration limitation does not allow you to remove the node (if, for example, it includes a File Store that must first be decommissioned), a message will display letting you know this. See **Prerequisites** above for more information.

**Note:** If you just added the node, and have not configured it, you must first apply pending changes before you can remove the node.

3. Click **Pending Changes** at the top right, and **Apply Changes and Restart**.

Use the TSM CLI

Use the `tsm topology remove-nodes` command to remove a node from a cluster.

To remove a node from a cluster it must have been configured with a process at some point in the past. If you added a node using the CLI and want to remove it but have not configured any processes, you must add a process on it, run the `tsm pending-changes apply` command, and then remove the node. For example, you might add one instance of Cluster Controller to the node: `tsm topology set-process -n <nodeID> -pr clustercontroller -c 1`.

If you are removing a node you added using the Web UI, the Cluster Controller process is automatically added so you do not need to add it before removing the node.

1. On the initial node, open a command prompt as administrator.
2. Find the node ID for the node you are changing:

```
tsm topology list-nodes -v
```

3. Remove a node using the `remove-nodes` command.

For example, to remove `node2` from an existing cluster:

```
tsm topology remove-nodes --node-names "node2"
```

If a configuration limitation does not allow you to remove the node (if, for example, it includes a File Store that must first be decommissioned), a message will display letting you know this. See **Prerequisites** above for more information.

4. Apply the changes:

```
tsm pending-changes apply
```

## Configure Tableau Server for High Availability with Coordination Service-Only Nodes

The Coordination Service is built on [Apache ZooKeeper](#), an open-source project, and coordinates activities on the server, guaranteeing a quorum in the event of a failure, and serving as the source of "truth" regarding the server topology, configuration and state. The service is installed automatically on the initial Tableau Server node, but no additional instances are installed as you add additional nodes. Because the successful functioning of Tableau Server depends on a properly functioning Coordination Service, we recommend that for server installations of three or more nodes, you add additional instances of the Coordination Service by deploying a new Coordination Service ensemble. This provides redundancy and improved availability in the event that one instance of the Coordination Service has problems.

The Coordination Service can generate a large amount of I/O as it communicates with other components of the server, so if you are running Tableau Server on computers that meet or just exceed the minimum hardware requirements, you may want to install Tableau Server in a configuration that uses Coordination Service-only nodes. This means installing Coordination Service on nodes that run no other server processes, and removing Coordination Service from any nodes that are running other server processes. This procedure explains how to do this. You can also run the Coordination Service ensemble on the same nodes running other Tableau Server processes. For details on how to do that, see [Deploy a Coordination Service Ensemble](#).

**Important:** The process to deploy a Coordination Service ensemble changed as of version 2020.1.0. If you are running an earlier version of Tableau Server, see the documentation for that version. You can find documentation for all supported versions here: [Tableau Help](#)

### Prerequisite

Before proceeding with the procedures in this topic, complete the following prerequisites:

- Install and Configure Tableau Server – Install Tableau on your initial node.
- Install and Configure Additional Nodes – Install Tableau on at least two additional nodes.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

### Deploy an ensemble on Coordination Service-only nodes

One way to accommodate the high I/O impact of the Coordination Service is to deploy an ensemble on nodes that only run the Coordination Service and the Cluster Controller. The following steps illustrate how to deploy a Coordination Service ensemble on an existing multi-node Tableau Server cluster.

**Note:** For a core-based Tableau Server licence, Coordination Service-only nodes do not count against the total count of licensed cores.

1. Add additional nodes to your cluster.

See [Install and Configure Additional Nodes](#).

2. If you added the new nodes using the TSM CLI, you need to configure the nodes with Cluster Controller (this step is not necessary if you added the nodes using the TSM Web UI because Cluster Controller is automatically added when you add a node with the Web UI).

On the initial node, open a command prompt as administrator.

3. From the initial node of the cluster, configure the new nodes with an instance of the Cluster Controller:

```
tsm topology set-process -pr clustercontroller -n <node4> -c 1
```

```
tsm topology set-process -pr clustercontroller -n <node5> -c 1
```

```
tsm topology set-process -pr clustercontroller -n <node6> -c 1
```

If prompted, sign in as a TSM administrator.

4. Apply the configuration changes. If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

```
tsm pending-changes apply
```

A warning about deploying a Coordination Service ensemble displays because you have deployed a multi-node cluster. If this is the only warning, you can safely override it using the `--ignore-warnings` option to apply the configuration changes in spite of the warning.

```
tsm pending-changes apply --ignore-warnings
```

5. Confirm that all nodes are up and running:

```
tsm status -v
```

6. On the initial node of the cluster, open a terminal session and type this command to stop Tableau Server:

```
tsm stop
```

7. Get the node IDs for each node in the cluster:

```
tsm topology list-nodes -v
```

8. Use the `tsm topology deploy-coordination-service` command to add a new Coordination Service ensemble by adding the Coordination Service to specified nodes. You must specify the node(s) that the Coordination Service should be added to. The command also makes the new ensemble the "production" ensemble (the ensemble in use) and removes the old ensemble.

**Note:** A "y/n" prompt displays confirming that a server restart will take place. To run the command without input, include the `--ignore-prompt` option.

For example, deploy the Coordination Service to three nodes of a six-node cluster:

```
tsm topology deploy-coordination-service -n <node4,node5,node6>
```

Wait until the command completes and you are returned to the system prompt.

9. Start Tableau Server:

```
tsm start
```

## Add a Load Balancer

You can enhance the reliability of Tableau Server by running gateways on multiple nodes, and configuring a load balancer to distribute requests across the gateways. Unlike the repository process, which can be active or passive, all gateway processes are active. If one gateway in a cluster becomes unavailable, the load balancer stops sending requests to it. The load balancer algorithm you choose determines how the gateways will route client requests.

- **Kerberos:** If you will be using Kerberos authentication, you need to configure Tableau Server for your load balancer before you configure Tableau Server for Kerberos. For more information, see [Configure Kerberos](#).

Microsoft SSPI authentication is not supported with a load balancer.

- **Tested load balancers:** Tableau Server clusters with multiple gateways have been tested with Apache and F5 load balancers.

If you are using an Apache load balancer and creating custom administrative views, you need to connect directly to the Tableau Server repository. You cannot connect through the load balancer.

- **Tableau Server URL:** When a load balancer is in front of a Tableau Server cluster, the URL that's accessed by Tableau Server users belongs to the load balancer, not the initial Tableau Server node.
- **Single load balancer endpoint:** You must configure your load balancers for a single URL endpoint. You cannot configure different endpoint hosts to redirect to the same Tableau Server deployment. The single external URL is defined in `gateway.public.host` when you configure Tableau Server, as described in [Configuring Proxies and Load Balancers for Tableau Server](#).
- **Trusted host settings:** The computer running the load balancer must be identified to Tableau Server as a trusted host, as described in [Configuring Proxies and Load Balancers for Tableau Server](#).

### Configure Tableau Server to work with a load balancer

The settings used to identify a load balancer to Tableau Server are the same ones that are used to identify a reverse proxy server. If your Tableau Server cluster requires both a proxy server and a load balancer, both must use a single external URL defined in `gateway.public.host` and all proxy servers and load balancers must be specified in `gateway.trusted` and `gateway.trusted_hosts`. See [Configuring Proxies and Load Balancers for Tableau Server](#).



# Upgrade Tableau Server Overview

The topics in this section help you upgrade an existing installation of Tableau Server on Windows. They describe the recommended steps of planning and testing before actually performing the upgrade. There's information about best practices, and when you're ready to actually perform your upgrade, steps for upgrading a single node server and a multi-node installation. Where possible, we call out possible pitfalls and help you to avoid these.

**Note:** Use [Tableau Release Navigator](#) to search for features in Tableau Desktop, Server and Prep or to see a full list of features when comparing your current version of Tableau to a later one.

Looking for Tableau Server on Linux? See [Upgrade Tableau Server on Linux](#).

## Choose your upgrade path

### Blue/Green upgrades

Blue/green upgrades are a special type of upgrade approach that provides minimal downtime, but requires a knowledgeable IT team and resources to implement. These are not for every organisation, but for those who are equipped to handle them, they can be the right upgrade solution. For more information, see [Using a Blue/Green approach for upgrading Tableau Server](#).



### Upgrading in place

Your upgrade steps depend on the version of Tableau Server on Windows you are upgrading from, the version you are upgrading to, and the install location of your existing version. Use the table below to find a link to the steps that apply to your upgrade situation.

## Upgrade Type

Current version	Upgrading to version	Install location	Upgrade procedure
<i>What version are you upgrading from?</i>	<i>If you aren't sure how to find your version, see <a href="#">Determine your Tableau Server version below</a>.</i>	<i>If you do not know where Tableau Server is installed, see <a href="#">Determine your Tableau Server install location below</a>.</i>	<i>Upgrade steps to use</i>
2018.2.x or later	2018.2.x or later	default or non-default location	Upgrading from 2018.2 and Later (Windows)
2018.1.x or earlier	2018.2.x or later	default or non-default location	<a href="#">Upgrade from Tableau Server 2018.1.x or Earlier</a> in the 2021.4 Server Help.

### Determine your Tableau Server version

To see what version of Tableau Server you are running, sign in to Tableau Server and click the information icon (  or  ) at the upper right of the Tableau Server window, then click **About Tableau Server**. Your server version is listed in the About Tableau Server dialog.

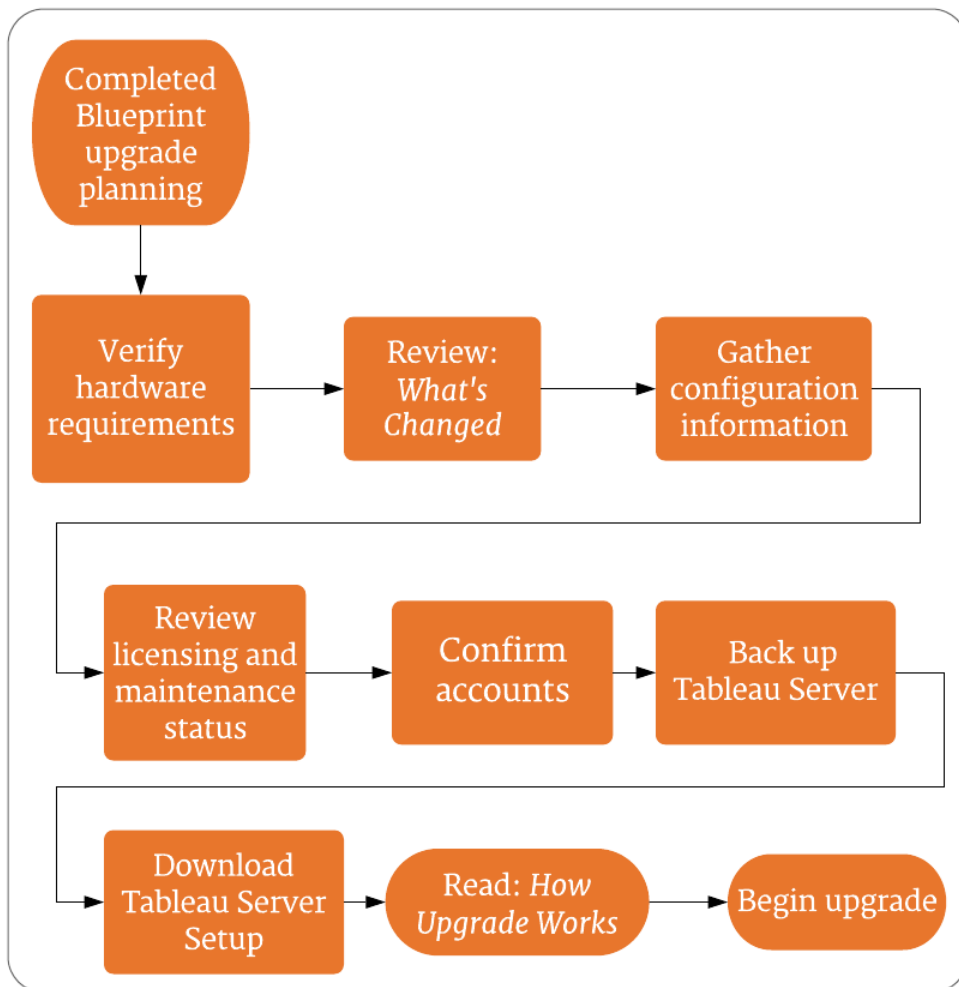
### Determine your Tableau Server install location

Knowing where your current version of Tableau Server is installed is a key aspect of choosing the right upgrade path. By default Tableau Server version 2018.2 or later is installed to `C:\Program Files\Tableau Server\packages\`.

Versions before 2018.2 install to `C:\Program Files\Tableau\Tableau Server-<version>`. For more details about these versions, see [Upgrade Tableau Server Overview](#) in the 2021.4 Server Help.

## Preparing for Upgrade

Follow the flow chart and the linked topics to prepare your environment for Tableau Server upgrade.



## Release Navigator

**Note:** Use [Tableau Release Navigator](#) to search for features in Tableau Desktop, Server and Prep or to see a full list of features when comparing your current version of Tableau to a later one.

## Server Upgrade - Minimum Hardware Recommendations

For production use, the computer on which you upgrade Tableau Server should meet or exceed the minimum hardware recommendations. These recommendations are general. Actual system needs for Tableau Server installations can vary based on many factors, including number of users and the number and size of extracts. If the Setup program determines that your computer does not meet the following recommendations, you will get a warning, but you can continue with the setup process. The minimum recommendations listed here are intended as general guidance. However the recommendations for your environment may vary. For more information, see the [Hardware recommendations section](#) of the [Recommended Baseline Configurations](#) topic.

<i><b>Install Type</b></i>	<i><b>Processor</b></i>	<i><b>CPU</b></i>	<i><b>RAM</b></i>	<i><b>Free Disk Space</b></i>
Single node	<ul style="list-style-type: none"> <li>• 64-bit (x86_64 chipsets)</li> <li>• Must support SSE4.2 and POPCNT instruction sets</li> <li>• ARM-based processors are not supported</li> </ul>	8 cores (16 vCPUs), 2.0 GHz or higher	Version 2022.3 and later: <ul style="list-style-type: none"> <li>• 128 GB</li> </ul> Version 2021.4.0 to version 2022.1.x: <ul style="list-style-type: none"> <li>• 64 GB</li> </ul> Version 2021.3.x and	50 GB

<i>Install Type</i>	<i>Processor</i>	<i>CPU</i>	<i>RAM</i>	<i>Free Disk Space</i>
			earlier: <ul style="list-style-type: none"><li>• 32 GB</li></ul>	
	If you are adding Tableau Prep Conductor to your Tableau Server installation, we recommend you add a second node and dedicate this to running Tableau Server Prep Conductor. This node should have a minimum of 4 cores (8 vCPUs) and 16 GB of RAM.			
Multi-node and enterprise deployments	<p>Contact Tableau for technical guidance.</p> <p>Nodes must meet or exceed the minimum hardware recommendations, except:</p> <ul style="list-style-type: none"> <li>• Dedicated Backgrounder nodes running up to two instances of backgrounder, where 4 cores may be acceptable.</li> <li>• Dedicated node for Tableau Prep Conductor: Minimum of 4 cores (8 vCPUs), and 16 GB of RAM.</li> <li>• Dedicated node for Independent Gateway: Minimum of 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.</li> </ul>			

**Important:** The disk space requirement cannot be checked until you initialise TSM.

- Free disk space is calculated after the Tableau Server Setup program is unzipped. The Setup program uses about 1 GB of space. You may need to allocate additional disk space depending on various factors like whether you will be using extracts.
- **Network attached storage space requirements for External File Store:** If you are planning to configure [Tableau Server with External File Store](#), you will need to estimate the amount of storage space to dedicate on your network attached storage.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the Option 2: Back up repository separately topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.
  - Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- Core count is based on "physical" cores. Physical cores can represent actual server hardware or cores on a virtual machine (VM). Hyper-threading is ignored for the purposes of counting cores.
- RAM shown is the minimum recommended for a single-node installation. Your installation may function better with more RAM, depending on activity, number of users, and background jobs, for example.

To see the full list of recommendations and to see the minimum requirements, see Minimum Hardware Requirements and Recommendations for Tableau Server. For hardware specifications Tableau uses internally for testing scalability, see Hardware recommendations for production installations.

## Tableau Server on Windows Help

For hardware recommendations for Tableau Server in the cloud, see the following:

- Selecting an AWS Instance Type and Size in the [Tableau Server on Windows in the AWS Cloud Administrator Guide](#)
- Selecting a Google Compute Engine Virtual Machine Type and Size in the [Tableau Server on Windows in the Google Cloud Platform Administrator Guide](#)
- Selecting a Microsoft Azure Virtual Machine Type and Size in the [Tableau Server on Windows in Microsoft Azure Administrator Guide](#)

### Determining Computer Hardware

To determine how many physical cores a computer has, the Tableau Server setup program queries the operating system. To view hardware information that the setup program detected on your computer, open the `tabadmin.log` file in the following folder on the computer where you are installing Tableau Server:

```
<install_directory>\ProgramData\Tableau\Tableau Server-  
\logs\tabadmin.log
```

In the `tabadmin.log` file, look for lines similar to the following. These lines provide information about the physical and logical cores that the setup program detected and that it used to determine the core count that is being used for licensing.

```
2015-04-09 14:22:29.533 -0700_DEBUG_10.36.2.32:<machine name>:_pid-  
d=21488_0x2cd83560__user=__request=__ Running hardware check
```

```
2015-04-09 14:22:29.713 -0700_DEBUG_10.36.2.32:<machine name>:_pid-  
d=21488_0x2cd83560__user=__request=__ Detected 12 cores and  
34281857024 bytes of memory
```

```
2015-04-09 14:22:29.716 -0700_DEBUG_10.36.2.32:<machine name>:_pid-  
d=21488_0x2cd83560__user=__request=__ Hardware meets recommended spe-  
cifications. Default values will be used.
```

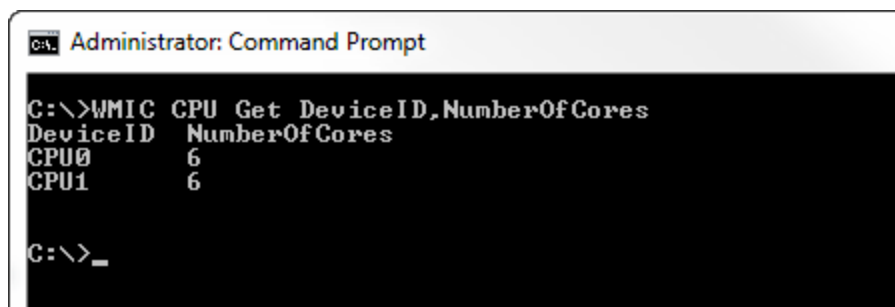
## Manually determining the number of cores on your computer

To determine manually how many physical cores your server has, you can use the Windows Management Instrumentation Command-line tool (WMIC). This is useful if you do not know whether your computer will meet the minimum hardware requirements for installing Tableau Server.

1. Open a command prompt.
2. Enter the following command:

```
WMIC CPU Get DeviceID,NumberOfCores
```

The output will display the device ID or IDs and the number of physical cores the computer has.



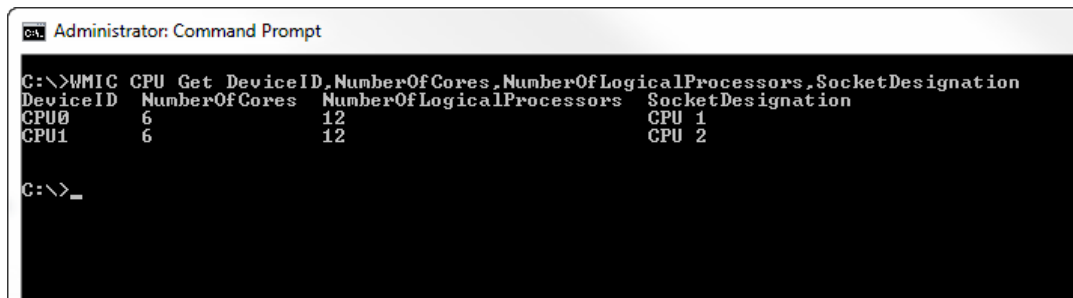
```
Administrator: Command Prompt
C:\>WMIC CPU Get DeviceID,NumberOfCores
DeviceID  NumberOfCores
CPU0      6
CPU1      6
C:\>_
```

In this example, there are two CPUs, each with six cores, for a total of twelve physical cores. This computer would satisfy the minimum hardware requirements for installing Tableau Server.

The following command shows a longer version that lists the logical processors as well as the physical cores.

```
WMIC CPU Get DeviceID,NumberOfCores,NumberOfLogicalProcessors,SocketDesignation
```





```

Administrator: Command Prompt
C:\>WMIC CPU Get DeviceID,NumberOfCores,NumberOfLogicalProcessors,SocketDesignation
DeviceID    NumberOfCores  NumberOfLogicalProcessors  SocketDesignation
CPU0        6              12                          CPU 1
CPU1        6              12                          CPU 2
C:\>_

```

In the above example, the server has a total of twelve physical cores, resulting in 24 logical cores.


*Continue to Server Upgrade - Review What's Changed.*

## Server Upgrade - Review What's Changed

This topic includes a list of important product changes in Tableau Server, beginning with version 2019.1. The changes listed in this topic may impact the upgrade process itself, or they may impact functionality after you have upgraded. Read these changes carefully and make note of the changes and remediation steps that you'll need to take. Include these remediation steps as part of your upgrade process or post-upgrade configuration plan.

This list is cumulative, so if you are upgrading from an early version (for example, 2019.1), read the list of changes for every version between your version and the version you are upgrading to. You can also download the workbook with the list and use it to create your own customised checklist.

To develop a more robust verification and testing plan, we recommend that you also review new features before you upgrade. To see a full list of all new and changed features, select everything listed in the **Status** filter.



# Tableau Release Navigator

Search by Feature

Upgrade Server

Upgrade ... 2023.3

Upgrade ... 2024.2

Status (All)

Offering (All)

Select a feature to see more details


Upgrade Desktop

Upgrade Prep

Tableau Server		
Product Version	Status	
2024.2	Changed	Extension Security - Best Practices for Deployment Incremental Extracts with Subrange Refresh Manage Dashboard and Viz Extensions in Tableau Server OAuth with Snowflake Safely Remove and Re-Add a Table in a Virtual Connection Updated Data Cloud Connection Pane Labels Virtual Connections: Duplicate Rows No Longer Appear
	Deprecated	Embed Tableau Views into Salesforce The Salesforce Customer Data Platform connector is hidden and ..
	New	Connected apps' multiple EAS support Connected apps' multiple project support Consume Native Salesforce Data Cloud Objects in Tableau Catal.. Convert Virtual Connection Table to Custom SQL Data Label Dialogue and Other Data Labels Improvements Dynamic group membership using assertions Group sets Incremental Extracts for Virtual Connections Individual Control Formatting More Data Labels in the Data Pane (Web Authoring) Multi-fact Relationships Virtual Connections Support Custom OAuth

[Product Downloads](#)

Have feedback? [Let us know](#)



*Continue to Server Upgrade - Gather Configuration Details.*

## Server Upgrade - Gather Configuration Details

If you are running an in-place upgrade (you're not updating hardware as part of your upgrade), then nearly all the configuration data is preserved. Strictly-speaking, you do not need to gather all of the configuration information in this case. However, we recommend gathering the information as detailed in this topic. In the worse case scenario, should upgrade fail, then you will have a record of all configuration information should you need to restore. In any case, you can use the configuration details you collect to verify the upgrade when it's complete.

### Take screen shots

A relatively quick way to capture the basics of your configuration is to take screen shots of the TSM web interface pages and the Tableau Server admin area.

Click through all visible pages and take screen shots:

- Sign in to Tableau Services Manager Web UI
- Sign in to the Tableau Server Admin Area

### Record object counts

When you are in Tableau Server admin area, count and record the following in each site:

- Projects, workbooks, views, data sources
- Users and groups

### Gather asset files

Many of the supporting files (certificates, IdP metadata, logos, etc) that you upload to Tableau Server are not accessible with TSM after you upload them. Specifically, files that are uploaded and managed by the Client File Service are renamed and obfuscated before they are distributed across the deployment. This process also parametrises the file attributes that are required by Tableau services. As a result, files are not mapped to a single file location on the file system for the following files. If you have uploaded any of the following files, be sure to have copies of them saved off of the computer that is running Tableau Server:

- SAML certificate file
- SAML key file
- SAML IdP metadata file
- OpenID.static.file
- Kerberos.keytab file
- LDAP Kerberos keytab file
- LDAP Kerberos conf file
- Mutual SSL certificate file
- Mutual SSL revocation file
- Customisation header logo file
- Customisation sign-in logo file
- Customisation compact logo file

## Gather custom configuration information

Some configuration information is not displayed in the TSM or Tableau Server web pages. This section includes configuration details that you may need to gather depending on how you've customised your Tableau deployment.

### Secure SMTP

If you have configured TLS for Tableau Server, then you will need to record the TLS-related configurations, which are not included in the **Email Server** configuration of the TSM Web UI.

To gather the TLS-related configurations, you must run `tsm configuration get` with the following key values:

- `svcmonitor.notification.smtp.ssl_enabled`
- `svcmonitor.notification.smtp.ssl_required`
- `svcmonitor.notification.smtp.ssl_check_server_identity`
- `svcmonitor.notification.smtp.ssl_trust_all_hosts`
- `svcmonitor.notification.smtp.ssl_ciphers`
- `svcmonitor.notification.smtp.ssl_versions`

For example, to retrieve the list of ciphers that are configured for SMTP TLS, run the following command:

```
tsm configuration get -k svcmonitor.notification.smtp.ssl_ciphers
```

You can find more information about each of the keys above in the TSM CLI section of *Configure SMTP Setup*.

### Analytics extensions

If you have configured analytics extensions (formerly referred to as "external services"), you will need to record your configuration information. Upgrading to Tableau Server 2020.2 or later will remove all configuration for this feature.

To retrieve the analytics extensions configuration from Tableau Server versions 2019.1 through 2020.1, run the following command:

```
tsm security vizql-extsvc-ssl list
```

To retrieve the password that is stored for the analytics extensions connection (if any), run the following tsm command:

```
tsm configuration get -k vizqlserver.rserve.password
```

You should also have a copy of the certificate for analytics extensions if you've configured SSL.

### External Repository

This applies only if you are using the External Repository configuration with Tableau Server. If you are not sure if this applies to you, see [Tableau Server External Repository](#).

If you are using an External Repository, you may need to take additional steps when upgrading.

- **No version change** – If there is no version change in PostgreSQL, there are no special actions required.
- **Minor version change** – If there is a minor version change in PostgreSQL, you need to upgrade your external repository before upgrading Tableau Server. In most cases there are in-place methods for doing so. The method you use depends on the location of your repository and is beyond the scope of this documentation.
- **Major version change** – If there is a major version change in PostgreSQL, you need to follow the steps described in [Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL](#).

Steps include:

1. Creating a new instance of PostgreSQL DB. For more information, see:
  - [Create a PostgreSQL DB Instance on AWS Relational Database Service \(RDS\)](#)
  - [Create an Azure Database PostgreSQL Instance on Azure](#)
  - [Create a PostgreSQL Instance on Google Cloud](#)
  - [Create a PostgreSQL Database as a Stand-Alone Installation](#)
2. Creating a configuration file and downloading the SSL certificate file for the new instance that you created in Step 1.

During upgrade, you will need to point Tableau Server to the new instance using the configuration file. The upgrade process will migrate the content from your current external repository to your new instance. For more details, see [Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL](#).

### External File Store

There are no special steps, actions or configurations required when upgrading Tableau Server configured with External File Store. You can upgrade Tableau Server using the normal procedure.

### Port customisation

If you have changed the dynamic port range or have configured ports manually for Tableau Server, record the changes you have made.

Run the following command:

```
tsm topology list-ports
```

For more information see [Tableau Services Manager Ports](#).

### Proxy customisation

If you are using OAuth and have made any changes to the `net.properties` file for Tableau Server in the `<drive>:\Program Files\Tableau\Tableau Server-\packages\repository.<version>\jre\conf` folder, you should record the changes you have made. The upgrade process creates a new `net.properties` file and you may need to update the new one after you upgrade.

You can save a copy to a safe location and use it after upgrade to compare to the newly created file for any differences.

For more information see [Configure a proxy for OAuth authentication](#) in the Tableau Desktop and Web Authoring Help.

*Continue to [.Server Upgrade - Verify Licensing Status](#)*

## Server Upgrade - Verify Licensing Status

Prior to upgrading Tableau Server, review the product keys that are currently installed and compare them to the product keys, maintenance expiration, and licence expiration end dates that are listed in the Tableau Customer Portal.

It is important that all expiration and end dates associate with product keys are up-to-date before you upgrade.

### Step 1: View licence expiration information.

Run the following command to view all licences that are installed on your Tableau Server installation:

```
tsm licenses list
```

The `tsm licenses list` command returns all licences, each with a number of fields. For upgrade, you need to make note of two fields:

- For each subscription licence, make note of the date in the LIC EXP field. LIC EXP displays the date that the licence expires and Tableau Server will stop working.
- For each legacy perpetual key, make note of the MAINT EXP field. MAINT EXP displays the date that the maintenance contract for the Tableau Server deployment expires.

### Step 2: Compare licence expiration dates from TSM to your licences in [Tableau Customer Portal](#).

### Step 3: If required, update licences.

If your TSM maintenance date is not current or the expiration date will occur soon or is not the same as the date listed in the Tableau Customer Portal, refresh the licence.

To refresh the licence:

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.

2. Open TSM in a browser:

`http://<tsm-computer-name>:8850`

3. Click **Configuration** and **Licensing** and click **Refresh All**:

**Licensing**  
View and manage Tableau Server licenses, review expiration dates, and activate or deactivate product keys. [Learn More](#)

Product Key	Seat Licenses	Expires
<span style="background-color: #f0f0f0; padding: 2px;">Product Key (15 seats)</span>	15	May 1, 2018
trial	10	January 22, 2018

Access Tableau Server product keys in the [Customer Portal](#). View [Desktop License Usage](#) for more information about

If this does not update the maintenance or expiration end date but the Tableau Customer Portal does show more current end dates, please contact [Tableau Technical Support](#).

Reactivating the product key will be part of the upgrade process.

*Continue to Server Upgrade - Verify Accounts.*

## Server Upgrade - Verify Accounts

Before you upgrade Tableau Server, verify that you have passwords for two accounts:

- An account that is a member of the local administrators group: The account that you use to install Tableau Server must be a member of the local administrators group.
- Run As service account: If your organisation uses Active Directory as the identity store and/or if you have configured Tableau Server to connect to data sources in Active Directory, then it's a best practice to keep the Run As service account credentials at hand as you run upgrade.



Tableau Server Setup will not modify existing directory permissions during the upgrade process. But it's a best practice to verify any non-default permission configurations before you run Setup:

- If you have installed Tableau Server on to a non-default drive (default is typically `C:\Program Files`), then verify that permissions for the Run As service account are compliant with the required permissions specified in Installing in a non-default location.
- In addition, if you have scoped permissions on the computer running Tableau Server, verify that those permissions are compliant with the required directory permissions specified in Windows Accounts and Permissions.

*Continue to Server Upgrade - Back Up Tableau Server.*

### Server Upgrade - Back Up Tableau Server

We *strongly* recommend that you make a backup of your installation of Tableau Server before beginning the upgrade process. A backup made before you start the upgrade provides data that you'll need to set up a test version of the upgraded environment, and it also gives you the ability recover if the upgrade process fails. Backups are not an included step during upgrades, except when the upgrade includes a minor version upgrade to PostGRES and then a pg-only upgrade is created for internal use during upgrade.

#### **Notes:**

- We recommend you disable subscriptions and scheduling in your production environment immediately before taking the backup, and re-enable them after the backup is complete. Doing this will help avoid having your users receive duplicate subscriptions and email messages when you restore your backup in your test environment.
- The full backup can take a while if you have a large installation or a lot of extracts.
- Any changes made between the time you took the backup and the time you do the upgrade are lost because they aren't included in the backup.
- Remove Unneeded Files.

To back up server configuration data, use the `tsm settings` command.

When you use the `tsm maintenance backup` command, the current date is appended to the backup file:

```
tsm maintenance backup -f <backup_file> -d
```

For more information, see [tsm maintenance backup](#).

*Continue to Server Upgrade - Download Setup.*

## Server Upgrade - Download Setup

You must download and copy the Tableau Server Setup program to the computer running Tableau Server. If you are running a multi-node deployment of Tableau Server, copy the Setup program to each node in the cluster.

To get the latest version of Tableau Server software, go to the [Customer Portal](#). When you purchase Tableau, you receive a user name and password to sign in to the Customer Portal.

**Important:** Always download and install the latest maintenance release for the version you are upgrading to.

*Continue to How Tableau Server Upgrade Works.*

## How Tableau Server Upgrade Works

When upgrading from Tableau Server 2018.2 or later, you do not uninstall the previous version. The upgrade process is designed to install a new version side-by-side with your existing version, and then switch from the earlier version to the later one.

When doing a TSM-to-TSM upgrade (version 2018.2.x to later version), you must leave your existing version in place and running until just before you upgrade using the upgrade script. If you uninstall your existing version before upgrading, you will not be able to upgrade. For your end-users, this has the impact of reducing downtime because you install your new version

while the existing version is running. The only time the server is not running is during the period the upgrade script is actually upgrading to the new version.

After installing the new version and upgrading, you can uninstall the previous version when you choose to do so. You can leave the older version installed indefinitely, though one reason you might choose to uninstall it is to free up disk space used by files specific to the older version. To understand the difference between uninstalling Tableau Server and completely removing all aspects of Tableau Server, see [Uninstall Tableau Server](#).

Upgrading Tableau Server requires a stop and start the server as part of the upgrade process. During this stop/restart Tableau Server is unavailable.

### What's Changed - Things to Know Before You Upgrade

Beginning with version 2020.2, this topic has been merged with [What's New in Tableau Server](#) in order to provide a single location for new and changed features and behaviour in Tableau Server. See [Tableau Server Release Notes](#) for both new features and for changes introduced in this and earlier versions.

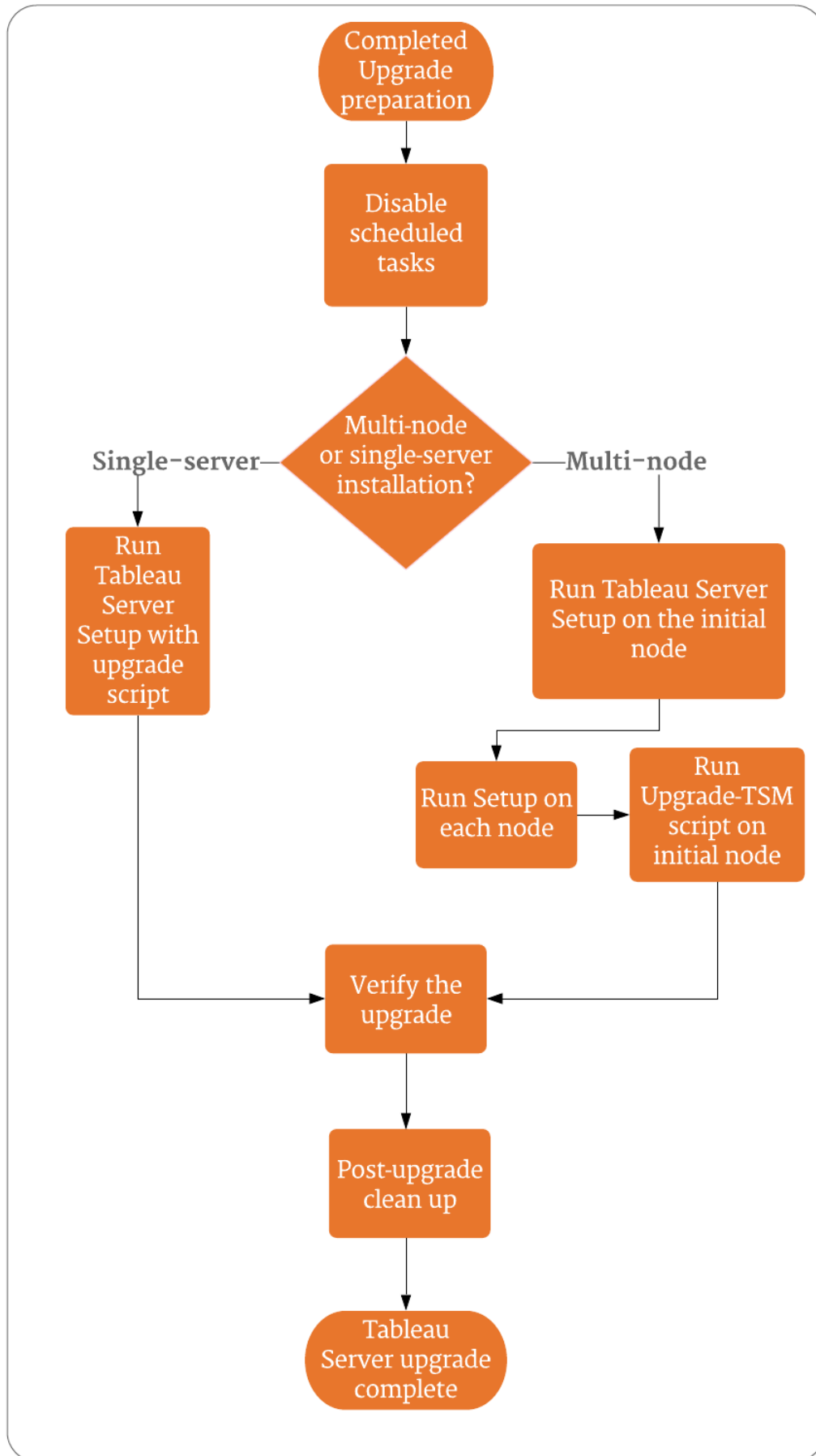
**Note:** Use [Tableau Release Navigator](#) to search for features in Tableau Desktop, Server and Prep or to see a full list of features when comparing your current version of Tableau to a later one.

### Upgrading from 2018.2 and Later (Windows)

Follow the flow chart below and the linked topics to perform an in-place upgrade of Tableau Server.

Before you start the upgrade, make sure you have completed the Upgrade Preparation. For more details, see [Preparing for Upgrade](#).

If you are migrating Tableau Server to new hardware as part of your upgrade, see [Migrate to New Hardware](#).



## Support and services to help with Tableau Server upgrades

Tableau Server upgrades require planning and testing. Upgrades are generally done during times when users are not on Tableau Server. If you plan an upgrade over a weekend and anticipate needing Tableau Technical Support, see the [Technical Support Programs](#) information on the Tableau web site. Availability depends on the level of support you have. If you would like Tableau to assist with the planning and upgrading of your Tableau Server installation, see our [Tableau Global Services Server Upgrade](#) page for details.

## Server Upgrade - Disable Scheduled Tasks

**Important:** We strongly recommend disabling scheduled tasks before you perform an upgrade. This includes all updates to data content and should be done before you create your pre-upgrade backup. This may involve disabling jobs that are triggered outside of Tableau Server, such as those initiated through REST API-based extract refreshes or using tabcmd.

Run the following procedure to disable all scheduled extract refreshes, flows and subscriptions.

1. Sign in to the Tableau Server Admin Area as the Tableau Server administrator.
2. Go to the server-wide Schedules page:
  - On a Tableau Server where only a single (Default) site exists, click **Schedules** in the left pane.
  - On a Tableau Server with more than one site, click **Manage all sites** in the drop-down menu on the top of the left pane, and then click **Schedules**.
3. On the Schedules page, click **Select All**.
4. On the **Actions** menu, select **Disable**, and then click **Disable** in the resulting prompt.

*Continue to: [Single-Server Upgrade -- Run Setup](#), or [Multi-node Upgrade -- Run Setup](#)*

## Single-Server Upgrade -- Run Setup

### Run Setup

Follow these steps to upgrade a single-node installation of Tableau Server version 2018.2 or later.

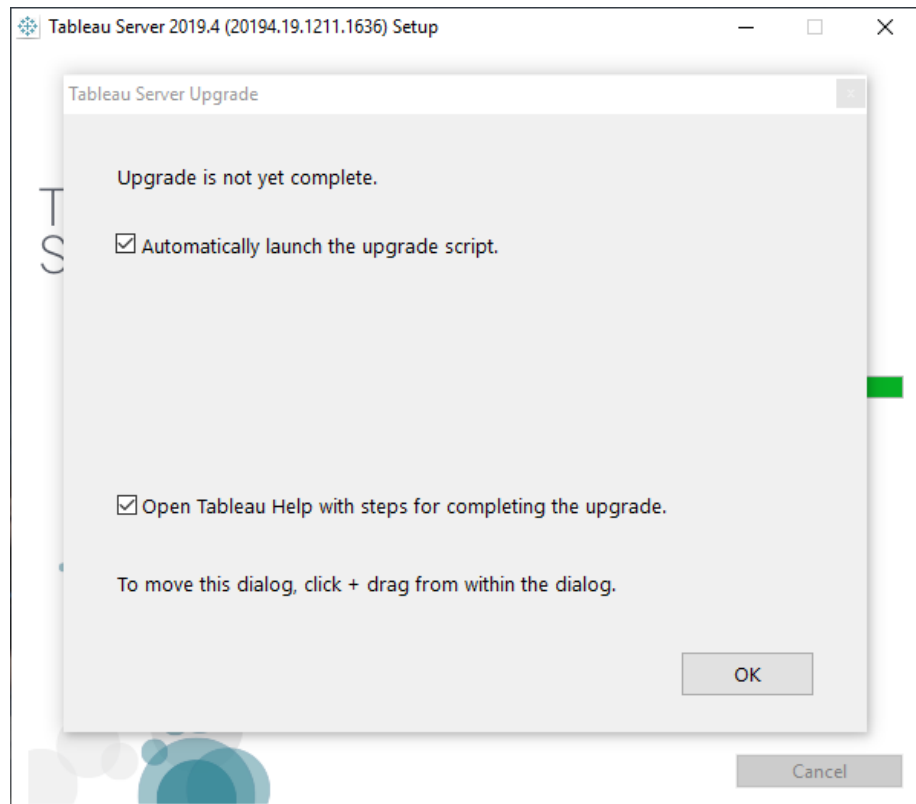
1. Log onto the computer with an account that is a member of the local administrators group.
2. Navigate to the folder where you copied the Tableau Server Setup program and run it.
3. The Setup program checks system resources to confirm that the computer satisfies the minimum requirements and recommendations.
4. The Setup program displays the location of your existing version and will install the new version side-by-side in the same location. You cannot change the location.
5. When the installation is done, the last page of the Setup program tells you that the upgrade is not yet complete. You need to run an upgrade script, `upgrade-tsm`, to complete the upgrade. If Tableau Server is running, the script will let you know, and will offer to stop it. Tableau Server must be stopped to complete the upgrade.

**Note:** Beginning in version 2020.4.0, if the upgrade script fails, details about the failure display in the command window and you can rerun the script to try the upgrade again. The script restarts at the point it failed. This saves time and is a good first step if your upgrade fails. For more information, see [Upgrade fails on 2020.4.0 or later](#).

Run the upgrade script in one of two ways.

## Tableau Server on Windows Help

- From the Setup program:
  - a. Select **Automatically launch the upgrade script**, and click **OK**:



- b. A command window will open for the script. Because you are logged in as a user with local administrator rights, the script will run using your credentials. If you are prompted, enter your password.

Clicking **OK** will close the Setup program dialog. If you cleared the option to automatically launch the upgrade script, you will need to run the script manually, from the command line.

- On the command line:

- a. On the initial node, open a command prompt as administrator.

You must open a new command window because the Setup program updates the path for the new installation.

- b. Navigate to the scripts folder for your new installation.

By default:

```
C:\Program Files\Tableau\Tableau Server-  
\packages\scripts.<version_code>\
```

- c. Run the upgrade script:

```
upgrade-tsm
```

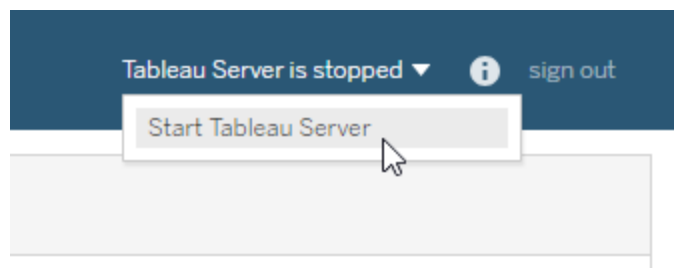
Because you are logged in as a user with local administrator rights, the script will run using your credentials. If you are prompted, enter your password. You can specify a different user and password when you run the script using `--username` and `--password` options.

To see all options for the `upgrade-tsm` script, use the `-h` option:

```
upgrade-tsm -h
```

6. Start Tableau Server. You can do this from the TSM web UI or from a command prompt:

- In TSM, click **Tableau Server is stopped**, and **Start Tableau Server**:





- From a command prompt:
  - a. Open a new command prompt as administrator.
  - b. Enter this command:

```
tsm start
```

If you get an error that the command is not recognised, close all command windows and then open a command prompt as administrator.

7. The upgrade process leaves your existing folders in place. You can identify these by the version code. For example:

```
C:\Program Files\Tableau\Tableau Server\packages\
```

*Continue to Verify Tableau Server Upgrade.*

## Multi-node Upgrade -- Run Setup

### Run Setup

1. Log onto the initial node with an account that is a member of the local administrators group.
2. Navigate to the folder where you copied the Tableau Server Setup program and run it. This will install the new version of Tableau Server side-by-side with your existing, running version.
3. The Setup program checks system resources to confirm that the computer satisfies the minimum requirements and recommendations.
4. The Setup program displays the location of your existing version and will install the new version side-by-side in the same location. You cannot change the install location.
5. When the installation is done on the initial node, the last page of the Setup program tells you that the upgrade is not yet finished. You need to run an upgrade script to complete

the upgrade. Leave the Setup window open on the initial node and continue with your installation on all other nodes in the cluster.

**Important:** You *must* install the new version on every node before you run the upgrade script. *Do not run the upgrade script* until after you have installed the new version on all nodes in your cluster.

*Continue to Multi-node Upgrade -- Run Setup on Each Node.*

## Multi-node Upgrade -- Run Setup on Each Node

### Run Setup

On each additional node, navigate to the folder where you copied the Tableau Server Setup program and run the Setup program as you did on the initial node. This will install the new version of Tableau Server on each node, side-by-side with your existing, running version.

When the installation is done on each additional node, the last page of the Setup program tells you that the upgrade is not yet finished. Make sure **Automatically launch the upgrade script** is *not* selected, and click **OK** to close the Setup window. You will run the upgrade script after the new version is installed on all nodes.

*Continue to Multi-node Upgrade -- Run Upgrade Script.*

## Multi-node Upgrade -- Run Upgrade Script

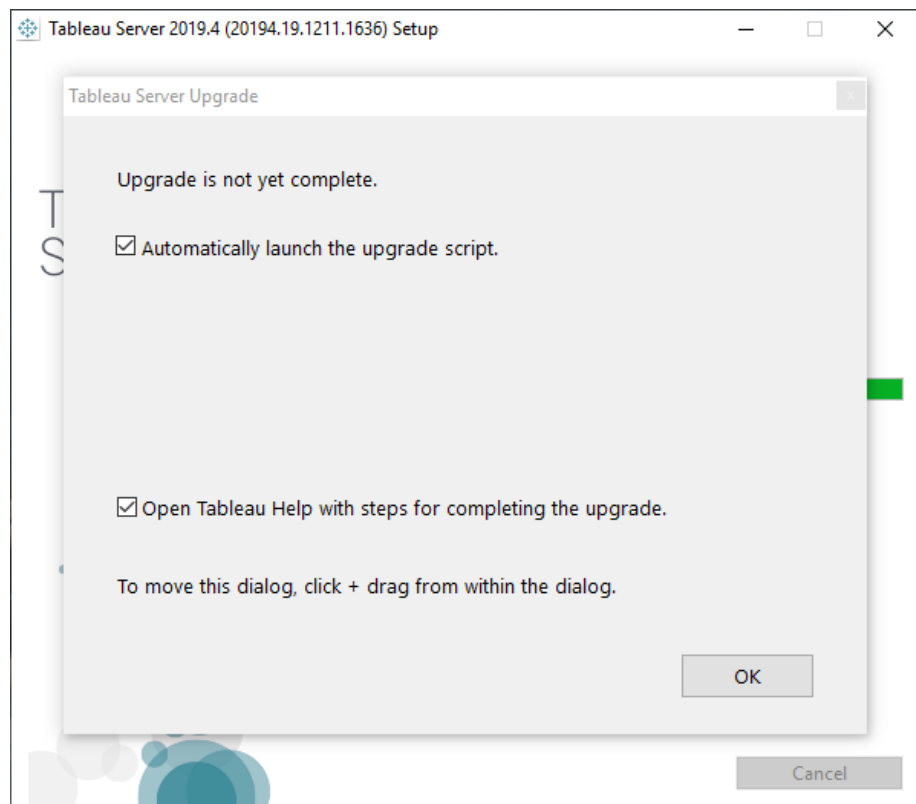
### Run Upgrade script

1. After you have installed the new version on *every node in the cluster*, run the upgrade script on the initial node. If Tableau Server is running, the script will let you know, and offer to stop it. Tableau Server must be stopped to run the upgrade script.

If the final Setup screen is still open, you can select **Automatically launch the upgrade script** and a command window will open to run the script. Alternately, you can run the script directly from a command prompt.

**Note:** Beginning in version 2020.4.0, if the upgrade script fails, details about the failure display in the command window and you can rerun the script to try the upgrade again. The script restarts at the point it failed. This saves time and is a good first step if your upgrade fails. For more information, see [Upgrade fails on 2020.4.0 or later](#).

- To run the upgrade script from the Setup program:
  - a. Select **Automatically launch the upgrade script** and click **OK**:



- b. A command window will open for the script. Because you are logged in as a user with local administrator rights, the script will run using your credentials. If you are prompted, enter your password.

Clicking **OK** will close the Setup program dialog. If you cleared the option to automatically launch the upgrade script, you will need to run the script manually, from the command line.

- To run the upgrade script from a command prompt:

- a. Open a command prompt as administrator.

You must open a new command window because the Setup program updates the path for the new installation.

- b. Navigate to the scripts directory for the new version you have just installed.

By default:

```
C:\Program Files\Tableau\Tableau Server-
\packages\scripts.<version_code>\
```

- c. Run the upgrade script:

```
upgrade-tsm
```

Because you are logged in as a user with local administrator rights, the script will run using your credentials. If you are prompted, enter your password. You can specify a different user and password using the `--user-name` and `--password` options.

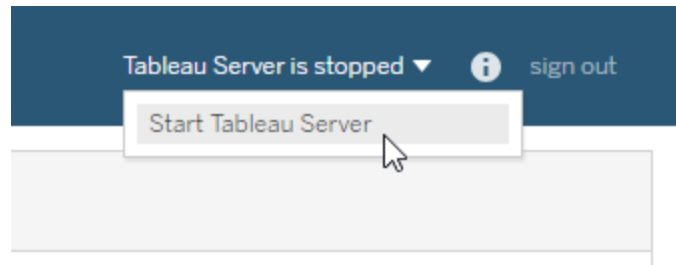
To see all options for the upgrade-tsm script, use the `-h` option:

```
upgrade-tsm -h
```

The upgrade script will take some time to complete.

2. When the upgrade script completes, start Tableau Server. You can do this from the TSM web UI or from a command prompt:

- In TSM, click **Tableau Server is stopped**, and **Start Tableau Server**:



- From a command prompt:
  - a. Open a new command prompt as administrator.
  - b. Enter this command:

```
tsm start
```

*Continue to Verify Tableau Server Upgrade.*

## Verify Tableau Server Upgrade

Work through the sections of this topic to verify if server upgrade was successful.

### Verify Tableau Service processes

Start your verification process by signing into TSM with the command line and verifying the status of Tableau Server processes.

1. Open a new command prompt as a user with administrator access.

For more information on using the tsm command line, see Using the tsm CLI.

2. Run the following command to view the status of all the Tableau Server processes: `tsm status -v`.

**What if I get an access denied error when I attempt to run TSM commands?**

Verify that the account you are using is a member of the Local Administrators group on the Windows computer where you are installing Tableau Server.

#### Verify TSM global settings

As part of the preparation for upgrade, you should have taken screen shots of the TSM web UI settings. Sign in to Tableau Services Manager Web UI and compare the settings with the screen shots.

#### Enable subscriptions and scheduling

1. Sign in to the Tableau Server Admin Area as the Tableau Server administrator.
2. Go to the server-wide Schedules page:
  - On a Tableau Server where only a single (Default) site exists, click **Schedules** in the left pane.
  - On a Tableau Server with more than one site, click **Manage all sites** in the drop-down menu on the top of the left pane, and then click **Schedules**.
3. On the Schedules page, click **Select All**.
4. On the **Actions** menu, select **Enable**, and then click **Enable** in the resulting prompt.

#### Verify user access

With a user account, sign in to Tableau Server with Tableau Desktop and a browser.

If Tableau Server is available from outside your organisation, verify connectivity from the internet.

If your organisation supports mobile connectivity to Tableau Server, sign in to server with a mobile device.

If you are using OAuth and cannot connect from Tableau Desktop, confirm that the `net.properties` file does not need to be updated. For more information, see [Proxy customisation](#)

## Tableau Server on Windows Help

### View published workbooks

With a user account, sign in to Tableau Server and browse published workbooks. Open workbooks to view them in a browser

### Verify publishing workbooks and data sources

Using an account with a Creator licence, verify web authoring functionality to connect to data, and to create and publish workbooks and data sources:

- [Connect to Data on the Web](#)
- [Publish a Data Source on the Web](#)
- [Upload Workbooks to a Tableau Site](#)

### Verify Tableau Prep Builder

If your organisation is running Tableau Prep Builder, verify that you can connect to data, open a flow, and other Prep tasks. See [Tableau Prep: Connect to Data](#).

### Verify count of Tableau objects

As part of upgrade preparation, you should have noted how many projects, workbooks, views, data sources, users and groups are in your deployment. Verify that all objects still appear.

Sign in to the Tableau Server Admin Area as the Tableau Server administrator.

- Verify count of projects, workbooks, views, data sources
- Verify count of users and groups

### Verify API functionality

If your organisation has deployed or developed content with Tableau APIs, verify that these are operational.

### REST API

Verify REST API access and authentication by running the sample cURL from [Get Started Tutorial: Introduction and Set Up](#):

```
curl "https://MY-SERVER/api/3.8/auth/signin" -X POST -d @signin.xml
```

Content of signin.xml:

```
<tsRequest>
  <personalAccessTokenName="MY_PAT_NAME"
    <credentials name="username" password="password" >
      <site contentUrl="MarketingSite" />
    </credentials>
  </tsRequest>
```

Example response:

```
<tsResponse version-and-namespace-settings>
  <credentials token="12ab34cd56ef78ab90cd12ef34ab56cd">
    <site id="9a8b7c6d-5e4f-3a2b-1c0d-9e8f7a6b5c4d"
      contentUrl="MarketingSite"/>
  </credentials>
</tsResponse>
```

### Compatibility testing

For other developed features, perform compatibility testing to verify that the upgraded version of Tableau Server operates as expected with your existing solutions:

- Dashboard Extensions
- JavaScript API for embedded Tableau
- Connectors (Web Data Connector, Tacos)

*Go to Post Upgrade Cleanup.*

## Post Upgrade Cleanup

As discussed in *How Tableau Server Upgrade Works*, the Tableau Server upgrade process installs a new version side-by-side with your existing version. Now that upgrade is complete and verified, you can remove the older version of Tableau Server to free up disk space. This is an optional step.

### Uninstall previous version

To uninstall a version of Tableau Server:



1. Open Control Panel, click **Uninstall a program**, and locate the version you want to uninstall.

Be sure you select the correct version to uninstall:

- Uninstalling previous versions of Tableau Server does not affect the running version and simply removes unnecessary files from those previous versions.
- **Do not** uninstall the current, running version. Uninstalling the current, running version of Tableau Server stops server and removes server-specific files and folders, but may leave some elements behind. Uninstalling does not create a backup of your repository data.

2. With the Tableau Server version selected, click **Uninstall**.

Delete 'Tableau Server' folders from `\packages` directory

After an upgrade, you will see multiple versions of Tableau Server folders in the `\packages` folder. When the upgrade is completed successfully, you can delete the folders related to the older version you upgraded from. You can identify these by the version code in the folder name. For example, `scripts.<version_code>`. For more information about version codes, see [View Server Version](#).

## Using a Blue/Green approach for upgrading Tableau Server

While many organisations are well-served by performing an in-place upgrade of Tableau Server, other organisations with mission-critical use of Tableau may want a more robust, enterprise-grade upgrade approach which uses investments of additional effort and resources to reduce risk and impact. In these cases, Tableau recommends a “Blue/Green” upgrade approach to achieve that outcome, characterised by:

- Reliable deployment of applications into a freshly configured host non-production environment (versus an in-place upgrade)
- Performing pre-production testing of the new version in your non-production environment to validate business-critical functionality, including testing common use cases to detect changes in behaviour that may impact the organisation

- Testing in production-identical environments to validate integrations and resource requirements
- The ability to roll back to the previous version rapidly

This high-level guidance describes a Blue/Green approach to upgrades that has been successfully used by many of our biggest customers to upgrade Tableau Server (and other mission-critical applications) with confidence. Blue/Green upgrades are a [long-established industry practice](#); there are many variations and the specific steps below are one possible path. If you're seeking specific guidance on customising this approach for your organisation's next upgrade, talk to your Premium Support Technical Account Manager, or discuss a services engagement with your account executive or delivery partner.

The Blue/Green approach involves installing a new version of Tableau Server in a non-production environment (your "Green" installation) that mirrors the configuration of your existing production environment (your "Blue" installation). For purposes of your Tableau licence, note that Tableau grants a standard right to two (2) non-production environments to support the single production environment in your deployment, as further described in the governing licence agreement. These non-production environments should be able to be taken down and used for this method consistent with the intended use of a test environment as described in this Tableau Knowledge Base article: [Licensing a Tableau Server Test Environment](#).

By copying your content from the production environment to the Green installation in your non-production environment (for example, your test environment), you can create an upgraded instance of Tableau Server with minimum downtime and the safety net of having the original production installation to fall back on if necessary. Once you've determined that all your critical content in the Green environment is functional, switch your users over to the new environment (Green). Your Green environment becomes your production environment, and your original installation (Blue environment) can be maintained as a non-production environment to support your next upgrade.

What follows is a high-level outline of the steps necessary to use Blue/Green as an approach to upgrade Tableau Server. These assume you have a load balancer or DNS that allows you to redirect user traffic from one installation to the other, and that you have downloaded the new version of Tableau you want to upgrade to.

**Important:** Your Blue/Green installations should be treated as production environments. They should not serve as disaster recovery or general testing environments. For more details on Disaster Recovery, please see [Disaster Recovery](#) in the Tableau Blueprint.

1. Create a second installation of servers that mirrors your production installation of Tableau Server as closely as possible. This second environment is your Green installation, a non-production environment. It should have a similar capacity, resources and configuration as your production environment (“Blue”) because your Green instance will become your production instance after the upgrade.
2. Create an initial backup and settings export of your Tableau Server Blue installation. You’ll use these for initial user acceptance testing (UAT) in Green. Later, you’ll create final, up-to-date backup and export to use when actually switching from Blue to Green.
  - a. Backup: For details on creating backups, see [Back up Tableau Server Data](#).
  - b. Settings export: Along with a backup, you’ll also need to export the settings from the Blue installation. Some settings will need to be manually recreated in the Green environment. For more information, see [Backup assets that require a manual process](#)
3. Install the new version of Tableau Server in Green. You should specify the same Identity Store type and Run As service account as you use in Blue.
4. Use the initial Blue backup and settings export to update the Green installation.
  - a. Restore the backup from the Blue environment in the Green installation.
  - b. Import the settings you exported from the Blue installation. You may have to manually recreate some of the settings in your Green environment. See [Restoring core Tableau Server functionality](#).

5. Disable any scheduled tasks in Green to avoid sending duplicate messages while testing and to avoid overloading database resources. For details, see [Server Upgrade - Disable Scheduled Tasks](#).
6. Test the Green installation to confirm that it is functioning as expected. Perform User Acceptance Testing (UAT), and simulate any load testing if desired. If you have scripts or API integration with Tableau, you should test these as well. The more complete your testing, the better prepared you will be to address any discrepancies between your original Blue installation and your new Green installation.
7. Prepare the Blue installation so you can create a backup and export settings you'll use for production in Green. This might mean restricting access to Tableau or sending a message instructing users not to make any changes to their content and warning them that any changes made after you create your backup will be lost.
8. Create a final backup of Blue. This is the backup you will use to bring Green up to the most recent production content. If you do regular backups, you can use your latest production backup, keeping in mind that any changes or updates done in Blue after the backup is created will be lost. We recommend a "change freeze" on your production environment after this backup is taken, so no new workbooks or data sources are added, and there are no changes to existing content.
9. Export the settings in the Blue environment, paying attention to those assets you may need to handle manually. For more information, see [Restoring core Tableau Server functionality](#).
10. Restore the final Blue backup and import the Blue settings file to Green. Make any manual configuration changes necessary.
11. Perform UAT/sanity checks on Green content.
12. Re-enable schedules for any jobs, subscriptions and notifications you disabled in Step 5 above.
13. Switch your users to Green using a load balancer or DNS, and block access to Blue.

14. Verify that the Green server is functional as desired and monitor for production load issues. If you have Advanced Management, you can use the Resource Monitoring Tool to monitor performance.
15. (Optional) If you're not keeping your Blue environment for future upgrades, deactivate the Blue environment product keys:
  - For Tableau Server 2021.4 and later activated with ATR, see [Deactivate Product Key](#).
  - For any version of Tableau Server not activated with ATR, see [Deactivate Product Key](#).
  - For Tableau Server 2021.3 and earlier activated with ATR, see [Move a Server ATR Licence to Another Tableau Server](#).
16. (Optional) If you're not keeping your Blue environment for future upgrades, stop the Blue environment and prepare it for decommissioning. For details about decommissioning, see [Remove Tableau Server from Your Computer](#).

## Test the Upgrade

The best way to learn what impact a Tableau Server upgrade will have to your current environment is to test it. Knowing how an upgrade will affect your users and your server helps you plan and communicate before the actual upgrade, ensuring that your users will not be caught by surprise.

If you have a Tableau Server test environment this is a great place to test out the upgrade.

We recommend the following sequence for testing a Tableau Server upgrade:

1. [Prepare a test environment](#)
2. [Upgrade the test environment](#)
3. [Confirm that existing functionality works](#)
4. [Performance and user acceptance testing](#)

5. [Test new features](#)
6. [Communicate about the upgrade](#)

## Prepare a test environment

To start, create a test environment that mirrors your production environment as closely as possible. The closer your test environment is to the actual environment you will be upgrading, the more accurate a representation you will have of how the upgrade will impact you. This includes identical or similar hardware and operating systems, as well as the same authentication options and network access.

When you've got a test computer or virtual machine ready, follow these steps for creating a test environment.

1. On the existing production environment, create a backup of Tableau Server using the `tsm maintenance backup` command.

For more information, see [Create a pre-upgrade backup](#).

2. On your test environment, install a copy of the same version of Tableau Server as you have in your production environment.

**Note:** You can download the setup program for your current version from the [Alternate Downloads Site](#).

3. Restore your existing database data using the `tsm maintenance restore` command.

For more information, see [Restore from a Backup](#).

4. Manually replicate your existing Tableau Server configuration.

You need to manually configure certain aspects of your environment because when you restore the Tableau database, it doesn't include configuration details and customisations.

## Upgrade the test environment

Follow the appropriate steps for upgrading the test environment, based on your environment:

- Upgrading from 2018.2 and Later (Windows)

## Confirm that everything works as expected

After you have the new version of Tableau Server installed and configured in your test environment, you are ready to test. You should test basic functionality, along with any special aspects of server that your organisation relies on. For example, if there are key subscriptions that your organisation relies on, make sure that you test those.

These are some areas of testing to consider:

- **Server processes.** Sign in to Tableau Server as a server administrator, and then open the Server Status page to confirm that all services and processes are running as expected (including on all additional nodes if this is a distributed installation).
- **User access.** Confirm that Tableau Server users can sign in. Test your normal user sign in process. Have some of your users participate in the testing to make sure they are able to sign in as expected, and that they can reach the same content that they have access to in your production environment.
- **Publishing workbooks and data sources.** Have users publish workbooks and data sources from Tableau Desktop to make sure this goes as you expect.
- **Viewing published workbooks.** Have users who are familiar with the content try to view published workbooks make sure they are appearing as expected. Test views embedded in web pages (for example, in SharePoint pages).

- **Subscriptions and extract refreshes.** Manually run some extract refreshes to confirm that they complete successfully. Run some key scheduled extract refreshes to confirm that they complete as expected.
- **Permissions.** Confirm that permissions are still set as expected for users and content.
- **Command-line utilities and APIs.** If applicable, test the command line utilities (tsm and tabcmd) and programmatic access via APIs.

## Performance and user acceptance testing

Use tools like Tabjolt, Replayer, and Scout to do performance and user acceptance testing on your test environment. For more information about these and other performance testing tools, see Performance Monitoring Tools.

## Test new features

Take a look at the new features that come with the version you are upgrading to, and at any features that were added between the version you currently have and the new version. Think about how to help your users understand the benefits of the features that apply to your environment.

For more information on new features, see What's New in the Tableau Server Help.

## Communicate about the upgrade

The best way to make an upgrade go smoothly is by letting your organisation know ahead of time about the upgrade and how it might impact them. If you've had users help test, take advantage of their experience by having them help communicate the changes they saw while testing. You can also provide user access to the test environment if there are key people who should see the upgraded version before the actual upgrade.

## Troubleshoot Tableau Server Install and Upgrade

Follow the suggestions in this topic to resolve common issues with Tableau Server. For additional troubleshooting steps based on process status viewed on the Status page, see



## General Troubleshooting Steps

Many Tableau Server issues can be addressed with some basic steps:

1. Make sure there is enough disk space on each computer running Tableau Server. Limited disk space can cause a failure to install, a failure to upgrade or problems running Tableau Server.
2. Restart Tableau Server. Issues related to processes not fully started can be resolved by restarting Tableau Server in a controlled way. To restart Tableau Server, use the `tsm restart` command. This will stop all the processes associated with Tableau Server and then restart them.
3. Reindex Tableau Server. Issues related to indexing can be resolved by reindexing Tableau Server. To reindex Tableau Server, use the `tsm maintenance reindex-search` command. For more information, see Reindexing Tableau Server Search & Browse below.
4. Restart the computer on which Tableau Server is running. Some issues, such as those related to data source connectivity, can be resolved by restarting the server computer.

## Common Tableau Server Install Issues

### Installation logs location

The installation logs are written to the `\Temp` directory of the user account that is running Setup. In most cases, this is located at `C:\Users\<user>\AppData\Local\Temp`.

To determine where the `\Temp` directory is for the logged on user, run the following command in Windows Command Prompt: `ECHO %Temp%`.

Install program does not prompt for location to install to

When you install Tableau Server for the first time, you will be prompted for the location you want to install to. *If you do not see this prompt, you may have leftover files or directories from a previous installation, even if you uninstalled Tableau.* To completely remove all traces of Tableau version 2018.2 or later, run the `tableau-server-obliterate.cmd` script, then restart the computer and try the install again. If the previous installation was a version earlier than 2018.2, manually delete all Tableau related folders before rerunning the install program.

**Important:** If you created a backup of Tableau (<file>.tsbak) you want to keep (for example, to restore to your new installation), copy that file to a safe location on another computer to guarantee it is not removed when you clean up your Tableau computer.

Install program does not restart Windows

When you install Tableau Server the Setup program may prompt you to restart Windows at the end of the installation. In certain cases, clicking **Restart** does not restart the computer. This can happen when a 3rd Party component installer is requesting a restart of Windows.

If clicking **Restart** does not restart Windows, complete the installation by manually restarting Windows.

TSM Install fails with 'initialisation failed' error

If you attempt to install Tableau Server and the installation fails with this error:

```
Tableau server initialization failed
See install log at C:\ProgramData\Tableau\Tableau Server\logs
```

This may be related to a permissions issue on your computer. The user is signed into Windows and installing Tableau must have administrator permissions to the C drive, to C:\Windows, and C:\Windows\System32 folders, and to the cmd.exe file. This is true even if you are not installing Tableau on the C drive.

For more information, see the [Tableau Knowledge Base](#).

### TSM Initialise screen does not display

When installing or upgrading Tableau Server, if the browser opens but nothing displays, you may need to add the hostname to the trusted sites list. Alternatively, clear the browser cache or use a different browser. For more information, see the [Tableau Knowledge Base](#).

### Multiple install attempts fail

If you attempt to install Tableau Server and the installation fails, any subsequent installation attempts are likely to fail unless you run the `tableau-server-obliterate.cmd` script to clean Tableau off the computer.

**Important:** You must run the `tableau-server-obliterate.cmd` script from a 64-bit command prompt. For example, run `cmd.exe` in the `C:\Windows\System32` folder. If you run the script from a 32-bit command prompt, the script will not completely remove Tableau, and subsequent installations may fail. To determine if you are running a 64-bit command prompt, type `echo %processor_architecture%` in your command window. If the result includes "64" (AMD64 for example), the command prompt is a 64-bit prompt. If the result includes "x86" you are running a 32-bit prompt. For more information, see the appropriate Microsoft documentation for your versions of Windows.

A failed install attempt can leave the computer in a state that causes subsequent attempts to also fail with errors that don't seem directly related to a previous install attempt.

To fix this problem, run the `tableau-server-obliterate.cmd` script to clean up any left-over remnants of the previous installation attempt and then restart the computer. For more information, see [Running the tableau-server-obliterate script](#).

**Important:** If you created a backup of Tableau (`<file>.tsbak`) you want to keep (for example, to restore to your new installation), copy that file to a safe location on another computer to guarantee it is not removed when you clean up your Tableau computer.

Obliterate script generates error: 'refresh-environment-variables.cmd' is not recognised as an internal or external command

If you use Control Panel to uninstall Tableau Server and then run the `tableau-server-obliterate.cmd` script to completely remove Tableau from your computer, the script may generate an error about the refresh-environment-variables. This occurs because a second script called by the obliterate script was not moved to the temp directory. You can ignore this error.

Install fails due to hardware requirements

Tableau Server cannot install if the computer you are installing on does not meet the minimum hardware requirements. The requirements apply to all computers on which you are installing Tableau Server. For details on minimum hardware requirements, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#).

Install or upgrade fails due to CPU requirements

Beginning in version 2020.4.0 Tableau Server requires CPUs that support SSE4.2 and POPCNT instruction sets. You cannot install or upgrade Tableau Server 2020.4.0 or later on computers that have CPUs which do not support these instruction sets.

You may see this error message when installing a new installation, or in preparation for upgrading an existing installation:

```
Your computer's processor doesn't meet the minimum requirements
that Tableau requires to install the software. If you are using a
VM, make sure Processor compatibility mode is off.
```

The SSE4.2 and POPCNT instruction sets have been common for more than 10 years and most newer CPUs support them, but if you get an error related to processor minimum requirements when attempting to install or upgrade Tableau Server on a Virtual Machine (VM), Processor compatibility mode may be enabled on the VM. To successfully install or upgrade Tableau on a VM, make sure the Processor compatibility mode is turned off.

## Common Tableau Server Upgrade Issues

### Upgrade logs location

By default the upgrade log, `app-upgrade.log`, is written to `C:\ProgramData\Tableau\Tableau Server\logs`.

### Error: Failed to establish a connection with Active Directory

Beginning with Tableau version 2021.2, Tableau Server no longer allows insecure connections with Active Directory. If your current instance of Tableau Server is communicating with Active Directory over a non-encrypted channel, upgrade will fail.

To resolve this issue follow one of the steps below:

- Investigate and resolve the failed secure connection. See the Microsoft topic, [LDAP Over SSL Connection Issues](#).
- Run the following commands to allow an insecure connection on your current version of Tableau Server before you upgrade:

```
tsm configuration set -k wgserver.domain.allow_insecure_connection -v true --force-keys
```

```
tsm pending-changes apply
```

After upgrade completes, we recommend securing the channel and then setting this option to `false`.

**Note:** By default (when `wgserver.domain.allow_insecure_connection` is set to `false`), Active Directory group synchronisation will fail if the communication channel with Active Directory is not encrypted.

## Maps do not display or display incompletely after upgrading

Beginning with Tableau version 2019.2, the internet access requirements changed for maps. If you are upgrading from version 2019.1.x or earlier to version 2019.2.x or later, and maps are not displaying as expected, confirm that your environment is configured to allow access on port 443 to `mapsconfig.tableau.com` and `api.mapbox.com`.

In version 2019.1.x or earlier, access was necessary to `maps.tableausoftware.com`.

For more details on internet access requirements, see [Communicating with the Internet](#).

Upgrade script error: "Tableau Server Version change validation failed."

When upgrading, if you run the `upgrade-tsm` script from the `scripts.<version_code>` directory for the earlier version, the upgrade will fail with an error:

```
Tableau Server Version change validation failed.
Tableau Server <version> is already installed.
```

If you get this error, change to the `scripts.<version_code>` directory for the version you just installed and run the script from there.

Upgrade multi-node, initialising additional node fails with 'Enter your credentials again' error

If you attempt to initialise an additional node when upgrading Tableau Server and see this error:

```
Enter your credentials again. The credentials you enter must
provide administrative access to the computer where you generated
the configuration file.
```

this is an indication that the node is unable to connect to or communicate with the initial node.

This can happen for multiple reasons:

- The credentials you entered are not valid or you mistyped them. The credentials must be for a user who has administrative permissions on the computer where Tableau Server was first installed. You do not need to use the credentials of the user who

created the bootstrap file but doing so will ensure you are using valid credentials.

- The local firewall of the computer you are trying to add is not allowing communication to the initial node. For more information, see [Local firewall configuration](#).

### Upgrading fails due to lack of disk space

If there is not enough disk space for the Tableau Server Setup program to run and do the upgrade, the installation will fail. The amount of disk space required will depend on the size of your repository database and the number and size of your extracts.

**Note:** When upgrading from a pre-TSM version of Tableau Server (a version earlier than 2018.2.0), the uninstallation of Tableau creates a server backup file in the data directory. This backup file has a `.tsbak` extension and is required for the upgrade. *After* you upgrade successfully, you can safely delete this file to free up space (make a copy on a computer that is not part of your Tableau Server installation in case you need the file for any reason). Do not delete this file until you have completed the upgrade and know it is working.

To free up disk space:

1. Create a log archive snapshot using the `tsm maintenance ziplogs` command.

After you create the ziplogs file, save it to a safe location that is not part of your Tableau Server installation.

2. Clean up unnecessary files using the `tsm maintenance cleanup` command. For more information, see [Remove Unneeded Files](#).

### Upgrade fails on RebuildSearchIndex job

Beginning with version 2020.1.x, the final step in an upgrade is to rebuild the search index. At this point, all services have been upgraded, so if this job fails, you can manually reset the

search server by running the `tsm maintenance reset-searchserver` command. You do not need to obliterate and start over.

The error will be:

```
An error occurred while rebuilding search index.
```

To reset the search server :

1. On the initial node, open a command prompt as administrator.

This must be a new command prompt because the upgrade script updates the system environment for the new version.

2. Rebuild the search index using the `tsm maintenance reset-searchserver` command.

Upgrade fails on 2022.1 and later

After upgrading Tableau Server 2022.1 (or later), restoring a Tableau Server backup as part of your upgrade process can cause the following error:

*“The backup cannot be restored because Tableau Server uses the new identity service tables by default.”*

This issue occurs because Tableau Server 2022.1 (and later) uses an identity schema that is different from the identity schema used by the backup. To resolve this issue, see [Troubleshoot Issues with the Identity Migration](#).

Upgrade fails on 2020.4.0 or later

Beginning with version 2020.4.0, the Checkpoint Upgrade feature allows you to retry a failed upgrade. In general, this is most useful for experienced server administrators and IT professionals who are comfortable with Tableau Server log files and are willing to search through them. But the feature can help in all failed upgrades because it allows you to rerun the `upgrade-tsm` script, and the script is run from the last successful step, saving time. For those with experience, it may be possible to identify problems like disk space problems or permissions issues, correct them, and rerun the upgrade.



If you are upgrading to version 2020.4.0 or later and the upgrade fails, the following steps may help you to complete the upgrade:

- Rerun the `upgrade-tsm` script. Upgrade failures are sometimes a result of timeouts during the upgrade process, and rerunning the script can allow the upgrade to get beyond intermittent or occasional timing issues. This is also a step that is safe and easy to do. Rerunning the script will do no harm, and at worst, the upgrade will fail again at the same point, but without needing to go through any previous steps.

The script is located in the `\scripts` directory:

By default,

```
C:\Program Files\Tableau\Tableau Server-  
\packages\scripts.<version_code>\upgrade-tsm.cmd
```

If your Tableau Server upgrade isn't successful when you rerun the `upgrade-tsm` script, and you are comfortable with Tableau Server logs, you can take these additional troubleshooting steps:

- Look at the output of the script in the command window (rerun the script if you no longer have the command window open). You need to run the script in a command windows with administrator access. Useful error messages may help you identify the cause of the upgrade failure and give you some ideas for how to correct the issue.
- Look in the `app-upgrade.log` file. Any errors that are displayed at the command line will also appear in the `app-upgrade.log` file, often with more details.
- Look in the `tabadmincontroller.log` file. Upgrade problems that aren't easily identifiable in the above two instances are likely the result of an issue in a job. The `tabadmincontroller.log` file may have more information that helps you diagnose the issue.

**Note:** For information about log file locations, see [Tableau Server Logs and Log File Locations](#).

## Upgrade fails due to permission problems with the backup/restore file location

With versions of Tableau Server before 2022.1.0, if the file location for the backup/restore file does not have the correct permissions, the upgrade script will fail with an error about not being able to read the backup file or not being able to restore the repository.

Beginning with version 2022.1, the upgrade script confirms the permissions of file location for the backup/restore file before starting the upgrade so the file can be written to and read from the location during the upgrade to the new version of Tableau Server.

Required permissions for the backup/restore file location:

- NetworkService: read/write/execute permission
- Run As service account: read/write/execute permission

The errors will be similar to these:

```
The runas user does not have permission to read the backup file:
<backup/restore basefilepath>.
```

```
Repository restore failed.
```

```
An error occurred during installation.
```

```
An error occurred while restoring repository.
```

The location used by TSM for backup and restore is defined by the `base-filepath.backuprestore` configuration key and has a default that the installation program sets up with correct permissions, but these may be impacted by organisation IT rules or if you change the location to one you have created yourself. A new command available starting in 2022.1 allows you to check the permissions on the backup/restore file location immediately after creating it to avoid any permission-related problems. For details about that command, see `tsm maintenance validate-backup-basefilepath`.

For details about the backup/restore file path, see `tsm File Paths`.

## Common Settings Import Issues

Import of settings file causes "not present on any node" validation error due to missing services

If you are upgrading by installing a new version of Tableau Server and importing a settings file from an earlier version, you may encounter topology validation errors when running the `tsm settings import` command.

This can happen when you export a settings file from an older version of Tableau Server and import it into a new version, and new services have been added to Tableau between the two versions.

Errors will be similar to this (the specific service may be different):

```
c:\Users\mytableau\Desktop>tsm settings import -f 20183-export.json
```

```
Pending topology set.
```

```
There are 1 topology validation errors/warnings.
```

```
Service 'elasticserver' is not present on any node in the cluster.
```

```
Service: Elastic Server
```

To resolve this issue, add any missing services to Tableau Server:

1. For any service that generated a validation error, add the service with an instance count of 1.

For example, if the Elastic Server is not present in the cluster, set the process instance count to 1 using the service name that appears in the first line of the validation error message:

```
tsm topology set-process -n node1 -pr elasticserver -c 1
```

Repeat this step for each service that results in an error.

2. When you have no more warnings or errors, apply the pending changes:

```
tsm pending-changes apply
```

Your settings should be imported successfully.

Import of settings file causes "configuration value you specified does not match" error

If you are installing a new version of Tableau Server and import a settings file from an earlier version, you may encounter configuration validation errors when running the `tsm settings import` command. These can occur when a settings file includes a configuration value that has since been removed from Tableau.

The error will look similar to this (the configuration key may be different):

```
c:\Users\mytableau\Desktop>tsm settings import -f 20183-export.json
Configuration error: At least one configuration value you specified
does not match a known configuration key. This applies to the fol-
lowing keys: '[features.TsmConfigFileService]'
Use this parameter to override unknown key error: --force-keys
```

To resolve this issue, edit the settings file you are importing to remove the reference to the configuration key or keys in the error:

1. Copy the JSON settings file and save the copy for backup.
2. Open the JSON settings file in a plain text editor.
3. Locate and delete the entire line that includes the key. In this example, `features.TsmConfigFileService`:

```
"configKeys" : {
  "config.version" : 19,
  "tabadmincontroller.port" : "8850",
  "endpoints.enabled" : false,
  "endpoints.health.enabled" : true,
  "features.TsmConfigFileService" : true,
  "tableau_projects.language" : "en",
```

The above is an example of a small section of an exported settings file and is not inten-

ded to represent the entire contents of the file.

4. Save the settings file and import it again.

You may encounter additional errors related to topology validation. For information about solving those errors, see [Import of settings file causes "not present on any node" validation error due to missing services above](#).

"You cannot directly modify instances of the Coordination Service" error

This error can occur in two situations:

- When you import a Tableau Server settings file into an installation that has a different Coordination Service topology than the settings file does
- When you attempt to configure the Coordination Service using the `tsm topology set-process` command

If you see this error after importing a settings file:

The Tableau Server settings file has a different Coordination Service topology than the target server does. This can happen if you are upgrading Tableau Server by installing a new version and importing a settings file from an earlier version. If you have not explicitly deployed a Coordination Service ensemble on the target server, it has a single instance of Coordination Service, on the initial node.

To correct this error you can take either correct the mismatch from the command line, or by editing the settings import file. You can also discard all pending changes, deploy the Coordination Service on the target computer to match the settings in the import file, and reimport the settings file.

To correct the mismatch from the command line, for each node that generates an error, use the `tsm topology set-process` command to revert the instance count of Coordination Service.

1. Run the `tsm pending-changes list` command. The output shows you which nodes have changes.
2. Find the node or nodes where the Coordination Service count is changed.

For example, if the settings file had a Coordination Service instance on node2, but the target system did not have any Coordination Service instance on that node, the count for node 2 would show as changed from 0 to 1 by the import of the settings file:

```
C:\Windows\system32>tsm pending-changes list
Configuration
There are no pending configuration changes.
Topology
node2:
    Coordination Service
        New Instance Count:1
        Old Instance Count:0
```

3. Use the `tsm topology set-process` command to set the count back to the "Old Instance" value.

For the example above:

```
tsm topology set-process -n node2 -c 0 -pr "Coordination Service"
```

4. Once you have reset any Coordination Service instance count that was changed, apply pending changes:

```
tsm pending-changes apply
```

If you see the error when setting the process count for Coordination Service manually:

This error can also occur if you attempt to update the Coordination Service directly, using the `tsm topology set-process` command instead of the `tsm topology` commands for managing the Coordination Service. If you tried this:

1. Use the `tsm pending-changes discard` command to discard the pending changes.
2. Use the correct commands for configuring the Coordination Service. For more information, see [Deploy a Coordination Service Ensemble](#).

## Troubleshooting connections to TSM

### Unable to connect to TSM

If you are able to connect to TSM from the computer where you installed Tableau (using `https://localhost:8850` for example), but cannot connect from another computer (using `https://<server-name>:8850`), you may need to configure the local firewall on the Tableau Server computer.

Beginning with version 2018.2 you need to configure the firewall manually. For more information, see [Local firewall configuration](#).

## Starting Tableau Server

### Tableau Server cannot determine if it fully started

In some instances Tableau Server may report that it could not determine if all components started properly on startup. A message displays: 'Unable to determine if all components of the service started properly'.

If you see this message after starting, verify that Tableau Server is running as expected by using a `tsm status -v` command.

If the status shows as running ("Status: RUNNING"), then the server successfully started and you can ignore the message. If the status is DEGRADED or STOPPED, see 'Tableau Server doesn't start' in the next section.

### Tableau Server doesn't start

If Tableau Server does not start or is running in a degraded state, run the `tsm restart` command from a command prompt. This will shut down any processes that are running, and restart Tableau Server.

## Reindexing Tableau Server Search & Browse

Problems that can be solved by rebuilding Search & Browse index

Symptoms of an index that needs to be rebuilt include:

- A blank list of sites when a user attempts to log in
- A blank list of projects when a user tries to select a project
- Missing content (workbooks, views, dashboards)
- Unexpected or inaccurate alerts (for example, an "refresh failed" alert on a workbook that does not include an extract)

If you see any of these behaviours, reset and rebuild the Search & Browse index using the `tsm maintenance reset-searchserver` command.

## Activating Tableau Server

Tableau Server licence activation fails

In some instances Tableau Server licence activation may fail. Error messages can range from a very generic one:

- An error has occurred

To more specific messages:

- Function `flxActCommonLicSpcPopulateFromTS` returned error 50030, 71521,
- No license found for 'Tableau Server'

To resolve this issue, try these solutions in the order listed:

Confirm you can access the licensing server

The Tableau licensing service was moved to a new data centre on 6 October 2018. This means any environments that required special configuration (static IP safe listing for example) to access `licensing.tableau.com` or `licensing.tableau.com` will need to be updated before you can activate, refresh or deactivate a Tableau product key.



## Tableau Server on Windows Help

To test access, type the URL and the port of the licensing server in a browser:

```
https://licensing.tableau.com:443
```

and:

```
https://atr.licensing.tableau.com/_status/healthz
```

If you are able to access the server, a "Test success" message displays for the first server, and an "OK" message displays for the second.

Tableau Server needs to make a connection to the following internet locations for licensing purposes:

- atr.licensing.tableau.com:443
- licensing.tableau.com:443
- register.tableau.com:443
- o.ss2.us
- s.ss2.us
- crt.rootca1.amazontrust.com
- crt.sca1b.amazontrust.com
- crt.sca0a.amazontrust.com
- crt.sca1a.amazontrust.com
- crt.sca2a.amazontrust.com
- crt.sca3a.amazontrust.com
- crt.sca4a.amazontrust.com
- \*.digicert.com

- `ocsp.*.amazontrust.com`
- `crl.*.amazontrust.com`

Requests to the above domains may be on port 80 or 443. Port 80 is used for certificate validation (revocation, certificate chain, etc). Port 443 is used for SSL connections.

Requests to the `ocsp.*.amazontrust.com` and `crl.*.amazontrust.com` domains are managed by Amazon for certificate revocation information. See [ACM certificate characteristics](#) for more information.

Verify the date and time

Verify the date and time on the initial Tableau Server computer is correct. If the clock is set to a time and date earlier than the current date, Tableau Server cannot be activated.

Verify FlexNet Licensing Service has started

If the date and time on the Tableau Server computer are correct, verify that the FlexNet Licensing Service is running on the initial Tableau Server computer.

1. On the initial computer, from the Windows Start menu, open **services.msc**.
2. In the Services dialog box, verify that the status of *FlexNet Licensing Service 64* (64-bit) or *FlexNet Licensing Service* (32-bit) is **Started**.

If FlexNet is not listed as **Started**, right-click FlexNet Licensing Service and select **Start**.

If the **Start** option is greyed out, the service may be set to Disabled. To enable the service:

- a. Right-click FlexNet Licensing Service and select **Properties**.
- b. From the **Startup type** drop-down list, select **Automatic**.
- c. Click the **Start** button, and then click **OK**.

## Tableau Server on Windows Help

Force the product key to be read again

1. On the initial Tableau Server computer, sign in as administrator and open a command prompt.

Change to the Tableau Server bin directory. By default, this is:

```
C:\Program Files\Tableau\Tableau Server\packages\bin.<version_
code>
```

- 2.
3. Type the following commands:

```
tsm stop
lmreread

tsm start
```

Send the contents of trusted storage to Tableau Support

If FlexNet Licensing Services is installed and running but you're still seeing an error, there might be a problem with the Tableau product key information. To resolve this issue, complete the following steps to create a file of the key information located in trusted storage.

1. On the initial Tableau Server computer, sign in as administrator and open a command prompt.
2. Type the following command:

```
serveractutil -view > <machine_name>-LicResults.txt
```

This creates the `<machine_name>-LicResults.txt` file in your current directory. If you don't have write permissions for that location and see an error, change to a location where you do have permission to create a file and run the command again.

3. Contact Tableau Support (<http://www.tableau.com/en-gb/support/request>) and include the `<machine_name>-LicResults.txt` file that you created.

## tabcmd Installation Problems

### Installing tabcmd separately

tabcmd is automatically installed on the initial Tableau Server node when you install Tableau Server, but if you want to run it on another computer, you need to download and install tabcmd separately. For details, see [Install tabcmd](#).

### Problems installing tabcmd on Linux

tabcmd requires Java 11 to run properly. On RHEL-like systems, this will be installed as a dependency when installing tabcmd. On Debian-like systems, you need to install Java 11 separately if it is not already installed.

As of July 2022, Debian distributions are no longer supported. For more information, see [this Tableau Community post](#).

### Java is not installed

If you see errors similar to this when installing tabcmd, confirm that Java 11 is installed on your Linux computer:

```
Cannot find 'java' in your PATH. Install 'java' and make sure it is  
in your PATH to continue.
```

### Incorrect version of Java is installed

If you see errors similar to these, confirm that Java 11 is installed:

```
Exception in thread "main" java.lang.UnsupportedClassVersionError:  
com/tableausoftware/tabcmd/Tabcmd : Unsupported major.minor version  
52.0
```

or.

```
*** Uncaught exception NoClassDefFoundError: javax/xml-  
1/bind/JAXBException  
*** See the logs for the stacktrace.
```

# Uninstall Tableau Server

Do not uninstall Tableau before upgrading. For details on upgrading, see [Upgrading from 2018.2 and Later \(Windows\)](#).

Beginning with version 2018.2, you can have multiple versions of Tableau Server installed at the same time. This allows you to run most of an upgrade while an existing version is running, and reduces downtime and impact to users. Once you have upgraded, you can uninstall your previous version. Doing this frees up disk space. You do not have to uninstall the previous version.

This article explains how to uninstall previous versions, after you've upgraded to a newer version.

## Uninstalling and completely removing Tableau Server

There are two primary "uninstall" scenarios that Tableau Server on Windows supports:

- **Uninstall Tableau Server:** *After you upgrade* to a new version of Tableau Server you can uninstall your previous version to free up disk space. Continue reading for information about uninstalling Tableau.
- **Remove Tableau Server:** If you want to complete remove Tableau Server from a computer, you can use a script provided by Tableau to remove Tableau Server and all related files. This removes all data as well as server components, so should only be done if you know you want to reset the computer to a pre-Tableau state. You might need to do this if Technical Support recommends this step when troubleshooting an installation problem. We recommend you create a backup of your data before removing Tableau. Save the backup file to a safe location on a computer that is not part of your Tableau installation. Completely remove Tableau Server without uninstalling any version first. The script will uninstall all existing versions found on the computer. If you have already uninstalled your existing version and now want to completely remove Tableau,

you can find the script to do so in a temporary location. For more details, see [Remove Tableau Server from Your Computer](#).

## Uninstall a Tableau Server version

When upgrading from one TSM version to another, you must leave the earlier version in place until you have finished the upgrade. *Then* you can uninstall it.

Use Control Panel to uninstall an earlier version of Tableau Server after upgrading. Starting with version 2018.2, you can have multiple versions of Tableau Server installed at the same time. All installed versions are visible in Control Panel, but only one version is running (the running version will generally be the version you upgraded to, but if you have not completed the upgrade process it could be an earlier version). After completing the upgrade you can uninstall your previous version.

**Important:** Beginning with version 2018.2, uninstalling Tableau Server will not create a backup of your data. As a best practice, always create a backup of your data before upgrading or uninstalling Tableau. This ensures you can reinstall and restore the data if you decide you want to do this. Save the backup to a safe location on a computer that is not part of your Tableau Server installation.

To uninstall a version of Tableau Server:

1. Open Control Panel, click **Uninstall a program**, and locate the version you want to uninstall.

Be sure you select the correct version to uninstall:

- Uninstalling previous versions of Tableau Server does not affect the running version and simply removes unnecessary files from those previous versions.

- **Do not** uninstall the current, running version. Uninstalling the current, running version of Tableau Server stops server and removes server-specific files and folders, but may leave some elements behind. Uninstalling does not create a backup of your repository data.

2. With the Tableau Server version selected, click **Uninstall**.

## Remove Tableau Server from Your Computer

**Warning:** The steps below *completely remove* Tableau Server on Windows, and delete all related data, users and configuration information. This includes any files in `\temp`. Tableau Server licences are also deactivated if you include the `-l` option when running the command shown below and the computer is connected to the internet.

As a best practice, copy any backup files you want to save to a location that is not related to Tableau. This will preserve the files when you remove Tableau. You should copy any backup files to a separate computer for safety, including backup files created when you uninstall Tableau. By default these are created in `C:\ProgramData\Tableau\Tableau Server` with a name similar to `uninstall-2018.1.tsbak`. Saving backup files on a separate computer will allow you to reinstall the version of Tableau Server that created the backup, and have the data contained in the backup, even after running the `tableau-server-obliterate.cmd` script.

If you want to uninstall a particular Tableau Server package to free up disk space (after upgrading, for example), see [Uninstall Tableau Server](#).

As part of the regular installation of Tableau Server, a script is installed that provides you a way to completely remove Tableau and all associated files from your computer. This is something you would only do if you did not care about your Tableau data, configuration, or log files, or if you are working with Tableau Technical Support and need to reinstall Tableau Server after an installation or upgrade attempt fails. The obliterate script will not remove any drivers you installed separately, even those you installed to use with Tableau Server.

The `tableau-server-obliterate.cmd` script is intended for when you want to completely remove Tableau Server from your computer. You might want to do this for a couple of different reasons:

- You no longer want Tableau Server installed on the computer. Use the `tableau-server-obliterate.cmd` script to remove Tableau Server completely. If this is the case, and the computer is connected to the internet, you can include a `-l` option to deactivate the Tableau Server licence.
- Troubleshooting Tableau Server installation problems – If you run into issues installing Tableau, you may need to use the `tableau-server-obliterate.cmd` script to completely remove Tableau Server from your computer before reinstalling. Doing this will clean up any older settings or states and allow you to reinstall on a "clean" computer. If you are doing this, you can leave off the `-l` option to preserve licensing information on the computer. When you omit the `-l` option, you will not need to activate your licence when you reinstall Tableau Server.

**Important:** You must run the `tableau-server-obliterate.cmd` script from a 64-bit command prompt. For example, run `cmd.exe` in the `C:\Windows\System32` folder. If you run the script from a 32-bit command prompt, the script will not completely remove Tableau, and subsequent installations may fail. To determine if you are running a 64-bit command prompt, type `echo %processor_architecture%` in your command window. If the result includes "64" (AMD64 for example), the command prompt is a 64-bit prompt. If the result includes "x86" you are running a 32-bit prompt. For more information, see the appropriate Microsoft documentation for your versions of Windows.

## What tableau-server-obliterate does

The intent of the `tableau-server-obliterate.cmd` script is to completely remove Tableau Server from your computer. This includes files, system settings and configurations, and, if you specify, licensing information.

When you run `tableau-server-obliterate.cmd`, the following steps are taken:



## Tableau Server on Windows Help

- Uninstall is run for all installed versions of Tableau Server (Control Panel uninstall).
- Most contents of the data directory is removed (by default `C:\ProgramData\Tableau\Tableau Server`). Backup and log files are preserved by default. See the section below, "Preserving Tableau Server backup and log files."
- All registry entries related to Tableau Server are removed.
- All server licences are deactivated if you use the `-l` option and the computer is connected to the internet. This option does not work in offline situations.

### Preserving Tableau Server backup and log files

Prior to version 2020.1 of Tableau Server, running the `tableau-server-obliterate` script deleted all content from the Data directory. Beginning with version 2020.1, the default behaviour of the `tableau-server-obliterate` script has changed: the script copies and saves Tableau Server backup and log files to the `logs-temp` directory. The default location for the `logs-temp` directory is at `\ProgramData\Tableau\logs-temp`. You can set options on the script to disable this new functionality.

To change the default behaviour and to remove backup or log files, include one of the following options when running the `tableau-server-obliterate.cmd` script:

- `-k` Do not copy backups to logs-temp directory.
- `-g` Do not copy logs to logs-temp directory.
- `-a` Do not copy anything to logs-temp directory.

### Running the `tableau-server-obliterate` script

You can completely remove Tableau Server from a computer, either preserving the licensing information, or removing the licensing information along with all other aspects of Tableau Server. You might want to preserve licensing if you are going to reinstall Tableau Server on the same computer.

An older version of `tableau-server-obliterate.cmd` may miss files from new versions of Tableau Server. Always run the obliterate script for the version of Tableau Server that is installed on the computer.

To completely remove Tableau Server without removing server licensing

The example script in this procedure also includes the `-a` option to remove Tableau Server backup and log files.

**Note:** If you plan to reinstall Tableau Server and Activate Tableau Server Using the Authorisation-To-Run (ATR) Service, we recommend that you remove licensing information before reinstalling and activating Tableau Server using Server ATR.

1. On the initial node, open a command prompt as administrator.
2. Run the `tableau-server-obliterate.cmd` script:

By default: `C:\Program Files\Tableau\Tableau Server-`  
`\packages\scripts.<version_code>\tableau-server-obliterate.cmd`  
`-a -y -y -y`

**Note:** If you have already uninstalled Tableau Server using Control Panel and now you want to completely remove it, run the copy of the `tableau-server-obliterate.cmd` script located in the `\Tableau Server\temp` folder (by default: `C:\Program Files\Tableau\Tableau Server\temp`). If the script is not in that directory, reinstall the Tableau Server package and then run the `tableau-server-obliterate.cmd` script from the scripts folder (By default: `C:\Program Files\Tableau\Tableau Server-`  
`\packages\scripts.<version_code>\`).

You can also get a copy of the script from this Knowledge Base article: [Obliterate Script Unavailable](#).

If you have a multi-node (distributed) installation of Tableau Server, run the `tableau-`

`server-obliterate.cmd` script on each node in the cluster.

3. Restart each computer you ran the `tableau-server-obliterate.cmd` script on.

To completely remove Tableau Server and licensing

The example script in this procedure also includes the `-a` option to remove Tableau Server backup and log files.

1. On the initial node, open a command prompt as administrator.
2. Deactivate any active product keys.

```
tsm licences deactivate -k <product_key>
```

3. Run the `tableau-server-obliterate.cmd` script:

```
By default:C:\Program Files\Tableau\Tableau Server-  
\packages\scripts.<version_code>\tableau-server-obliterate.cmd  
-a -y -y -y -l
```

The `-l` option for the obliterate script removes all licensing files from the computer if the computer is connected to the internet. The script first attempts to deactivate any active licences, but it will remove all licensing information, whether or not deactivation was successful. This is why we recommend you run the `tsm licenses deactivate` command before running the obliterate script.

**Note:** If you have already uninstalled Tableau Server using Control Panel and now you want to completely remove it, run the copy of the `tableau-server-obliterate.cmd` script located in the `\Tableau Server\temp` folder (by default: `C:\Program Files\Tableau\Tableau Server\temp`). If the script is not in that directory, reinstall the Tableau Server package and then run the `tableau-server-obliterate.cmd` script from the scripts folder (By

```
default:C:\Program Files\Tableau\Tableau Server-
\packages\scripts.<version_code>\).
```

If you have a multi-node (distributed) installation of Tableau Server, run the `tableau-server-obliterate.cmd` script on each node in the cluster. You do not need to deactivate licences on any additional nodes.

4. Restart each computer you ran the `tableau-server-obliterate.cmd` script on.

## Help Output for tableau-server-obliterate Script

The following help content is the output when you run the following command:

```
tableau-server-obliterate -h
```

The `./tableau-server-obliterate` script is installed to By default: `C:\Program Files\Tableau\Tableau Server\packages\scripts.<version_code>\.`

### Output

Remove Tableau Server from this computer.

This script will stop and remove all Tableau Services from this computer. It also removes data and configuration files. It leaves licensing in place. It also preserves logs and backup files, which are moved to a temp directory under the Tableau data folder. You can

force removal of these files, and licensing, using optional parameters.

This script is destructive and not reversible. It should only be used to clean Tableau Server from a computer. For multi-node installations, you must run the script separately on each node.

This script must be run as the Administrator.

-y	Required. Yes, remove Tableau Server from this computer.  Must be specified three times to confirm.
-q	Optional. Quiet mode. Windows only. Do not display progress UI when removing Tableau Server.
-l	Optional. Delete licensing files and data. This command will attempt to deactivate licenses before deleting licensing data. Internet access is required for license deactivation. Offline deactivation is not supported. To deactivate license before removing Tableau Server, run 'tsm licenses deactivate' before running this script.
-k	Optional. Do not copy backups to logs_temp directory.
-g	Optional. Do not copy logs to logs_temp directory.
-a	Optional. Do not copy anything to logs_temp directory.

# Migrate

The topics in this section describe how to migrate from Tableau Server to Tableau Cloud. Topics here also cover Tableau Server to Tableau Server migration scenarios.

Looking for Tableau Server on Linux? See [Migrate](#).

<b>Migrate Tableau Server to Tableau Cloud</b> .....	<b>450</b>
<b>Server to Server Migrations</b> .....	<b>461</b>

## Migrate Tableau Server to Tableau Cloud

For information about migrating small (less than 100 users) Tableau Server to cloud, see [Tableau Cloud Manual Migration Guide](#).

For information about planning a move to Tableau Cloud, see [Tableau Blueprint: Move Tableau to Cloud](#).

## Technical Considerations for Migrating from Tableau Server to Tableau Cloud

This topic covers most of the technical considerations that may arise in a migration from Tableau Server to Tableau Cloud. It's written for the administrators that currently manage Tableau Server and who are considering a migration to Tableau Cloud. We recommend that you review this topic as a primary step in your migration plan. Additionally, work with your account team to understand if a migration makes sense for your organisation.

The topic reflects the product capabilities in Tableau Server 2023.3.

For additional information and to initiate a migration to Tableau Cloud, visit the [Tableau Cloud Migration](#) site on Tableau.com.

## Summary outline

This topic is organised into four major areas that are familiar to Tableau administrators. The following tables show a summary feature comparison between Tableau Cloud and Tableau Server within each major area. For more information on a given feature, see the corresponding section later in this topic.

<b>Security, administration and governance</b>		
	<b>Tableau Cloud</b>	<b>Tableau Server</b>
Compliance	See <a href="#">Salesforce Compliance</a> portal. Access to this site may require permission from your account manager.	Managed by customer
Hosting and upgrades	Managed by Tableau	Managed by customer
Site level administration	Single site default	Managed by customer
Telemetry data	Limited	Managed by customer
Observability data	<a href="#">Admin Insights</a> with <a href="#">Activity Log</a>	Managed by customer with repository access and <a href="#">Activity Log</a>
Availability	99.9% with SLA for Premium Support customers	Managed by customer

<b>Data Connectivity</b>		
	<b>Tableau Cloud</b>	<b>Tableau Server</b>
Files	Supported	Supported
Applications and databases	Supported, with database-	Supported

	specific limitations	
Custom connectivity	Limited support	Supported
Cube data sources	Not supported	Supported

User management and licensing		
	Tableau Cloud	Tableau Server
Licensing	Internal: role-based  External: role and usage-based	Internal: role and core-based  External: role and core-based
SSO	Supported	Supported
Active Directory, Kerberos, LDAP directory	Not supported	Supported
Automated user and group management	Okta, OneLogin, Azure AD and <b>custom tooling</b>	Active Directory, LDAP

Extensibility and external integrations		
	Tableau Cloud	Tableau Server
Automated tooling through APIs	Supported	Supported
R and Python integration	Supported	Supported
Embedding	Supported	Supported
Customisation	Limited support	Supported



## Security, administration and governance

### Security and compliance

Make sure Tableau Cloud security certifications meet your organisation's requirements. Tableau Cloud is compliant with ISO 27001/27017/27018 and SOC 2/3 and adheres to data privacy requirements such as those outlined in GDPR. To see a complete and up-to-date list of certifications go to the [Salesforce Compliance](#) portal. Access to this site may require permission from your account manager.

Additionally, Tableau Cloud and Salesforce adheres to the strictest standards for regional data security and privacy. Customer data never leaves the region in which it is hosted. Salesforce adopts a Shared Responsibility Model. In this model, we work with you to ensure that all the proper security and compliance controls are enabled by Salesforce and your organisation.

### Hosting and upgrades

Tableau hosts and manages Tableau Cloud for customers. Tableau Cloud is always running the latest version of Tableau. Major upgrades are completed with zero downtime. Routine maintenance (activities like upgrades, backups, performance tuning, etc.) is performed to minimise downtime. In the case where downtime is required, maintenance occurs during pre-communicated windows. For more information about the Tableau maintenance schedule and how to sign up for maintenance notifications from Tableau Trust, see [Tableau Cloud System Maintenance](#).

Tableau Cloud is run in Amazon Web Services. You can choose to deploy your site in any of the AWS Regions listed [here](#).

Tableau takes daily backups of the environment for Disaster Recovery. However, these backups are for the purpose of restoring the system as a whole. Customers are responsible for maintaining backups of any files they want to recover if they're removed or deleted from Tableau Cloud.

## Site level administration

By default, Tableau Cloud deployments provide a single Site for deploying Tableau to your users. A single site model simplifies administration of the environment while allowing comprehensive governance scenarios as recommended in [Blueprint](#).

To ensure consistent performance across the platform, Tableau Cloud restricts sites with site capacity limits. See [Tableau Cloud Site Capacity](#) for a list of capacity types and associated allowances. The capacity restrictions include limits for overall storage and for tasks that you may perform on the site. You can evaluate if any of your use cases would be impacted by these limits by connecting to the Tableau Server repository and comparing usage to the site capacity limits. For more information about connecting to the repository, see [Collect Data with the Tableau Server Repository](#).

## Observability data

In Tableau Cloud, you can't connect directly to the Tableau Server repository database. Instead, Site Admins have access to a Project called Admin Insights that contain pre-built observability dashboards and data sources. See [Use Admin Insights to Create Custom Views](#). Admin Insights help you to understand usage, performance, licensing, user management and more. You can also use the provided data sources to build custom reports or take advantage of Accelerators built on this data. For an example, see the [Dashboard Load Times Accelerator](#). Default data retention in Admin Insights is 90 days. With Advanced Management you receive an extended retention period of 365 days and get access to [Activity Log](#) for more detailed observability data.

## Availability

Tableau Cloud offers a service level agreement (SLA) that guarantees monthly service availability of 99.9%. We provide this level of service to all Tableau Cloud customers. However, in the unlikely event availability falls short of 99.9%, only those customers subscribed to Premium Support for Tableau Cloud are eligible for a service credit on their account.

Tableau Cloud customers who subscribe to Standard Support or Extended Support benefit from the SLA because Tableau maintains 99.9% availability across all Tableau Cloud

deployments. However, Standard and Extended Support customers can't request service credits if Tableau Cloud fails to meet 99.9%.

Learn more about Technical [Support Services](#) and [Premium Support](#) for Tableau Cloud.

## Data connectivity

Where your data resides determines which of the two connectivity options you use with Tableau Cloud:

- Tableau Cloud can directly connect to the cloud data sources listed below. For direct connections, some databases require authorizing Tableau Cloud to access these data sources before you connect. See [Authorise Access to Cloud Data Published to Tableau Cloud](#).

## Supported Tableau Cloud connectors

Alibaba AnalyticsDB for MySQL‡	Dropbox*‡	OData‡
Alibaba Data Lake Analytics‡	Esri Connector‡	OneDrive*‡
Amazon Athena‡	Exasol‡	Oracle‡
Amazon Aurora for MySQL‡	Google BigQuery*‡	Pivotal Greenplum Database‡
Amazon EMR Hadoop Hive‡	Google Cloud SQL (MySQL compatible)‡§	PostgreSQL‡
Amazon Redshift‡	Google Drive‡	Presto‡
Apache Drill‡	Hortonworks Hadoop Hive	Qubole Presto‡
Azure Data Lake Storage Gen2‡	Impala‡	Salesforce‡
Azure Synapse Analytics	Kyvos‡	SAP HANA (for virtual connections only)‡

(SQL Server compatible)	MariaDB‡	SharePoint Lists‡
Box‡	Microsoft Azure	SingleStore (formerly
Cloudera Hadoop‡	SQL Database‡	MemSQL)‡
Databricks‡	Microsoft Azure Synapse	Snowflake‡
Datorama by Salesforce‡	Analytics‡	Spark SQL‡
Denodo‡	Microsoft SQL Server‡	Teradata**‡
Dremio by Dremio‡	MongoDB BI Connector‡	Vertica‡
	MySQL‡	

\*For more information about using OAuth 2.0 standard for Google BigQuery, OneDrive and Dropbox connections in Tableau Cloud, see [OAuth Connections](#).

\*\*Teradata web authoring currently doesn't support query banding functionality. See [Teradata](#) for details.

‡Supports virtual connections if you have Data Management. See [About Virtual Connections and Data Policies](#) in the Tableau Cloud help for details.

§Tableau Cloud doesn't support SSL using Google Cloud SQL.

- For data that is stored on-premises or in a private cloud network, you can deploy Tableau Bridge. For a list of all the connectors that Tableau Bridge supports and doesn't support, see [Connectivity with Bridge](#).

## Files

Tableau Cloud supports various file types. Files hosted on cloud platforms like Google Drive, Dropbox, Box and S3 can use Tableau Cloud direct connectors to support both live and extract connections. Tableau Bridge supports file-based data connections for extracts, but doesn't support live connectivity to file-based data.

### Applications and databases

Tableau Cloud supports most of the same Connectors that Tableau Server supports, but there are some differences. Some databases require specific configuration to enable direct Tableau Cloud connectivity. See [Allow Direct Connections to Data Hosted on a Cloud Platform](#).

Tableau Cloud and Tableau Bridge don't support authentication to a database using Kerberos.

### Custom connectivity

Tableau Cloud is designed to use the same database Connector for every Tableau Cloud customer and therefore doesn't support customer-specific connectivity solutions. The two notable exceptions are the Hyper API and Tableau Bridge, which can be used to extend or customise your connectivity. The Hyper API can create extracts that can be published to Tableau Cloud. Tableau Bridge can be used to extend some connectivity options, for example, ODBC, JDBC and Web Data Connectors. See [Connectivity with Bridge](#).

You can't customise connectivity with Connector SDK (.taco) on Tableau Cloud or with Tableau Bridge.

If you're using Virtual Connections as a part of the Data Management offering there may be differences specific to your desired connector. Verify that Tableau Cloud or Tableau Bridge supports your scenario.

### Cube data sources

Tableau Cloud doesn't support Cube Data Sources. Instead, we recommend that you connect directly to the underlying database that the cube is built on top of for greater flexibility in your analysis.

### Data prep

Tableau Bridge doesn't support running Tableau Prep Flows with Prep Conductor. Instead, follow the process in the KB article, [How to Run Tableau Prep Conductor Flows with On-Premises Data in Tableau Cloud](#), to automate data preparation.

## Licensing and user management

### Licensing

Tableau Cloud supports licensing with subscription role-based plans. Learn more at the [Tableau Pricing](#) page. To eliminate key management tasks, Tableau Cloud defaults to licensing users with login-based licence management ([LBLM](#)). Legacy perpetual licences and server core-based licensing aren't supported.

Tableau Cloud doesn't offer a "Guest" user. However, connected applications can be used to provide content for broader usage within your organisation. See [Use Tableau Connected Apps for Application Integration](#).

If you're licensing Tableau Cloud for users outside of your organisation, usage-based licensing for those external use cases is available. See [Raise Revenue and Lower Costs with Usage-Based Licensing for Tableau Embedded Analytics](#).

### Single sign-on

Tableau Cloud supports single sign-on (SSO) through both SAML and OIDC. Direct integrations with Okta, Azure AD, One Login, Salesforce, PingOne and more are supported.

All users accessing Tableau Cloud are required to utilise multi-factor authentication (MFA) to authenticate into Tableau Cloud.

If you aren't using an SSO provider, you can use Tableau Cloud's built-in authentication type, TableauID with MFA. You can also create custom solutions with SAML or use [Connected Applications](#) for embedded solutions.

For more information, see the [Authentication](#) section in Tableau Cloud help.

### Active Directory, Kerberos and LDAP

Tableau Cloud doesn't support direct integration with Active Directory. However you can [configure SAML with Azure AD](#) to integrate with Tableau Cloud.

Additionally, most IdPs have an Active Directory integration that would suffice for authentication with Tableau Cloud. For an example, see [Active Directory integration \(Okta\)](#).

Tableau Cloud doesn't support Kerberos authentication or using LDAP as an Identity Store.

#### Automated user and group management

Tableau Cloud uses System for Cross-domain Identity Management (SCIM) for automating the exchange of user identity information. There are several IdP-specific configurations available in Tableau Cloud. See [Automate User Provisioning and Group Synchronisation through an External Identity Provider](#).

The [Tableau REST API](#) and [tabcmd 2.0](#) supports many user and group automation tasks.

Tableau Cloud doesn't support direct integration with Active Directory for user or group provisioning.

## Extensibility and external integrations

#### Automated tooling

Tableau Cloud supports REST APIs, JavaScript APIs, Metadata APIs, Dashboard APIs, Webhooks and embedding in HTML pages for authenticated users. See [Tableau Developer Tools](#) for more information.

We recommend that you verify your use cases prior to a migration.

There are some differences to be aware of as you plan your automated tooling strategy for Tableau Cloud:

- Tableau Server supports REST APIs for server-level administration. Tableau Cloud supports site-level administration.
- Tableau Server supports a global list of Web Data Connectors. Tableau Cloud requires using Bridge to run extract refreshes for Web Data Connectors.
- The connectors on the Tableau Exchange are only supported by Tableau Server.

APIs supported by Tableau Cloud are optimized for authentication with Tableau personal access tokens (PATs). Plan on refactoring your tooling to use PAT authentication as part of your migration to Tableau Cloud. See [Personal Access Tokens](#).

### Extensibility

Tableau Cloud supports analytics extensions with both R and Python. See [Configure Connections with Analytics Extensions](#). However, Tableau Bridge doesn't support analytics extensions, so these extensions are only compatible with data sources that don't require Tableau Bridge.

Tableau Cloud doesn't support [R or Python script steps in a Prep flow](#) authored or published to Tableau Cloud.

### Embedding

Tableau Cloud supports embedding Tableau into other applications. It supports the Embedding API, various SSO options, and Tableau REST API for user and content management.

There are two main differences for embedding with Tableau Cloud vs Tableau Server:

- Tableau Cloud supports both a subscription role-based licensing model or a usage-based licensing model for embedding scenarios.
- Tableau Cloud uses a single-tenant model. To ensure data separation, you can use a number of different methods. The data separation strategy you use will be determined by your business needs and embedding solution. The following Tableau Cloud help topics provide more information:
  - [Use Projects to Manage Content Access](#)
  - [Use Tableau Connected Apps for Application Integration](#)
  - [Manage Site User Visibility](#)
  - [Permissions](#)

### Customisations

Tableau Cloud allows you to customise some aspects of the user experience like language, locale, custom logos and custom project images. See [Customise the Site and Content Settings](#).



Tableau Cloud doesn't support custom URLs, custom fonts or custom welcome banners.

## Server to Server Migrations

The topics in this section provide information on migrating between hardware, operating system and public cloud platforms for Tableau Server.

To migrate a site from one Tableau Server to another, see [Export or Import a Site](#).

To copy or migrate content between Tableau Server projects using the Tableau Content Migration Tool, see [About Tableau Content Migration Tool](#).

### Migrate to New Hardware

Use the following procedure to migrate Tableau Server from one computer to another. You might do this if you are upgrading the computer hardware that Tableau is running on.

Specifically, these steps describe how to move Tableau Server data from your in-production computer to a new computer where Tableau Server is installed. Before you start, make sure you have followed the steps in [Preparing for Upgrade](#), including creating a backup and gathering any assets that require manual actions. For details, see [Perform a Full Backup and Restore of Tableau Server](#). You'll need these to restore your Tableau Server data and configuration.

**Important:** If you perform Blue/Green upgrades or manually upgrade Tableau Server 2021.4 (or earlier) using the [tsm maintenance \(backup and restore\)](#) method, you must enable `legacy-identity-mode` before you can restore to Tableau Server 2022.1 (or later). For more information, see [Troubleshoot Issues with the Identity Migration](#).

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

1. Deactivate your product key on your original installation of Tableau Server. You need to do this so you can activate it on the new computer. For more information, see "Tableau Server product key activation" below.
2. Install Tableau Server on the new computer, activate your licence, configure initial settings and create your admin user. For details, see [Install and Configure Tableau Server](#).
3. Copy your backup file *.tsbak* to the folder location specified by the `base-filepath.backuprestore` variable. By default, this is: `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\backups\`.

**Note:** You can change the location for the backup file. For more information, see [tsm File Paths](#).

4. Next, stop Tableau Server:

```
tsm stop
```

5. Restore your in-production data to your new Tableau Server installation using the `tsm maintenance restore` command:

```
tsm maintenance restore -f <filename>
```

where `<filename>` is the name of the *.tsbak* file you copied in step 3.

For more information about restoring Tableau Server data, see [Restore from a Backup](#).

6. Start the server:

```
tsm start
```

7. **Distributed installations only:** Install Tableau Server on the new computers you want to add to your new Tableau Server cluster. See [Install and Configure Additional Nodes](#) for steps.
8. If you have not deactivated your product key on the old computer, do that after you test your new Tableau Server installation and confirm that it's ready for production. For details, see ["Tableau Server product key activation"](#) below.

**Note:** If you do not have an internet connection, you are prompted to create an off-line activation file to complete the deactivation process. See [Activate Tableau Server Offline](#) for steps.

## Tableau Server product key activation

You can activate the same Tableau Server product key up to three times. This allows you to test Tableau Server (in a sandbox or QA environments, for example), as well as use Tableau in production. To maximise your activations, you should deactivate your product key when you remove Tableau Server from a computer, unless you will be reinstalling Tableau on the same computer. Doing this gives you the opportunity to use the activation on a different computer. For example, if you move Tableau Server from one computer or VM to another, deactivate the product key, then remove Tableau from the original computer. When you install Tableau on the new computer, you can activate the key there without any conflict. If you use role-based licensing, be sure to activate a Creator or Explorer key or you may lose administrator access to Tableau. If you are removing Tableau Server to reinstall it on the same computer, you don't need to deactivate the key. Tableau will use the key when reinstalled. For example, if you are moving Tableau from one drive on a computer to a different drive on the same computer. For information on how to deactivate a product key, see [tsm licences deactivate](#).

# Migrate Tableau Server from an On-Premises Computer to a VM in the Cloud

You can migrate Tableau Server from a computer in your data centre to a virtual machine (VM) in the cloud. As a part of this migration, you'll need to move various Tableau Server data and configuration settings from your on-premises computer to a VM in the cloud where Tableau Server is installed.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

## Prerequisites

Before you migrate Tableau Server from an on-premises computer to a VM in the cloud, be sure to review the following prerequisites:

- Have an account and an environment set up on your cloud provider. For more information, see:
  - [Install Tableau Server on Amazon Web Services](#)
  - [Install Tableau Server on the Google Cloud Platform](#)
  - [Install Tableau Server on Microsoft Azure](#)
  - [Install Tableau Server in the Alibaba Cloud](#)
- Read [Preparing for Upgrade and Back up Tableau Server data](#) to prepare for the migration.

To migrate Tableau Server to a VM in the cloud

1. Ensure that there are no background tasks running, such as, extract refreshes, workbook publishing, etc. When Tableau Server is idle, note any data source connection

types in use so that you can install the appropriate drivers on the new Tableau Server on the VM in the cloud.

2. Stop Tableau Server. At a command prompt, type:

```
tsm stop
```

3. After Tableau Server is stopped, make a complete backup, following the steps in [Preparing for Upgrade](#) and [Back up Tableau Server data](#). The backup is what you will use to restore your Tableau Server data. You'll use this backup to restore your Tableau Server data on the VM in the cloud.
4. Move the backup off the server and store the backup securely. For example, you can store your backup on cloud storage such as Amazon S3, Google Drive, etc.
5. If you are using SSL on the on-premises server, make a copy of the SSL folder. Be sure to note any security rules, for example, firewall rules, ports, etc. to avoid communication issues between different elements of your infrastructure and your new Tableau Server on the VM in the cloud.
6. Remove any DNS entries using the IP address of the on-premises Tableau Server, so you can reassign them to the Tableau Server on the VM in the cloud.
7. Launch a VM into the cloud that meets the Tableau Server recommendations.
8. Install Tableau Server on the VM in the cloud. For more information, see:
  - [Install Tableau Server on Amazon Web Services](#)
  - [Install Tableau Server on the Google Cloud Platform](#)
  - [Install Tableau Server on Microsoft Azure](#)
  - [Install Tableau Server in the Alibaba Cloud](#)
9. After installation is complete, copy any SSL files to Tableau Server on the VM in the cloud, and restore the backup on your new server.
10. Configure Tableau Server on the VM in the cloud and install all SSH and port related stuff.

**Note:** If you change the IP address/port of the database, you might need to update all connection information.

11. Copy your backup file `.tsbak` to the folder location specified by the `base-filepath.backuprestore` variable. By default, this is: `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\backups\`.

**Note:** You can change the location for the backup file. For more information, see [tsm File Paths](#).

12. Next, stop Tableau Server. At a command prompt, type:

```
tsm stop
```

13. Restore your in-production data without configuration information to your new Tableau Server installation. At a command prompt, type:

```
tsm maintenance restore -f <filename>
```

where `<filename>` is the name of the `.tsbak` file you copied in step 11.

For more information about restoring Tableau Server data, see [Restore from a Backup](#).

14. Start the server. At a command prompt, type:

```
tsm start
```

15. **Distributed installations only:** Install Tableau Server on the new VMs you want to add to your new Tableau Server cluster in the cloud. For more information, see:
  - [Install and Configure Additional Nodes](#)
  - [Self-Deploy Tableau Server on AWS in a Distributed Environment](#)
  - [Self-Deploy Tableau Server on the Google Cloud Platform in a Distributed Environment](#)
  - [Self-Deploy Tableau Server on Microsoft Azure in a Distributed Environment](#)
  - [Self-Deploy Tableau Server on Alibaba Cloud in a Distributed Environment](#)

16. Test your Tableau Server on your VM in the cloud to ensure that it works as expected. If your Tableau Server is working fine in the cloud, you can deactivate your on-premises Tableau Server product key and use this same product key to activate your Tableau Server on the VM in the cloud.

**Note:** If you do not have an internet connection, you are prompted to create an off-line activation file to complete the deactivation process. For more information, see [Deactivate Tableau Server Offline](#).

17. The same Tableau Server product key can be activated three times: once for a production environment, once for a test environment and once for a QA environment. After you have tested your new Tableau Server installation and confirmed that it's ready for production, you must deactivate your earlier production version of Tableau Server, and then you must uninstall it. To deactivate the earlier version, see [tsm licences deactivate](#).

**Note:** If you do not have an internet connection, you are prompted to create an off-line activation file to complete the deactivation process. See [Deactivate Tableau Server Offline](#) for steps.

## Changing the Identity Store

Infrastructure or business changes may require you to change the identity store on Tableau Server. There are two kinds of identity stores: local and external. When you installed Tableau Server you configured either a local identity store or an external identity store.

When you configure Tableau Server with a local identity store, all user and group information is stored and managed in the Tableau Server repository. In the local identity store scenario, there is no external source for users and groups.

When you configure Tableau Server with an external store, all user and group information is stored and managed by an external directory service. Tableau Server must synchronise with the external identity store so that local copies of the users and groups exist in the Tableau

Server repository, but the external identity store is the authoritative source for all user and group data. Examples of external identity stores are OpenLDAP and Active Directory.

For more information about the Tableau identity store, see [Identity Store](#).

You can change from local store to an external store, or you can change from an external store to a local store. In either case, to change the identity store type, you complete these steps:

1. Uninstall and then reinstall Tableau Server. The procedures for full uninstall and clean install are at the end of this topic.
2. Restore content and permissions.

In these steps, the term "restore" does not refer to using the `TSM maintenance restore` command to restore the backup you are making. You cannot restore a backup (`.tsbak`) created on a Tableau Server instance that uses a different identity store than the target Tableau Server. The backup is a best practice safeguard, in case you need to go back to your original Tableau Server configuration.



### Warning

Changing the installation type on Tableau Server can be a complicated and time-consuming process. To avoid data loss or orphaning of content or users, you'll need to plan this process carefully. In all cases, user filters applied to workbooks and data sources will need to be updated manually after the change.

Most importantly, determine how you will transition content and permissions to the new identity store after you reinstall Tableau Server.

## Methods for restoring content and permissions

The following list describes two methods for restoring content and permissions after you reinstall Tableau Server. Select the method that best fits with your environmental requirements.



- **Method 1: Use site export and import** – In this method, you start by exporting each site in your existing deployment. Then, you install the new server and configure it for the new identity store type. Next, you create new users in the default site on the new server. Finally, you import all the original sites. During the import stage, you can map the original identities to the new users that you created in the default site.

**Note:** When migrating sites between instances of Tableau Server, the target site must be on a version of Tableau Server that is the equal to or later than the version of Tableau Server for the source site. Both the source and target sites must be from supported versions of Tableau Server.

Because this method exports all content and permissions at each site, it is the best method for organisations that require a high fidelity replica of the content and permissions after the identity store change is complete. Some organisations require an identity store change as the result of an authentication change. In these cases, a different user name syntax is often a requirement in the new model. This method, which includes a process of mapping original user names to new names, provides flexibility for such scenarios.

- **Method 2: Fresh installation; users republish content** – In this method, you install a new version of Tableau Server and select the new identity store type during setup. You also create new sites. You then create users and give them access, and they republish their workbooks and data sources. Unlike the other method, in this one, you do not reuse any of your existing Tableau Server infrastructure.

This method is most appropriate for smaller deployments with fairly autonomous and data savvy users. From an administrative perspective, this method is the simplest, since you're not actively porting over content. However, because you rely entirely on users to republish content, this method may not be successful for large organisations or for those where centralised oversight of content is required.

## User filters

User filters are domain-specific. Therefore, when the domain of Tableau Server changes or authentication type changes, filters no longer function as expected. Although the user filters are generated by Tableau Server, after they are set by the user, the filters are stored in the workbooks and data sources. Neither of these methods for changing the identity store modifies the contents of the workbooks or data sources.

As you plan the identity store change, you must also include a final task to correct user filtering in all workbooks and data sources with Tableau Desktop.

## User names and the Tableau Identity store

If you are using Method 1, it's helpful to understand how Tableau Server stores user names in the Tableau identity store. Tableau stores all user identities in the repository, which coordinates content permissions and site membership with various services in Tableau Server. Generally, an identity store configured for Active Directory store user names in the format, `domain\username`. Some organisations use a UPN (`jsmith@domain.lan`).

On the other hand, organisations that configure Tableau Server with local identity store usually create standard, truncated user names, such as `jsmith`.

In all cases, these user names are literal strings that must be unique in the Tableau identity store. If you are changing from one identity store type to another, then your target authentication, SSO, or user provisioning solution may require a specific user name format.

Therefore, to maintain all permissions, content, and user viability, one of the following must be true after you change the identity store type:

- The new user names must match the original user names, or
- The original user names must be updated to match a new format.

If an authentication change is driving the identity store change, then the target authentication scheme will likely impose a user name syntax that is different than your original user names. Method 1 includes a process where you can map original user names to new user names.

It's possible that the original user name format will work with the new authentication type. For example, if you used UPN names in a local identity store deployment, you might be able to use the same user names in an Active Directory deployment. You could also use the `domain\username` format for local identity store, as long as users continue to use that format to sign in to Tableau Server.

If you are changing from local identity store to an external Active Directory store, review the topic, *User Management in Deployments with External Identity Stores*, as part of your planning process.

### Method 1: Use site export and import

You must use the same version of Tableau Server for the export and import operations.

1. Export all sites on your server. See *Export or Import a Site*.
2. Back up, remove, and then reinstall.
3. Create new users on Tableau Server. You should have a new user that corresponds to each user on the original server.
4. Import the sites that you exported in Step 1. See *Export or Import a Site*. During import, you will be prompted to map the new users to the original users.

### Method 2: Fresh installation—users republish content

Even if you do not plan to port content as part of your identity store change, we recommend that you back up the server.

1. Back up, remove, and then reinstall.
2. Create users, sites, and groups.
3. Inform your users of the new Tableau Server, provide them with credentials, and allow them to republish their content.

### Back up, remove, and then reinstall

Both methods include the following steps:

1. Back up Tableau Server
2. Remove Tableau Server.
3. Reinstall Tableau Server with the new identity store type.

### Step 1: Back up Tableau Server

As a best practice, you should back up the server before proceeding.

Follow the procedure, Create a backup using the TSM command line interface (CLI). Run the `backup` command with the `-d` option. The `-d` option adds the datestamp.

When you are finished, copy the backup file ( `.tsbak` ) to a safe location that is not a part of your Tableau Server installation.

### Step 2: Remove Tableau Server

You must completely remove Tableau Server from the computer. See [Remove Tableau Server from Your Computer](#).

### Step 3: Reinstall Tableau Server with new authentication type

1. Go to the Tableau Customer Portal, sign in with your Tableau user name and password, and then download Tableau Server.
2. Install Tableau Server. See [Install and Configure Tableau Server](#) more information. During installation, you will select the new identity store type. See [Configure Initial Node Settings](#).

# Manage Individual Sites

In addition to planning your sites in Tableau, you can manage users and groups, manage projects and control content access, manage your site data and interact with views on the web.

<b>What is a site</b> .....	<b>473</b>
<b>Planning a Site</b> .....	<b>476</b>
<b>Site Settings Reference</b> .....	<b>479</b>
<b>Manage Users and Groups</b> .....	<b>496</b>
<b>Dashboard-based Custom Portals</b> .....	<b>567</b>
<b>Manage Content Access</b> .....	<b>571</b>

## What is a site

You might be used to using the term *site* to mean “a collection of connected computers”, or perhaps as the short form of “website”. In Tableau-speak, we use site to mean a collection of users, groups and content (workbooks, data sources) that’s walled off from any other groups and content on the same instance of Tableau Server. Another way to say this is that Tableau Server supports multi-tenancy by allowing server administrators to create sites on the server for multiple sets of users and content.

All server content is published, accessed and managed on a per-site basis. Each site has its own URL and its own set of users (although each server user can be added to multiple sites). Each site’s content (projects, workbooks and data sources) is completely segregated from content on other sites.

If you are a server administrator on your Tableau Server deployment, you can learn more about sites, when to use them (vs projects), and more in [Sites Overview](#), in the **Manage Server** section.

**Note:** This article pertains to configuring sites on Tableau Server deployments. For Tableau Cloud, see [Site Administrator Role and Tasks](#).

## Site administrator tasks

Where the Server Administrator site role gives a user unrestricted access to the entire Tableau Server deployment, the Site Administrator site roles give a user unrestricted or minimally restricted access at the site level. The differences between Site Administrator Creator and Site Administrator Explorer are in the level of data connection and publishing access. Both site roles allow administering the site itself and managing site users. For more information, see [Set Users' Site Roles](#).

Although a server administrator can work at both the server and site levels, we make a distinction between the two levels of task. The site administrator is typically in charge of creating and maintaining the framework that enables Tableau users in the organisation to publish, share, manage and connect to data sources and workbooks. In this vein, site administrator tasks include any of the following (and both site roles allow this level of access):

- Creating project hierarchies to organise the site's data sources and workbooks.

This can include delegating project-level management to project leaders.

- Creating groups and assigning permissions that allow users to access only the content they need.
- Adding and removing users, assigning their site roles.

This is allowed by default on a site; however, a server administrator can restrict this access to the server level only.

- Managing the site's extract and subscription schedules.
- Monitoring site activity.

For more information about the distinction between server administrator and site administrator, see Administrator-level access to sites, in the **Manage Server** section.

## Steps for setting up your site

The table below shows a loose sequence of steps for setting up a site, along with links to topics where you can get more information. You can complete the steps in any order that makes sense for you.

However, before you perform the steps to configure the site, we recommend spending some time with the articles in this section, learning about site authentication, site roles, projects and permissions. Ideally you would document a plan for your projects, groups and overall permissions strategy. Then set up a few projects and add a preliminary set of users, to test the plan and resolve issues before you add the remaining users. You can change many site settings after your users are working with the site, but try to go in with the intention of minimising post-production changes.

<b>Plan</b>	To supplement the recommendations above this table, get an overview of how the site components work together in Planning a Site.
<b>Configure access</b>	<p>Work with the server administrator to determine how users sign in to the site, and configure the site appropriately.</p> <p>For example, if the server is configured for single sign-on using SAML, you might configure SAML authentication at the site level as well.</p>
<b>Create projects and the permissions structure</b>	Projects help you organise content, delegate project-level content management and manage permissions effectively. To get started, see Use Projects to Manage Content Access.

<b>Add users</b>	Determine the users who can sign in to the site. See <a href="#">Add Users to a Site</a> .
<b>Get your data to Tableau Server</b>	<p>After you create your projects and permissions structure, designate approved users for publishing and managing vetted data sources to the appropriate projects on the site.</p> <p>In some organisations, people serve in multiple Tableau roles. Site administrators commonly also are data stewards. By that, we mean they create, publish and manage the Tableau data connections. If this is you, make sure you are assigned the Site Administrator Creator site role.</p> <p>After content is published to the site, you can maintain connection information (credentials, access tokens) and refresh schedules. For more information, see <a href="#">Refresh Data on a Schedule</a>.</p>
<b>Analyse site usage and performance</b>	Monitor usage, performance, and other metrics. See <a href="#">Administrative Views</a> .

## Planning a Site

Before you add users and content to a site, we recommend that you plan the following aspects of the site.

- [Projects](#)
- [Users and groups](#)



- [Site roles and permissions](#)
- [Extract refresh schedules](#)

The subsequent sections go over these site components, assuming that you are familiar with

**Note:** This article and section apply only to self-managed Tableau Server deployments on-premises or in the cloud. If you use Tableau Cloud, see [Manage Content Access](#).

## Projects

You can create projects on a site, which act as containers in which you can organise related content assets (such as data sources and workbooks). For example, you might set up a project to contain all of the certified data sources and workbooks your organisation uses for mission-critical decisions. Or you might set up projects by department.

Projects are also useful for managing permissions. Once you know how your users need to access content, it's usually easier to create projects based on those the type of content, and maintain permissions at the project level.

Every site has a default project named **Default**. When you create projects, the new projects get their initial set of permissions from the default project. In effect, the default project is a template for new projects. As we explain in related articles, for most environments, we recommend that you use the Default project only as a permissions template, and not as a container for published content.

For more information, see [Use Projects to Manage Content Access](#).

## Users and groups

Any user who will publish content or access published content on a site must be able to sign in to the site. If the user already has an account on the server, you'll need to add that user to the appropriate site. You can add a user to more than one site as well. If the user doesn't already

exist, you need to create a user account. Either way, make a list of the users who will need to be able to sign in to each site.

**Note:** The server licence might restrict how many users you can have, or what level of access they can have. Check with the server administrator to make sure that you'll be able to have an account for all your users.

In general, we recommend that you create groups on the server and then add users to the groups. This helps to make permissions much easier to manage. You can assign permissions on groups, to give those permissions to all users in the group. (See the next section.)

A typical strategy is to create groups for users who use content in similar ways. For example, you might create a group named SalesWBPublishers for all the users in the Sales department who publish workbooks, and a separate group named SalesDSPublishers for people in Sales who publish data sources. Each of these sets of users needs its own set of capabilities, so it makes sense to have a group for each for these needs.

## Site roles and permissions

Each user has a *site role* that determines the maximum permissions that they can have on the site. As part of your site planning, you need to decide each user's site role. A user with a site role that's too restrictive might not be able to do the work they need. By the same token, a security best practice is to limit users' capabilities to only those that they need to do their work. This is referred to as following the principle of *least privilege*.

You or a site administrator you delegate this task to must also determine the permissions a user needs to work with content. Each content asset (workbook, data source, project) supports a set of *capabilities*. For example, you can **View** or **Add Comments** to a workbook. Before a user can perform tasks on a workbook, their permissions must allow those capabilities. A recommended practice is to sketch out a mapping of permissions to users outside of Tableau before you try to set this up on the server.

Permissions determine what a user can do *within the context of the site role*. A user whose site role is **Viewer** can never publish to the site, regardless of the permissions you grant them. A user whose site role is **Creator** can publish a workbook to the site, but only if that user has permission to save and view workbooks.

## Extract refresh schedules

If users publish data sources or workbooks that include extracts, you usually want to make sure that the extracts are refreshed, so that they contain the latest data. Users can manually refresh an extract, but this isn't always a good idea if the extract is large, and the refresh takes a long time. Instead, you can set up schedules for when an extract should be refreshed. Another planning task for a site administrator, therefore, is to think about when extracts should be refreshed and to work out schedules.

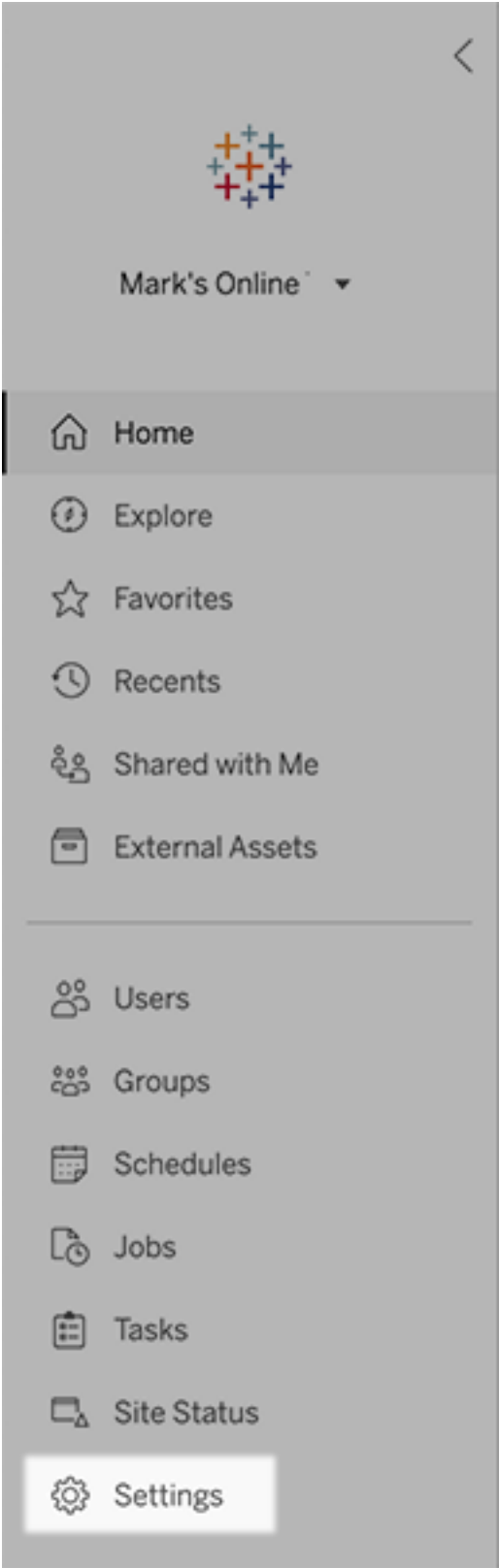
## Site Settings Reference

Customise a site for your organisation using the settings below. To view and edit site settings, you must be a Site Administrator on Tableau Cloud or Server Administrator on Tableau Server.

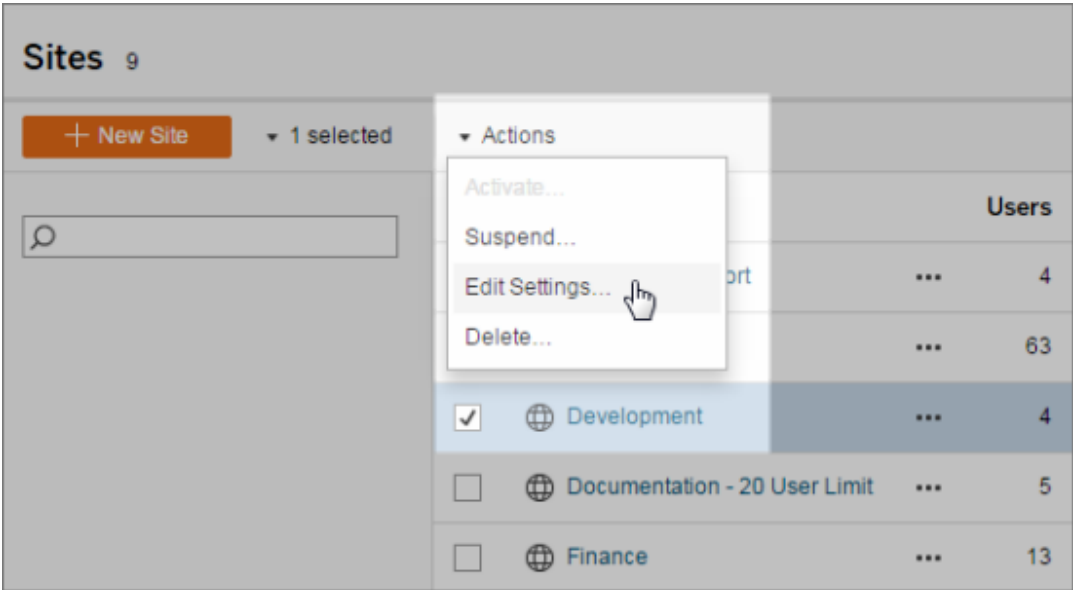
Site settings are displayed differently in Tableau Cloud and Tableau Server. The settings available to you depend on your site configuration and whether you use Tableau Cloud or Tableau Server. To easily find a specific setting below, press Ctrl+F (Windows) or Command+F (macOS) and search for the setting.

### Accessing site settings

- (Tableau Cloud) From the Home page, expand the side panel and click **Settings** at bottom.



- (Tableau Server) If you're editing an existing site, select it on the Sites page, and then select **Edit Settings**. Or, in a single-site deployment, click **Settings** at the bottom of the side pane.



General tab

Setting	Description
Site Name and ID (Tableau Server Administrators only)	<p>Specifies the site name seen in the user interface and the ID seen in the site URL. (If you are editing the Default site, you cannot change the ID.)</p> <p>You can't change the “#/site” portion of the URL (for example, http://localhost/#/site/sales). In multi-site server environments, these segments appear in the URL for sites other than the Default site.</p>
Storage (Tableau Server Administrators only)	<p>Select either <b>Server Limit</b> or <b>GB</b>, and for the latter, enter the number of gigabytes you want as a limit for storage space for published workbooks, extracts and other data sources.</p> <p>If you set a server limit and the site exceeds it, publishers will be pre-</p>

vented from uploading new content until the site is under the limit again. Server administrators can track where the site is relative to its limit using the Max Storage and Storage Used columns on the Sites page.

Revision History (Tableau Server Administrators only)	Specifies the number of previous versions of workbooks, flows and data sources that are stored on the server.
Tableau Prep Conductor	Controls whether users with appropriate permissions can schedule and monitor flows. Tableau Prep Conductor is part of Data Management. For more information, see <a href="#">Tableau Prep Conductor</a> .
Web Authoring	<p>Controls whether browser-based authoring is enabled for the site. When web authoring for workbooks is disabled, users can't create or edit published workbooks from the server web environment but instead must use Tableau Desktop to republish the workbook. When web authoring for flows is disabled, users can't create or edit published flows from the server web environment but instead must use Tableau Prep Builder to re-publish the flow.</p> <p>For more information, see <a href="#">Set a Site's Web Authoring Access and Functions</a> in Tableau Cloud Help.</p>
Managing Users (Tableau Server Administrators only)	<p>Determines whether only server administrators can add and remove users and change their site roles, or whether site administrators can too.</p> <p>If you allow site administrators to manage users, specify how many users they can add to the site by selecting one of the following:</p> <ul style="list-style-type: none"> <li>• Server Limit adds the number of available server seat licences. For a server with core-based licensing, there is no limit.</li> <li>• Site Limit lets site administrators add users up to a limit you specify.</li> <li>• Site Role Limit lets site administrators add users of each site</li> </ul>

role up to the licence limit you specify for the site.

For more information, see [View Server Licences](#).

Guest Access  
(Tableau Server  
Administrators only)

Lets people who lack a Tableau Server account see views that have guest access permissions.

**Note:** If you use Tableau Server, your administrator can disable Guest Access.

Tableau Catalog

Turns off Catalog capabilities when Tableau Server or a Tableau Cloud site is licensed with Data Management. For more information, see [Disable Catalog](#).

Workbook Performance after a  
Scheduled Refresh  
(Tableau Server  
Administrators only)

Pre-computes recently viewed workbooks with scheduled refreshes to open them faster. For more information, see [Configure Workbook Performance after a Scheduled Refresh](#).

Workbook Performance Metrics  
(Tableau Server  
Administrators only)

Lets site users collect metrics on how workbooks perform, such as how quickly they load To initiate recording, users must add a parameter to the workbook's URL. For more information, see [Create a Performance Recording](#).

Managed Keychain  
Clean-Up (Tableau  
Server Administrators only)

Lets site administrators manage saved credential keychains for OAuth connections on the site. For more information, see [OAuth Connections](#).

Automatically Suspend Extract Refresh  
Tasks

To save resources, Tableau can automatically suspend extract refresh tasks for inactive workbooks. This feature applies only to refresh schedules that run weekly or more often. For more information, see [Automatically Suspend Extract Refreshes for Inactive Workbooks](#) in Tableau Cloud Help.

Linked Tasks  (Tableau Server and Site Administrators only)	<p>Lets Server administrators enable users to schedule flow tasks to run one after the other. They can also enable users to trigger the scheduled flow tasks to run using <b>Run Now</b>.</p> <p>This setting can be applied at the server level to include all sites on Tableau Server. The setting can be disabled at the site level to include only specific sites.</p> <p>If the setting is turned off after linked tasks are scheduled, any tasks that are running will complete and the scheduled linked tasks are hidden and no longer show on the <b>Scheduled Tasks</b> tab.</p> <p>For more information, see <a href="#">Schedule Linked Tasks</a>.</p>
Email Settings (Tableau Server Administrators only)	Specifies the From address and message footer seen in automatic emails for alerts and subscriptions.
Site Invite Notification (Tableau Cloud only)	For sites with single-sign-on authentication, sends an invite email when new users are added to the site.
Site Logo (Tableau Cloud only)	Specifies the image that appears with the site name.
Start Page	Controls which site page appears when users sign in. By default, the Home page appears, but you can instead open All Projects, All Workbooks, or other pages. For more information, see <a href="#">Set the Default Start Page</a> in Tableau Cloud Help.
<p><b>Note:</b> If you use Tableau Server, your administrator can override this site setting.</p>	
Tableau Pulse Deployment	Controls whether Tableau Pulse is available for all users, a group of users or no users. For more information, see <a href="#">Set Up Your Site for</a>



**Tableau Pulse.**

Tableau AI (Tableau Cloud only) Controls whether generative AI functionality is enabled for Tableau features. For example, Tableau Pulse can use generative AI to summarise key metric insights using natural language so they are easier to understand.

Some generative AI features require Tableau+ and a connection to a Salesforce org with Einstein generative AI set up. For more information about how to turn on Tableau AI features, see [Turn On Tableau AI for Your Site](#).

To learn more about Tableau AI, see [Tableau AI](#).

User Visibility Controls what user and group names are visible to other users. For more information, see [Manage User Visibility](#) in Tableau Cloud Help.

Availability of Ask Data Controls whether Ask Data lenses are enabled or disabled for data sources. Ask Data lets users query data using conversational language and automatically see visualisations. For more information, see [Automatically Build Views with Ask Data](#) in Tableau user Help.

Availability of Explain Data Controls whether site users with the appropriate permissions can run Explain Data and authors can access Explain Data Settings. For more information, see [Control Access to Explain Data](#). To learn more about Explain Data, see [Discover Insights Faster with Explain Data](#).

Automatic Access to Metadata about Databases and Tables Automatically grants users certain capabilities to external assets using derived permissions. For more information, see [Turn off derived permissions](#) in Tableau Cloud Help.

Sensitive Lineage Data Specifies whether sensitive lineage data should be obfuscated or filtered when users don't have the appropriate permissions to related metadata. For more information, see [Sensitive lineage data](#).

Cross-Database Joins	Determines where the join process happens when joining data from multiple sources. For more information, see <a href="#">Combine Tables from Different Databases</a> in Tableau user Help.
Extract Encryption at Rest (Tableau Server Administrators only)	Lets you encrypt .hyper extracts while they are stored on Tableau Server. Server administrators can enforce encryption of all extracts on their site or allow users to encrypt all extracts associated with particular published workbooks or data sources. For more information, see <a href="#">Extract Encryption at Rest</a> .
Tableau Support Access (Tableau Cloud only)	Allows Tableau Support technicians access to the site to help troubleshoot support cases. By default, this feature is disabled. For more information, see <a href="#">Enable Support Access</a> .
Sharing	Allows users to share items directly with other users. When an item is shared, the recipients get a notification and the item is added to their Shared with Me page. If this is not enabled, users can only copy a link to share. For more information, see <a href="#">Share Web Content</a> in Tableau user Help.
Comments	Controls whether users can add remarks in a Comments side pane for each view and @mention other Tableau users to notify them via email. For more information, see <a href="#">Comment on Views</a> in Tableau user Help.
Data-Driven Alerts	Lets users automatically receive emails when data reaches key thresholds. For more information, see <a href="#">Send Data-Driven Alerts</a> in Tableau user Help.
Subscriptions	Lets site users subscribe to views and receive regular emails of them. On Tableau Server, these options are available only if you first <a href="#">configure subscription settings</a> .
High-Visibility Data Labels in View and Workbook Subscriptions	Controls whether subscriptions include relevant upstream high-visibility data quality warnings and sensitivity labels in the email. On Tableau Server, these options are available only if you first <a href="#">turn on and configure subscriptions</a> . For more information on data quality

warnings, see [Set a Data Quality Warning](#). For more information on sensitivity labels, see [Sensitivity Labels](#).

Previously titled **Data Quality Warnings in Subscriptions**.

**Note:** Data quality warnings and sensitivity labels are a feature of Tableau Catalog, which is part of Data Management.

#### Tagging

Specifies the number of tags that users can add to items. The default limit is 50 tags, and the maximum is 200. For more information, see [Use Tags](#).

#### Recommendations for Views

Controls whether recommendations show on the site and whether the names of users who have looked at recommended items show on recommendation tooltips.

**Note:** If you use Tableau Server, your administrator can disable Recommendations.

#### Request Access

Lets users send access requests to content or project owners. For more information, see [Let Site Users Request Access to Content](#) in Tableau Cloud Help.

#### Metrics Content Type

Controls whether metrics are available on the site. When you turn metrics on, users can create metrics from views and metrics appear as a content type. When turned off, metrics won't appear on the site or continue to sync. If you turn on metrics again, pre-existing metrics will reappear and resume refreshing. For more information, see "Set Up for Metrics" in [Tableau Cloud Help](#) or [Tableau Server Help](#).

#### Retirement of the legacy metrics feature

Tableau's legacy metrics feature was retired in Tableau Cloud in

February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.

Web Page Objects and Web Images	Controls whether these Web Page and Image objects can display target URLs. For more information, see <a href="#">Security for Web Page objects</a> in Tableau user Help.
Personal Space	Allows Creator and Explorer site users to create and save content to a private Personal Space. When Personal Space is turned on, you can set user storage limits. For more information, see <a href="#">Create and Edit Private Content in Personal Space</a> .
Collections	Controls whether collections are available on the site. When you turn on collections, users can create collections to organise content and browse collections made available by other users. For more information, see <a href="#">Organise Items in a Collection</a> .
Site Time Zone for Extracts	The default time zone for extract-based data sources in a site is Coordinated Universal Time (UTC). Site administrators can set a different time zone. For more information, see <a href="#">Set the Site Time Zone for Extracts</a> in Tableau Server Help or <a href="#">Set the Site Time Zone for Extracts</a> in Tableau Cloud Help.
Extract Quota Limit Notifications	Sends email alerts to all site administrators when extract refresh jobs are canceled because of extract job capacity issues.
Flow Parameters	Enables users to schedule and run flows that include parameters.
(Tableau Server and Site Administrators only)	Administrators can also enable flow parameters to accept any value. If this option is enabled, any flow user can enter any value in a parameter, potentially exposing data that the user should not

have access to.

Parameters can be entered in an input step for file name and path, table name or when using custom SQL queries, in an output step for file name and path and table name, and in any step type for filters or calculated values.

Flow parameter settings can be applied at the server level to include all sites on Tableau Server. The settings can be disabled at the site level to include only specific sites.

For more information about using parameters, see [Create and Use Parameters in Flows](#) in the Tableau Prep help.

#### Run Now

Controls who can run jobs manually using the Run Now option from the web, Rest API and Tabcmd. By default, this option is selected to allow users to run jobs manually. Untick the box if only administrators should be allowed to run jobs manually.

**Note:** If you use Tableau Server, your administrator can disable this site setting.

#### Manage Notifications

Controls how site users can receive notifications for events such as extract jobs, flow runs or when another user shares content with them or mentions them in a comment. Notifications can be seen in their Tableau site via the notification centre, sent by email or sent to a Slack workspace. When a notification is enabled, users can configure their notification preferences on their Account Settings page.

**Note:** If you use Tableau Server, your server administrator can disable this site setting.

Customise Email Notifications (Tableau Cloud only)	<p>Controls whether email notifications for data-driven alerts and subscriptions to workbooks and views are sent using the Tableau email server or your own SMTP server. When you use your own SMTP server, you can customise the email sender's name as well as the domain used in the sender's email address and the domain for links in the notifications emails. Added for Tableau Cloud in February 2024.</p> <p>Separately from the SMTP settings, you can control whether the email notifications sent to users for data-driven alerts and subscriptions include links. These links direct users to your Tableau site to see the content and manage the alert or subscription. A link to unsubscribe is always included in notification emails, regardless of whether this setting is on. Added for Tableau Cloud in June 2023.</p>
Flow Subscriptions	<p>Controls whether flow owners can schedule and send emails with flow output data to themselves and others. When you allow flow subscriptions, you can control whether flow output data is included in the subscription email and whether flow output files are attached to the email. For more information, see <a href="#">Notify Users of Successful Flow Runs</a></p>
OAuth Clients Registry	<p>For a subset of connectors, you can register a custom OAuth client for the site to override an OAuth client that has been configured for the server. By registering a custom OAuth client, you enable new and existing connections to use the site-level OAuth client instead of the server-wide OAuth client. For more information, see <a href="#">Configure Custom OAuth</a>.</p>
View Acceleration	<p>Controls whether Creator and Explorer site users can accelerate the views in their workbooks for faster loading times. When you allow view acceleration, you can set a maximum number of views to be accelerated, and you can choose to automatically suspend acceleration for views that repeatedly fail the acceleration task. For more information, see <a href="#">View Acceleration</a>.</p>

Assertions for Group Membership	Enables local group membership to be controlled and managed by your SSO IdP or through a Tableau connected app by dynamically asserting group membership when a user authenticates to Tableau Server. Requires additional configuration in the SAML assertion, OIDC assertion or JSON web token (JWT). For more information, see <a href="#">Dynamic group membership using assertions</a> .
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**Note:** This site-level setting can be enabled only when the server-wide setting has been enabled first.

Group Sets	Enables the <b>Group Sets</b> page and the ability to create group sets. Group sets can be used by certain users (server admins, site admins, project owners and content owners) to apply permission rules that require users to be members of all groups in the group set to access content whose permissions are dependent on the group set. For more information, see <a href="#">Work with Group Sets</a> .
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## Authentication tab (Tableau Cloud)

Setting	Description
Authentication Types	Specifies how users can sign in to the site, and how they access it after signing in the first time. Authentication verifies a user's identity. For more information, see <a href="#">Authentication</a> .
Default Authentication Type for Embedded Views	Specifies how users can sign in to embedded views. By default, Tableau authentication is selected.
Control User Access in Authentication Workflows	Enables user attribute functions used in embedded content to accept the passing of user attributes from a JSON Web Token (JWT). The user attributes are passed to Tableau to customise and control the data that can be shown to a user at runtime. For more information, see <a href="#">Embedding API v3 Help</a> .
Automatic Pro-	Allows you to manage users on the site through a third-party identity

visioning and Group Synchronisation (SCIM)	provider (IdP). When enabled, the Base URL and Secret boxes are populated with values to use in the IdP SCIM configuration. For more information, see <a href="#">Automate User Provisioning and Group Synchronisation through an External Identity Provider</a> .
Connected Clients	Allows Tableau clients such as Tableau Mobile, Tableau Bridge and others to stay authenticated to the server after a user provides sign-in credentials the first time. When turned off, users are required to sign in explicitly each time they visit Tableau Cloud. For more information, see <a href="#">Access Sites from Connected Clients</a> .

## Bridge tab (Tableau Cloud)

Setting	Description
Client Not Running Notifications	Sends email alerts to data source owners when a client appears to be disconnected from the site.
Pooling	Distributes live queries and refresh jobs across all clients in Bridge pools. For more information, see <a href="#">Configure and Manage the Bridge Client Pool</a> in the Tableau Cloud Help.
Private Network Allowlist	Add and manage domains that enable dedicated Bridge pool access to private network data on behalf of Tableau Cloud.

## Extensions tab

Setting	Description
Dashboard and Viz Extensions	Manage and control dashboard and viz extensions. Dashboard extensions are web applications that run in custom dashboard zones and can interact with the rest of the dashboard. Viz extensions are web applications that support new viz types. For more information, see 'Manage Dashboard and Viz Extensions' in <a href="#">Tableau Cloud Help</a> or <a href="#">Tableau Server Help</a> .



## Tableau Server on Windows Help

Analytics Extensions	Enables a set of functions that your users can use to pass expressions to analytics extensions for integration with R and Python. For more information, see "Configure Connection with Analytics Extensions" in <a href="#">Tableau Cloud Help</a> or <a href="#">Tableau Server Help</a> .
Tableau Prep Extension	When authoring flows on the web, enable users to apply Einstein Discovery-powered models to their flows to bulk score predictions for their data.  For more information, see <a href="#">Configure Einstein Discovery Integration</a> in the Tableau Server help.

## Integrations tab

Setting	Description
Slack Connectivity	<p>Displays connections between a Slack workspace and the Tableau site. When connected, Tableau site users can see their Tableau notifications in the connected Slack workspace.</p> <div><b>Note:</b> In Tableau Server, a Slack administrator must create a private Slack app and install it to a Slack workspace before a Tableau server administrator can add an OAuth Client and connect to Slack.</div> <p>In Tableau Server, you can add OAuth client information for a private Slack application, then select Connect to Slack to finalise the connection. For more information, see <a href="#">Integrate Tableau with a Slack Workspace</a>.</p>
Analytics Extensions	Enables a set of functions that your users can use to pass expressions to analytics extensions for integration with R

and Python. For more information, see "Configure Connection with Analytics Extensions" in [Tableau Cloud Help](#) or [Tableau Server Help](#).

Publish to Salesforce	Allows site users to publish views to a Salesforce app.
(Beta on Tableau Cloud and Tableau Server)	When a view is published to Salesforce, anyone with access to the selected app can see that the content exists. However, only those signed in with existing Tableau permissions can see the view. For more information, see <a href="#">Publish Views to Salesforce (Beta)</a> .

## Connected Apps tab

Setting	Description
Connected Apps	Create and manage Tableau-connected apps, or explicit direct trust or OAuth 2.0 trust relationships between Tableau Server (server-wide and site-level) and custom applications and programmatically authorise access to the Tableau REST API on users' behalf using JSON web tokens (JWTs). For more information, see <a href="#">Use Tableau Connected Apps for Application Integration</a> in the Tableau Cloud Help.

## Mobile tab

Setting	Description
App Lock	Requires a biometric method or device passcode for users to open this site on Tableau Mobile. For more information, see <a href="#">Enable App Lock for Added Security</a> in the Tableau Mobile Deployment Guide.

Offline Previews	Controls whether offline previews are generated for display when users access the site on Tableau Mobile. For more information, see <a href="#">Manage Tableau Mobile Data on Devices</a> in the Tableau Mobile Deployment Guide.
<b>Mobile Security Policies</b>	Some security policies are enabled automatically and cannot be disabled. Mobile security policies are not available for MAM versions of Tableau Mobile.
Jailbreak Detection	Controls whether a Tableau Mobile app user with a device that has been "jailbroken" or "rooted" is allowed to access content on Tableau, and what level of response occurs when a jailbroken or rooted device is detected. For more information, see Tableau Mobile App Security Settings.
Malware Detection (Android only)	Controls whether malware detection is enabled for mobile devices and what level of response occurs when malware is detected. For more information, see Tableau Mobile App Security Settings.
Maximum Days Offline Without Policy Refresh	Controls whether there is a maximum number of days a mobile device can be offline and still use the app. For more information, see Tableau Mobile App Security Settings.
Prevent Debugging	Controls whether debuggers are prevented on mobile devices. For more information, see Tableau Mobile App Security Settings.
Screen Sharing and Screenshots (Android only)	Controls whether a Tableau Mobile user is able to take screenshots or use screen sharing while in the app. For more information, see Tableau Mobile App Security Settings.

# Manage Users and Groups

You can add users to your Tableau sites and set their site roles, which determines each user's level of access. In addition, you can create groups of users and enable guest access to your sites.

## Add Users to a Site

Everyone who needs to access Tableau Server – whether to browse, publish, edit content or administer the site – must be added as a user. Administrators have the following options for adding users:

- Add a local user account or a user account from Active Directory, described later in this article.

You can also add users by importing an Active Directory group. See [Create Groups via Active Directory](#).

- Import Users via a CSV file that you create using the [CSV Import File Guidelines](#).

## Site administrator access to user management

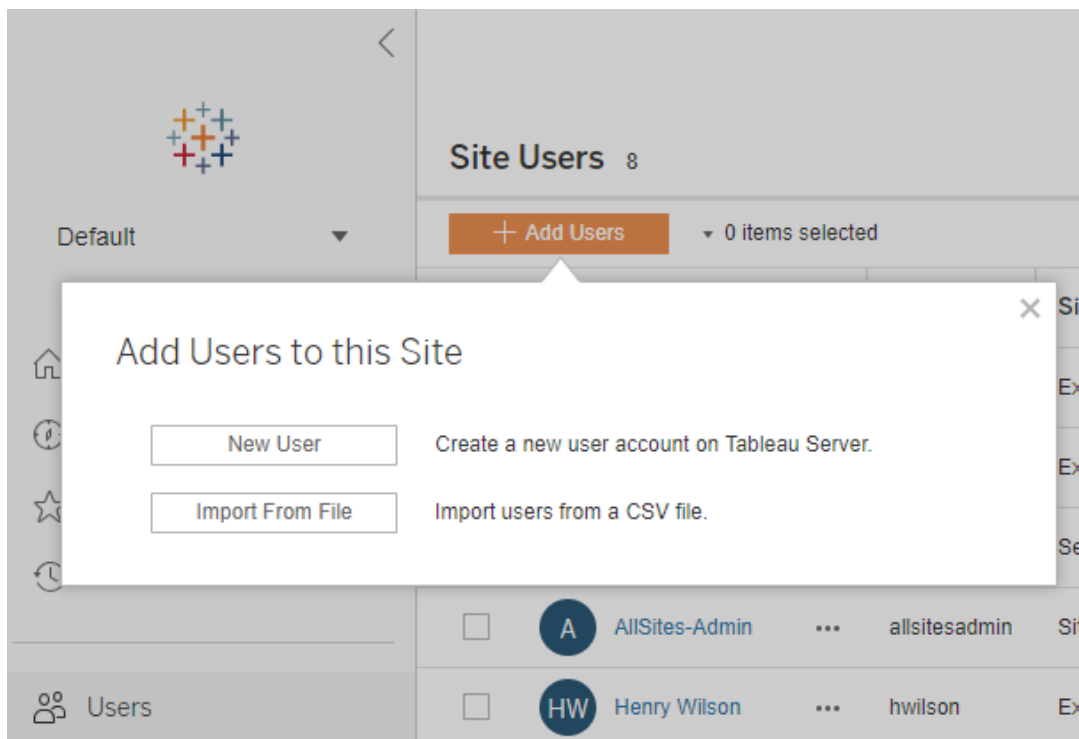
By default site administrators can add and remove users on a site. On the site's Settings page, server administrators can revoke that capability, so that only server administrators can manage the site's users.

A site administrator can edit an existing local user account only if the administrator has access to all of the sites the user is a member of. For example, if User1 is a member of sites A and B, an administrator of only site B cannot edit User1's full name or reset the password.

**Note:** When using local authentication, if a site administrator is able to add and remove users, they will be able to tell if a username is configured as a user on any site of Tableau Server

## Add local users to a site

1. Sign in to Tableau Server as an administrator, and if applicable select the site.
2. Select **Users**. On the Users page, click **Add Users**, and then click **New User**.



3. Enter a user name. With local authentication, using an email address for the user name is the best way to avoid user name collisions (for example, *lrodriguez@example.com* instead of *lrodriguez*).

## New User

Username:


Username available

Display name:

Password:

Confirm password:

Email (optional):

Site role:  

User names are not case sensitive. Characters not allowed in user names include the semi-colon (;) and colon (,).

Also enter information in the following fields:

- **Display Name** – Type a display name for the user (e.g., *Laura Rodriguez*).
- **Password** – Type a password for the user.
- **Confirm password** – Retype the password.
- **Email** – This is optional and can be added at a later time in the user profile settings.

4. Select a site role.

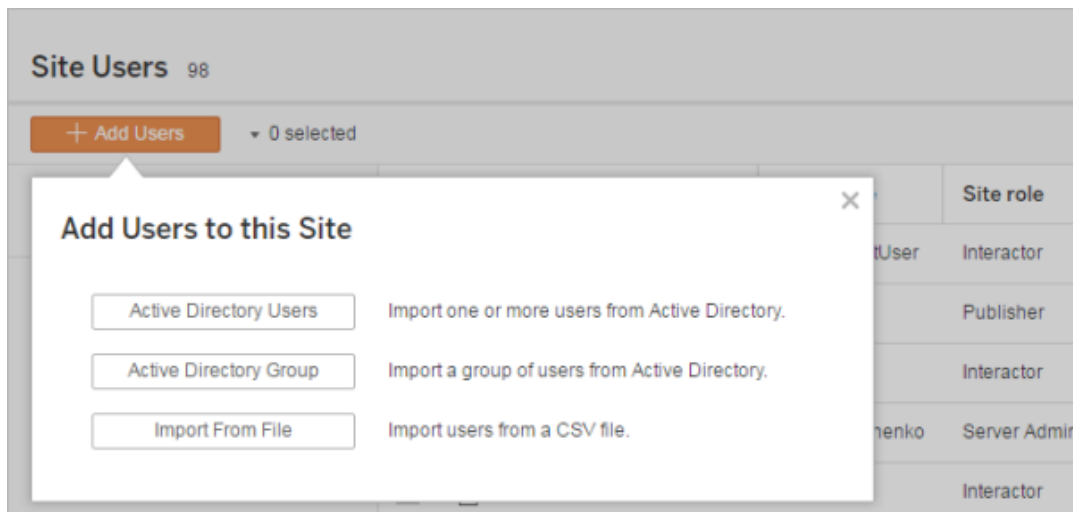
For site role definitions, see [Set Users' Site Roles](#).

5. Click **Add User**.

## Add Active Directory users to a site

Before adding users to a site, be sure to review User Management in Deployments with External Identity Stores to understand how multiple domains, domain naming, NetBIOS, and Active Directory user name format influence Tableau user management.

1. In a site, click **Users**, and then click **Add Users**, and then click **Active Directory User**.



2. Enter one or more user names (separated by semicolons).

For example, *tdavis; jjohnson; hwilson*

If you are adding a user that is from the same Active Directory domain that the server is running on, you can type the AD user name without the domain. The server's domain will be assumed.

**Note:** Do not enter the user's full name in this field; it can cause errors during the importing process.

3. Select a site role.

For site role definitions, see [Set Users' Site Roles](#).

4. Click **Import Users**.

## Remove local users

1. Sign in to Tableau Server as an administrator, select the site, and open the **Users** page.
2. Select the tick boxes next to the users' names, and on the **Actions** menu, select **Remove**.

If a user is a member only of the current site, and they do not own any content, the user is removed from the server.

If a user you remove from the current site is a member of other sites on the server, their status remains unchanged on those sites.

## Related information

- You can also Add Users to Tableau Server, without site affiliation.
- Upgrading Tableau Server to version 2018.1 or later from a pre-2018.1 version, without activating user-based licences, affects users who were assigned the **Viewer** site role in the pre-2018.1 server version.

To learn more, see the section “User-based licences” in the [Licensing Overview](#) and see [Set Users' Site Roles](#).

## Set Users' Site Roles

When you add users to a site on Tableau Server, independent of their licence type, you must apply a *site role* to them. The site role signifies the maximum level of access a user can have on the site. Along with content permissions, the site role determines who can publish, interact with or only view published content, or who can manage the site's users and administer the site itself.



Looking for Tableau Server on Linux? See [Set Users' Site Roles](#).

## How user licences, site roles and content permissions work together

The intersection of a user's licence type, site role and content permissions determines the level of access a user has on the Tableau site.

**Note:** The licence level count at the top of the header on the **Server Users** tab may differ from the count under the **Max User Role** filter due to some users having different roles across sites.

1. The licence type is associated with the user. The site role you want to assign to the user determines the licence type they require.

In a multi-site environment on Tableau Server, a user's licence applies to all sites the user is a member of.

2. The site role is also set at the user level. In a multi-site environment, you assign site roles on each site. For example, the same user can have the Site Administrator Creator site role on one site, and Viewer site role on another site.

The site role defines the maximum capabilities the user can have.

3. Whether the site role's maximum capabilities are available to the user depends on the permissions set on the content resources (projects, data sources, workbooks).

For example, let's say that a user has the following access on a site:

- Creator licence (due to their access on another site)
- Explorer site role (on this site)
- Save permission capability on a project (on this site)

In this scenario, the licence allows connecting to and creating new data sources in the web editing environment or Tableau Desktop, and a permission rule allows them to save in a project. However, their site role prevents them from being able to save, so their effective permissions don't include the save capability. Therefore, the user can't publish content to the site.

Even if a user has a creator licence and a creator site role, if they don't have the save capability on at least one project, they can't publish anything to the site.

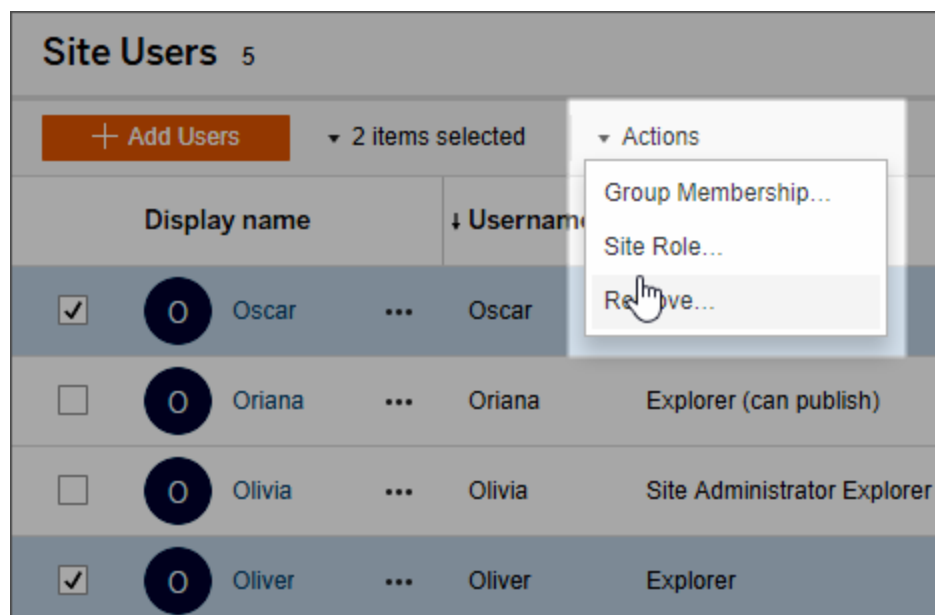
For more information, see [Permissions](#).

## Change a user's site role

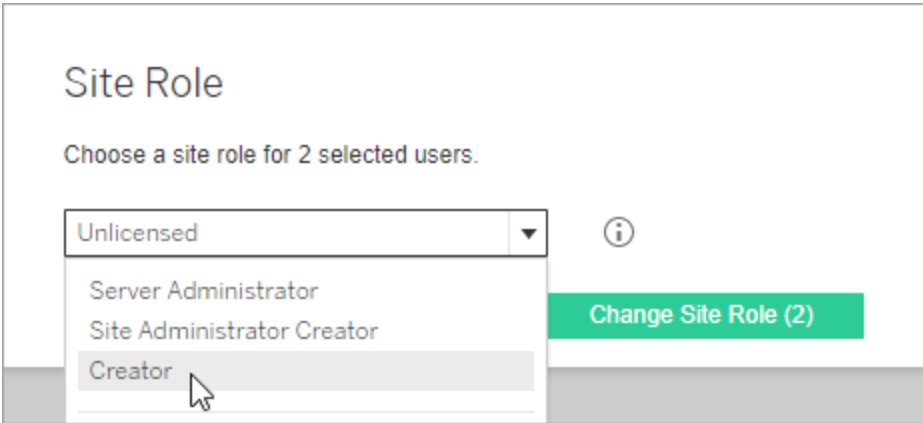
1. Sign in to the site as a server or site administrator, and go to the **Users** area.

If you are a site administrator and don't see the **Users** area, check with your server administrator on whether they have denied user management capabilities to site administrators.

2. Select the users, and then select **Actions > Site Role**.



3. Select the new site role, and then click **Change Site Role**.



You can hover the pointer over the information icon to display a matrix that shows the maximum level of general capabilities each site role allows. For more information, continue to [General capabilities allowed with each site role](#).

## General capabilities allowed with each site role

The following table lists the licence types as of version 2018.1, the highest level of site role allowed with each, how each site role maps to its pre-2018.1 equivalent; and summarises the maximum capabilities each site role allows.

What this article covers and where to find what's not covered here

- This information focuses on *site* roles and is more generalised. For a list of common specific tasks available per *licence* role, see the matrix on the [For Teams & Organisations](#) tab on the Tableau pricing page.
- This information describes site roles as of version 2018.1. To learn more about how core-based licensing relates to user-based licensing, how licences transfer or other specific licensing transition scenarios, start with the following topics:

[Migrate from Core-Based to Role-Based Licensing](#)

## Troubleshoot Licensing

## Core-based licence model (Understanding Licence Models and Product Keys)

Tableau site roles as of version 2018.1

Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
<b>Site roles that use a Creator licence</b>		
– Users with these site roles have access to Tableau clients such as Tableau Prep, Tableau Desktop, Tableau Bridge and Tableau Mobile.		
Server Administrator	Server Administrator	<p>Available on Tableau Server only; not applicable to Tableau Cloud.</p> <p>This site role always occupies the highest licence activated on the server between Creator and Explorer. It allows unrestricted access to the configuration settings for the Tableau Server browser environment, all sites on the server, users and groups and all content assets, such as flows, projects, data sources (including connection information) and workbooks.</p> <p>Connect to Tableau published data sources or external data, from the browser, Tableau Desktop or Tableau Prep; create and publish new data sources; author and publish workbooks.</p>
Site Administrator Creator	--	<p>This is the highest level of access for Tableau Cloud.</p> <p>Unrestricted access to content as described above,</p>

Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
		<p>but at the site level. Connect to Tableau or external data in the browser, Tableau Desktop or Tableau Prep; create new data sources; build and publish content.</p> <p>On Tableau Server, server administrators can determine whether or not to allow site administrators to manage users and assign site roles and site membership. By default, on Tableau Server, and always on Tableau Cloud, site administrators are allowed these capabilities.</p>
Creator	--	<p>This is similar to the former Publisher site role, but allows new features. This site role offers non-administrators the maximum level of <i>content</i> access.</p> <p>Connect to Tableau or external data in the browser, build and publish flows, data sources and workbooks, have access to Dashboard Starters and use interactive features on published views. Can also connect to data from Tableau Prep or Tableau Desktop, and publish (upload/save) and download flows, workbooks and data sources.</p>
<b>Site roles that use an Explorer licence</b>		
– Users with these site roles can access the server from the browser or Tableau Mobile.		
Server Administrator	N/A	Tableau Server only; not applicable to Tableau Cloud.

Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
		<p>If Explorer is the highest licence type activated on the server when a new server administrator user is created, the user's site role is Server Administrator. However, the user won't have the full connecting and publishing capabilities that come only with the Creator licence.</p> <p>With the Explorer licence a Server Administrator has unrestricted access to the configuration settings for the Tableau Server browser environment, all sites on the server, users and groups and all content assets, such as projects, flows, data sources (including connection information) and workbooks.</p> <p>However, with the Explorer licence, a Server Administrator can't connect to external data from the browser to create a new data source. They can author or publish workbooks and data sources from Tableau Desktop. With regards to publishing, they have the same capabilities that the Explorer (can publish) site role does. They can't publish Tableau Prep flows.</p>
Site Administrator Explorer	Site Administrator	<p>Same access to site and user configuration as Site Administrator Creator, but can't connect to external data or virtual connections from the web editing environment.</p> <p>Can connect to Tableau published data sources to create new workbooks, and edit and save existing</p>

Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
		workbooks. Can't publish Tableau Prep flows.
Explorer (can publish)	Publisher	<p>Can author or publish workbooks and data sources from Tableau Desktop. Can also publish workbooks from the web using existing data sources, browse and interact with published views and use all interaction features.</p> <p>In the web editing environment, can edit and save existing workbooks. Can't save new stand-alone data sources from data connections embedded in workbooks, and can't connect to external data or virtual connections, or create new data sources.</p>
Explorer	Interactor	Can browse and interact with published views. Can subscribe to content, create data driven alerts, connect to Tableau published data sources and open workbooks in the web authoring environment for ad-hoc queries, but they can't save their work. Can't connect to a virtual connection. Can't publish Tableau Prep flows.
Read Only	Viewer	<p>This site role is available only in version 2018.1, for transitioning users to the user-based Viewer (or other) licence and site role. Any users in the Read Only site role prior to upgrading to version 2018.2 or later are reassigned to the Viewer site role.</p> <p>In 2018.1 versions, Read Only users can see and subscribe to published views others have created.</p>

Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
		Can't use other interaction features or save custom views.
<b>Site roles that use a Viewer licence</b>		
Viewer	N/A	<p>Can see published views others have created and use most interaction features. Can subscribe to views and download as images or summary data. Can't connect to data, create, edit or publish content or set data alerts.</p> <p>For a list of specific capabilities, see the <b>Viewer</b> column in the matrix on the <a href="#">Tableau pricing page</a>.</p> <p><b>Note:</b> Although the Viewer site role existed in previous versions, the new Viewer site role has additional capabilities.</p>
<b>Other site roles</b>		
Unlicensed	Unlicensed	<p>Unlicensed users can't sign in to Tableau Server or Tableau Cloud. Users are assigned the Unlicensed role in the following circumstances:</p> <ul style="list-style-type: none"> <li>You import users from a CSV file and their licence level is set to unlicensed.</li> <li>The number of available licences is reached at the time you add or import users.</li> <li>You remove a user who owns content on the site. The user will still own the content but not be able to do anything with it.</li> </ul>



Site role name as of version 2018.1	Previous site role name	Maximum capabilities this site role allows
		<ul style="list-style-type: none"> <li>A product key(s) has expired. See Refresh Expiration Date and Attributes for the Product Key.</li> </ul>

## Who can publish content

The following site roles allow the specified level of publishing access.

- **Server Administrator** (Tableau Server only); **Site Administrator Creator**; and **Creator** allow full connecting and publishing access.

This includes connecting to data and publishing new flows, new workbooks and new data sources from Tableau Desktop and the web editing environment. The site roles also allow editing and saving existing published workbooks, or publishing updates to existing data sources.

- **Explorer (Can Publish)** and **Site Administrator Explorer** have limited publishing capabilities, as described in General capabilities allowed with each site role.
- **Explorer**, **Viewer**, **Read Only** and **Unlicensed** don't allow publishing.

## Site roles and Active Directory import and synchronisation

When you import users from an external directory like Active Directory, you can specify the site role. If a user is not yet a member of any site on the server, the user is added to the site with the assigned role. When you synchronise groups from an external directory, the site role is applied through the **Minimum Site Role** setting on the **Groups - Details** page.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

If a user already exists in a Tableau Server site, the site role assigned during the import or sync process will be applied if it gives the user more access in a site. Importing or synchronising AD users and groups can promote a user's site role, but does not demote a user's site role.

If a user already has the ability to publish, that ability is maintained.

The matrix below shows the rules applied for site roles on import.

**Note:** The **Import Site Role** row abbreviated headers indicate the site role specified for import. The **Current Site Role** column headers represent the current user site role. The table values represent the abbreviated resulting site role.

- Site Administrator: SA
- Site Administrator Creator: SC
- Site Administrator Explorer: SE
- Creator: C
- Explorer: E
- Explorer (Can Publish): EP
- Viewer: V
- Unlicensed: U

	Current Site Role						
Import Site Role	SC	C	SE	EP	E	V	U
Site Administrator Creator (SC)	SC	SC	SC	SC	SC	SC	SC
Site Administrator Explorer (SE)	SC	SE	SE	SE	SE	SE	SE

	Current Site Role						
Import Site Role	SC	C	SE	EP	E	V	U
<b>Creator</b> (C)	SC	C	SE	C	C	C	C
<b>Explorer (Can Publish)</b> (EP)	SC	C	SE	EP	EP	EP	EP
<b>Explorer</b> (E)	SC	C	SE	EP	E	E	E
<b>Viewer</b> (V)	SC	C	SE	EP	E	V	V
<b>Unlicensed</b> (U)	SC	C	SE	EP	E	V	U

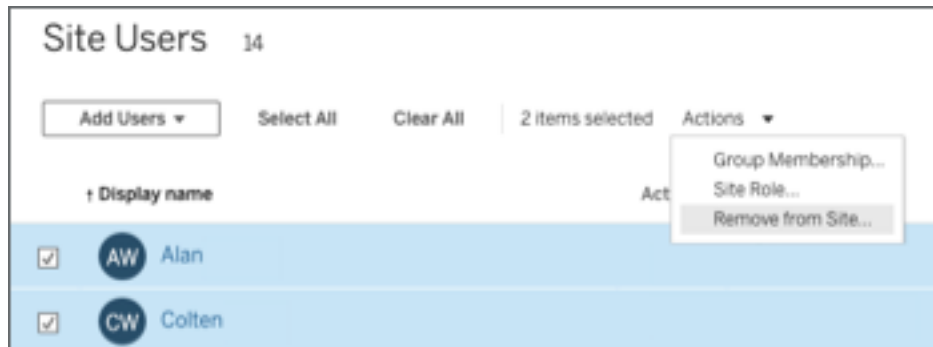
## View, Manage or Remove Users

Administrators can manage a site's users such as adding and removing users, setting the groups they're members of, setting their site roles, and so on. Server administrators can manage users on multiple sites at a time on the **All Sites** page.

## View and manage users on a site

Sign in to a site as an administrator, and then select **Users**. On this page you can do any of the following to manage users:

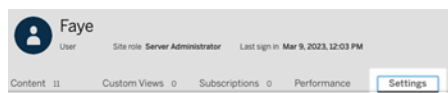
- Set group membership, set site role, or remove the user from the site. If you've configured the site for SAML single sign-on, you can set the selected users' authentication type. If your server is configured for password policies and account access lockout, you can unlock access to a user's locked out account. If your server is configured for one or more [identity pools](#), you can add or remove users.



- Select a user name to see details about them, such as content they own, views they subscribe to, and their account settings.

The user **Settings** page is available when the following conditions are true:

- The user is a member only of sites that the site administrator controls
- Site administrators can manage users by default. Tableau Server administrators can change this access for site admins.



If the server is configured to use the internal user management system (Local Authentication), you can edit the **Display Name**, **Email**, and **Password** for users after they have been added. If you are making many changes, you may find it easier to import the changes from a CSV file. For details, see [Import Users and CSV Import File Guidelines](#).

## View and edit server users

Sign in to Tableau Server as a server administrator. On the site menu, select **Manage All Sites**, and then select **Users**.

## Manage users' site membership

By default, server and site administrators can manage users at the individual site level. Server administrators can also manage users and their site roles on multiple sites. You do this at the **All Sites** level (at the server level).

1. In the site menu, select **Manage All Sites**, and then select **Users**.
2. On the Server Users page, select the check boxes next to the users, and then select **Actions > Site Membership**.
3. Select one or more sites, and a site role for each site, and then click **Save**.

## Search for users (or groups or sites)

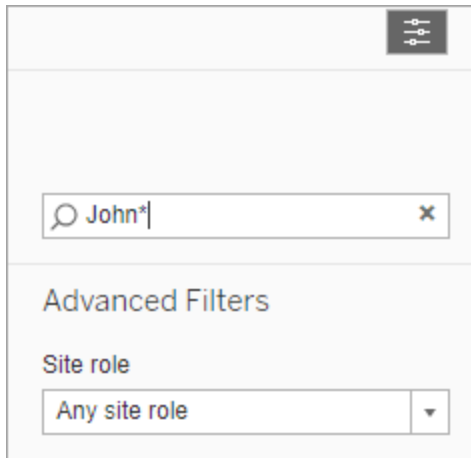
To search for a specific user (or group or site), use the filter toggle in the upper right to display the search box and site role filter. Then use the search box or filters to find the users (or group or site) you want. The search operation checks the display name and user name attributes.

The search box supports the wildcard (\*) character. For example, searching for `John*` will return all names that start with *John*.

In addition:

- Starting in Tableau Server 2021.4.1, you can use the wildcard character (\*) with a special character to search for names that contain special characters. For example, `sync-*` or `*sync-*`.
- Starting in Tableau Server 2022.1.13, when you search for names with diacritics, names must be entered with exact diacritics return relevant results. For example, to search for *José*, enter `José`. Searching for `Jose` will not return results.

- Starting in Tableau Server 2022.3.5, you can use the wildcard character (\*) with AND or OR conditions when filtering users. For example, searching for `*aw*` AND `John*` returns all users whose names contain *aw* and whose names start with *John*.



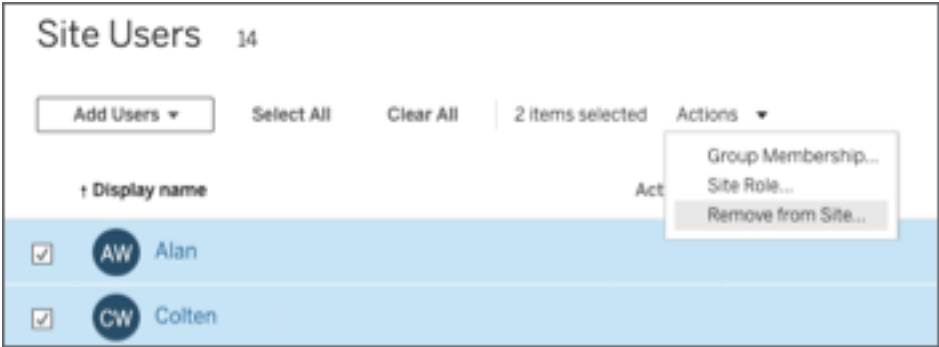
## Remove users from a site

You can remove a user only if the user does not own any content (projects, workbooks, views, data sources, collections or data alerts for example). If you attempt to remove a user who owns content, the user site role will be set to **Unlicensed**, but the user will not be removed.

If the default All Users group has enabled Grant site role on sign-in, that user's content must be reassigned to another user or removed before they can be unlicensed or removed. For more information on Grant role on sign-in, see [Removing users affected by Grant role on sign-in](#). For more information on changing content ownership, see [Manage Content Ownership](#).

**Note:** On Tableau Server, when an administrator removes a user from a site (and the user belongs only to that one site), the user is also deleted from the server.

1. Sign in to a site as an administrator, and go to the **Users** area. Select one or more users to remove, and then select **Actions > Remove**.



2. Click **Remove** in the confirmation dialog.

## Remove users from the server

You can remove a user only if the user does not own any content (projects, workbooks, views or data sources). If you attempt to remove a user who owns content, the user site role will be set to Unlicensed, but the user will not be removed.

If a user is a member of multiple sites, and they own content on any of those sites, they are removed from the sites on which they don't own content. The user remains a member on sites where they own content, but demoted to the Unlicensed site role.

1. In the site menu, click **Manage All Sites**, and then click **Users**. In a single-site environment, click **Users**.

Select one or more users to delete, and then click **Actions > Delete**.

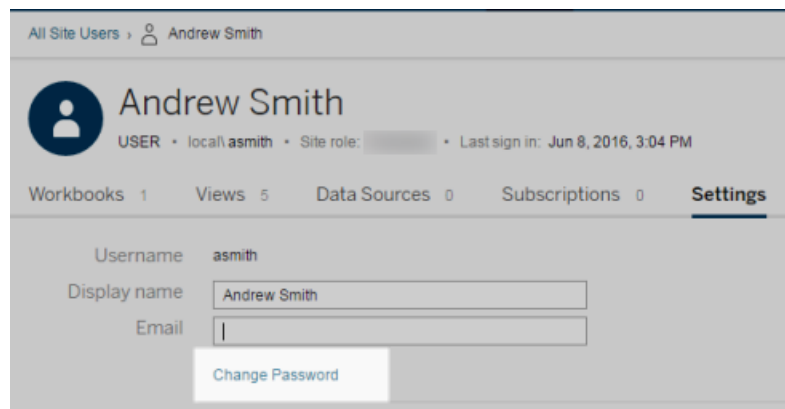


2. Click **Delete** in the confirmation dialog box.

## Change passwords for users of a single site

To change the password for a user with membership to a single site, sign in to Tableau Server as a site administrator or a server administrator.

1. Ensure that the correct site is selected in the menu.
2. Click **Users**.
3. Click the display name of a user.
4. Click **Settings**.
5. Click the **Change Password** link, edit the password and then click **Save Password**.



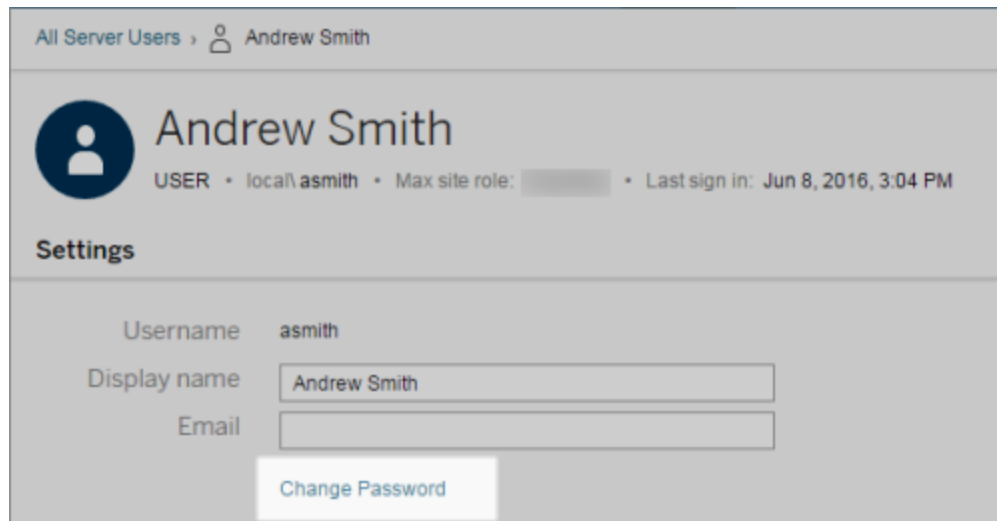
## Change passwords for users of multiple sites

To change the password of a user with membership to multiple sites, sign in to Tableau Server as a server administrator.

1. In the site menu, click **Manage All Sites**.
2. Click **Users**.
3. Click the display name of a user.



4. Click the **Change Password** link, edit the password and then click **Save Password**.



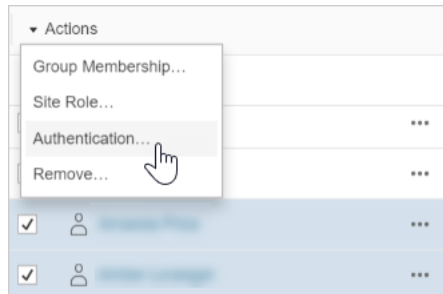
The screenshot shows the Tableau Server user interface for managing a user. At the top, there is a breadcrumb trail: "All Server Users > Andrew Smith". Below this, the user's profile is displayed with a blue circular icon, the name "Andrew Smith", and the role "USER". Additional details include "local\asmith" for the user identifier, "Max site role:" followed by a dropdown menu, and "Last sign in: Jun 8, 2016, 3:04 PM". The "Settings" section is highlighted, showing fields for "Username" (asmith), "Display name" (Andrew Smith), and "Email" (empty). A "Change Password" button is located at the bottom of the settings section.

## Set the User Authentication Type for SAML

On a site that has been configured for site-specific SAML, administrators can specify users' authentication type. For example, if Tableau Server was configured for site-specific SAML and server-wide SAML, administrators can specify which users authenticate with site-specific SAML and which users authenticate with server-wide SAML.

You can assign authentication type at the time you add users to Tableau Server, as well as any time afterward.

1. When you're signed in to the Tableau Server site, select **Users**.
2. On the **Site Users** page, tick the boxes next to the users you want to assign an authentication type.
3. On the **Actions** menu, select **Authentication**.



4. In the Authentication dialog box, select **Site SAML** or **Server Default**.

## Notes

- Users that authenticate with site-specific SAML can only belong to one site. If a user needs to belong to multiple sites, set their authentication type to the server default. Depending on how site-specific SAML was configured by the server administrator, the server default is either local authentication or server-wide SAML.
- If you change users' authentication to site-specific SAML, the next time they sign in, they will be directed to your identity provider's site to provide their credentials.

## Import Users

To automate the process of adding users to a site, you can create a CSV file that contains user information, and then import the file.

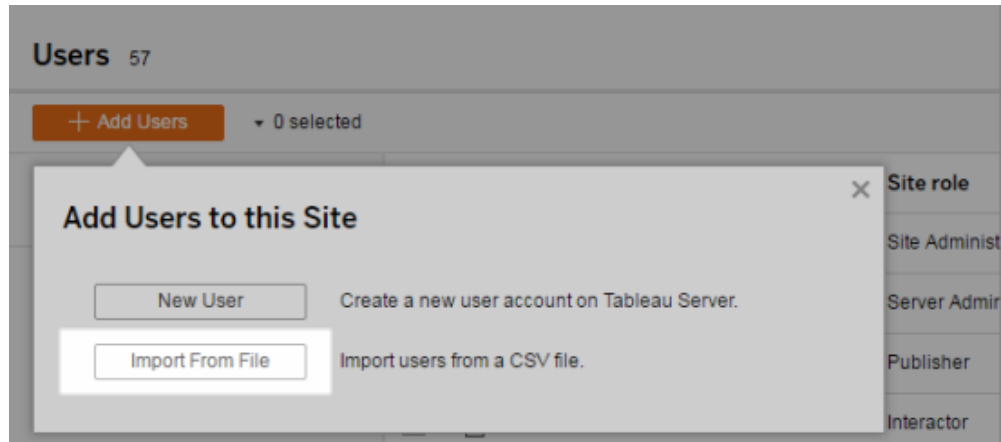
Site administrators can import users to a particular site; server administrators (Tableau Server only) can import users at the server level, to later add them to multiple sites.

**Note:** This topic contains the steps for importing, assuming that you have already created the CSV file. If you have not created the file yet, see [CSV Import File Guidelines](#) for a list of file format requirements and import options.

## Add users from a CSV file

The following steps describe how to add users to a site or to the server. The images reflect adding users at the site level.

1. Do one of the following:
  - To add users at the site level, select **Users**, and then **Add Users**.



- To add users at the server level on a **single-site** server, select **Users**, and then **Add Users**.
  - To add users at the server level on a **multi-site** server, open the list of sites, and select **Manage All Sites**. Select **Users**, and then **Add Users**.
2. Click **Import From File**, click **Browse** and navigate to the file, and then click **Import Users**.

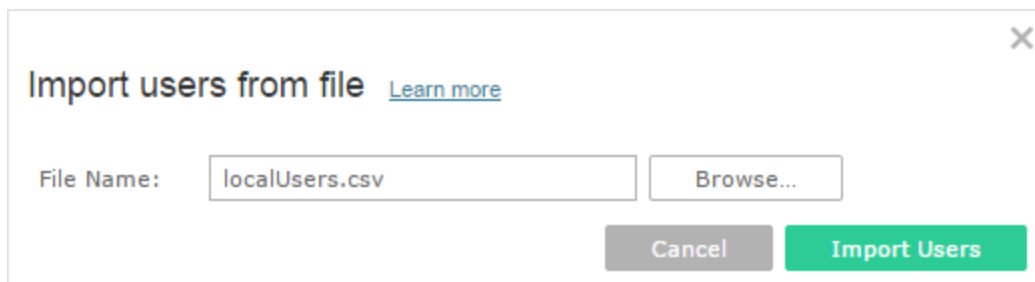
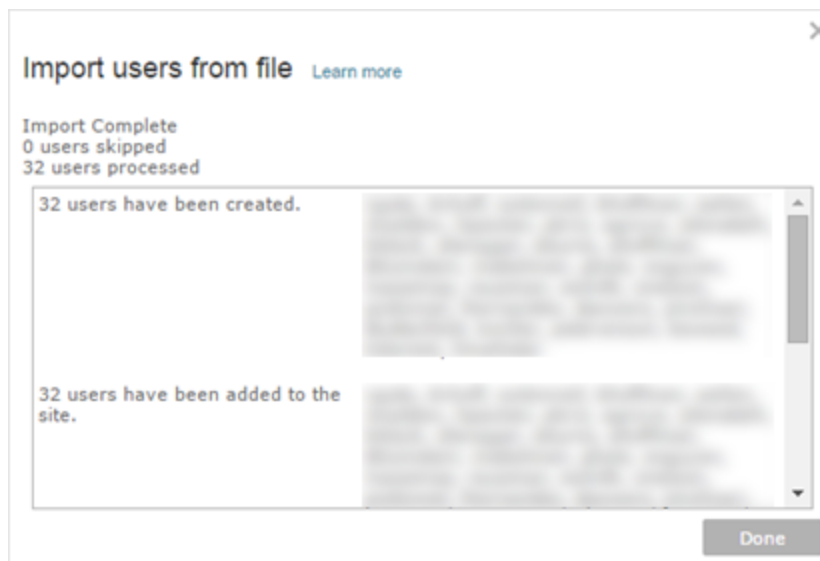


Tableau displays the results of the import process (names in this image have been blurred out).



3. Click **Done**.

## How users' site roles are assigned or maintained

When you import at the site level or on a single-site server using `tabcmd`, you can specify the site role for all users in the CSV file. If a user already exists in the Tableau Server site, the site role assigned during the import process will be applied, even if it is more restrictive than users' existing site role. The exception is that you cannot affect a server administrator's site role.

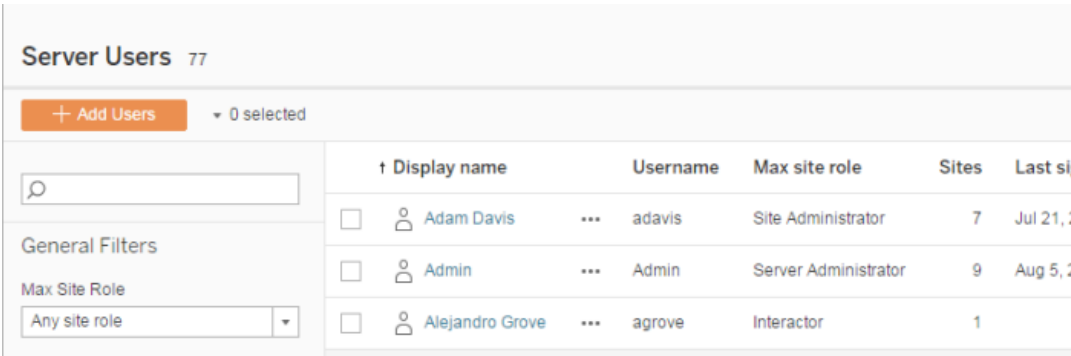
For a multi-site server, when you import users in the Server Users page, you create server users with no site affiliation. Because these users do not belong to a site, they cannot have a site role. The only site role a user can have at the server level is **Unlicensed** or **Server Administrator**.

You can also specify the user's site role when you assign site membership to a user. For information, see [Manage users' site membership](#).

# Importing at the server level in multi-site environments

If the server is running multiple sites and you are a server administrator, you can import a CSV file from two locations. Where existing user accounts are concerned, each location has different capabilities.

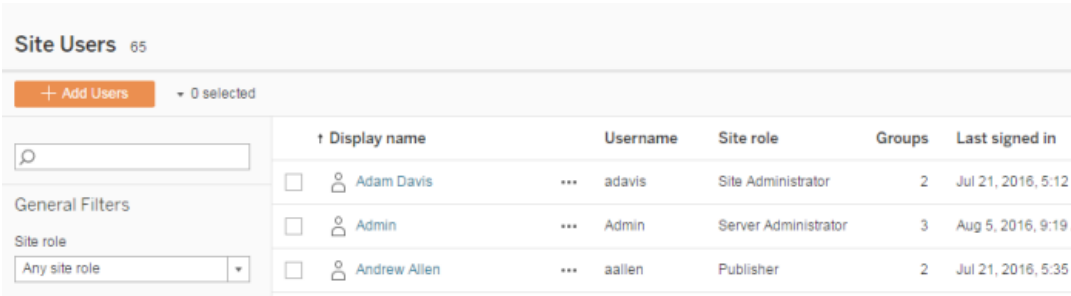
- The **Server Users** page appears in a multi-site environment. Only server administrators can access this page.



Server Users 77					
+ Add Users 0 selected					
<input type="text"/>					
General Filters					
Max Site Role					
Any site role					
Display name	Username	Max site role	Sites	Last signed in	
<input type="checkbox"/> Adam Davis	adavis	Site Administrator	7	Jul 21, 2016, 5:12	
<input type="checkbox"/> Admin	Admin	Server Administrator	9	Aug 5, 2016, 9:19	
<input type="checkbox"/> Alejandro Grove	agrove	Interactor	1		

You can import the CSV file from here if you want to update existing user accounts in addition to adding new ones. For example, if you import a file that has a new password for each existing user, their passwords will be reset.

- The **Site Users** page.

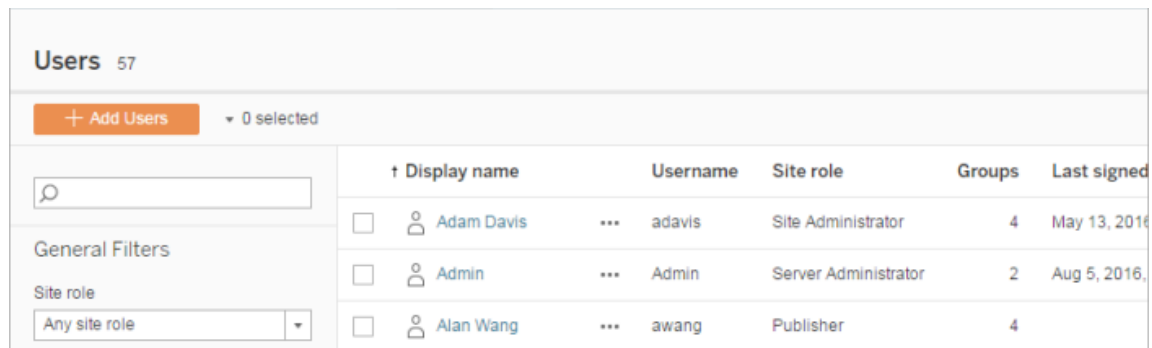


Site Users 65					
+ Add Users 0 selected					
<input type="text"/>					
General Filters					
Site role					
Any site role					
Display name	Username	Site role	Groups	Last signed in	
<input type="checkbox"/> Adam Davis	adavis	Site Administrator	2	Jul 21, 2016, 5:12	
<input type="checkbox"/> Admin	Admin	Server Administrator	3	Aug 5, 2016, 9:19	
<input type="checkbox"/> Andrew Allen	aallen	Publisher	2	Jul 21, 2016, 5:35	

Server administrators can add new user accounts with CSV imports. If the CSV file includes existing users, the **Password** and **Display Name** fields must either match the existing or be left blank. If new passwords or full names are used, the import will fail.

## Importing to a single-site environment

Server and site administrators on a single-site server perform CSV user imports from the **Users** page in a site.



The screenshot shows the 'Users' page in Tableau. At the top, it says 'Users 57'. Below this is a '+ Add Users' button and a '0 selected' indicator. On the left, there is a search bar and a 'General Filters' section with a 'Site role' dropdown set to 'Any site role'. The main table lists three users:

	† Display name		Username	Site role	Groups	Last signed
<input type="checkbox"/>	Adam Davis	...	adavis	Site Administrator	4	May 13, 2016
<input type="checkbox"/>	Admin	...	Admin	Server Administrator	2	Aug 5, 2016
<input type="checkbox"/>	Alan Wang	...	awang	Publisher	4	

## Multi-site versus single-site import

Users can belong to more than one site on the same server, but they must use the same credentials for each site. This becomes important when you're adding users to a site and those users might already be members of a different site. If you try to import a user who already exists, and if the user's credentials in the CSV file don't match the existing credentials, the import fails for that user.

If you're importing users to a site and think the users might already exist on the server, you can try leaving the **Password** field in the CSV file blank (while including the delimiters for the field). If a user who is defined in the CSV already exists in another site, the user is added to the site where you're importing. However, if the user *doesn't* already exist on the server, the user is created, and the CSV import window alerts you that the new user doesn't have a password. You can then use the server administrator pages to assign a password to any user who doesn't have one.

**Note:** If the server is configured to use Active Directory for authentication, user passwords are managed by Active Directory, and you can leave the password field in the CSV file blank.

## CSV Import File Guidelines

You can automate adding users by creating a comma-separated values (CSV) file with user information and then importing the file. You can include attributes in the CSV file, such as licence level and the publishing access, to apply to the users at the same time you import them.

To import users, you can use the server or site administration pages or the `tabcmd` utility. Using `tabcmd` provides an option for assigning a site role to all users in the CSV file. For information, see `Import Users` or `createsiteusers filename.csv`.

You can import users at the site or server level. If you import users to the server (not to a specific site), the users aren't assigned to a site and are imported as Unlicensed.

**Note:** Unless otherwise noted, the guidelines specified in this topic apply to Tableau Server when configured with or without [identity pools](#).

### CSV file format requirements

When you create the CSV file for importing users, make sure that the file meets the following formatting requirements:

- The file does not include column headings. Tableau Server assumes that every line in the file represents a user.
- The file is in UTF-8 format, and includes the byte-order mark (BOM).
- Character encodings such as BIG-5 have been converted to UTF-8. You can do this by opening the file in a text editor and using the **Save As** command.
- If a username includes an @ character that represents anything other than a domain separator, you need to refer to the symbol using the hexadecimal format: `\0x40`

For example, `user@fremont@mycompany.com` should be `user-\0x40fremont@mycompany.com`

## Required columns in the CSV file

The following values are required for each user:

- Username
- Password: If Tableau Server is configured to use Active Directory authentication, there must be a `Password` column, but the column itself should be empty. If the server is using local authentication, you must provide passwords for new users.

## Additional import file options

The CSV file can contain the following fields, in the order shown here:

- Username. The username. If the server is configured to use Active Directory, this value must match a user defined in Active Directory. If the username is not unique across domains, you must include the domain as part of the username (for example, `example\Adam` or `adam@example`). **This is the only required field.**

If adding users to an **identity pool**, make sure of the following:

- If adding a user to an identity pool that uses AD as its identity store, make sure to use the AD `sAMAccountName` value for user name.
- If adding a user to an identity pool that uses LDAP as its identity store, make sure to use the LDAP username value for user name.
- Password. A password for the user. If the server is configured to use Active Directory, this value is not used.
- Display name. The display name is part of the information used to identify a user on the server. If the user's display name is already in use, Tableau Server updates the existing user information with the settings in the CSV file. If the server is configured using Active Directory, this value is not used.
- Licence level. This can be **Creator**, **Explorer**, **Viewer** or **Unlicensed**. If you specify **Creator** for a particular user account, then you must also set the Publishing capability



to **True**.

- Administrator level (**System**, **Site**, or **None**). This setting determines whether the user is imported as an administrator.

If you are using the web UI to import users, you can set the administrator site role to **System** only if you import the file at the server (All Sites) level. If you are signed in to a specific site, and if the administrator column for a user in the CSV file is set to **System**, Tableau Server imports the user as a site administrator.

- Publishing capability (**yes/true/1** or **no/false/0**). If you are using the web UI, the publisher setting is used only if you import while signed in to a specific site.
- Email address. The email address is part of the information used to identify a user on the server. If the email address is already in use, Tableau Server updates the existing user information with the settings in the CSV file.

If adding users to an identity pool, the following values are needed in addition to the above:

- Identity pool name. The name of the identity pool that you want to add the user to.
- Identifier. The identifier for the user you want to add. Identifiers are only used for identity matching purposes. For more information, see [Usernames and identifiers in Tableau](#).

**Note:** The identifier is required if adding a user to an identity pool that uses Active Directory (or LDAP) identity store. The identifier is optional if adding a user to an identity pool that uses the local identity store.

**Notes:**

- If you are adding users to an identity pool and you don't specify the identity pool name, users are added to the initial pool (TSM configured), which is the set of users who were provisioned in TSM during Tableau Server setup.
- For the username value, make sure of the following:
  - If adding a user to an identity pool that uses AD as its identity store, make sure to use the AD sAMAccountName value for user name.

- If adding a user to an identity pool that uses LDAP as its identity store, make sure to use the LDAP username value for user name.
- You can use the CSV import process to:
  - Bulk add users to additional identity pools. **Note:** You cannot use the CSV import process to replace the identity pool that a user already belongs to with another identity pool. If you add an existing user with a different identity pool value, they will be added to that additional identity pool.
  - Bulk add identifiers for users who don't already have them. **Note:** If you add a different identifier for a user in the same pool, it will not replace the existing identifier for that user. Instead, a new identifier record will be created for that user.

**Important:** The order of the columns is significant. The first column is treated as the user-name, the second as the password, the third as display name, and so on, regardless of the content in the columns. If you omit values for a field, you must still include the field's comma delimiter.

Improve performance for large CSV files passed through `tabcmd`

**Note:** These settings apply to Tableau Server version 2022.1 and earlier. The search and index service they affect was deprecated starting in version 2022.3 and retired (removed completely) in 2023.3.

A server administrator can enable server settings that help to improve performance for importing large CSV files through `tabcmd` commands. You can do this using the `tsm configuration set` command with the following options:

- `vizportal.csv_user_mgmt.index_site_users`
- `vizportal.csv_user_mgmt.bulk_index_users`

- `searchserver.index.bulk_query_user_groups`

Essentially, these options index users after the CSV file is processed, instead of one-by-one as they are added to the server's database. This reduces the number of calls to the database and the memory required to process the file. These `tsm configuration set` options apply to the `tabcmd createsiteusers`, `deletesiteusers`, `addusers`, and `removeusers` commands.

For descriptions for these settings, see [tsm configuration set Options](#).

### Notes

- If you are not signed in to a specific site and are importing users at the server level, you can assign only the Server Administrator and Unlicensed site roles.
- If you have a user-based server installation, and if adding users would exceed the number of users allowed by your licence, the users are added as unlicensed users.
- If you use `tabcmd` and specify the licence, but importing users would exceed your licence limits, users are imported as Unlicensed.

## CSV settings and site roles

The licence level, administrator, and publishing settings for a user determine how the user's site role is set during the import process. The following table shows how the settings are converted to site roles.

CSV settings	Site role
Licence level=(any)  Administrator=System  Publisher=true	Server Administrator. This setting applies to Tableau Server only, and it is valid only if you are importing users while managing the server (that is, not signed in to a specific site).  The Server Administrator site role always takes a Creator licence if one is available. If no Creator

CSV settings	Site role
	licence is available, see Troubleshoot Licensing to learn about the way Tableau Server handles this.
Licence level=Creator or Explorer Administrator=Site Publisher=true	Site Administrator Creator or Site Administrator Explorer. This setting is valid only if you are importing users while signed in to a specific site.
Licence level=Creator Administrator=None Publisher=true	Creator
Licence level=Explorer Administrator=None Publisher=true	Explorer (Can Publish)
Licence level=Explorer Administrator=None Publisher=false	Explorer
Licence level=Viewer Administrator=None Publisher=false	Viewer
Licence level=Unlicensed Administrator=None	Unlicensed

CSV settings	Site role
Publisher=false	

### CSV import examples for Tableau Server

The following example shows a CSV file that contains information for several users.

```
henryw,henrypassword,Henry Wilson,Creat-
or,None,yes,henryw@example.com
freds,fredpassword,Fred Suzuki,Viewer,None,no,freds@example.com
alanw,alanpassword,Alan Wang,Explorer,Site,yes,alanw@example.com
michellek,michellepassword,Michelle Kim,Creat-
or,System,yes,michellek@example.com
```

If you import this file while managing a site, four users are added to that site. The **Administrator** setting for user Michelle is **System**. However, because you are importing the users into a site, Tableau Server give Michelle the Site Administrator Creator site role. Three of the users are allowed to publish.

If you import this file while managing the server, four users are added to the server, but they are not added to any site. Only one user is imported as a server administrator; the rest are set to Unlicensed.

### Identity pools examples

The following example shows a CSV file that contains information for two users added to an identity pool.

```
henryw,henrypassword,Henry Wilson,View-
er,None,yes,hwilson@myco.com,General Contractors,hwilson
freds,fredpassword,Fred Suzuki,Creat-
or,None,no,fsuzuki@myco.com,General Contractors,fsuzuki
```

The following example shows a CSV file that contains information for two users added to an additional identity pool.

```
henryw,henrypassword,Henry Wilson,View-
er,None,yes,hwilson@myco.com,General Contractors 2,hwilson
freds,fredpassword,Fred Suzuki,Creat-
or,None,no,fsuzuki@myco.com,General Contractors 2,fsuzuki
```

The following example shows a CSV file that contains information for two users without existing identifiers.

```
janes,janepassword,Jane Smith,View-
er,None,yes,jsmith@myco.com,General Contractors,jwang
laurar,laurapassword,Laura Rodrig-
uez,Creator,None,no,lrodriguez@myco.com,General Con-
tractors,jrodriguez
```

## Manage Site User Visibility

By default, all site users can see aliases, project ownership and comments by other users when permissions allow. The User Visibility setting lets administrators manage if users with Viewer and Explorer site roles see other users and groups on the site, which can be important for sites that are used by multiple clients. To learn more about site roles, see [Set Users' Site Roles](#).

### Limit user visibility

Setting User Visibility to **Limited** impacts certain collaboration tools and hides user information in Tableau Cloud and Tableau Server. Limited User Visibility either disables the feature for Viewers and Explorers (excluding Site Administrator Explorers), or removes user information from other areas. Note that Creators and administrators will still see user information when User Visibility is set to Limited.

To limit user visibility for Explorers and Viewers (excluding Site Administrator Explorers):

- Navigate to the site's **Settings** page
- Select **Limited** in the **User Visibility** setting

The following is a list of site areas impacted when User Visibility is set to Limited. Unless noted that the feature is disabled for all users, only non-administrator Explorers or Viewers are impacted.

Area	Impact
Search	User information not displayed
Content owners	User information not displayed (Explorers and Viewers can't see themselves, but can see their content in My Content)
Profile pictures	User information not displayed
Subscriptions	User information not displayed
Recommendations	Similar users not displayed (all users)
Add/Edit Tags	Explorers and Viewers can see tags but cannot delete or modify them
"Who has seen this view?"	Disabled
Ask Data usage analytics	Disabled
Permissions dialogs	Disabled
Named sharing	Disabled (all users)
Alerts	Disabled (all users) Existing alerts paused
Comments	Disabled (all users)
Public Custom Views	Disabled (all users)

	Existing public custom views appear as private
Request Access	Disabled (all users)
Tableau Desktop	Publishing workbooks disabled from Desktop
	User information not displayed on user filters
Tableau Pulse manage followers	No users appear as followers, and no results appear when searching for users.
Tableau Catalog (with Data Management)	User information not displayed

When User Visibility is set to Limited, Tableau Server REST API and Metadata API calls behave as described in the table above.

Users on a site can interact with views and modify them, such as applying filters. If that user shares their modified view with others, or if the user creates something from that modified view (like a metric or a private custom view), then that user's name appears in the URL. Make sure that the URL for this modified view is only distributed to users who are permitted to see that person's name.

**Note:** If a user is a member of multiple sites, entering an email on the sign-in page for Tableau Cloud will return the names of all sites that the user is a member of.

### Best practices for limiting user visibility

Administrators can also check that user and group information is not visible in these ways:

- Configure permissions to only provide content to appropriate parties. For more information, see [Permissions](#).
  - Limited User Visibility hides user identification information from search, but might return content that the user published, including when searching by owner name, if the person searching has viewing permission to that content.



- A user publishing a workbook with a duplicate title in the same project might see a warning that a workbook with that title already exists.
- Apply row-level security when necessary.
- Check that metadata within dashboards does not contain user information.
- Check that calculations accessible to users don't contain user metadata (e.g. user filters).

## Restore Full User Visibility

When administrators set User Visibility back to Full, features disabled for all users by Limited User Visibility (such as comments and alerts) remain off. Administrators can re-enable these features through the site's Settings page.

Any previous feature settings are not retained when User Visibility is set to Full, and affected features are not automatically turned on.

## Guest User

Core-based licences of Tableau Server include a Guest user option, which you can use to let people access Tableau views without an account on the server.

Guest user access is enabled by default when Tableau Server is installed with a core-based licence. It is not available with user-based licensing. If you do not intend to use Guest user access, you should disable it.

Guest access allows users only to see and interact with Tableau views. The Guest user cannot browse the Tableau Server interface or see server interface elements in the view, such as user name, account settings, comments and so on. For more information about licences, see [Manage Licences](#).

**Tip:** To share views with Guest users, either provide URL links or embed views into web pages. For more information, [see Tableau User Help](#).

## Guest user permissions

A Guest user can have the following maximum capabilities:

- **Workbooks and views:** View, Export Image, Summary Data, View Comments, Filter, Full Data, Web Edit, Download (to save a local copy)
- **Data sources:** View and Download

If you add the Guest user to a group that has a higher level of access to a content resource, the Guest user's access does not exceed the capabilities listed above. However, the Guest user account will comply with more restrictive permissions settings.

The Guest user can only access data with embedded credentials or where credentials are not required. A data source that prompts the user for credentials cannot be accessed by the Guest user. See [Data access for published Tableau data sources](#).

## Enable or disable Guest access

You must be a server administrator to change Guest account settings at either the server or the site level.

**Note:** Enabling the Guest user for a site can increase the number of potential simultaneous viewers beyond the user list you might be expecting. The administrative view **Status > Traffic to Views** can help you gauge the activity.

1. In the site menu, click **Manage All Sites** and then click **Settings > General**.
2. For **Guest Access**, select or clear **Enable guest access**.
3. Click **Save**.

This enables the Guest user on all sites. You can then go to the same setting for a specific site. To disallow Guest access for a site:

1. In the site menu, select a site.
2. Click **Settings**, and on the General tab, clear the **Enable guest access for this site** tick box.

If the Guest account is enabled on some or all sites, and you turn off Guest access at the server level, it is turned off for all sites as well.

**Note:** You can turn off Guest user access at the server or site level; however, you aren't able to remove the user. So, although no one can access data or views without signing in to the server, the Guest user still appears in the Site Users list and group lists for groups you've added the Guest user to.

### Additional Guest account characteristics

The Guest user is unique in the following additional ways:

- As a single user account, it represents all unauthenticated users accessing Tableau views.
- When enabled, it is a member of the All Users group.
- You can add it as a member of other groups on a site.
- You cannot edit it or select it as the owner of a content resource.
- The account is not allowed to save custom views.
- Guest cannot be used in a user filter.
- You cannot delete the account; however, you can turn off access to it by clearing the tick box described in the steps above.

### Work with Group Sets

Beginning in Tableau Server 2024.2, you can create a container for your groups using group sets. A group set can contain one or more groups and be used to apply more granular rules for content permissions that are dependent on the group set. When enabling capabilities based on a group set, users in the groups that belong to the group set must be members of all the groups for the capability to be evaluated. In this way, group sets enforce AND logic.

#### Benefits of group sets:

- You can mix and match synchronised groups with local groups in permission rules to enable more dynamic access control scenarios.

- Use AND logic for groups in permission rules, which can simplify access control in some scenarios.

**Notes:**

- Group set permission rules are evaluated after user and group rules. For more information about those rules, see [Evaluate permission rules](#).
- Group sets can only be created by server administrator.

## Turn on group sets

Before group sets can be used for permissions, group sets settings must be enabled.

1. Sign in to Tableau Server as server administrator.
2. Navigate to the **Settings** page.
3. Under the Group Sets section, select the **Allow group sets** tick box.

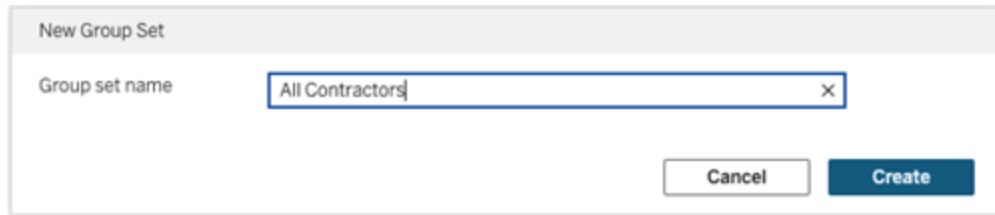


After enabling group sets, a dedicated Group Sets page displays in the navigation pane.

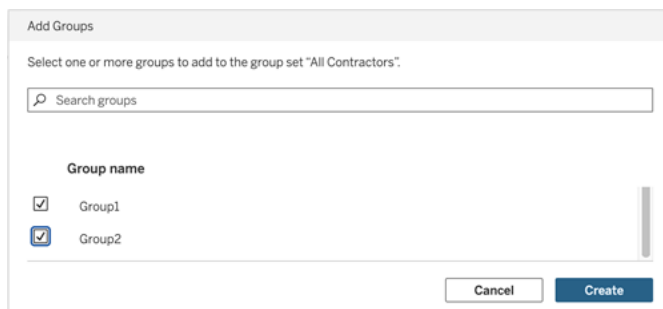
## Create group sets

To create a group set, navigate to the Group Sets page and create a group set as you would a group.

1. Sign in to Tableau Server as server administrator.
2. Navigate to the Group Sets page and click the **New Group Sets** button.
3. Enter a name for the group set and click **Create**.



4. In the Group Sets table, click the name of the group set you just created and click the **Add Groups** button.
5. From the list of available groups, select the groups you want to add to the group set and click the **Add** button.



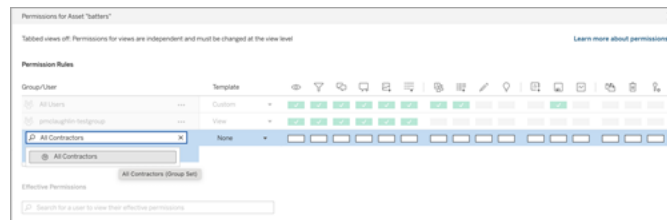
## Set permissions on group sets

To use group sets, as a site admin, project leader or content owner, add or edit the permissions of the content to use the group set.

For example, suppose you are the owner of the “Batters” workbook. To apply permissions based on the group set, do the following:

1. Go to the workbook and select **Permissions** from the actions menu.
2. In the Permissions dialog box, click the **Add Group/User Rule** button, and do the following:
  - a. In the text box, enter the group set name, for example “All Contractors”.
  - b. Select the desired capabilities in the template.

c. Click **Save**.



When permissions are applied using the group set model, you can enforce a more fine-grained access control.

For example, you might restrict access to different "Batters" workbook views based on a user's regional group affiliation:

- North Region view:
  - Group set is called North Region
  - Groups in the group set: All Regions and North Region
- South Region view:
  - Group set is called South Region
  - Groups in the group set: All Regions and South Region
- East Region view:
  - Group set is called East Region
  - Groups in group set: All Regions & East Region
- West Region view:
  - Group set is called West Region
  - Groups in the group set: All Regions and West Region

For more information about permissions, see [Configure Projects, Groups, Group Sets and Permissions for Managed Self-Service](#).

## Groups

You can create and delete user groups, add users to a group and synchronise groups with Active Directory.

## Add Users to a Group

You can organise Tableau Server users into groups to make it easier to manage multiple users. You can create groups on the server or import groups from Active Directory.

If you're managing users with an External identity store, such as Active Directory, add users to a group through the external identity store itself. Once users are added to a group in the external identity store, Tableau Server is able to update those users by synchronising the group of users in the external identity store with the group of users on Tableau Server.

For example, to keep Active Directory group membership up to date, we recommend you review the following:

- Site administrators can synchronise selected groups on demand in a site. For more information, see [Synchronise Active Directory Groups on a Site](#).
- Server administrators can synchronise all Active Directory groups on the server based on a schedule or on-demand. For more information, see [Synchronise All Active Directory Groups on the Server](#).

### Notes:

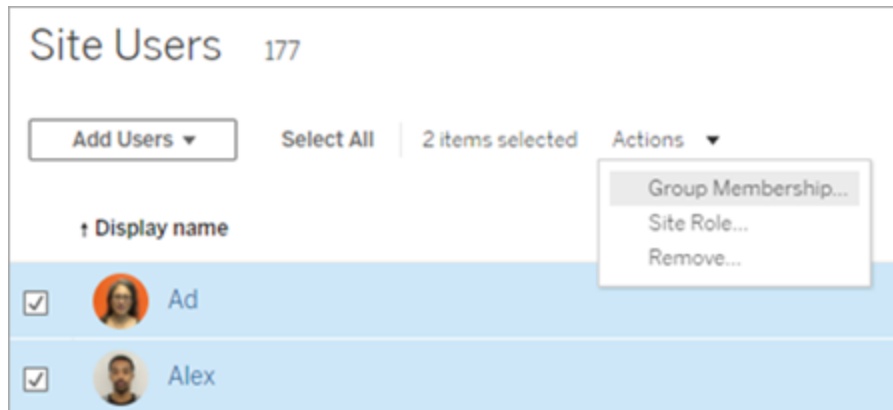
- In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions. When identity pools are configured, you cannot add groups to an identity pool.
- Adding groups to an [identity pool](#) is not supported. Only individual users can be added to an identity pool.

If you're managing users with an Local identity store, use the procedures described below to add users to a group.

To add a user to a group, the group must already exist.

## Add users to a group (Users page)

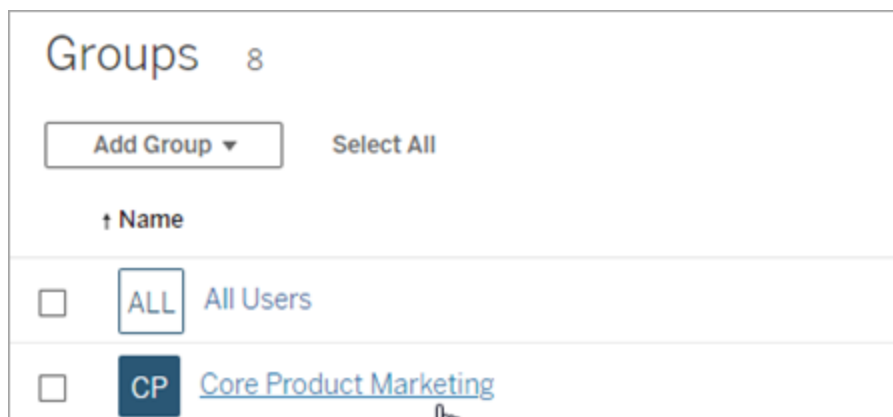
1. In a site, click **Users**.
2. Select the users you want to add to a group, and then click **Actions > Group Membership**.



3. In the Group Membership dialog box, select the groups and then click **Save**.

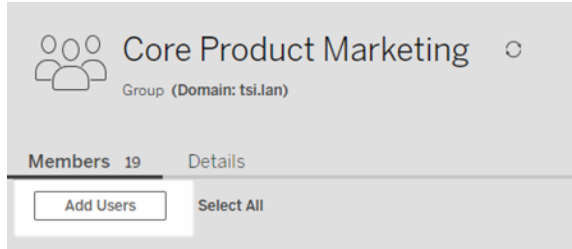
## Add users to a group (Groups page)

1. In a site, click **Groups**, and then click the name of the group.



2. In the group's page, click **Add Users**.



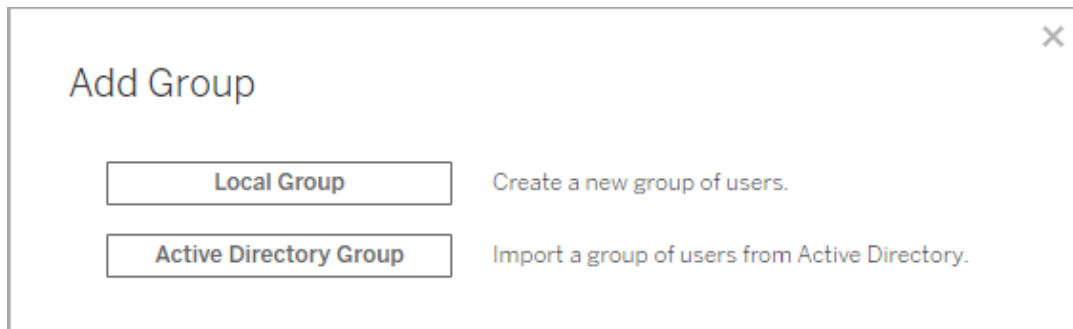


3. In the Add Users dialog box, select the users to be added, and then click **Add Users**.

## Create a Local Group

Local groups are created using the Tableau Server internal user management system. After you create a group you can add and remove users, as well as set a minimum site role to grant to users in the group when they sign in.

1. In a site, click **Groups**, and then click **Local Group**.



2. Type a name for the group.
3. To set a minimum site role for the group, select **Grant site role on sign-in** and select a minimum site role from the drop-down list.

**New Local Group**

Enter a name for this group

Marketing

☒ Grant role on sign in

Minimum Site Role

Explorer (can publish) ⓘ

Creator

Site Administrator Creator

Creator

Explorer

Site Administrator Explorer

Explorer (can publish)

Explorer

Viewer

Viewer

Unlicensed

Cancel Create

4. Click **Create**.

#### Dynamic group membership using assertions

Beginning in Tableau Server 2024.2, if you have SAML authentication configured or use Tableau-connected apps for embedding workflows, you can dynamically control group membership through assertions. When configured, at runtime during user authentication, Tableau receives the assertion and then evaluates membership in groups and thus the content whose permissions are dependent on those groups.

The process to dynamically control group membership through assertions requires 1) enabling the setting and 2) ensuring the group membership claims are included in the assertions.

Step 1: Turn on the setting

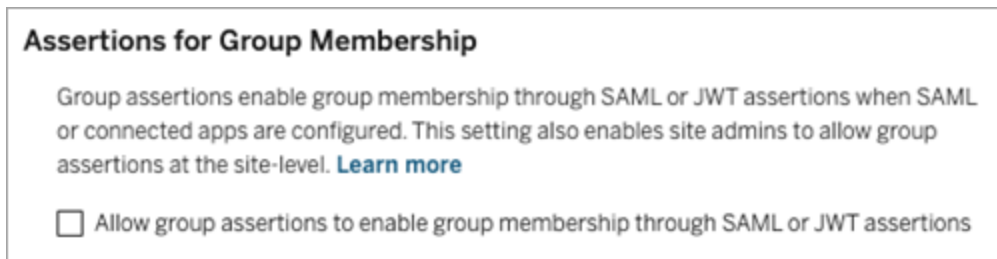
This capability has two settings, a server-wide setting and site-level setting. The site-level setting can only be turned on if the server-wide setting has been enabled first. Consider turning on the site-level setting if you have site SAML or connected apps configured.

For security purposes, group membership is only validated in an authentication workflow if the setting is turned on.

1. Sign in to Tableau Server and navigate to the **Settings** page.

**Note:** For a multi-site server, navigate to the **Settings** page for all sites.

2. Under Assertions for Group Membership heading, select the **Allow group assertions to enable group membership through the SAML or JWT assertions** tick box.



3. (Optional) If you have site SAML or connected apps configured at the site level, navigate to the site, go to the Settings page and then under the Assertions for Group Membership heading, select the **Allow group assertions to enable group membership through SAML or JWT assertions** tick box.

For more information about the settings, see one of the following topics:

- Server-wide - Server Settings (General and Customisation)
- Site-level - Site Settings Reference

Step 2: Ensure group membership claims are included in the assertion

Two custom group membership claims must be included in the respective SAML, OIDC or JWT assertion to specify group membership. The two custom group membership claims are:

- **Group:** `https://tableau.com/groups`
- **Group names:** These names should match local group names in Tableau Server exactly.

For example assertions, refer to one of the following sections:

- Dynamic group membership using SAML assertions:
- Connected apps - direct trust: Dynamic group membership (embedding workflows only)
- Connected apps - OAuth 2.0 trust: Dynamic group membership (embedding workflows only)

## Create Groups via Active Directory

You can import Active Directory (AD) groups to create matching groups on Tableau Server, as well as a user for each member of an AD group that is not already on the server.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

Each user is assigned a site role as part of the import process. If any of the users to be imported exist in Tableau Server, the site role assigned during the import process is applied only if it gives the user more access to the server. Importing users does not demote site roles.

Before you begin

Before importing groups, review User Management in Deployments with External Identity Stores to understand how multiple domains, domain naming, NetBIOS, and Active Directory user name format influence Tableau user management.

### Import from AD to add a group

As part of adding a user group to Tableau Server, you import a group from Active Directory (AD). When importing a group, you first enter the group name to search for the group.

Entering a group name, by default, causes Tableau Server to perform a wildcard query (for example, \*marketing\*) against AD (or LDAP) to maximise the search results. If you're working against a large AD (or LDAP) identity store, you might experience a timeout before you can successfully select the group to import.

To help save time and avoid potential timeout issues during the import process, consider searching a group name using one of the following methods:

- **Exact match:** The most efficient method for searching a group name is entering the exact group name by including quotation marks (") preceding and following the string you enter. For example, **"marketing"**.
- **Partial match:** Enter a part of the group name and include an asterisk (\*) preceding and following the string you enter. For example, **\*ket\***.
- **Begins with:** Enter the beginning portion of the group name followed by an asterisk (\*). For example, **market\***.
- **Ends with:** Enter an asterisk (\*) followed by the ending portion of the group name. For example, **\*ing**.

**Note:** These methods also apply to how Tableau Server searches for users.

1. In a site, click **Groups**, and then click **Add Groups**.
2. Type the name of the Active Directory group you want to import, and then select the group name in the resulting list. Use one of the filtering methods above to improve performance.

If you're importing a group from the same AD domain that the server is running on, you can type the AD group name without the domain. The server's domain will be assumed.

The screenshot shows a dialog box titled "Import a Group from Active Directory". Below the title is a subtitle: "Import a group of users from Active Directory." There is a text input field containing the word "marketing". Below this is a list box containing the item "Marketing", which is currently selected and highlighted in blue. At the bottom left, there is a "Site role" dropdown menu set to "Explorer (can publish)" with an information icon to its right. Below the dropdown is a checkbox labeled "Grant role on sign in" which is currently unchecked. At the bottom right are two buttons: "Cancel" and "Import".

3. Select the minimum site role for the users.

## Import a Group from Active Directory

Import a group of users from Active Directory.

marketing

**Marketing**

Site role: Explorer (can publish) ⓘ

☐ Grant role on sign-in

Creator  
 Site Administrator Creator  
 Creator  
 Explorer  
**Site Administrator Explorer**  
 Explorer (can publish)  
 Explorer  
 Viewer  
 Viewer  
 Unlicensed

Cancel Import

- (Optional) Select **Grant role on sign-in** to provision new site roles and licences when group users sign in. For more information, see Grant Licence on Sign-in.
- Click the **Import** button.

**Note:** You cannot change the name of groups imported from Active Directory. The group name can only be changed in Active Directory.

## Synchronise External Directory Groups in a Site

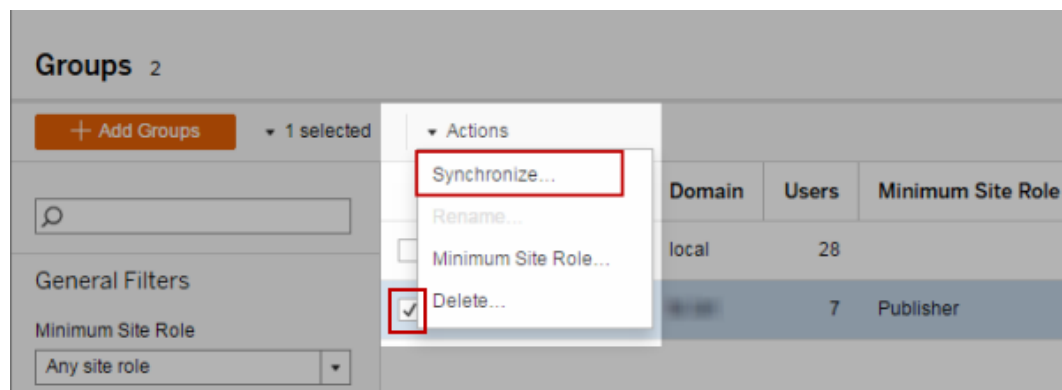
At any time, you can synchronise an external directory (such as Active Directory) group with Tableau Server to ensure new users in the external directory are also added in Tableau Server. You can synchronise individual groups or multiple groups at once.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

1. In a site, click **Groups**.

On the Groups page, select one or more groups.

2. Click **Actions > Synchronise**.



Set the minimum site role for users in an external directory group

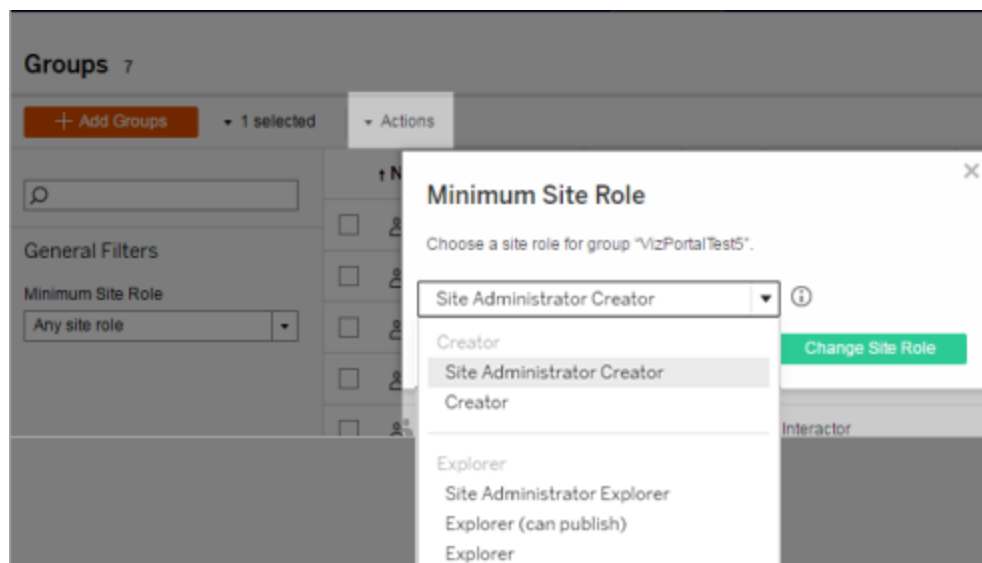
In the **Groups - Details** page, administrators can set the minimum site role for group users to apply during synchronisation.



This setting does not run synchronisation; it sets the minimum site role applied to the group every time synchronisation runs. When you synchronise external directory groups, new users are added to the site with the minimum site role. If a user already exists, the minimum site role will be applied if it gives the user more access in a site. If you don't set a minimum site role, new users are added as **Unlicensed** by default.

**Note:** A user's site role can be promoted but never demoted based on the minimum site role setting. If a user already has the ability to publish, that ability will always be maintained. For more information on minimum site role, see Site roles and Active Directory import and synchronisation.

1. In a site, click **Groups**.
2. On the Groups page, select a group, and then select **Actions > Minimum Site Role**.
3. Select the minimum site role, and then click **Change Site Role**.



What happens when users are removed in the source external directory?

Users cannot be automatically removed from the Tableau Server through an external directory sync operation. Users that are disabled, deleted or removed from groups in the external

directory remain on Tableau Server so that administrators can audit and reassign the user's content before removing the user's account completely. For more information, see [Sync behaviour when removing users from Active Directory](#).

What happens when a user name changes in the source external directory

By default, Tableau Server will not synchronise changes to the user display name or email address after the initial synchronisation when the corresponding account is created in Tableau Server. For example, if the user name jsmith is used for the display name John Smith, changing the display name in external directory to Joe Smith will not synchronise to the corresponding jsmith user in Tableau Server. Similarly, if the user's email changes in the external directory, Tableau Server will not synchronise changes.

You can configure Tableau Server to update the name and email properties when they change in the source external directory by setting `vizportal.adsync.update_system_user` to `true`.

To change this behaviour run the following tsm commands:

```
tsm configuration set -k vizportal.adsync.update_system_user -v true
tsm pending-changes apply
```

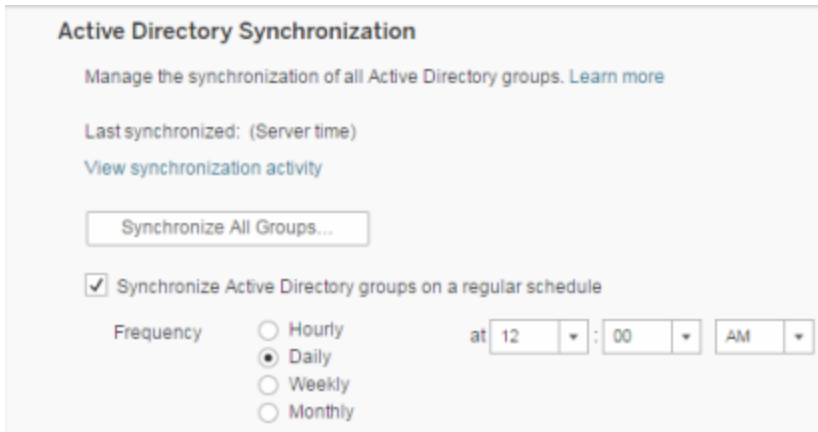
If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

What happens when an external directory group is removed from Tableau Server?

Many Tableau administrators use external directory groups to import and create users. After the users are imported into Tableau Server, administrators will then delete the group in Tableau Server. Deleting a group does not delete the users in it.

## Synchronise External Directory Groups on the Server

As a server administrator, you can synchronise all external directory (such as Active Directory) groups (that have been configured on Tableau Server) on a regular schedule or on-demand on the **General** tab of the **Settings** page for the server.



The screenshot shows the 'Active Directory Synchronization' settings page. At the top, it says 'Manage the synchronization of all Active Directory groups. [Learn more](#)'. Below this, it shows 'Last synchronized: (Server time)' and a link 'View synchronization activity'. There is a button 'Synchronize All Groups...'. A checkbox is checked, labeled 'Synchronize Active Directory groups on a regular schedule'. Under 'Frequency', there are four radio buttons: 'Hourly', 'Daily' (which is selected), 'Weekly', and 'Monthly'. To the right of the radio buttons, there is a time picker showing 'at 12 : 00 AM'.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

Before you begin

Before synchronising groups as described in this topic, you must first import the external directory group into Tableau Server. See [Create Groups via Active Directory](#).

Synchronise external directory groups on a schedule

1. **Single-site:** Click **Settings> General**.

**Multisite:** In the site menu, click **Manage All Sites** and then click **Settings> General**.

2. Scroll down the page to **Active Directory Synchronisation**, and then select **Synchronise Active Directory groups on a regular schedule**.

**Active Directory Synchronization**

Manage the synchronization of all Active Directory groups. [Learn more](#)

Last synchronized: (Server time)

[View synchronization activity](#)

[Synchronize All Groups...](#)

☒ Synchronize Active Directory groups on a regular schedule

Frequency ☐ Hourly ☒ Daily ☐ Weekly ☐ Monthly

at 12 : 00 AM

3. Select the frequency and time of synchronisation.
4. Click **Save**.

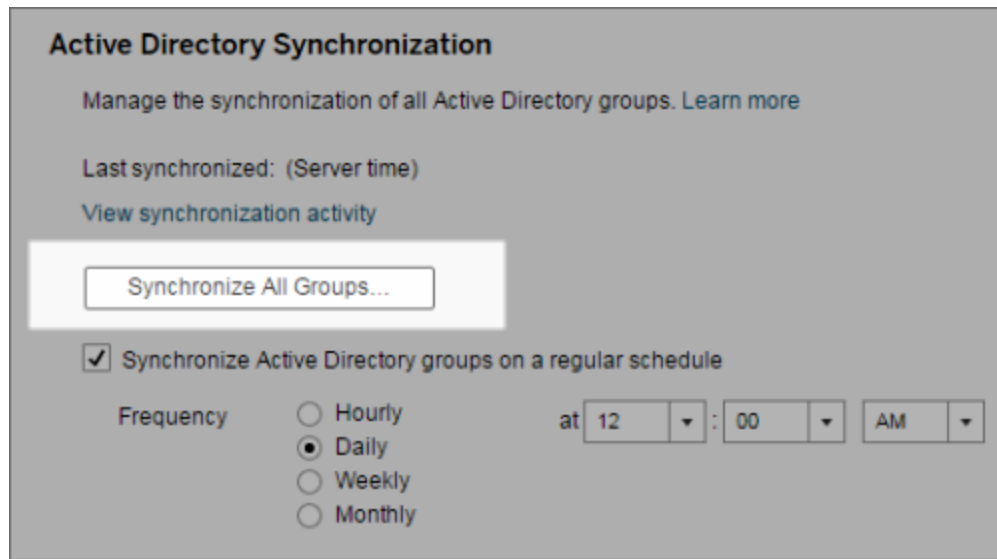
**Note:** Beginning in versions 2021.1.23, 2021.2.21, 2021.3.20, 2021.4.15, 2022.1.11, 2022.3.3 and 2023.1, a default time limit of 4 hours limits how long a scheduled group synchronisation can take before it is cancelled. A server administrator can change this time limit if your scheduled synchronisation is of very large groups, or taking longer than the default. For more information, see [Synchronise All Active Directory Groups on a Schedule](#) and `backgrounder.timeout.sync_ad_group`.

Synchronise all external directory groups on demand

At any time, you can synchronise external directory (such as Active Directory) groups with Tableau Server to ensure that new users and changes in the external directory are reflected in all external directory groups on Tableau Server.

1. **Single-site:** Click **Settings> General**.

**Multisite:** In the site menu, click **Manage All Sites**, and then click **Settings> General**.



2. Under **Active Directory Synchronisation**, click **Synchronise All Groups**.

View synchronisation activity

You can view the results of synchronisation jobs in the **Background Tasks for Non Extracts** administrative view. **Queue Active Directory Groups Sync** is the task that queues and indicates the number of **Sync Active Directory Group** tasks to be run.

1. **Single-site**: Click **Status**.  
**Multisite**: In the site menu, click **Manage All Sites** and then click **Status**.
2. Click the **Background Tasks for Non Extracts** link.
3. Set the **Task** filter to include **Queue Active Directory Groups Sync** and **Sync Active Directory Group**.

You can quickly navigate to this administrative view by clicking the **View synchronisation activity** link in the **Settings** page for the server.

Set the minimum site role for users in an external directory group

In the **Groups - Details** page, you can set the minimum site role for group users to be applied during Active Directory synchronisation.

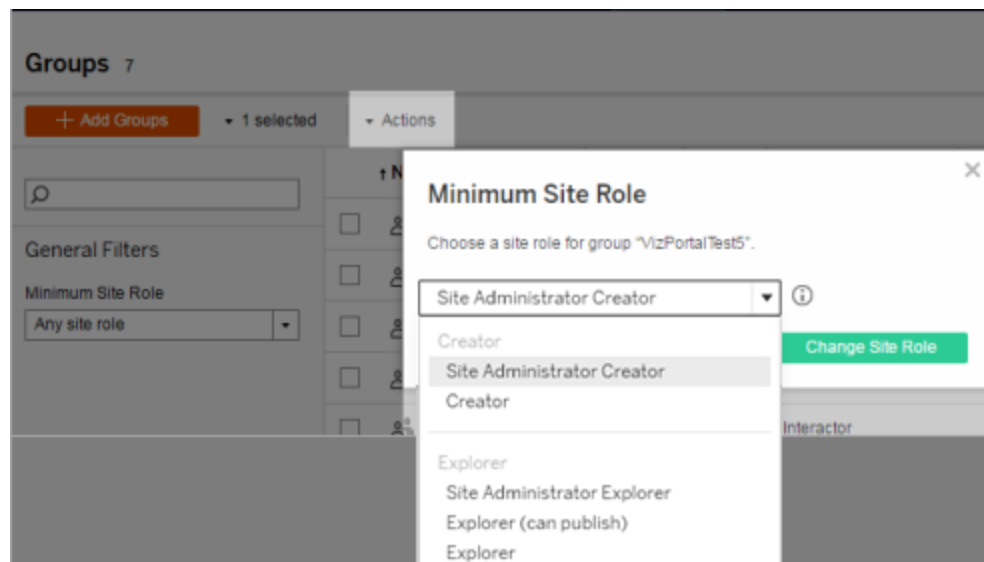
This setting does not run synchronisation; instead, it sets the minimum site role to applied to the group every time synchronisation runs. The result is that when you synchronise external directory groups, new users are added to the site with the minimum site role. If a user already exists, the minimum site role is applied if it gives the user more access in a site. If you don't set a minimum site role, new users are added as **Unlicensed** by default.

**Note:** A user's site role can be promoted but never demoted based on the minimum site role setting. If a user already has the ability to publish, that ability will always be maintained. For more information on minimum site role, see Site roles and Active Directory import and synchronisation.

1. In a site, click **Groups**.
2. On the Groups page, select a group.

Click **Actions > Minimum Site Role**.

3. Select the minimum site role, and then click **Change Site Role**.



What happens when users are removed in the source external directory?

Users cannot be automatically removed from the Tableau Server through an external directory sync operation. Users that are disabled, deleted or removed from groups in the external directory remain on Tableau Server so that administrators can audit and reassign the user's content before removing the user's account completely. For more information, see Sync behaviour when removing users from Active Directory.

Improving group synchronisation performance

External directory synchronisation is performed by the backgrounder process. The Backgrounder process is the same process that is used for managing and creating extracts, and is also used to generate subscription content. In large organisations with dynamic group membership and heavy extract usage, the external directory group synchronisation process may be disruptive. We recommend running group synchronisation during non-business hours.

By default, the Backgrounder process performs synchronisation in a serial operation. This means that each group is synchronised, one after the other, in a single Backgrounder process. If you are running multiple instances of Backgrounder processes either on a single Tableau Server or across a distributed deployment, consider enabling parallel processing for external directory synchronisation. When parallel Backgrounder processing is enabled, the group synchronisation is distributed across multiple Backgrounder processes for better performance.

To enable parallel backgrounder processing for group synchronisation, open TSM CLI and enter the following commands:

```
tsm configuration set -k backgrounder.enable_parallel_adsync -v true  
  
tsm pending-changes apply
```

## Synchronise All Active Directory Groups on a Schedule

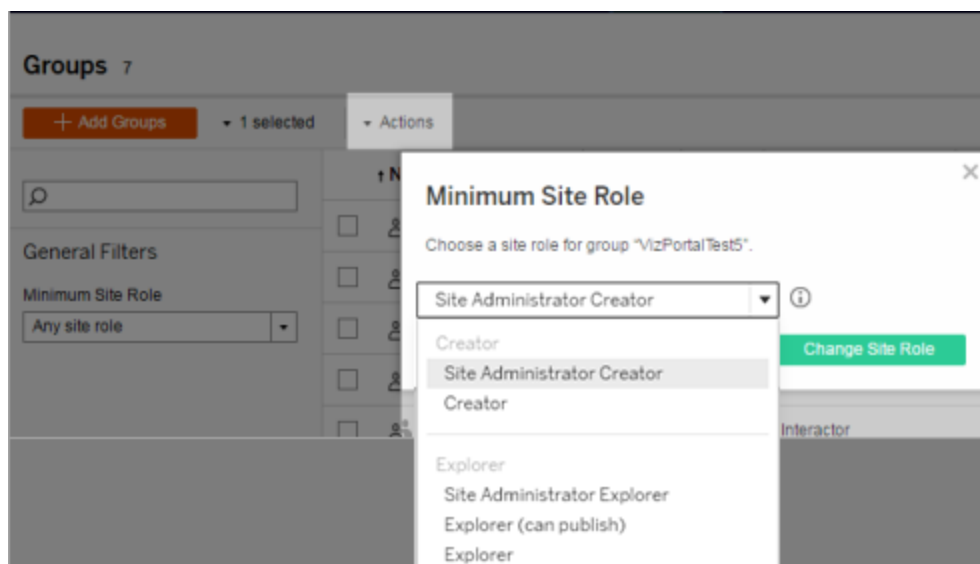
After you import Active Directory groups in Tableau Server, you can make sure they stay synchronised in Tableau Server by setting up a schedule. You can also synchronise all Active Directory groups on the server on-demand, at any time. The minimum site role setting for the group is applied when users are synchronised.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

Beginning in versions 2021.1.23, 2021.2.21, 2021.3.20, 2021.4.15, 2022.1.11, 2022.3.3 and 2023.1, you can set a maximum time limit for how long a scheduled group synchronisation can take before it gets cancelled. The default time limit is 4 hours. For more information, see [backgrounder.timeout.sync\\_ad\\_group](#).

### 1 Set a minimum site role for synchronisation

In a site, click **Groups**. Select a group, and then click **Actions > Minimum Site Role**. Select the minimum site role, and then click **Change Site Role**. Server and site administrators can set the minimum site role for group users to be applied during Active Directory synchronisation. If you don't set a minimum site role, new users are added as **Unlicensed**.

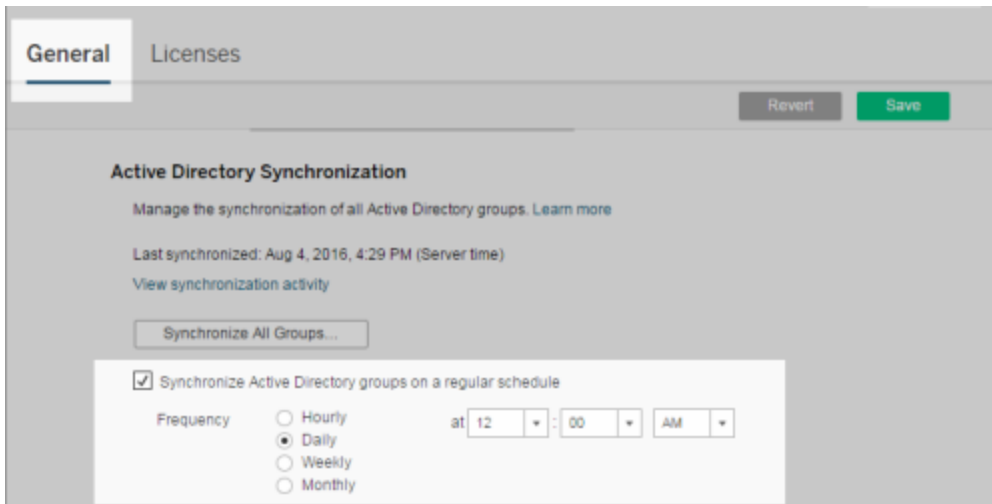


Synchronising can promote a user's site role, but will never demote a user's site role.



## 2 Set the schedule

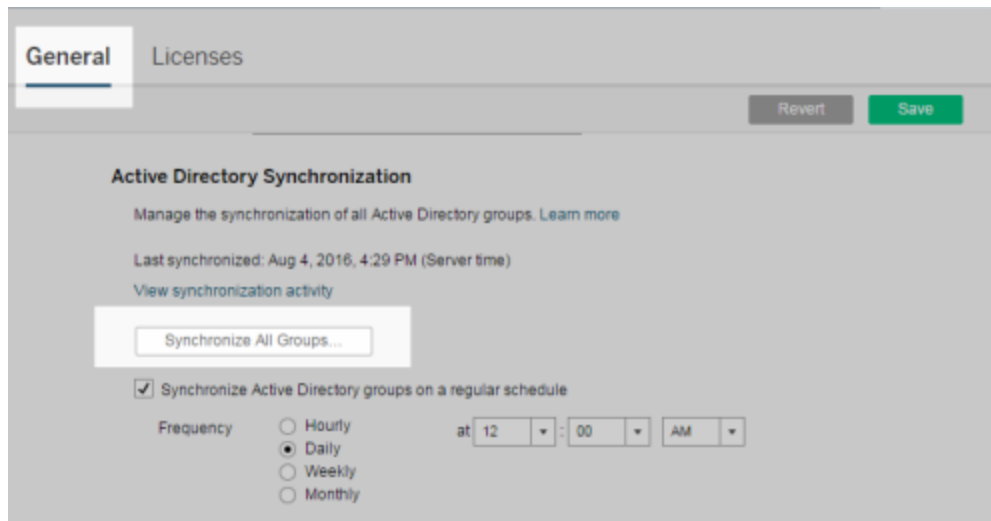
Server administrators can enable synchronisation for all Active Directory groups on the **General** tab of the **Settings** page for the server. Enable synchronisation, select the frequency settings, and then click **Save**.



All Active Directory groups on the server are synchronised according to the same schedule.

## 3 Run synchronisation on-demand (optional)

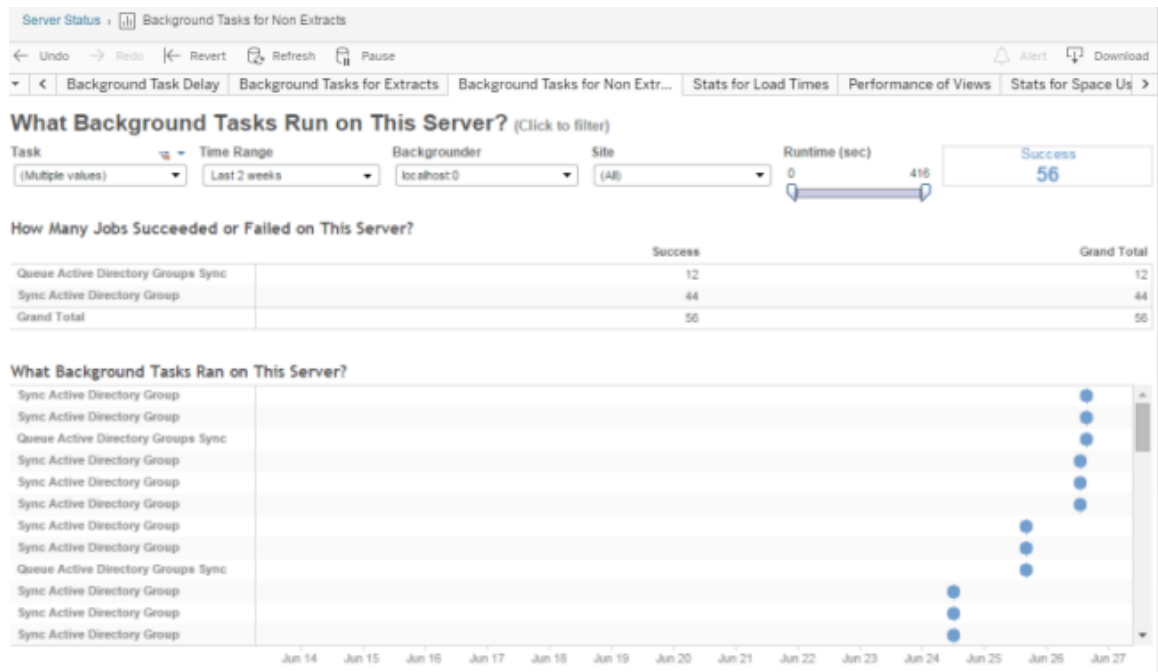
On the **General** tab of the **Settings** page, click **Synchronise All Groups** to synchronise all Active Directory groups on Tableau Server immediately. Click this button at any time to ensure new users and changes are reflected in all Active Directory groups on the server.



Click **Synchronise All Groups** to synchronise all Active Directory groups on the server outside of a schedule.

#### 4 View the status of synchronisation tasks

Server and site administrators can view the results of Active Directory synchronisation jobs in the **Background Tasks for Non Extracts** administrative view. On the server or in a site, click **Status**. Under **Analysis**, click **Background Tasks for Non Extracts** and filter on the **Queue Active Directory Groups Sync** and **Sync Active Directory Group** tasks.



**Queue Active Directory Groups Sync** queues the **Sync Active Directory Group** tasks to be run.

## Grant Licence on Sign-in

Grant licence on sign in (Grant role on sign in) lets unlicensed users in specific groups become licensed when they sign into a Tableau site. This streamlines licence provisioning for administrators and removes the user's need to request a licence before using Tableau.

For more information about site role capabilities and minimum site roles, see [Set Users' Site Roles](#).

For example, imagine an Active Directory group called Marketing with 100 users, but only 25 users need to access Tableau Server. A site or server administrator can import all users in the Marketing Active Directory group, set the group's minimum site role to Explorer, and select **Grant role on sign in**. When any of the Tableau users in Marketing sign into their Tableau site, they'll be granted Explorer licences. Users who don't need Tableau Server remain unlicensed unless they sign in.

**Note:** For more information about benefits and best practices, see [Grant Role on Sign In](#) in Tableau Blueprint, Tableau's planning tool for data-driven organisations.

### Activate Grant role on sign in

You can enable Grant role on sign in on new or existing groups. The following steps walk through how to use Grant role on sign in to add new users that are eligible for a licence but may not consume one. This may be the case when your company has a lot of eligible users, but limited Tableau licences.

1. On a site, click **Groups**, and then click **Add Group**.

Add new users by importing an Active Directory group. Type the name of the group you want to import, and then select the group name in the resulting list.

The screenshot shows a dialog box titled "Import a Group from Active Directory". Below the title is the instruction "Import a group of users from Active Directory." There is a text input field containing the word "marketing". Below this is a list box containing the word "Marketing", which is currently selected and highlighted in blue. At the bottom left, there is a "Site role" dropdown menu set to "Explorer (can publish)" with an information icon to its right. Below the dropdown is a checkbox labeled "Grant role on sign in" which is currently unchecked. At the bottom right are two buttons: "Cancel" and "Import".

2. Select the minimum site role for the users, and select **Grant role on sign in**.

All users in the selected Active Directory group will be imported as unlicensed users.

The minimum site role set for the group will only be provisioned to group users who sign into Tableau Server.

**Import a Group from Active Directory**

Import a group of users from Active Directory.

marketing

Marketing

Site role: Explorer (can publish) ⓘ

☒ Grant role on sign in

Creator  
Site Administrator Creator  
Creator

Explorer  
Site Administrator Explorer  
Explorer (can publish)  
Explorer

Viewer  
Viewer

Unlicensed

Cancel Import

3. Click **Import**.

**Note:** Grant Site Role on Sign In can also be activated in local groups to provision minimum site roles to group members when they sign in to Tableau Server. For more information, see [Create a Local Group](#).

### Modifying user roles with Grant role on sign-in

If a user is part of a group using Grant role on sign-in, then that user role can't be set to unlicensed or downgraded to a role lower than the minimum site role set for the group, whether or not they sign in. Administrators can upgrade a user's site role manually, however.

To downgrade a user's site role, or unlicense the user from the site, remove the user from the group(s) that have Grant role on sign-in enabled.

In accordance with the terms of the [End User Licence Agreement](#), licences granted on an Authorised User basis may be permanently reassigned to new users. Users may only be downgraded to a lower site role (including Unlicensed) when they will permanently discontinue access to Server Software at the higher role.

### Removing users affected by Grant role on sign-in

You can remove a user from a site only if the user does not own content. If you attempt to remove a user who owns content, the user site role will be set to Unlicensed and removed from all groups, but the user will not be removed from the site. To remove content owners, remove owners from group with Grant site role enabled, or reassign content ownership to another user. For more information, see [Remove users from a site in the View, Manage or Remove Users help topic](#).

If the default All Users group has Grant site role enabled, users who own content can't be removed from the site or unlicensed. To remove or unlicense these users, reassign content ownership to another user, then remove or unlicense the user.

Tableau REST API can be used to reassign content ownership of a workbook. For more information, see [Update Workbook](#) method in the REST API Help. REST API can also be

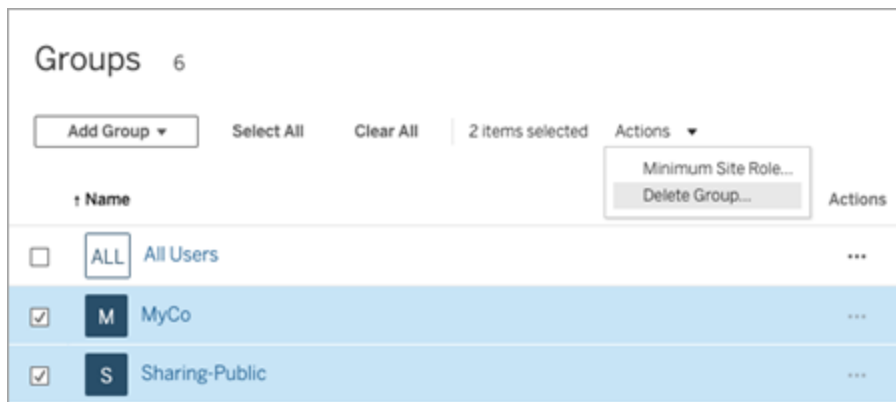
used to remove users from the site and transfer content ownership to another user. For more information, see [Remove User from Site](#) method in the REST API Help.

For more information on changing content ownership in Tableau Server, see [Manage Content Ownership](#).

## Delete Groups

You can delete any group from the server with the exception of the **All Users** group. When you delete a group, the users are removed from the group but they are not deleted from the server.

1. Sign in to Tableau Server site as an administrator.
2. From the left navigation pane, click **Groups**.
3. On the Groups page, select one or more groups to delete.
4. Select **Actions > Delete**.



### Effects of deleting groups

#### Groups in group sets

Beginning in Tableau Server 2024.2), groups can be added to group sets. When content permissions are dependent on a group set, content capabilities are evaluated when users belong to all groups in the group set. If a group that belongs to a group set is deleted, then it can

change user access to Tableau content when content permissions are dependent on the group set.

## Work with Group Sets

Beginning in Tableau Server 2024.2, you can create a container for your groups using group sets. A group set can contain one or more groups and be used to apply more granular rules for content permissions that are dependent on the group set. When enabling capabilities based on a group set, users in the groups that belong to the group set must be members of all the groups for the capability to be evaluated. In this way, group sets enforce AND logic.

### Benefits of group sets:

- You can mix and match synchronised groups with local groups in permission rules to enable more dynamic access control scenarios.
- Use AND logic for groups in permission rules, which can simplify access control in some scenarios.

### Notes:

- Group set permission rules are evaluated after user and group rules. For more information about those rules, see [Evaluate permission rules](#).
- Group sets can only be created by server administrator.

### Turn on group sets

Before group sets can be used for permissions, group sets settings must be enabled.

1. Sign in to Tableau Server as server administrator.
2. Navigate to the **Settings** page.



3. Under the Group Sets section, select the **Allow group sets** tick box.



**Group Sets**

Group sets enable the organization of multiple groups and more granular application of content permissions. [Learn more](#)

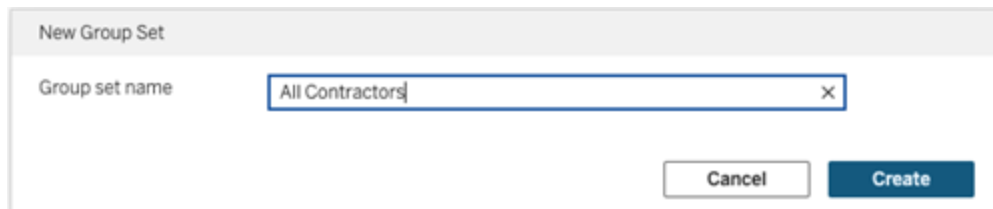
☐ Allow group sets

After enabling group sets, a dedicated Group Sets page displays in the navigation pane.

### Create group sets

To create a group set, navigate to the Group Sets page and create a group set as you would a group.

1. Sign in to Tableau Server as server administrator.
2. Navigate to the Group Sets page and click the **New Group Sets** button.
3. Enter a name for the group set and click **Create**.

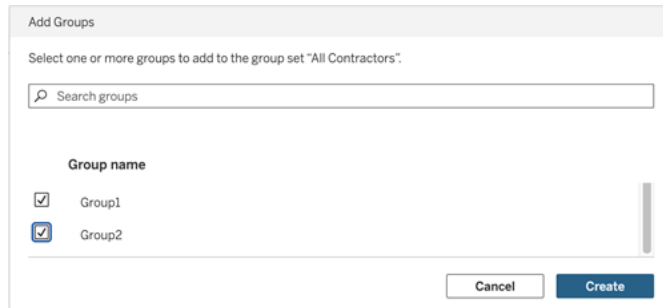


New Group Set

Group set name

4. In the Group Sets table, click the name of the group set you just created and click the **Add Groups** button.
5. From the list of available groups, select the groups you want to add to the group set and

click the **Add** button.

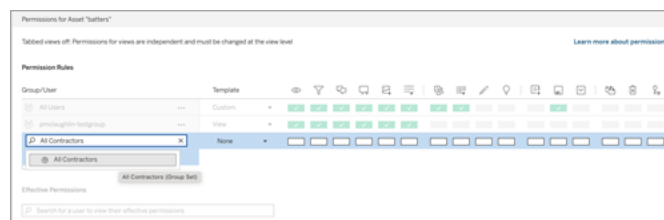


### Set permissions on group sets

To use group sets, as a site admin, project leader or content owner, add or edit the permissions of the content to use the group set.

For example, suppose you are the owner of the “Batters” workbook. To apply permissions based on the group set, do the following:

1. Go to the workbook and select **Permissions** from the actions menu.
2. In the Permissions dialog box, click the **Add Group/User Rule** button, and do the following:
  - a. In the text box, enter the group set name, for example “All Contractors”.
  - b. Select the desired capabilities in the template.
  - c. Click **Save**.



When permissions are applied using the group set model, you can enforce a more fine-grained access control.

For example, you might restrict access to different "Batters" workbook views based on a user's regional group affiliation:

- North Region view:
  - Group set is called North Region
  - Groups in the group set: All Regions and North Region
- South Region view:
  - Group set is called South Region
  - Groups in the group set: All Regions and South Region
- East Region view:
  - Group set is called East Region
  - Groups in group set: All Regions & East Region
- West Region view:
  - Group set is called West Region
  - Groups in the group set: All Regions and West Region

For more information about permissions, see [Configure Projects, Groups, Group Sets and Permissions for Managed Self-Service](#).

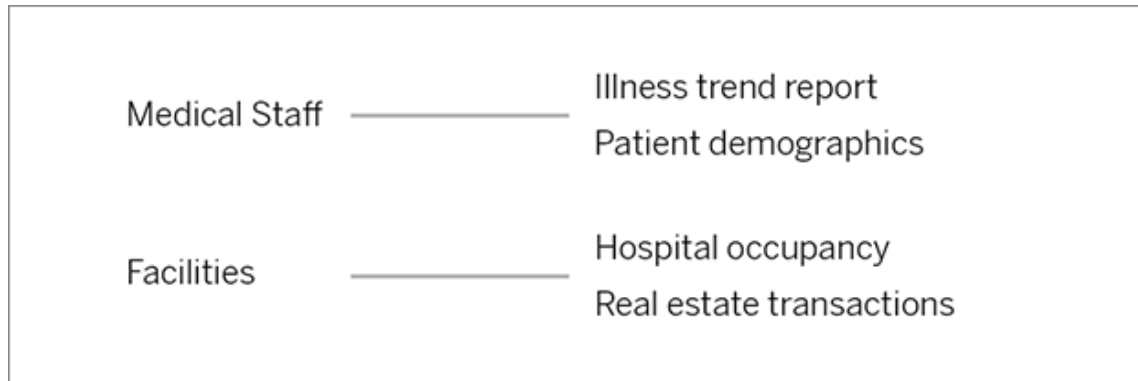
## Dashboard-based Custom Portals

**Note:** This overview was inspired by the work of Tableau Visionary Mark Jackson. For more details about the process, [check out Mark's blog](#).

The [standard Tableau Cloud or Tableau Server interface](#) works great for many organisations, but if you want to create a company-branded experience and don't have API developer skills, consider creating a custom portal based on a Tableau dashboard. A custom portal lets you organise content around specific departments or job roles, and you can even incorporate training that helps people interact with data more fully. As the volume of Tableau content grows, a custom portal guides your users directly to the data they need, while providing ready access to related views and Tableau Server search so they can easily explore further.

## Sketch out a portal design

Begin outside of Tableau, on paper or in a wireframing application. Consider the structure of your organisation and the number of Tableau views that apply to each group of users. Do you simply need one level of navigation that points immediately to content? Or might you need to start with a main page that provides navigational links for separate groups of users or report types, followed by a second level with related dashboards and views?



After you get buy-in on your design from key stakeholders and data consumers, you're ready to move on to the next phase.

## Gather images for logos and navigation elements

Start thinking about images while refining your initial mockup, and then gather them from libraries of clip-art or approved brand graphics, or create them from scratch in an application like Photoshop or SnagIt. PowerPoint can also be a good source if you plan to create navigation thumbnails of common chart types.



## Lay out text, images and selected sheets on a dashboard

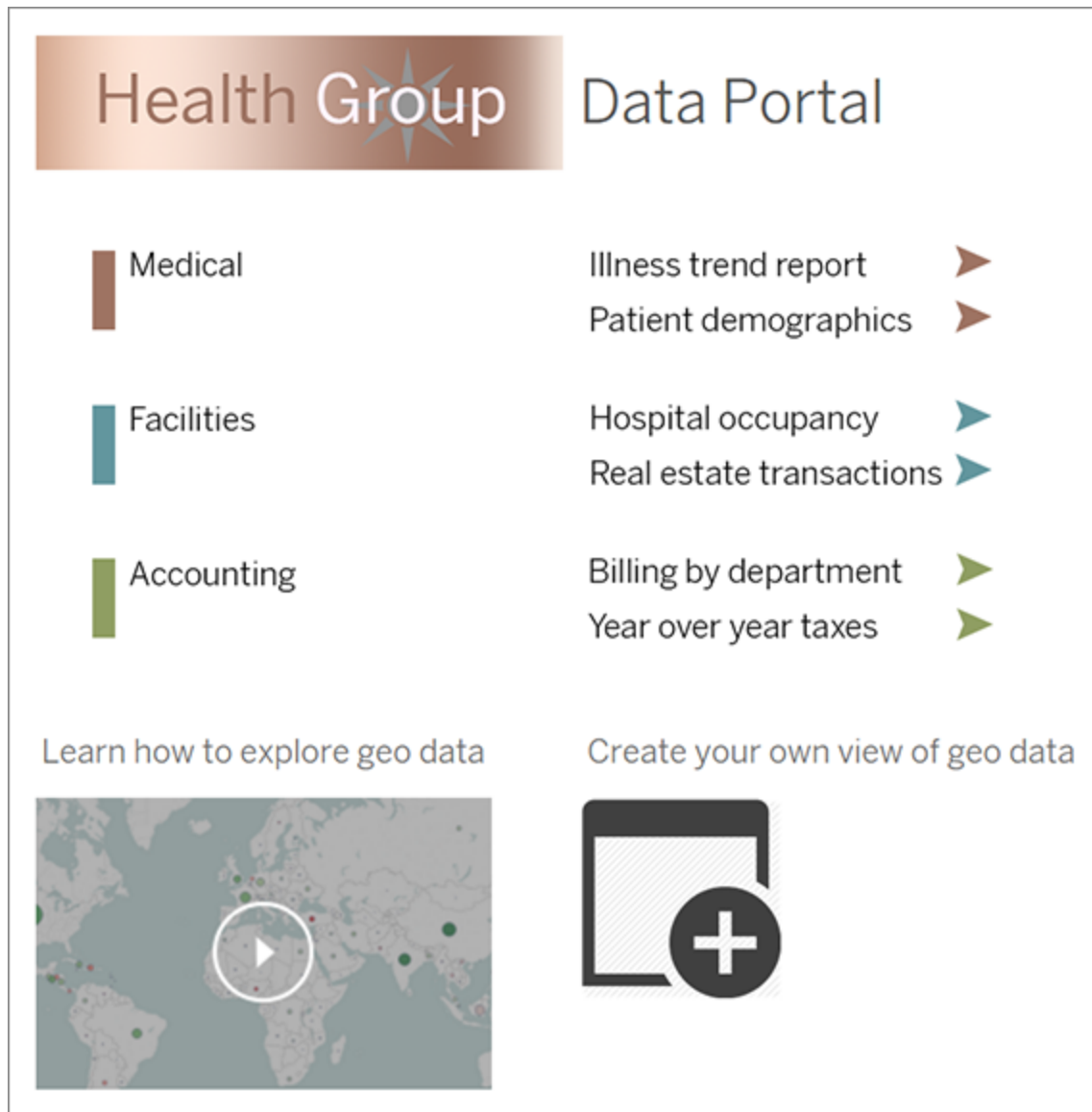
Create a workbook with a dashboard for the portal, using a [tiled layout](#) for more predictable positioning and scaling of elements on different devices. Then start adding Text and Image objects, as well as any sheets for data views you want to highlight right up front in your portal. To refine spacing between these dashboard elements, insert Blank objects and adjust their size. For more information, see [Create a Dashboard](#).

**Tip:** For dynamic elements that show popular or recently created content, include sheets based on [custom administrative views](#).

## Link dashboard elements to content

If you have a second level of navigation in your portal, use [filter actions](#) to point to a secondary dashboard from the main one. To create links that directly open data views, right-click Image objects and choose Set URL. (In our example below, each coloured arrow and accompanying text is an image that links to a view URL.) You can even point to empty views with preloaded data sources, encouraging users to create new Tableau content in the web-authoring workspace.

**Tip:** To add hyperlinks to text objects, include the full URL (for example, `http://www.tableau.com`).



## Publish, test, and refine your portal

Publish the workbook to your server and distribute the dashboard URL to your users. Portal design, like data analysis itself, is a cyclical process. Now that your portal is out in the wild, start gathering user feedback so you can continuously improve the experience

**Tip:** As a finishing touch, hide the Tableau toolbar to give your portal a custom feel. After the question mark at the end of the dashboard URL, add `:embed=y&;:toolbar=n`

## Manage Content Access

You can manage who can access content on your site and set the permissions that govern content ownership.

### Set a Site's Web Authoring Access and Functions

Tableau Server administrators can specify at the site level whether to allow users to edit published views in the web environment and configure other web authoring functionality.

By default web authoring functionality is enabled for all sites. Users with the **Web Edit** capability can create and edit workbooks directly on the server. Turn off web authoring if you want users to be able to view and interact with published workbooks but not make any changes to the core information.

The steps below describe how to set web authoring and other associated functionality for an entire site. For more granular control over which users can use web editing, you can use projects, groups, and permissions. See [Set Web Edit](#), [Save and Download Access on Content](#).

For information about how to enable authoring for flows on the web, see [Create and Interact with Flows on the Web](#).

#### Turn web authoring on or off for a site

1. In a web browser, sign in to the server as an administrator and go to the site in which you want web authoring to be enabled. In that site, click **Settings**.
2. In the **Web Authoring** section, select **Workbooks. Let users edit workbooks in their browser.** to enable the functionality.

Clear the tick box to turn off web authoring for that site.

## Web Authoring

Users with the appropriate permissions can edit content in their browser.

- ☒ Workbooks. Let users edit workbooks in their browser.
- ☒ Flows. Let users edit flows in their browser.

3. If your site is already in production, and you want the change to take effect immediately, restart the server.

Otherwise, the change takes effect after server session caching expires or the next time users sign in after signing out.

### Notes

- When you enable web authoring, make sure that, on the appropriate workbooks or views, the permission rule for a user or group allows the **Web Edit** capability.
- If you turn off web authoring on a production site and do not complete the last step to restart the server, users might continue to have authoring access until their session caches expire or they sign out.

## See which sites allow web authoring

To confirm which sites allow web authoring, on the site-selection menu at the top, select **Manage All Sites**, and then go to the **Sites** page.

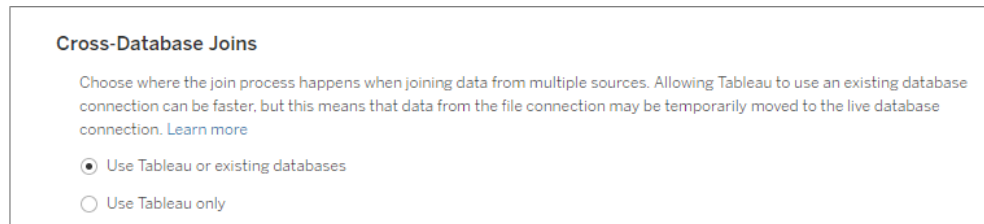
Sites 9										
+ New Site		▼ 0 selected								
	↑ Name		Users	Site administrators	Max users	Storage used	Max storage	Status	Metrics	Web authoring
<input type="checkbox"/>	🌐 Customer Support	...	4	2	Server limit	0 B	Server limit	Active	✓	
<input type="checkbox"/>	🌐 Default	...	63	8	Server limit	25.6 MB	Server limit	Active	✓	✓
<input type="checkbox"/>	🌐 Development	...	4	2	Server limit	0 B	Server limit	Active	✓	✓
<input type="checkbox"/>	🌐 Documentation - 20 User Limit	...	5	1	20	3.2 MB	Server limit	Active	✓	
<input type="checkbox"/>	🌐 Finance	...	13	2	Server limit	9.8 MB	Server limit	Active	✓	✓



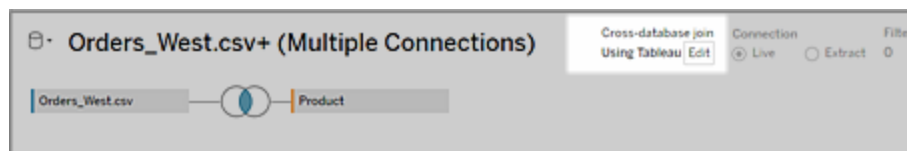
## Configure cross-database join options

To improve performance for cross-database joins, users can allow Tableau to perform the join using the live database they are connected to instead of using Hyper. While this option is faster, if Tableau uses the connected database to perform the join, data from the file data source that the user is connected to is temporarily moved into temp tables in the database. Because this moves data outside of Tableau, as an administrator you may want to restrict access to this feature for users with web authoring permissions.

1. In a web browser, sign in to the server as an administrator and go to the site in which you want web authoring to be enabled. In that site, click **Settings**.
2. In the **Cross-Database Joins** setting, select one of the following options:
  - **Use Tableau or existing databases** – Select this option if you want to allow users to choose whether they want to allow Tableau to use the live database to perform cross database joins. Published data sources with this option enabled will continue to use the user's database for cross-database joins.
  - **Use Tableau only** – Select this option to restrict users to use only Hyper to perform cross data-base joins.



If you select **Use Tableau only**, the option to choose how Tableau performs the cross-database join won't display in the canvas when the user connects to a supported data source and supported database. For more information about this feature, see [Improve performance for cross-database joins](#).



## Set Web Edit, Save, and Download Access on Content

If you're enabling web authoring functionality on your site, you can configure more precisely which users on the site have access to this functionality. Using site roles and permissions rules at the content level, you can grant or deny **Web edit**, **Save**, or **Download** capabilities on projects, workbooks, and data sources.

**Note:** This document strives to use the phrase *Web edit* to specify the name of the capability in permissions rules, and *web authoring* to refer to the general functionality of creating and modifying workbooks on the server. However, you might otherwise see these two phrases used interchangeably.

### Why allow users to work on the site directly

As an administrator, your initial thought about allowing people to populate a site with content, seemingly indiscriminately, might be one of scepticism. However, with a few controls, you can limit where this is done, while providing important benefits that centralised content management offers both you and your users.

#### Web authoring pros and cons

For publishers and business users, some benefits of web authoring include the following:

- It provides analyst teams who work collaboratively with a central location in which to provide input.
- It enables people who do not have Tableau Desktop to connect to data sources and create workbooks.
- It enables people to access content when they are away from their Tableau Desktop computer or VPN, whether on a computer or a hand-held device.
- It can provide a framework for enabling consistency across Tableau reports. (By making template workbooks available on the site, analysts can download or create new workbooks with data connections, branding and formatting already in place.

For administrators, benefits can include the following:

- Fewer Tableau Desktop deployments to manage and support.
- Fewer computers that need to have database drivers installed.
- Capacity to govern content.
- More accurate monitoring of what people are doing with Tableau.

Some disadvantages to web editing include the following:

- For analysts, web editing functionality is not as extensive as in Tableau Desktop (although it continues to evolve toward that parity).
- For administrators, more people working on the server might mean upgrading systems.
- Without publishing guidelines, content proliferation on the site is expected. This can confuse the people who rely on published Tableau dashboards and data sources, degrade server performance and data quality, and potentially affect data security.

## Managing permissions to help users avoid content proliferation

To help users to avoid content proliferation on the site, many Tableau administrators use projects to allow varying levels of access to content. For example, one project can be configured to allow all users to edit and save workbooks; another can allow only approved publishers to save new content.

To get a better idea how this works, see the following resources:

- Configure Projects, Groups, Group Sets and Permissions for Managed Self-Service
- [Governed Self-Service at Scale](#), a Tableau White Paper by Rupali Jain.

To view the PDF, you might need to provide your Tableau website credentials. These are the same ones you use for the community forums or to submit support cases.

## Coordinate edit and save capabilities with site roles for the appropriate level of access

To edit, save, and download workbooks, users must have a site role that allows those actions, along with the capabilities – defined in permissions rules – that grant or deny editing-related access.

### Site role access

- When the appropriate permissions are set at the content level, the **Creator** or **Explorer (can publish)** site role allows both **Save** (overwrite) and **Save As/Download**.

Note that **File > Save** is only available to the workbook owner. When the **Save** permission capability has been granted at the project and workbook level, a non-owner user can overwrite the existing workbook in web authoring by selecting **File > Save As** and using the same workbook name. This overwrites the existing content and they become the owner and gain full access to the content.

- The **Explorer** site role can be granted the **Web Edit** and **Save As/Download** capabilities, but they will not be able to save (neither overwriting existing nor saving changes to a new workbook).

For more information, see Web Editing and Web Authoring.

## Configure Projects, Groups, Group Sets and Permissions for Managed Self-Service

Publishing to Tableau Cloud and Tableau Server is easy. For some organisations, it might be a little *too* easy. There is value in creating a controlled framework before letting creators publish their own content.

To keep things tidy and to make sure people can find and access the right content, it may be useful to configure your site for managed self-service. This means having guidelines and settings in place to ensure content is organised, discoverable and secure without having bottlenecks in the publishing process.

This article lays out a possible path for you as a site administrator to set up your site for managed self-service:

1. Identify the types of groups and projects you'll need
2. Create groups and group sets
3. Remove permissions that will cause ambiguities and establish default permission patterns

4. Create projects
5. Lock project permissions

**Note:** The information provided here is adapted and simplified from practices of Tableau Visionaries and customers who have shared their experiences.

## Plan your strategy

Permissions in Tableau consist of rules that are applied to content (projects, workbooks, etc.) for a group or user. These permission rules are built by allowing or denying specific capabilities.

Group/User	Template															
All Users	View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Group	Explore	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Evie	Publish	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lari	Administer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maris	Custom	✓	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✓	✓

+ Add Group/User Rule

Having a comprehensive plan for your projects, groups and permission rules is useful whether you're starting anew or making changes. The details are up to you, but there are two important practices that we recommend for all environments:

- Manage permissions on projects, not individual pieces of content.
- Assign permissions for groups, not individual users.

Setting permissions at the individual user level and on individual content assets becomes unmanageable quickly.

Use a closed permissions model

General models for setting permissions are *open* or *closed*. In an open model, users get a high level of access, and you explicitly deny capabilities. In a closed model, users get only the access they need to do their jobs. This is the model security professionals advocate. The examples in this topic follow a closed model.

For more information on how Tableau permissions are evaluated, see [Effective permissions](#).

## Identify the types of projects and groups you'll need

Designing a structure to accommodate content (in projects) and categories of users (as groups) or categories of groups (in group sets) can be the most challenging part of setting up a site, but it makes ongoing management much easier.

**Projects:** Projects function both as a unit for managing permissions and as an organisational and navigational framework. Try to create a project structure that balances how people expect to find content and allows for logical permissioning.

**Groups or group sets:** Before you create groups, it can be useful to find common themes in how people interact with content. Try to identify patterns you can use to create groups or group sets and avoid one-off permissions for individual users.

## Example 1: Project and group structure

For example, let's imagine an environment where there is company-wide content that everyone should be able to access, as well as some HR content that needs to be restricted.

Projects include:

- **Acme Corp Conference.** This will include data sources and workbooks for ticket sales, dashboards for content strategy and project plans for the company conference.
- **Employee Success.** This will include anonymised data sources and workbooks for the internal employee survey
- **Human Resources.** This will include HR data sources and workbooks that should only be available to members of the HR team.

Then, groups should match what people need to do:

- **Core Content Creators.** This group is for users who can publish to top-level projects and have broad access to data sources, but who don't need to be able to move or

otherwise manage content.

- **HR Content Creators.** This group is for users who have access to HR data sources and can publish to the HR project.
- **Business Users.** This group is for users who should be able to access the content created by the Core Content Creators, but shouldn't even know the HR content exists.
- **HR Users.** This group is for users who should be able to access content in the HR project but don't have rights to create or publish content.
- **Core Project Leaders.** This group is for users who should be given project leader status on the projects that aren't HR.

## Example 2: Group and group set structure

Beginning in Tableau Server 2024.2, you can use group sets to further control the capabilities granted (or denied) to users by enabling permissions at the group set level. When permissions are set at the group set level, users must belong to all groups in the group sets to be evaluated.

**Note:** Group set permission rules are evaluated after user and group rules.

For example, suppose you've created the groups to match what people need from Example 1 above. You can create the following group set to further lock down HR access:

- **HR Leaders.** This group set consists of HR Content Creators and Core Project Leaders. Only if the users in this group set belong to both groups are they given project leader status and the ability to access sensitive HR data sources and publish to the HR project.

Consider site roles

Remember that permissions are tied to content, not groups or users. This means that you can't give a group **Explore** permissions in a vacuum. Rather, the group can be given **Explore** permissions for a project and its content. Site roles, however, are given to specific users and may define or limit the permissions they can have. For more information on how licences, site roles and permissions tie together, see [Permissions, Site Roles and Licences](#).

## Create the groups and group sets

While it might be tempting to create the groups and projects as soon as you identify what you need, it's important to do things in a certain order.

**Projects:** Projects shouldn't be created until after the Default project has been properly configured (see the next section). This is because top-level projects use the Default project as a template for their permission rules.

**Groups:** Groups need to be created before they can be used to build permission rules. Users do not need to be added to the groups yet, but they can be. For more information about creating groups and adding users to them, see [Groups and Add Users to a Group](#).

**Group sets:** Groups need to be created before they can be used to build permission rules. Users do not need to be added to the groups yet, but they can be. For more information, see [Work with Group Sets](#).

**Tip:** Creating multiple groups and projects and setting permissions manually can get a little tedious. To automate these processes and make them repeatable for future updates, you can perform these tasks using [REST API](#) commands. You can use [tabcmd](#) commands for tasks such as adding or deleting a single project or group and adding users, but not for setting permissions.

### Membership in multiple groups

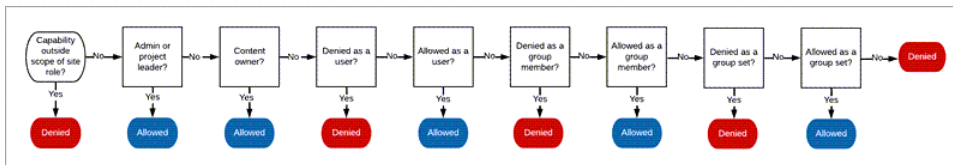
It's possible to include the users in the HR Content Creators and HR Users groups in the Business Users group. This would make it easy to assign permissions to Core Content Users versus Business Users for the majority of content. However, in that scenario, the Business Users group couldn't be denied any capabilities in the Human Resources folder without denying the HR users as well. Instead, the Business Users group would have to be left as unspecified, and the specific HR Content Creators and HR Users groups would be given their applicable capabilities.



This is because Tableau permissions are restrictive. If the Business Users group was denied certain capabilities, that Deny would override the Allow of another permission rule for users in both groups.

### Impact of group sets

If assigned permissions are enabled at the group set level, permissions for every group in the group set must not be specified or not be denied to allow the capability.



When deciding how group membership should be assigned, it's important to understand how permission rules are evaluated. For more information, see [Effective Permissions](#).

## Remove permissions that will cause ambiguities and establish default permission patterns

Every site has an **All Users** group and a **Default** project .

**All Users group:** Any user added to the site becomes a member of the All Users group automatically. To avoid any confusion with permission rules set on multiple groups, it's best to remove the permissions from the All Users group.

**Default project:** The Default project works as a template for new projects in the site. All new top-level projects will take their permission rules from the Default project. Establishing baseline permission patterns on the Default project means you will have a predictable starting point for new projects. (Note that nested projects inherit the permission rules from their parent project, not the Default project. )

Remove the permission rule for the All Users group on the Default project

1. Select **Explore** to see the top-level projects on the site.
2. On the **Default** project's **Action (...)** menu, select **Permissions**.
3. Next to the **All Users** group name, select ..., and then select **Delete Rule....**

This lets you establish permission rules for the groups that you have full control over without any conflicting permissions assigned to All Users. For more information on how multiple rules are evaluated to determine effective permissions, see [Effective Permissions](#).

#### Create permission rules

Now you can set up the basic permission patterns for the Default project that all new top-level projects will inherit. You may choose to keep the Default project's permission rules empty and build permissions for each new top-level project individually. However, if there are any permission rules that should apply to the majority of projects, it can be helpful to set them on the Default project.

Remember that the permissions dialog for a project contains tabs for each type of content.

**You must set permissions for each type of content at the project level**, or users will be denied access to that content type. (A capability is only granted to a user if they are expressly allowed it. Leaving a capability as Unspecified will result in it being denied. For more information, see [Effective Permissions](#).)

Tip: Every time you create a permission rule at the project level, make sure you look through all the content-type tabs.

Create permission rules as desired:

1. Click **+ Add Group/User Rule** and start typing to search for a group name.
2. For each tab, choose an existing template from the drop-down or create a custom rule by clicking the capabilities.
3. When finished, click Save.

For more information on setting permissions, see [Set Permissions](#).

## Example: Project level permissions for each content type

For our example, the majority of projects should be available to most people. For the default project, we'll use the [permission rules templates](#) to give the core content creators publishing rights and everyone else the ability to interact with workbooks and not much else.

Group	Projects	Workbooks	Data Sources	(Other content)
<b>Core Content Creators</b>	Publish	Publish	Publish	View
<b>HR Content Creators</b>	View	Explore	View	None
<b>Business Users</b>	View	Explore	View	None
<b>HR Users</b>	View	Explore	View	None
<b>Core Project Leaders</b>	<a href="#">Set as project leader</a>	n/a	n/a	n/a

This pattern follows a closed model and limits permissions to basic usage for most content for most users. As new top-level projects are created, these rules are what will be inherited by default, but the permission rules can be modified per project as needed. Remember that the **Human Resources** project should have these permissions removed and its own pattern established.

## Create projects and adjust permissions

After the Default project is set with your custom permissions templates, you can create the rest of your projects. For each project, you can adjust the default permissions as appropriate.

To create a project

1. Select **Explore** to see the top-level projects on the site.
2. From the **New** drop-down, select **Project**.

3. Name the project and, if desired, give it a description.

It can be useful to establish a naming convention. For example, a basic structure might be <DepartmentPrefix><Team> - <ContentUse>; such as DevOps - Monitoring.

The description appears when you hover over a project thumbnail and on the **Project details** page. A good description can help users know they're in the right place.

4. **Adjust permissions** as necessary.
  - a. Open the new project.
  - b. From the Action menu (...), select Permissions
  - c. Modify any permission rules as desired. *Remember to check all the content tabs.*

## Lock content permissions

In addition to permission rules, projects have a content permission setting. This setting can be configured in two ways, either **Locked** (recommended) or **Customisable**.

Locking a project is a way of maintaining consistency and ensuring that all content in the project has uniform permissions (per content type). A customisable project permits authorised users to set individual permission rules on pieces of content. For more information, see [Lock content permissions](#).

Regardless of the content permission setting, permissions are always enforced on content.

## Possible project structures

Some organisations find it useful to have projects that serve specific purposes. Here are some example projects and their intended uses. Note that these are example templates and you should always test the configuration in your environment.

For information about what capabilities are included with each content type's permission rule templates, see [Permission capabilities](#).

## Examples: permission settings for specific purposes

Workbooks shared for open collaboration on the server

Anyone in the department can publish to the open-collaboration project while their content is in development. Colleagues can collaborate using web editing on the server. Some people call this a sandbox, some call it staging, and so on. On this project you can allow web editing, saving, downloading, and so on.

Here you want not only to enable collaboration, but also to enable people who don't have Tableau Desktop to contribute and provide feedback.

Group	Projects	Workbooks	Data Sources	(Other content)
Data Stewards	Publish	Publish	Publish	TBD
Analysts	Publish	Publish	Explore	TBD
Business Users	Publish	Publish	Explore	TBD

Remember that some capabilities in the Publish template (such as Overwrite) may be **pre-vented by a user's site role** even if they are allowed that capability.

**Note:** "TBD" indicates these permission rules aren't easily determined by the scenario and can be set however makes sense for a given environment.

Shared reports that cannot be edited

This could be a project that people who create workbooks and data sources (Analysts and Data Stewards) could publish to when they want to make content available to business users for viewing, with confidence that their work cannot be "borrowed" or modified.

For this type of project, you would deny all capabilities that allow editing or getting the data off of the server for reuse. You would allow viewing capabilities.

Group	Projects	Workbooks	Data Sources	(Other content)
-------	----------	-----------	--------------	-----------------

<b>Data Stewards</b>	Publish	<i>TBD</i>	Publish	<i>TBD</i>
<b>Analysts</b>	Publish	Publish	View	<i>TBD</i>
<b>Business Users</b>	View	View	None	None

Vetted data sources for Analysts to connect to

This would be where Data Stewards publish the data sources that meet all your data requirements and become the “source of truth” for your organisation. Project leaders on this project can certify these data sources, so that they rank higher in search results and are included in recommended data sources.

You would allow authorised Analysts to connect their workbooks to data sources in this project, but not download or edit them. You would deny the view capability to the Business Users group for this project, so those users would not even see this project.

<b>Group</b>	<b>Projects</b>	<b>Workbooks</b>	<b>Data Sources</b>	<b>(Other content)</b>
<b>Data Stewards</b>	Publish	<i>TBD</i>	Publish	<i>TBD</i>
<b>Analysts</b>	View	None	View	None
<b>Business Users</b>	None	None	None	None

Inactive content

Another possibility is to segregate workbooks and data sources that the site’s administrative views show haven’t been used for a period of time. You could give content owners a time limit before their content is removed from the server.

Whether you do this or delete directly from the working projects is up to your organisation. In an active environment, don’t be afraid to be intentional about removing content that is not being used.

Group	Projects	Workbooks	Data Sources	(Other content)
<b>Data Stewards</b>	None	None	None	None
<b>Analysts</b>	View	View	<i>TBD</i>	<i>TBD</i>
<b>Business Users</b>	None	None	None	None

#### Source for workbook templates

This is a project that people can download from but not publish or save to, where authorised publishers or project leaders make template workbooks available. Templates that have your organisation's approved fonts, colours, images and even data connections built in can save authors a lot of time and keep your reports looking consistent.

Group	Projects	Workbooks	Data Sources	(Other content)
<b>Authorised Author</b>	Publish	Publish	Publish	<i>TBD</i>
<b>Data Stewards</b>	None	None	None	None
<b>Analysts</b>	View	<i>Template: Explore</i> + <i>Capability: Download Workbook/Save a Copy</i>	View	None
<b>Business Users</b>	None	None	None	None

#### Next steps

Besides projects, groups and permissions, other data governance themes include:

## User education

Help *all* of your Tableau users become good data stewards. The most successful Tableau organisations create Tableau user groups, have regular training sessions, and so on.

For a common approach to orienting users to the site, see [Dashboard-based Custom Portals](#).

For publishing and data certification tips, see the following topics:

- [Use Certification to Help Users Find Trusted Data](#)
- [Prepare for Publishing a Workbook](#) (links to Tableau Help)
- [Best Practices for Published Data Sources](#) (links to Tableau Help)

## Optimise extract refresh and subscription activity

If you use Tableau Server, create policies for extract refresh and subscription schedules, to avoid them dominating the site's resources. The TC customer presentations by Wells Fargo and Sprint address this subject in detail. In addition, see the topics under [Performance Tuning](#).

If you use Tableau Cloud, see the following topics to become familiar with the ways people can refresh extracts:

- [Keep Data Fresh](#)
- [Use Tableau Bridge to Expand Data Freshness Options](#)

## Monitoring

Use administrative views to keep an eye on the site's performance and content use.

[Administrative Views](#)

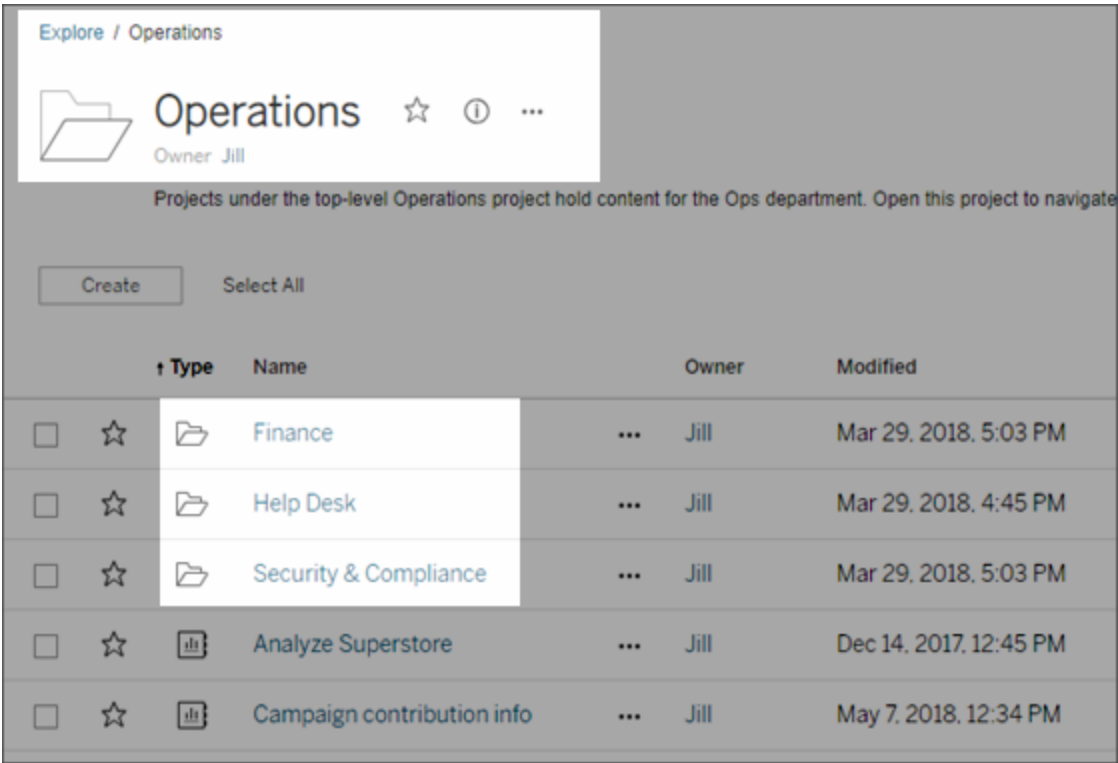


# Use Projects to Manage Content Access

When Tableau Desktop users publish content to a site on Tableau Server, they can select a *project* to publish it to.

Projects can be used for navigation, organisation and access management for assets like workbooks, data sources, lenses and nested projects. Starting in Tableau Cloud October 2022/Server 2022.3, if Data Management is licensed and Catalogue is enabled, a project can also contain external assets like databases.

The following image shows content within the top-level Operations project in the web authoring environment. The Operations project contains a few nested projects (highlighted) and published workbooks. A project can also contain other asset types.



## Why use projects

Projects help you to create a scalable process for managing access to the content published to Tableau Server. Advantages they have include:

- They enable administrators to delegate content management to project leaders who work with the content more closely, without having to give them administrator access to site or server settings.
  - Project leaders can create nested projects under their top-level project, enabling them to maintain their team's content within a single hierarchy.
  - **Note:** Project owners can delete top-level projects they own. Project leaders cannot delete top-level projects.
- They can make the site easier to navigate for self-service users.
  - They segment the Tableau Server site into areas that give users access based on how they use the data published to those areas, or on the Tableau user group they work with.
  - You can hide projects from groups who don't need to use them, create a distinguishable project-naming scheme, and take advantage of project descriptions to clarify how to use the project.
- They enable you to track permissions effectively.
  - You can create groups based on the level of content access users in the group need, and set default permissions on projects. This enables you to know exactly which capabilities new users get by default, and likewise which capabilities all users get when a new project is created.

### When to create project hierarchies (example)

Many organisations have several or more distinct groups of Tableau users, each with its own priorities and leaders. These groups might share some organisation-wide content (or even draw from an org-wide pool of data sources), but primarily they use data and reports that are specific to their team. In this or similar scenario, an example for using project hierarchies might look as follows:

1. You, as a site or server administrator, can create top-level projects for each of your distinct Tableau teams.
2. On each top-level project, you assign the Project Leader status to team leads, and change project ownership. Project leaders effectively are the content administrators,

so it's important that they understand how permissions work in Tableau, along with Tableau content management best practices.

3. Each project leader can manage their project, creating the structure within the project that works for their team. That is, they can create child projects they need, based on how their team members collaborate and share data and reports.

The benefit to you as the site administrator is that you can focus on system health. The benefit to your Tableau users is that people who know the best practices for working with Tableau and data can manage these things for their teams, without having to submit IT requests to change permissions or add projects.

Why not use sites?

Sites work well when content can remain completely separate during all phases, and there is little to no user overlap. A good (and common) example for using multiple sites is to create a site for each of multiple external clients, whose published content you manage as a consultant or vendor.

Projects allow the flexibility you need to administer shared data and reports, and users who might belong to multiple groups. Projects work better than sites for evolving content from development to staging to production.

### Project-level administration

For more information about administering projects, see [Manage Permissions with Projects](#).

### Add Projects and Move Content Into Them

Tableau content (such as workbooks or data sources) must be in a project. Starting in Tableau Server 2022.3 and Tableau Cloud October 2022, if Data Management is licensed and Catalogue is enabled, external assets (such as databases and tables) can also be in projects. Server and site administrators can add or remove top-level projects on a site, and move published content from one project to another. Project leaders with appropriate site roles can add or remove child projects and move content between projects on which they have Project Leader access.

This article contains the steps for creating and moving projects. We recommend becoming familiar with the following related content as well:

- To learn about projects and when or why to use them, see [Use Projects to Manage Content Access](#).
- Before you create project hierarchies, become familiar with [Permissions](#).
- To see the specific site roles that allow full Project Leader access, see [Project-level administration](#).

Add a top-level or child (nested) project

1. While you're signed in to Tableau Server as an administrator or project leader, select **Explore** and then do one of the following:
  - Select **New > Project** to create a new top-level project (only administrators can do this).
  - Navigate to and open the project in which you want to create a sub-project, and then select **New > Project**. If you're not sure where to find the child project, select **All Projects** from the drop-down menu next to **Explore** or use the filters in the upper right.
2. Enter a name and description for the project, and then click **Create**.

New Project

Enter a name for the new project:

CS Training - open collaboration

Description

Use this project to fine tune your analysis with your CS colleagues.

3,932 characters remaining

> Show formatting hints

Cancel Create

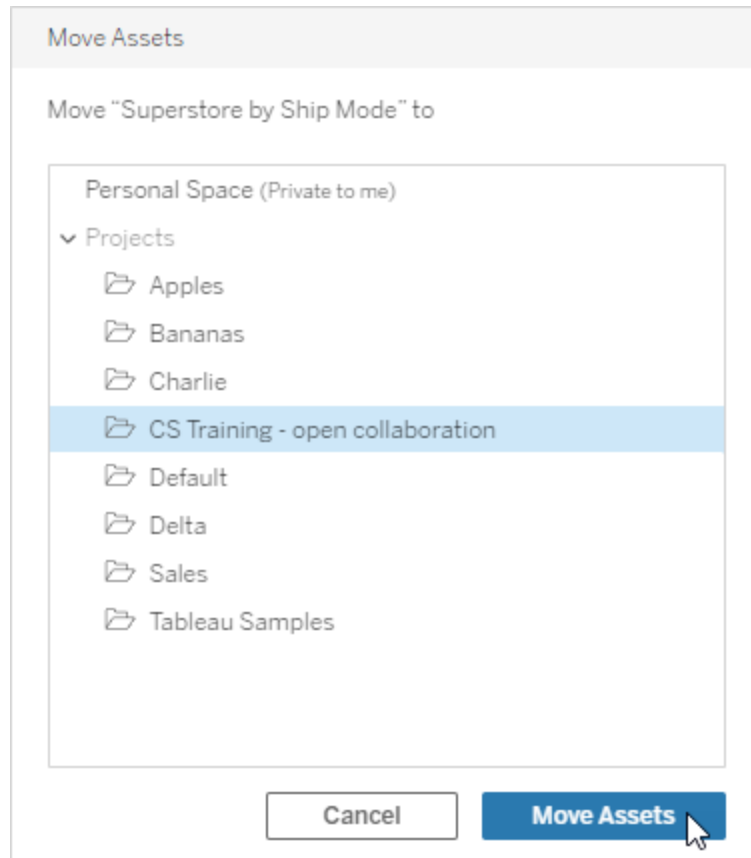
You can include formatting and hyperlinks in the project description. Select **Show formatting hints** for syntax.

When entering a project description, include a space between capital letters and parentheses to display content inside them, such as "PROJECT (a)". Omitting this space will cause display issues in the project description.

**Note:** To edit a project description later, select it to open it, select the information icon next to its name, and then click **Edit**.

## Move an asset to another project

1. In the **Explore** section, find the asset you want to move. You can use the filters in the upper right to search, or you can navigate through the project hierarchy.
2. On the workbook's **Actions(...)** menu, select **Move**.
3. Select the new project for the workbook, and then click **Move Content**.



Moving a project involves moving everything in it, including child projects and their assets.

## How moving projects affect permissions

When you move a project, Project Leader permissions adapt to the new project environment.

- When the target project hierarchy is **Locked**, previous Project Leader permissions are removed, and new Project Leader permissions are granted according to those set at the top-level of the target hierarchy.
- When the target project hierarchy is **Customisable**, previous implicitly granted Project Leader permissions are removed, explicitly set Project Leader permissions are retained and new Project Leader permissions are granted according to those set at the top-level of the target hierarchy.

When you move a project and assets, permissions may be impacted. For more information, see [Permissions](#).

### Delete a project

When you delete a project, all the Tableau content in the project is also deleted. If you want to delete a project but not its content, move the content to another project, and then delete the project.

External assets, such as databases and tables, are not deleted, but are moved to the **External Assets Default Project**. (In Tableau Server 2022.3 and earlier, the assets can be found in **External Assets**.)

### Important

- You cannot undo deleting a project.
- Deleting a project deletes all Tableau content in it, including child projects and their content, but not external assets.
- You cannot delete the **Default** project or the **External Assets Default Project**.

To delete a project:

1. In the **Explore** section, find the project you want to remove. If you're not sure where to find the project, select **All Projects** from the drop-down menu next to **Explore** or use the filters in the upper right.

2. On the project's **Actions** (...) menu, select **Delete**.
3. Confirm that you want to delete the project.

#### Requirements for moving assets

Moving an asset is effectively like removing it from one project and publishing it to another. For non-administrators, the permissions needed on the source project are different from those needed on the destination project.

#### Required site role

To move assets, users must have one of the following site roles:

- Server Administrator (Tableau Server only)
- Site Administrator Creator or Site Administrator Explorer
- Creator or Explorer (can publish)

Users with a Server Administrator or Site Administrator site role do not need any additional capabilities.

#### Required permissions for the project that users move content *to*

Non-administrators must have the **Publish** permission capability for the destination project.

#### Required permissions for the project that users move content *from*

Non-administrator users must

- Be the project owner, project leader or content owner for the original project

OR

- Have the **Move** permission capability for the content (or, for data sources, be the data source owner). When moving a database with its tables, the user must have the Move capability for both the database *and* its tables.

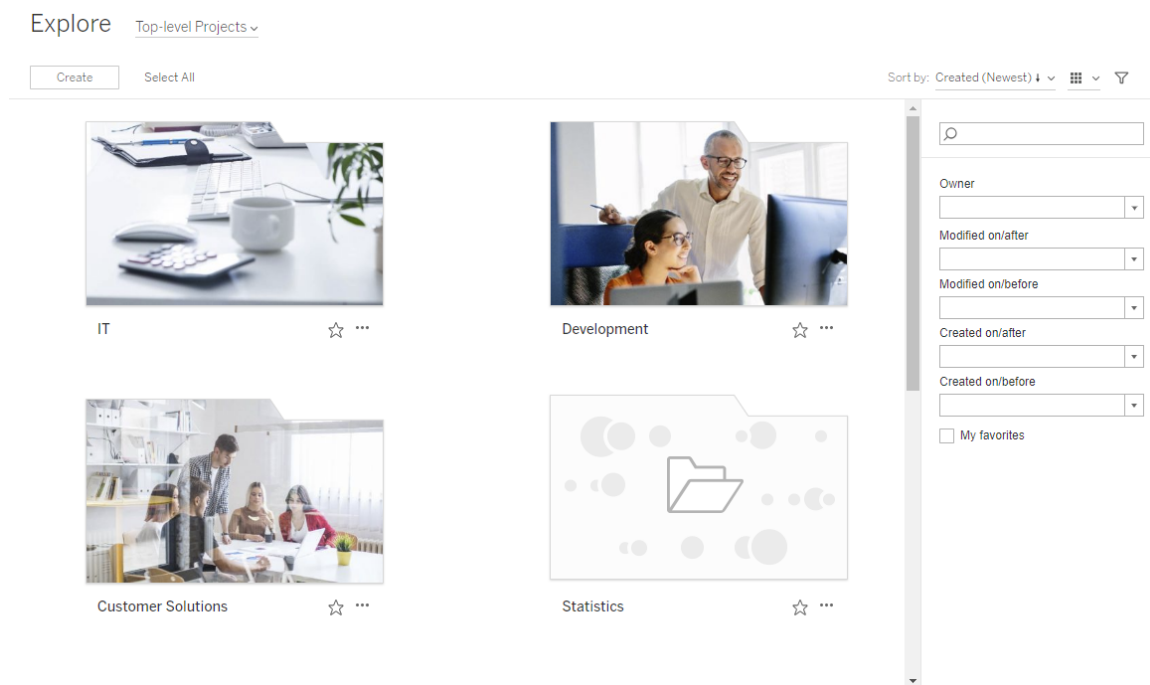
For more information on moving assets, see [Move content](#).



## Add a Project Image

To help distinguish projects you manage on Tableau Server (and help your users find them), you can add an image that appears in the thumbnail. Your image must meet the following requirements:

- The image must be accessible using HTTPS protocol. Shared network directory and related protocols (UNC, SMB, AFP, NFS, etc) are not supported. HTTP protocol for project images is not supported by Google Chrome.
- All users who access the project must have, at a minimum, "read-only" permission on the target image.
- The image must be common internet format: .jpg, png, or gif.

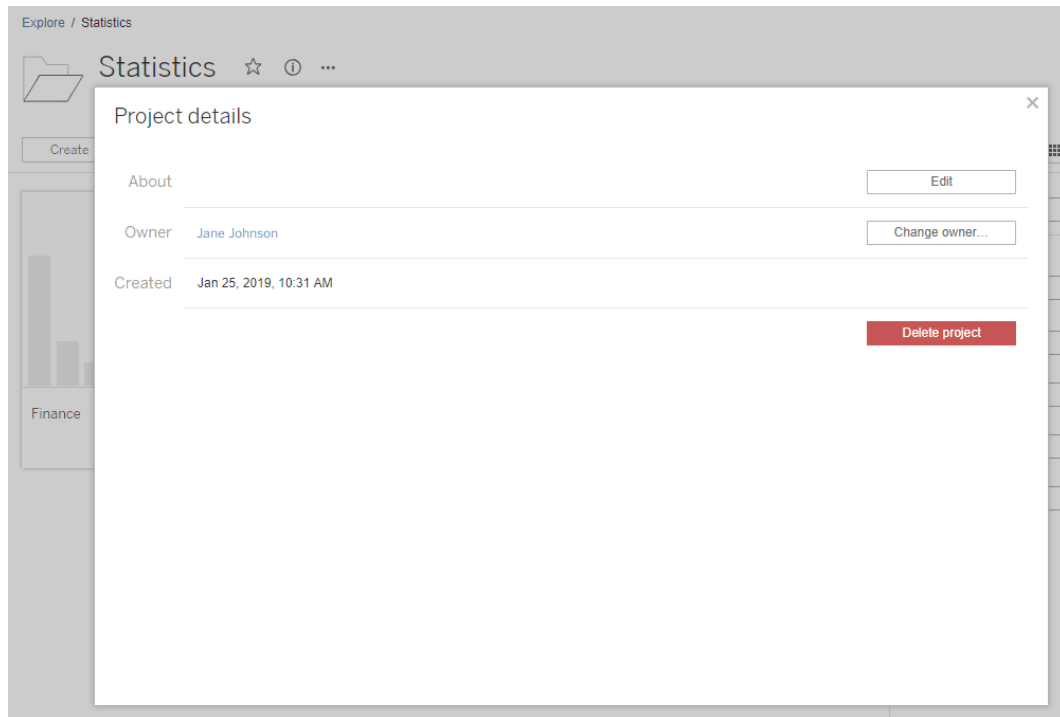


### Set a project image

1. Sign in to a site on Tableau Server. In the list of **Top-level Projects** you have access to, select or navigate to the project you want to update. In this example, we'll add an image to the Statistics project folder.

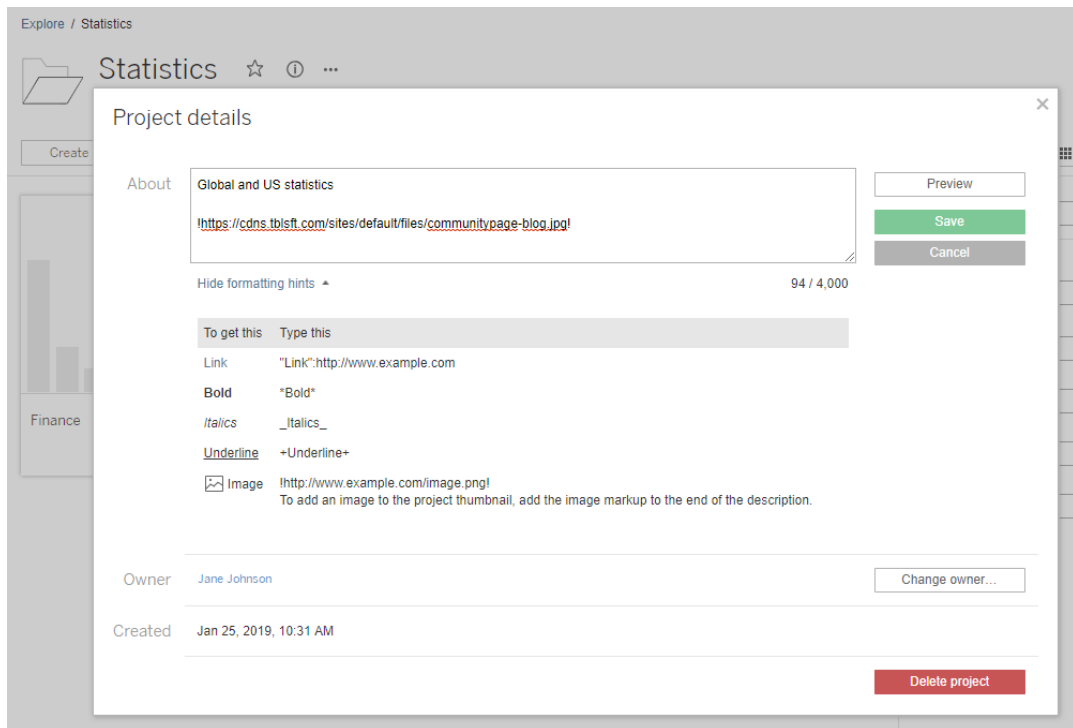
If you're not sure where to find a child project, use the **Explore** drop-down list and select **All Projects**.

2. Click the **Details** icon (i), to open the **Project details** dialog box, and then click **Edit**.



3. In the **About** field, you can enter a description for your project (optional), for example "Global and US statistics". At the end of the project description, add the URL for your image using the following syntax:

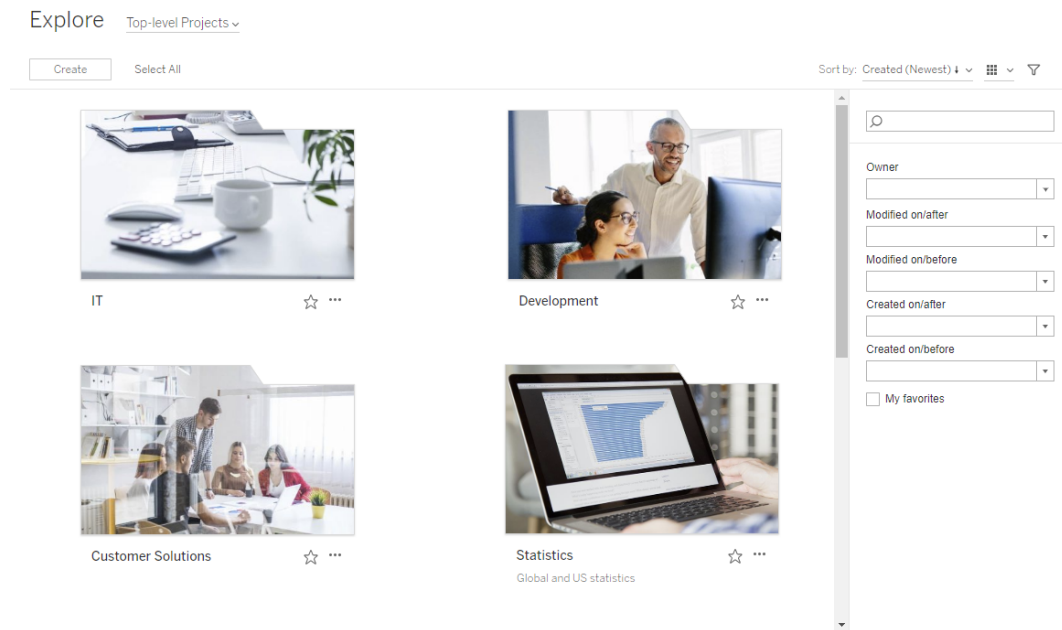
`!http://www.example.com/image.png!`



Select **Show formatting hints** to see how you can format description text.

**Note:** Images embedded in project descriptions cannot be resized or positioned. Recommended size is (300 x 184 pixels). Images that are not 300 x 184 pixels may be stretched, shrunk or cropped to fit the width of the thumbnail. In addition, they must be added at the end of the project description and be enclosed in ! (exclamation marks), otherwise they will not be displayed as the thumbnail.

4. Click **Save**.



## Let Site Users Request Access to Content

Permissions determine if a user has viewing access to a workbook, view or other content inside a project. If a user clicks on content or a project they don't have access to, they can send a request for access to the owner who controls permissions for that content.

### Permission Required

You don't have access to this workbook. Send a request for access.

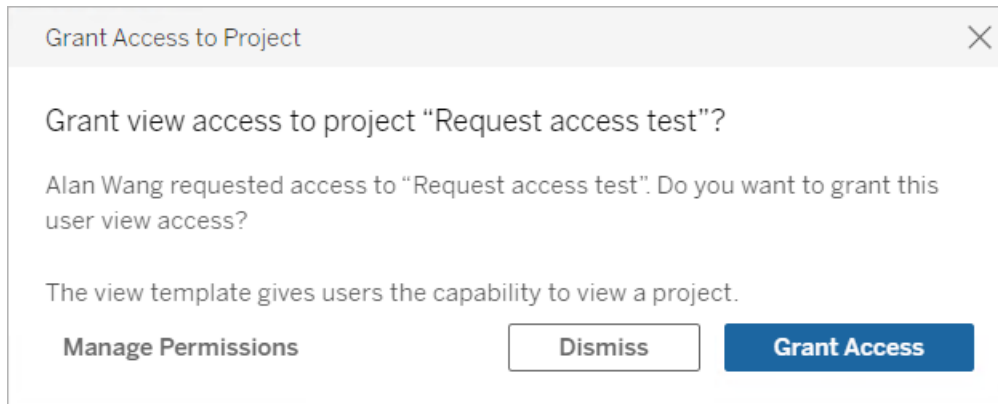
Message (optional)

0 / 500

CancelRequest Access

When someone requests access, the owner who controls permissions for that content (either at the project or workbook level) receives an email with the name and email of the requester, the content or project requested, and a link to grant access to the content. In Tableau Server version 2022.3 and earlier, the owner receives a link to the content to manage permissions instead of a link to directly grant access.

1. On the email notification, select **Grant Access**.
2. On the dialog that appears, to grant the view permissions template, select **Grant Access**. To grant permissions other than the view template, select **Manage Permissions**.



If a user requests access to a workbook and content permissions are locked to the project, then the project owner receives the request. Likewise, if a user requests access to a workbook and project permissions are managed by the workbook owner, then the workbook owner receives the request.

After permission is granted, the owner can email the requester to let them know they have view capability to the project or workbook.

## Default settings

The Request Access setting is enabled by default on a new site. To enable the setting if it's been disabled:

1. Go to the General tab of the Settings page for your site.
  - If you have a single site, on the side navigation, click **Settings** and **General**.
  - If you have multiple sites, select the site you want to configure and click **Settings** and **General**.
2. On the General tab, scroll down to Request Access and select **Let users request access to projects, workbooks and views**.
3. Click **Save**.

## Configure project permissions

You can control who receives the access request by adjusting the project's content permissions. If content permissions are:

- Locked to the project: the project owner receives the request.
- Managed by the owner: The workbook owner receives the request.

To manage content access using projects, see [Use Projects to Manage Content Access and Permissions](#).

For more information about how permission rules are evaluated, see [Permissions: Evaluate permission rules](#).

## Change project permissions

*For administrators and project leaders*

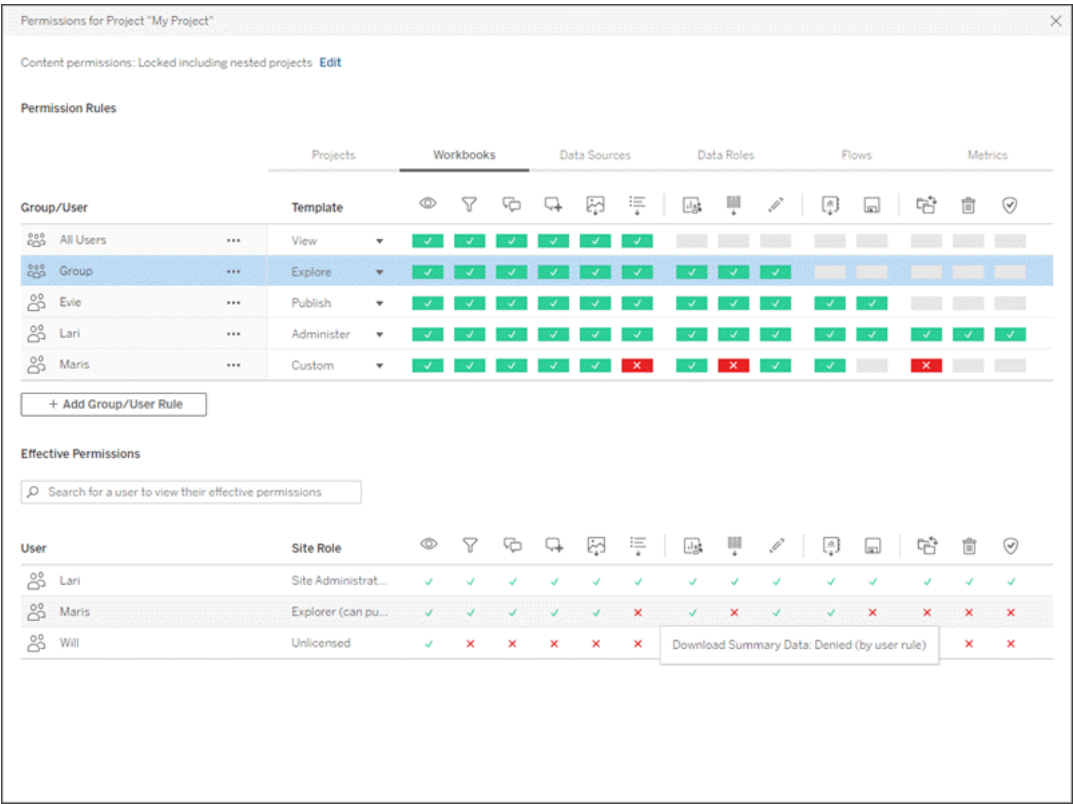
Permissions can be set at the project level for both the project itself and for any content in the project. For example, if workbook permissions are configured at the project level, all workbooks published into that project inherit those default permissions. However, the Creator can choose to change the permissions during publishing, or certain users can change the permissions on published content. To enforce the permissions established at the project level, **Content Permissions** can be locked to the project. For more information, see [Lock asset permissions](#).

To set permissions at the project level:

Tableau Server on Windows Help

1. Navigate to the project
2. Open the Actions menu (...) and click **Permissions**. The permissions dialog box opens.

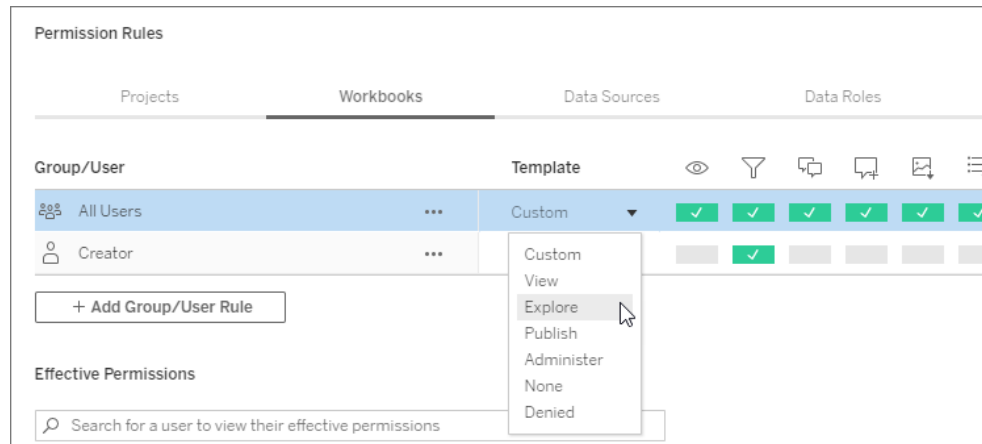
This dialog box has two main areas: permission rules at the top and the effective permissions grid below. Use the tabs to navigate between types of content.



With a row selected at the top, the effective permissions grid populates. Use this to verify permissions. Hovering over a capability indicator provides information about why the capability is allowed or denied for that specific user.

3. To modify an existing permission rule, select the rule and click the capability boxes to toggle through allowed/denied/unspecified.
4. To create a new rule,
  - a. Select **+ Add Group/User Rule**.
  - b. Select a group or user from the drop-down box. This creates a row where you can configure the permission rule.

5. In the row for the permission rule
  - a. choose an existing permission role template from the drop-down box for each content type tab.



- b. Or create a custom rule by navigating to a content type tab and clicking the capabilities. One click sets the capability to **Allowed**, two clicks sets it to **Denied** and a third click clears the selection (**Unspecified**).
6. When finished, click **Save**.

## Change content permissions

*For administrators, project leaders and content owners*

If project permissions are not locked, permissions for individual pieces of content can be modified.

**Warning:** Tableau recommends managing permissions at the project level within the Tableau site. These steps are relevant only for content in projects where permissions are managed by the owner.

### Set permissions on content

1. Navigate to the content (workbook, data source, flow, data role)
2. Open the Actions menu (...) and click **Permissions**. The permissions dialog box opens.



This dialog box has two main areas: permission rules at the top and the effective permissions grid below.

Search for a user to view their permissions

Permissions for views are controlled independently

User / Group	Permissions	View	Interact/Edit	Edit
All Users (39)	None			
Site Roles (8)	Editor	✓✓✓✓✓	✓✓✓✓✓	✓✓✓✓✓✓✓✓

+ Add a user or group rule

User Permissions	Site Roles (8)			
Creator	Editor	•••••	•••••	•••••
Explorer	Custom	•••••	•••••	•••••
Explorer (can publish)	Editor	•••••	•••••	Save: Denied (by user's site role)
Server Administrator	Administrator	•••••	•••••	•••••
Site Administrator Creator	Administrator	•••••	•••••	•••••
Site Administrator Explorer	Administrator	•••••	•••••	•••••
Unlicensed	Custom	•		•
Viewer	Custom	•••••	•	

With a row selected at the top, the effective permissions grid populates. Use this to verify permissions. Hovering over a capability square provides information about why the capability is allowed or denied for that specific user.

- 3. To modify an existing permission rule, open the Actions menu (...) for that row and click **Edit**.
- 4. To create a new rule,
  - a. Select **+ Add a user or group rule**.
  - b. If necessary, use the drop-down box on the right to change between groups and users.
  - c. Select a group or user from the drop-down box. This creates a row where you can configure the permission rule.
- 5. In the row for the permission rule, choose an existing permissions role template from the drop-down box or create a custom rule by clicking the capabilities.

One click sets the capability to **Allowed**, two clicks sets it to **Denied** and a third click clears the selection (**Unspecified**).

- 6. When finished, click **Save**.

### Set permissions on a view

In some situations, it may be valuable to specify permissions on a view independently from the workbook that contains it. To set permissions on a published view, navigate to the view within a published workbook and follow the steps above.

**Warning:** While it is possible to set view-level permissions within a workbook, we strongly recommend managing permissions at the project (or workbook) level as much as possible. For views to inherit permissions, the project must be locked or the workbook must be published with **Show Sheets as Tabs**. See [Let Site Users Request Access to Content](#) for more information.

## Permissions

Permissions determine how users can interact with content such as workbooks and data sources. Permissions are set in the permission dialog or via the [REST API](#). At the top of the dialog, permission rules configure capabilities for groups or users. Below, the permissions grid displays the effective permissions for users.

Permissions for Project "My Project"

Content permissions: Locked including nested projects [Edit](#)

**Permission Rules**

		Projects	Workbooks	Data Sources	Data Roles	Flows	Metrics
Group/User	Template						
All Users	View	✓	✓	✓	✓	✓	✓
Group	Explore	✓	✓	✓	✓	✓	✓
Evie	Publish	✓	✓	✓	✓	✓	✓
Lari	Administer	✓	✓	✓	✓	✓	✓
Maris	Custom	✓	✓	✓	✗	✓	✗

+ Add Group/User Rule

**Effective Permissions**

Search for a user to view their effective permissions

User	Site Role												
Lari	Site Administrat...	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maris	Explorer (can pu...	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗
Will	Unlicensed	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

Download Summary Data: Denied (by user rule)

There are several interrelated topics that discuss how to think about, set and manage permissions. The main topics are:

- This topic, which covers the fundamentals, how to set permission rules for projects and other content and permission considerations for specific scenarios.
- Permission Capabilities and Templates, which covers in detail the various capabilities that are used to build permission rules.
- Manage Permissions with Projects, which covers using projects to manage permissions and how nested and locked projects impact permissions.
- Effective permissions, which covers how permission rules are evaluated and how final permissions are determined.
- Permissions, Site Roles and Licences, which covers how permissions interact with site roles and licences to determine what a user can do on a site.

Additionally, if Data Management is licensed, permissions for external assets have additional considerations. For more information, see Manage Permissions for External Assets.

## Permissions fundamentals

### Projects and groups

Tableau sites use *projects* to organise content and *groups* to organise users. Managing permissions is easier when permission rules are:

- Set at the project level instead of on individual pieces of content.
- Established for groups instead of individuals.

Permissions can only be established for users, groups, projects or assets that already exist. For more information about creating users and groups, creating projects and publishing content, see [Manage Users and Groups](#), [Use Projects to Manage Content Access](#), and [Publish Data Sources and Workbooks](#).

### Capabilities and permission rules

Permissions are made up of *capabilities* – the ability to perform actions like view content, web edit, download data sources or delete content. *Permission rules* establish which capabilities are allowed or denied for a user or group on an asset.

For more information about capabilities and permission rule templates, see [Permission Capabilities and Templates](#).

**Note:** When talking about permissions in general, it's common to see a phrase like "a user must have the delete *permission*". This is easy to understand in a broad context. However, when working with permissions at a technical level like in this article, it's more accurate to say "the delete *capability*". In this topic we'll use the more precise term *capability*, but you should be aware that you might see *permission* in other places.

Group/User	Template															
All Users	View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Group	Explore	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Evie	Publish	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lari	Administer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maris	Custom	✓	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✓	✓
+ Add Group/User Rule																

For a breakdown of the capability icons and their meanings, see [Permission Capabilities and Templates](#).

The interplay between licence level, site role and potentially multiple permission rules factor into the final determination of what a user can or can't do. For each user, this becomes their *effective permissions*. For more information, see [Effective permissions](#). Some tasks such as creating new workbooks from a browser (web authoring) or moving content might require specific configurations of several capabilities rather than being captured in a single capability. For more information, see [Permission settings for specific scenarios](#).

## Set permissions

Permission rules are set differently at the project level, at the content level or when publishing content from Tableau Desktop.

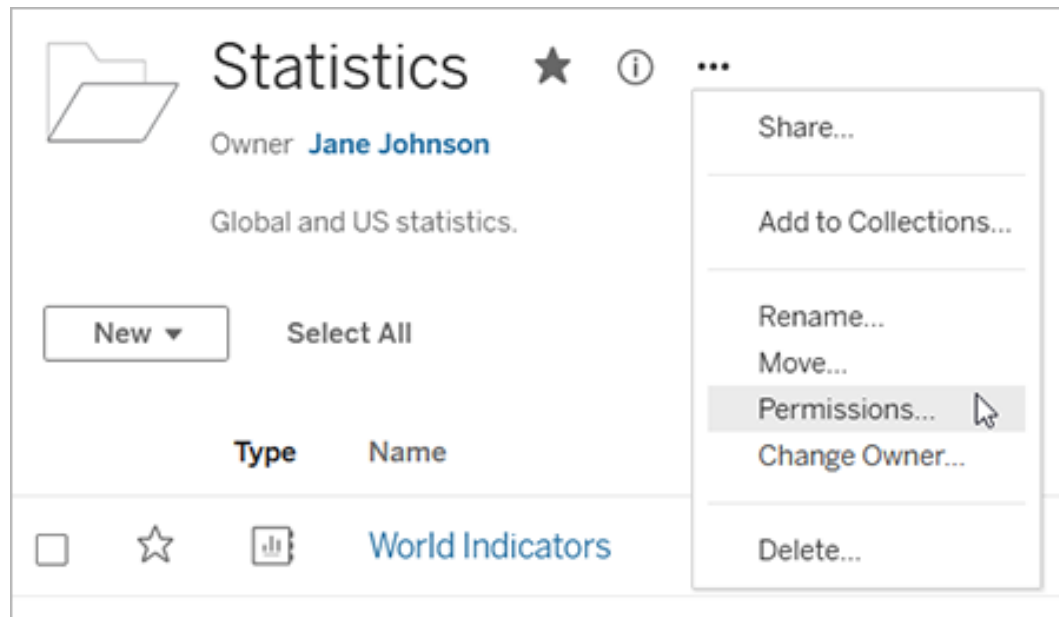
**Note:** The phrase "project permissions" can have two meanings. There are the permission capabilities for a project itself – View and Publish – that control how a user can interact with a project. There is also the concept of project-level permission rules for other content types. In this article “project-level permissions” means permission rules for workbooks, data sources and the other assets that are configured in the permission dialog for a project. This is in contrast to “content-level” permission rules that can be set on a specific workbook, data source, etc.

## Project-level permissions

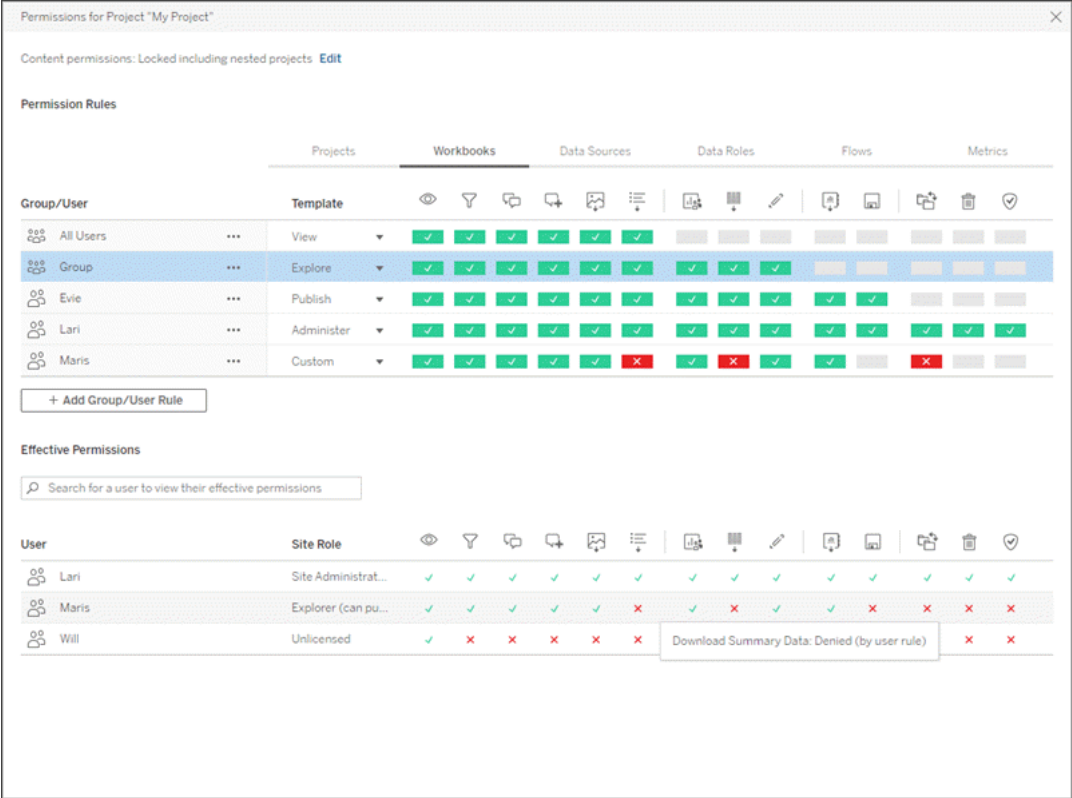
*For administrators, project owners and project leaders*

To set permissions at the project level:

1. Navigate to the project
2. Open the Actions menu (...) and click **Permissions**.



The permissions dialog opens. This dialog has two main areas: permission rules at the top and the effective permissions grid below. Each content type has a tab. The image below shows the Workbook tab.



With a row selected at the top, the effective permissions grid populates. Use this to verify permissions. Hovering provides information about why the capability is allowed or denied for that specific user.

3. To modify an existing permission rule, select the appropriate tab for that content type and click a capability.
4. To create a rule, click **+ Add Group/User Rule** and start typing to search for a group or user. For each tab, choose an existing template from the drop-down box or create a custom rule by clicking the capabilities.

One click sets the capability to **Allowed**, two clicks sets it to **Denied** and a third click clears the selection (**Unspecified**).

5. When finished, click **Save**.
  - If the "None" template is selected, the button will say "Delete Rule".

## Set project permissions for all content types

Remember that the permissions dialog for a project contains tabs for each type of content.

**You must set permissions for each type of content at the project level, or users will be denied access to that content type.** A capability is only granted to a user if they're expressly allowed it. Leaving a capability as Unspecified will result in it being denied.

**Tip:** Every time you create a permission rule at the project level, make sure you look through all the content-type tabs.

## Configure the asset permissions setting

Permission rules set at the project level act as a default for content saved in that project and any nested projects it contains. Whether those project-level default rules are kept uniform or are able to be edited depends on the **Asset permissions** setting. This setting can be configured in two ways, either **Locked** or **Customisable**. For more information, see Lock asset permissions.

## Content-level permissions

*For administrators, project leaders and content owners*

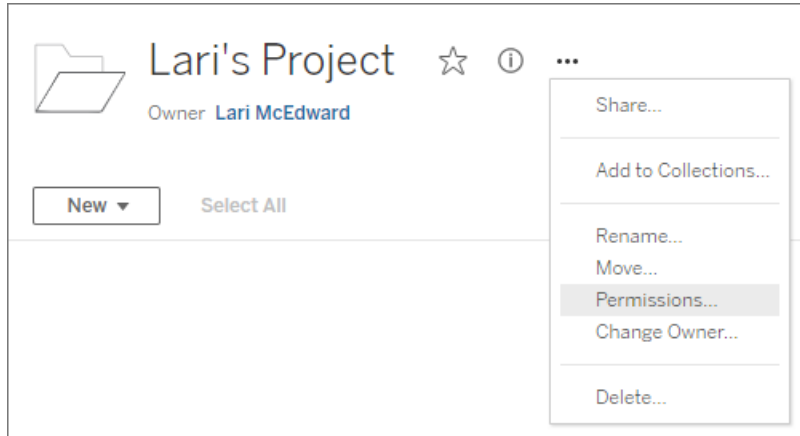
If project **Asset permissions** are **Customisable**, permissions for individual assets can be modified. The information below isn't relevant to assets in locked projects. For more information, see Lock asset permissions.

**Tip:** While it is possible to set permissions on individual assets in **Customisable** projects, we recommend managing permissions at the project level.



Set permissions on assets

1. Navigate to the asset (such as a workbook, data source or flow)
2. Open the Actions menu (...) and click **Permissions**.



The permissions dialog opens. This dialog has two main areas: permission rules at the top and the effective permissions grid below. (Note the lack of tabs across the top – an asset-level permissions dialog has no tabs.)



If a workbook is published with **Show Sheets as Tabs** ticked, the views in that workbook will inherit all permissions set for the workbook. The permission dialog for a view will be read-only.

In some situations, it may be valuable to specify permissions on a view independently from the workbook that contains it. If the workbook is published with **Show Sheets as Tabs** unticked (sheet tabs hidden), the views will start with the workbook permissions but will be independent thereafter and can be set independently. Note that this means if the permission rules are modified for the workbook, those changes won't be applied to the views – each view's permissions will need to be managed individually.

See [Show or Hide Sheet Tabs](#) for more information.

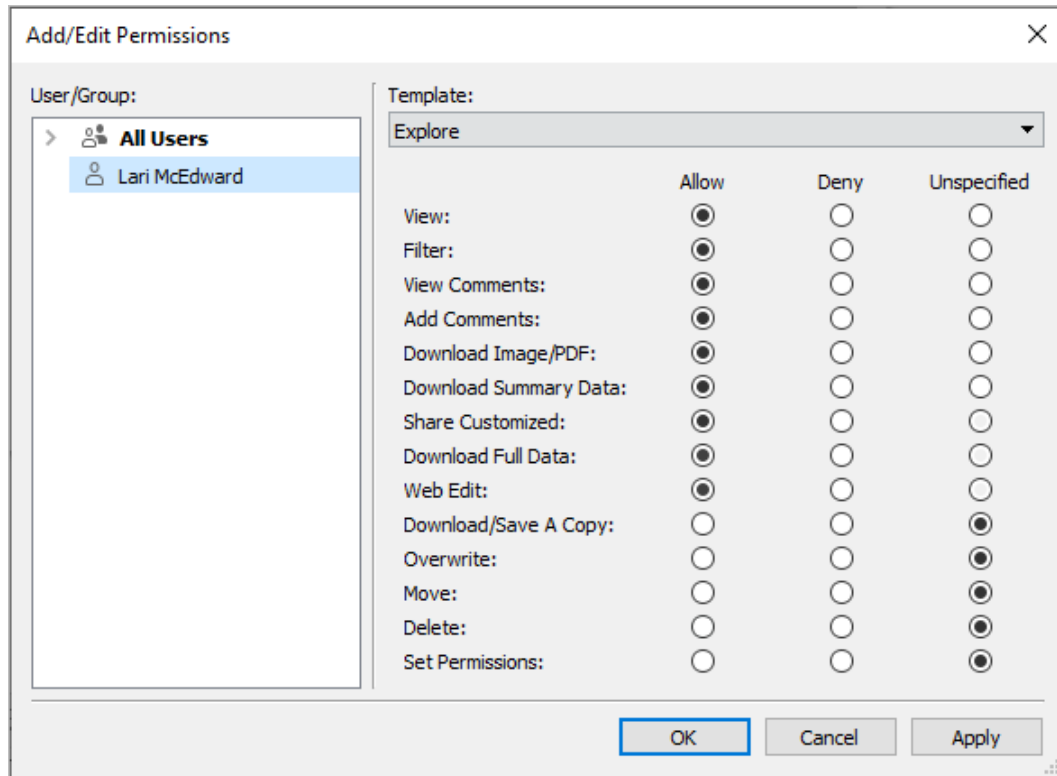
## Set permissions at publish

### *For content publishers*

If project **Asset permissions** are **Customisable**, permissions for individual assets can be set when publishing from Tableau Desktop. The information below isn't relevant for content in locked projects. For more information, see [Lock asset permissions](#).

**Tip:** While it's possible to set permissions on individual assets in **Customisable** projects, we recommend managing permissions at the project level.

1. From the publishing dialog, click the Edit link for **Permissions**.  
If the Edit link is unavailable, permissions are locked to the project and can't be modified except by the project owner, project leader or an administrator.
2. The Add/Edit Permissions dialog shows any existing permission rules. Click **Add** to add a permission rule or **Edit** to modify an existing permission rule
  - a. Select the group or user from the left pane. You can expand a group to see which users it contains.
  - b. Use the selector at the top of the right pane to choose an existing template, or use the radio buttons to create a custom rule.



Note that effective permissions can't be inspected from the publishing dialog.

- When finished, click **OK** and resume publishing.

**Note:** Permissions can't be set while publishing flows from Tableau Prep Builder. To set permissions on a flow, refer to the steps for Project-level permissions or Content-level permissions.

### Clean up the All Users group

By default, all users are added to an "All Users" group that has basic permissions for content. To start with a clean slate when building your own permission rules, we recommend that you delete the rule entirely or edit the rule for All Users to remove any permissions (set the permission role template to None). This helps prevent any ambiguity down the road by reducing the number of rules that applies to any given user and therefore making effective permissions easier to understand.

## Permission settings for specific scenarios

Certain actions require combinations of permission capabilities and possibly site roles. The following are some common scenarios and their necessary permission configurations

### Saving, publishing and overwriting

In the context of permissions, saving is essentially publishing. As such, the **Overwrite** and **Save a Copy** capabilities can only be given to users with a site role that allows publishing: Administrator, Creator or Explorer (can publish). Explorer or Viewer site roles can't publish, overwrite or save a copy.

- The **Publish** capability for a project allows a user to publish content into that project.
- The **Overwrite** capability allows a user to save over an existing piece of content. By saving over the content, the user becomes the owner of that content. The Overwrite capability also allows users to edit minor aspects of existing pieces of content, such as the description for a metric or the synonyms for a data role. Editing the existing content in this way doesn't change the owner of the content.
- The **Save a Copy** capability allows a user to save a new copy of the content. This is usually done in conjunction with web authoring and means the user can save their modifications.

It's important to note that users aren't able to Save or Save As a piece of content unless they have the **Publish** capability for at least one project, because all content must be published into a project. Without the **Publish** capability at the project level, the content can't be published.

In web editing, the **Save** option in the File menu only appears to the content owner. If a user who isn't the owner has the **Overwrite** capability (allowing them to save the content), they must use **File > Save As** and name the workbook the exact same name. This prompts a warning that they're about to overwrite the existing content, which they can do. Conversely, a user with only the **Save a Copy** capability trying to use the same name gets an error stating they don't have permission to overwrite the existing content.

If a user who isn't the content owner overwrites content, they become the owner, with all the permissions that entails. The original owner's access to the content is then determined by their permissions as a user rather than the owner.

**Note:** **Download Workbook/Save a Copy** is a joint capability for workbooks. Explorers can be given this capability, but they're only able to download the workbook, not save a copy. Giving the capability to Explorer (can publish), Creator or Administrator site roles gives them both the ability to download workbooks *and* save a copy.

Web Editing and Web Authoring






Web editing and web authoring allows users to edit or create workbooks directly in the browser.

The permission capability is called *Web Edit* and the site setting is called *Web Authoring*. This section refers to any web-based editing or publishing action as *web authoring*.

To enable this functionality, there are several requirements.

- **Site setting:** Web authoring must be turned on for the entire Tableau site. See [Set a Site's Web Authoring Access](#). Without this setting enabled, no users can create workbooks or edit existing workbooks from the browser, *even if they have the web edit capability*.
- **User site role:** The user must have the appropriate site role.
  - Viewers can never web edit.
  - Explorers can be given the web edit capability but can't publish. Essentially, they can use web editing to answer deeper questions based on existing content on the fly, but can't save their edits.
  - Explorers (can publish) or Site Administrator Explorers can publish, but they can only use data that is already published to the site.
  - Creators, Site Administrator Creators and Server Administrators can publish and create data sources.
- **Permission capabilities:** The user must have the necessary permission capabilities based on the desired functionality.

Required Permission Capability Settings

Desired functionality	Minimum Site Role	 Web	 Down- load/Save a	 Over- write ( <i>work-</i>	 Pub- lish ( <i>pro-</i>	 Con- nect
--------------------------	----------------------	---	--	---	--	--

		Edit	Copy	book)	ject)	(data source)
Web author without being able to save	Explorer	 Allow	 Deny	 Deny	Optional	 Allow
Web author and save as new content	Explorer (can publish)	 Allow	 Allow	 Deny	 Allow	 Allow
Web author and save (overwrite) content	Explorer (can publish)	 Allow	 Allow	 Allow	 Allow	 Allow
Web author with new data and save new content	Creator	 Allow	Optional	Optional	 Allow	Optional

Optional indicates this capability isn't involved in the desired functionality

Data access for published Tableau data sources

Data sources published to a Tableau site can have native authentication as well as permissions within the Tableau environment.

When the data source is published to the Tableau site, the publisher can choose how to [Set Credentials for Accessing Your Published Data](#), which addresses how data source credentials are handled (such as requiring users to log in to a database or enter their credentials for Google Sheets). This authentication is controlled by whatever technology holds the data. This can be embedded when the data source is published, or the data source publisher can choose to prompt the user for their credentials to the data source. For more information, see [Publish a Data Source](#).

There are also data source capabilities that allow or deny users the ability to see (**View**) and connect to the published data source (**Connect**) in the context of Tableau. These capabilities are set like any other permissions in Tableau.

When a workbook that uses a published data source is published, the author can control how the Tableau authentication behaves for someone consuming the workbook. The author sets the workbook's access to the published data source, either as **Embed password** (using the author's Connect access to the data source) or **Prompt users** (using the Connect access of the person viewing the workbook), which may require data source authentication as well.

- When the workbook is set to **Embed password**, anyone who looks at the workbook sees the data based on the author's access to the data source.
- If the workbook is set to **Prompt users**, the Tableau-controlled access is checked for the data source. The person consuming the workbook must have the Connect capability for the published data source to see the data. If the published data source is also set to Prompt user, the viewer must also enter their credentials for the data source itself.

Workbook authentication to the data source	Data source authentication to the data	How data access is evaluated for someone consuming the workbook
Embed password	Embed password	User sees the data as if they were the workbook author
Embed password	Prompt user	User sees the data as if they were the workbook author. (The author is prompted for data source authentication, not the user.)
Prompt user	Embed password	User must have their own <b>Connect</b> capability to the published data source
Prompt user	Prompt user	User must have their own <b>Connect</b> capability to the published data source and are prompted for their credentials to the underlying data



Note that this applies to consuming a workbook, not web editing. To web edit, the user must have their own Connect capability.

For information on embedding passwords when you publish Tableau content such as a data source or workbook that uses a virtual connection, see [Virtual connections](#) in the Tableau Server help.

### Move content

To move an item, open its Action menu (...) and click **Move**. Select the new project for the item, then click **Move Assets**. If **Move** is unavailable or there are no available destination projects, verify that the appropriate conditions are met:

- Administrators can always move assets and projects to any location.
- Project leaders and project owners can move assets and nested projects among their projects.
  - Note that non-administrators can't move projects to become top-level projects
- Other users can move assets only if all three of the following requirements are met:
  - Creator or Explorer (Can Publish) site role.
  - Publishing rights (**View** and **Publish** capabilities) for the destination project
  - Owner of the content, or – for workbooks and flows – having the **Move** capability.

When moving a database with its tables, the user must have the **Move** capability for both the database *and* its tables.

For information about how permissions are handled when moving content and projects, see [Move projects and content](#).

### Metrics

#### Retirement of the legacy metrics feature

Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more

information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.

Metrics are created from views in published workbooks. Users can create metrics if they:

- Are a Creator or Explorer (can publish) site role
- Have the **Publish** capability on a project
- Have the **Create/Refresh Metric** capability for the relevant workbook

For more information, see [Create and Troubleshoot Metrics \(Retired\)](#) and [Set Up for Metrics](#).

**Note:** Prior to 2021.3, the ability to create a metric on a view was controlled by the Download Full Data capability.

Because metrics are independent assets, it's important to note that the permissions for metrics are managed independently from the view they were created from. (This is unlike data-driven alerts and subscriptions, where the content of the alert or subscription can only be seen if the user has the correct permissions for the view itself.)

Although the capabilities for metrics are straightforward, the **View** capability should be considered carefully. It may be possible for a workbook with restricted permissions to be the basis for a metric with more open permissions. To protect sensitive data, you might want to deny metric creation for specific workbooks.

Metrics display data from their owner's perspective

When you create a metric, you capture your perspective of the data from that view. This means that any users who can access your metric will see the data as it appears to you. If the data in the view is filtered based on your credentials, the data you see might be different from what other users see when they access the same view. Limit the **View** capability for your metric if you're concerned about exposing your perspective of the data.

### Explain Data

When Explain Data is available, a user can select a mark in a view and click Run Explain Data in the mark's Tooltip menu. A combination of settings must be enabled to make Explain Data available in editing mode and viewing mode.

Requirements for authors to run Explain Data or edit Explain Data settings in editing mode:

- Site setting: **Availability of Explain Data** set to **Enable**. Enabled by default.
- Site role: Creator, Explorer (can publish)
- Permissions: **Run Explain Data** capability set to **Allowed**. Unspecified by default. If you open a workbook (Tableau version 2022.1 or earlier) that used this permission in Tableau version 2022.2 or later, you must reset the Run Explain Data capability to Allowed.

**Note:** The **Download Full Data** capability for a Creator or Explorer (can publish) controls whether they see the View Full Data option in Extreme Values explanations. Viewers are always denied the Download Full Data capability. However, all users can see record-level details when the Extreme Values explanation type is enabled in Explain Data settings.

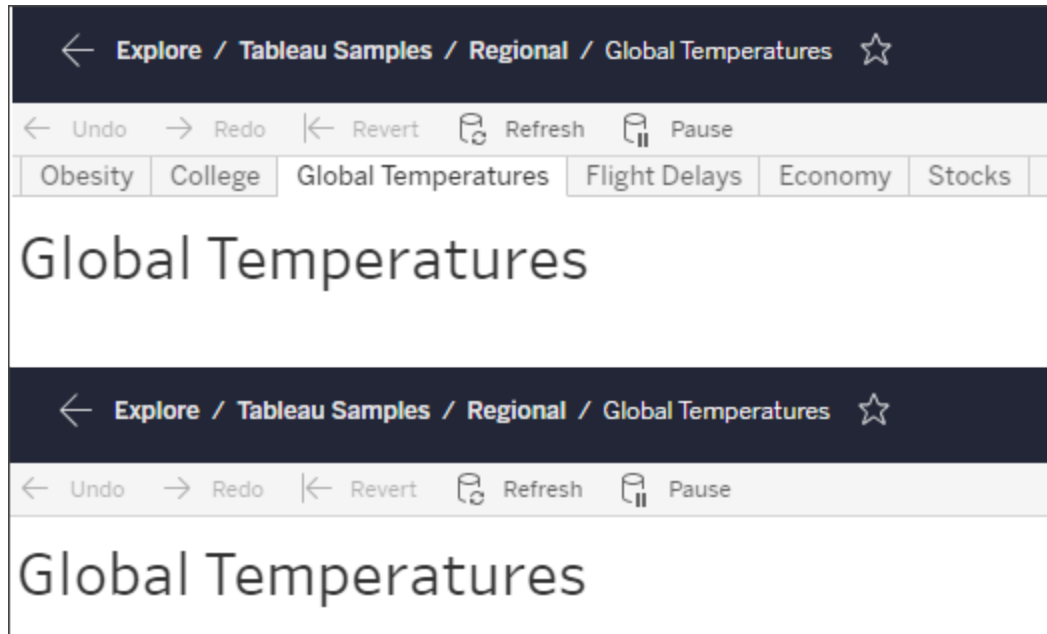
Requirements for all users to run Explain Data in viewing mode:

- Site setting: **Availability of Explain Data** set to **Enable**. Enabled by default.
- Site role: Creator, Explorer or Viewer
- Permissions: **Run Explain Data** capability set to **Allowed**. Unspecified by default. If you open a workbook (Tableau version 2022.1 or earlier) that used this permission in Tableau version 2022.2 or later, you'll need to reset the Run Explain Data capability to Allowed.

### Show or Hide Sheet Tabs

In the context of published content, sheet tabs (also referred to as tabbed views) is a distinct concept from sheet tabs in Tableau Desktop. Showing and hiding sheet tabs in Tableau Desktop refers to hiding sheets in the authoring environment. For more information, see [Manage Sheets in Dashboards and Stories](#).

Showing and hiding sheet tabs (turning tabbed views on or off) for published content refers to navigation in a published workbook. When sheet tabs are shown, published content has navigational sheet tabs along the top of each view.



This setting also impacts how permissions function and may have security implications (see note).

**Note:** It's possible to have the **View** capability for a view without the **View** capability for the workbook or project that contains it. Normally if a user lacks the View capability for a project and workbook, they wouldn't know those assets exist. If they have the View capability for a view, however, a user may be able to see the project and workbook name when looking at the view, such as in the navigational breadcrumb. This is expected and accepted behaviour.

Turn off tabbed views to allow independent view permissions

Although it isn't recommended as a general practice, there are times when it can be useful to set permissions on views independently of the workbook that contains them. To do so, three

conditions must be met:

1. The workbook must be published – there's no way to set view permissions during publishing.
2. The workbook must be in a customisable project.
3. The workbook can't show sheets as tabs (tabbed views must be hidden).

When a workbook shows sheets as tabs, all views inherit the workbook permissions and any changes to the workbook permissions affect all of its views. **When a workbook in a customisable project doesn't show tabbed views, all views assume the workbook permissions upon publication, but any subsequent changes to the workbook's permission rules *won't be inherited by the views*.**

Changing the configuration of sheets as tabs on a published workbooks will also impact the permission model. Show Tabs overrides any existing view-level permissions and reinstates the workbook-level permissions for all views. Hide Tabs breaks the relationship between the workbook and its views.

- To configure sheets as tabs on a published workbook, open the Actions menu (...) for the workbook and select **Tabbed Views**. Choose Show Tabs or Hide Tabs as desired.
- To configure sheets as tabs during publishing, refer to [Show sheets as tabs](#).
- To set view-level permissions, see Set permissions on assets.

**Important:** In a customisable project, any modifications to the workbook-level permissions won't be applied if navigational sheet tabs are hidden (aka tabbed views are off). Changes to permissions must be made on individual views.

## Collections

For information on managing permissions in Collections, refer to [Collections](#).

## Permission Capabilities and Templates

Permissions are made up of capabilities, or the ability to perform a given action on a piece of content, such as view, filter, download or delete. Each row in the Permission Rules area of the dialog is a *permission rule*. Permission rules are the setting for each capability (allowed, denied or unspecified) for the group or user in that row. Permission rules have *templates*

available that make it easier to assign capabilities quickly. Permission rules can also be copied and pasted.

**Note:** In the permission dialog for projects, there are tabs for each content type: **Projects, Workbooks, Data Sources, Data Roles, Flows, Ask Data Lenses, Metrics** and – if you have the Data Management – **Virtual Connections, Databases** and **Tables**. (Virtual connections were added in Tableau Server 2021.4 and Tableau Cloud December 2021. Databases and tables were added in Tableau Server 2022.3 and Tableau Cloud October 2022.) When a permission rule is added, the default for all capabilities across all content types is **Unspecified**. To allow or deny capabilities for each content type, you must go to each tab in turn. In the permission dialog for a specific piece of content, there are no tabs and the permission rules only apply to that piece of content.

## Templates

Templates group sets of capabilities that are often assigned together based on common user scenarios, **View, Explore, Publish** and **Administer**. When you assign a template, its included capabilities are set to **Allowed**, with the rest left as **Unspecified**. The templates are cumulative, so the Explore template includes everything from the View template plus additional capabilities. All content also has a template for **None** (which sets all capabilities to unspecified) and **Denied** (which sets all capabilities to denied).

Templates are meant to be a starting point and can be adjusted after they are applied. Capabilities can also be granted or denied without using a template at all. In both cases, the template column then shows **Custom**.

## Copy and paste permissions

If there is a permission rule that needs to be assigned to multiple groups or users, you can copy and paste from one rule to another. You can't copy from or paste onto a rule that involves Project Leader status.

1. Open the action menu (...) for the existing rule you want to copy from and select **Copy Permissions**. This is available only when the rule is not in edit mode.

2. Select an existing rule you want to paste over. You can also create a new rule by clicking **+ Add Group/User Rule** and selecting a group or user.
3. Open the action menu (...) and select **Paste Permissions**.


## Capabilities

Each content type has specific capabilities:


### Projects

Projects have only two capabilities and two templates. For more information about project leaders and how to assign them, see [Project administration](#).

### View template


 **View** lets a user see the project. If a user hasn't been granted the view capability, the project won't be visible to them. Granting the view capability for a project does not mean a user can see any content in the project, just the existence of the project itself.


### Publish template

 **Publish** lets a user publish content to the project from Tableau Desktop or Tableau Prep Builder. The publish capability is also required to move content into the project or save content to the project from web authoring.

### Workbooks

### View template


 **View** lets a user see the workbook or view. If a user hasn't been granted the view capability, the workbook won't be visible to them.

 **Filter** lets a user interact with filters in the view, including keep-only and exclude filters. Users lacking this capability won't see filter controls in the view.


 **View Comments** lets a user view the comments associated with the views in a workbook.

 **Add Comments** lets a user add comments to views in a workbook.


 **Download Image/PDF** lets a user download each view as a PNG, PDF or PowerPoint.


 **Download Summary Data** lets a user view the aggregated data in a view, or in the marks they've selected, and download that data (as a CSV).

## Explore template


 **Share Customised** lets users add their custom views to the list of “Other Views” visible on a workbook.

- When this capability is denied, users won't see the “Make visible to others” option when they create a custom view. For more information, see [Use Custom Views](#). This capability doesn't impact the ability to share a custom view with the share dialog or by copying the link.

 **Download Full Data** lets a user view the underlying data in a view, or in the marks they've selected, and download that data (as a CSV).

 **Web Edit** lets a user edit the view in a browser-based authoring environment.

- Note that creating new content in the browser or saving views from the web edit interface requires a specific combination of capabilities. For more information, see [Web Editing and Web Authoring](#).
- The Web Editing feature must also be enabled for the entire site or even users with this capability allowed won't be able to web edit. For more information, see [Set a Site's Web Authoring Access](#).

 **Run Explain Data** lets a user run Explain Data on marks in editing and viewing mode.

- Note that for Explain Data to be displayed as an option when a user selects a mark in a workbook, the feature must also be enabled as a site setting. To make Explain Data available in viewing mode, the feature must also be allowed by the author from within a



workbook in Explain Data settings. For more information, see [Control Access to Explain Data](#).

## Publish template



**Download Workbook/Save a Copy** lets a user download a packaged workbook (as a TWBX). Lets a user save (publish) a copy from the web edit interface as a new workbook.



**Overwrite** lets a user overwrite (save) the content or asset on the server.

- When allowed, the user can re-publish a workbook, data source or flow, or save a workbook or flow in web authoring, thereby becoming the owner and gaining access to all permissions. After this change in ownership, the original owner's access to the workbook is determined by their permissions just like any other user.



**Create/Refresh Metrics** lets a user create metrics on the views in a workbook and lets any metrics that a user creates from those views refresh. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).

## Administer template



**Move** lets a user move workbooks between projects. For more information, see [Move content](#).



**Delete** lets a user delete the workbook.



**Set Permissions** lets a user create permission rules for the workbook.


## Views


In a workbook that is not in a locked project and does not show sheets as tabs for navigation, views (sheets, dashboards, stories) inherit the workbook permissions at publication, but any changes to permission rules must be made on individual views. View capabilities are the same as those for workbooks, except for **Overwrite**, **Download Workbook/Save a Copy** and **Move** which are only available at the workbook level.

We recommend showing navigational sheet tabs whenever possible so views continue to inherit their permissions from the workbook.

## Data Sources


### View template

 **View** lets a user see the data source on the server.

 **Connect** lets a user connect to a data source in Tableau Desktop, Tableau Prep Builder, Ask Data or web editing.


- If a workbook author embeds their credentials to a published data source in a published workbook, they are essentially embedding their **Connect** capability. Therefore, users can see the data in the workbook regardless of their own **Connect** capability for that data source. If the workbook author doesn't embed their credentials to the published data source, the user needs their own **Connect** capability to the data source to consume the workbook. For more information, see [Data access for published Tableau data sources](#).
- A user must have the **Connect** capability for a data source to use Ask Data and to create Ask Data lenses. For more information, see [Enable Ask Data for Sites and Data Sources](#).

### Explore template

 **Download Data Source** lets a user download the data source from the server (as a TDSX).


- Cube data sources, like those for Microsoft Analysis Services or Oracle Essbase connections, must be used locally. To download the published data source to Tableau Desktop, the user must have the Download capability. For more information, see [Cube Data Sources](#).

### Publish template




 **Overwrite** lets a user publish a data source to the server and overwrite the data source on the server.

Administer template

 **Delete** lets a user delete the data source.










 **Set Permissions** lets a user create and edit permission rules for the data source.


Other types of assets

	View template	Explore tem- plate	Publish tem- plate	Administer tem- plate
Flows	 <b>View</b> lets a user view the flow.	 <b>Download</b> <b>flow</b> lets a user down- load the flow (as a TFLX).	 <b>Run</b> lets a user run the flow.   <b>Overwrite</b> lets a user pub- lish a flow and overwrite the published flow.	 <b>Move</b> lets a user move assets between projects. For more inform- ation, see Move content.   <b>Delete</b> lets a user delete the asset.
Data Roles	 <b>View</b> lets a user view data roles.	n/a	 <b>Overwrite</b> lets a user pub- lish data roles, overwrite pub- lished data roles and edit published data roles' syn- onyms.	 <b>Set Per- missions</b> lets a user create per- mission rules for the asset.
Metrics (The leg- acy Metrics feature was retired in	 <b>View</b> lets a user view metrics.	n/a	 <b>Overwrite</b> lets a user over- write a metric	

February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).)

and edit a metric's details.

Ask Data Lenses	 <b>View</b> lets a user see the lens.	n/a	 <b>Overwrite</b> lets a user edit the lens.
Virtual Connections	 <b>View</b> lets a user see the virtual connection.   <b>Connect*</b> lets a user connect to data using a virtual connection.	n/a	 <b>Overwrite</b> lets a user edit the virtual connection.
Databases	 <b>View</b> lets a user see the database.	n/a	 <b>Overwrite</b> lets a user edit the metadata for the database.
Tables	 <b>View</b> lets a user see the table.	n/a	 <b>Overwrite</b> lets a user edit the metadata for the table.

Collections	 <b>View</b> lets	n/a	n/a	n/a
	a user view collections.			

\*By default, virtual connections have a Custom template that sets the View capability to Allowed but not the Connect capability. Be sure to set the Connect capability to Allowed so that users can connect using the virtual connection.

## Manage Permissions with Projects

Projects can simplify permission management with features such as nested projects, project visibility, non-admin project leaders and locking permissions.

**Tip:** How permissions are set at the project level is important, especially for the Default project. When a new top-level project is created, it inherits its default permission rules (for all content types) from the Default project. When a new project is created nested inside another project, the child project inherits its default permission rules from the parent project.

### Project administration

Projects are containers used to organise and manage access to content. By giving non-administrators privileges to manage projects, certain content administration tasks can be handled at the project level.

**Project Leaders:** Projects can have project leaders, users who have been set as a **project leader**. This setting automatically grants a user their maximum capabilities – depending on their site role – for that project and all content in that project. Project leaders with site role of Explorer (can publish) and above have all capabilities. Project leaders are essentially local admins for the project without access to site or server settings.

**Hierarchy:** Only administrators can create top-level projects. Project owners and project leaders can create nested projects inside their projects.

Project owners and leaders have full administrative access to the project and its content, as well as any nested projects it contains. In a hierarchy, project leaders are implicitly given

project leader access to all child content. To remove project leader access, you must do so at the level in the hierarchy where the role was explicitly assigned.

**Ownership:** A project can have multiple project leaders, but each project has exactly one owner. By default, a project is owned by the user who created it.

A project's owner can be changed by the existing owner or an administrator. (Project leaders can't change project ownership, only content ownership). Projects can be owned by users with a site role of Explorer (can publish), Creator or administrator. Project ownership can be changed even if a project is locked.

**Deleting:** Most content can only exist inside a project. Only administrators can create and delete top-level projects, but project leaders can create or delete nested projects.

Deleting projects also deletes all the Tableau content and nested projects they contain. To delete a project without losing its content, move the content to another project first. Deleting projects can't be undone.

External assets are handled differently. They don't have to be in a project. External assets aren't deleted if their project is deleted and continue to appear in **External Assets**. See [External assets that aren't in projects](#) for more information.

For a deeper dive into project administration, see [Use Projects to Manage Content Access and Add Projects and Move Content Into Them](#).

### Special projects

**Default:** The project named "Default" is a special project. When other top-level projects are created, they use the Default project as a template, and copy all their permissions rules from it (but not the **Asset permissions** setting). The **Default** project can't be deleted, moved, or renamed, but its description can be changed. It has no owner by default, but one can be assigned.

**External Assets Default Project:** In Tableau Cloud and Tableau Server 2023.1 and later, if you have a Data Management licence with Catalogue enabled, the project named "External Assets Default Project" appears when Catalogue needs to move new or existing external

assets to it. Catalogue puts new external assets and external assets from deleted projects in the **External Assets Default Project**. The project has no permissions rules by default, so server administrators and site administrators are the only users who can see it unless permissions are added. It can't be deleted, moved or renamed, but its description can be changed. It has no owner by default, but one can be assigned.

### Set a project leader

Project leaders are users who have administrator-like access for a specific project or project hierarchy.

To assign project leader status to a group or user

1. Open the permission dialog for the appropriate project.
2. Select an existing permission rule, or click **+ Add Group/User Rule** and chose the desired group or user.
3. Open the action menu (...) for that permission rule and select **Set Project Leader....**

**Note:** If the action menu includes an option for **Enable "Set Project Leader"**, this needs to be selected before the group or user can be set as a project leader. This option only appears when that group or user was denied the Project Leader capability (prior to 2020.1). That denied capability needs to be removed before they can be set as a project leader.

After a permission rule establishes a project leader, the templates and capabilities can't be edited because all capabilities are allowed for project leaders. If a project leader is established on a project that contains nested projects, they have inherited project leader status on all nested projects and their content.

Project leader status is always applied downward through the entire project hierarchy and can only be removed from the level where it was set. To remove project leader status, follow the same steps but select **Remove as Project Leader** from the action menu. After a group or user has been removed as project leader, that permission rule has all capabilities set to Unspecified. This may mean their access to and capabilities for that project is removed if there's no

other permission rule giving them permissions to the content. To keep their access to the project and its content, they need to have capabilities set like any other group or user.

**Note:** Project leaders can refresh extracts in their projects in most circumstances. They can't refresh extracts if they're only the project leader of a nested project (instead of a top-level project) and the top-level project is *locked (including nested projects)*.

### Lock asset permissions

Permission rules set at the project level act as a default for content saved in that project and any nested projects it contains. Whether those project-level default rules are enforced or only preliminary depends on the **Asset permissions** setting. This setting can be configured in two ways, either **Locked** (recommended) or **Customisable**. Locking a project removes the ability for content owners to modify the permission rules on their content. Locking permissions can be applied to nested projects or just to the parent project itself.

- When **Asset permissions** is **Locked** (including nested projects), permission rules set at the project level are enforced for all assets in the project and all nested projects.
- When **Asset permissions** is **Locked** (*not* including nested projects), permission rules set at the project level are enforced for assets in the project. Nested projects can be configured independently with their own permission rules and set as locked or customisable.
- When **Asset permissions** is **Customisable**, permission rules set at the project level are applied to all assets in the project by default. However, permission rules can be modified for individual assets during or after publishing.

**Note:** Whether permission rules are locked or customisable, the permissions on content are always applied. *Locked* and *customisable* refer only to how project-level permissions are inherited by content in the project and who can change them. Even in a project with customisable permissions, only specific users can modify permissions (content or project owner, project leader, admins or those with the Set Permission capability).

In a locked project:



- The project permission rules per content type are applied to all assets.
- Only administrators, project owners and project leaders can modify permissions.
- Content owners lose the Set Permission capability but retain all other capabilities on their content.
- Permissions are predictable for all content in the project.

In a customisable project:

- The project permission rules are applied by default when content is published into the project or nested projects are created, but permissions can be modified during publication or after the content is created.
- Any user with the Set Permissions capability can modify permission rules for that content.
- Content owners have all capabilities on their content.
- Permissions can be different across content in the project.


Set asset permissions (lock a project)

New top-level projects inherit all initial permission rules from the Default project but not the **Asset permissions** setting, which is set to **Customisable**. This can be changed to **Locked** if desired.


To configure **Asset permissions**:

1. You must be logged into the site as an administrator, project owner or project leader
2. Open the permissions dialog for a project
3. Next to **Asset permissions** in the upper left, click the **Edit** link and select the desired option in the **Asset permissions** dialog

Asset Permissions

☒  **Locked:** Assets inherit project permission rules. Asset-level permissions can't be modified. (Recommended)

☒ Apply to nested projects

☐  **Customizable:** Assets starts with project permission rules. Permissions can be modified by users authorized to do so.

Cancel

Save

**Note:** If the upper left corner doesn't show an **Edit** link in step 3 above, you may be on the permissions dialog for (a) a nested project or a piece of content in a locked project, in which case the link should bring you to the managing project, (b) a piece of content in a customisable project, which won't show anything or (c) a view, which will indicate how the view permissions are tied to the workbook. For more information on the interplay of permissions for views and workbooks, see [Show or Hide Sheet Tabs](#).

Change asset permissions

When the **Asset permissions** setting for a project is changed, the outcome depends on the new setting. Changes to permission rules in a locked hierarchy must be done at the level of the managing project.

Changing from	Changing to	Outcome
Locked (including nested projects)	Locked	Doesn't modify existing permission rules.  Any nested projects become customisable.
	Customisable	Doesn't modify existing permission rules, though they become customisable.

		Any nested projects become customisable.
Locked	Locked (including nested projects)	Overwrites existing custom permission rules for all nested projects and their content. This can't be undone.
	Customisable	Doesn't modify existing permission rules, though they become customisable.
		Any nested projects retain their content permission settings and permission rules.
Customisable	Locked (including nested projects)	Overwrites existing custom permission rules for content in the project, and all nested projects and their content. This can't be undone.
	Locked	Overwrites existing custom permission rules for content in the project. This can't be undone.
		Any nested projects retain their permission rules and remain customisable.

Move projects and content

Move Tableau content and external assets

When *Tableau content* or *external assets* are moved between projects with different permission settings, **Asset permissions** settings determine the logic of how permissions are applied.

- Moving assets into a locked project overrides the existing permission rules and enforce the destination's permissions.
- **Moving assets into a customisable project maintains the existing permission rules on the asset.**

**Note:** Prior to Tableau Server 2022.3 and Tableau Cloud June 2022, external assets couldn't be in projects, and permissions on tables were managed through the **Table permissions** setting of the parent database. Beginning with Tableau Server 2022.3 and Tableau Cloud June 2022, external assets can be in projects. If a database or a table is moved into a project, older settings to control table permissions through the database are ignored, and the database or table permissions follow the logic of other assets.

## Move projects

When a *project* is moved into another project, the permissions settings on the item being moved are maintained unless the destination project is scoped to include nested projects. (Project permissions in this case mean the View and Publish capabilities for the project itself.)

- If the destination project is set to **locked (including nested projects)**, the permissions for the project being moved *and its content* are overwritten.
- If the destination project is set to **locked** (not including nested projects), the permissions for the project being moved aren't overwritten. Whether the moved project is locked or customisable is preserved from its original setting.
- If the destination project is set to **customisable**, the permissions for the project being moved aren't overwritten but they're now editable.

If the project being moved was previously nested under a parent that was *locked (including nested projects)*, when moved, the project takes on the setting of *locked (including nested projects)* and becomes the managing project for any projects it contains. Note: This is the same outcome if a project is moved to become a top-level project.

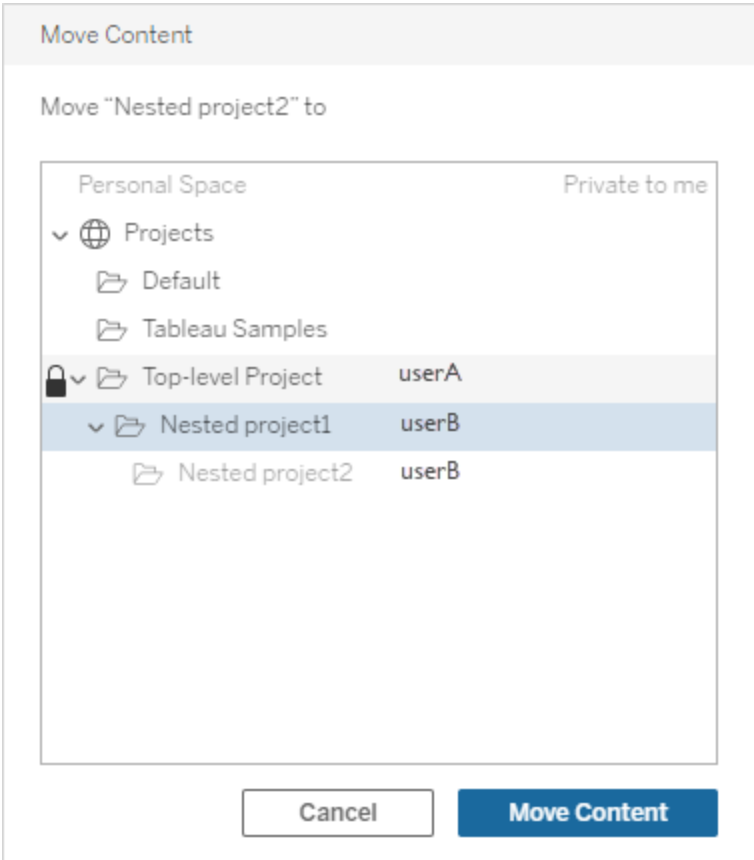
## Use care moving locked nested projects

Moving nested projects inside *locked (including nested projects)* environments can be tricky. A project can be moved into situation that prevents the user from moving it out again.

If a nested project is owned by a different user than the managing project, and the managing project is set to *locked (including nested projects)*, a nested project can wind up unable to be moved by anyone except an admin.

For example, consider a locked (including nested projects) top-level project owned by userA, and two nested projects owned by userB. If userB moves one nested project inside the other, they aren't then able to move it back out – and neither is userA.

- UserB can't move **Nested project2** because they don't have rights to move rights on **Top-level Project** as a destination.
- UserA can't move **Nested project2** because they don't have move rights on it.
- A project leader on **Top-level Project** can't move it even though project leader trickles down to nested projects.
- Only an admin can move **Nested project2** in this setup.



## Collections

Unlike projects, which contain content, a collection can be thought of as a list of links to content. Project permissions can be inherited by the content in the project, but permissions for a collection have no effect on the content added to the collection. This means that different users might see different numbers of items in a collection, depending on which items they have permission to view. To make sure that users can see all items in a collection, adjust the permissions for those items individually.

Permissions for a collection can be changed either by using the permissions dialog or by granting access upon sharing a collection, if you're an administrator or the collection owner. For more information, see [Manage Collection Permissions](#).

## Private collections

When a collection is created, it's private by default. A private collection appears on the owner's My Collections page, but it doesn't appear in the list of all collections on a site. Private collections are simply collections with no permission rules added. Unlike other types of content, collections don't have the "All Users" group added by default. When you add permission rules to a collection, it's no longer flagged as private. To return a collection to a private state, remove the permission rules.

Private collections can be viewed by the collection owner as well as by administrators, whose site role gives them effective permissions to view all collections.

## Effective permissions

A permission rule establishes who is impacted (a group set, group or user) and what Capabilities they are **Allowed**, **Denied** or **Unspecified**. While it seems straightforward to simply set a permission rule and have that be the whole story, whether a user has a capability may be unclear because of membership in multiple groups and the interplay of site roles and ownership with permission rules.

Multiple factors are evaluated in a specific order, yielding *effective permissions* on a piece of content.

**Tip:** To help keep things as straightforward as possible, we recommend (1) setting permission rules for groups instead of users, (2) managing permissions locked at the project level instead of setting permissions on individual content and (3) deleting the All User group's permission rule or setting all capabilities to None.

A capability is allowed for a user if and only if the following three conditions are all met:

- The capability is within the scope of their site role.
- They have that capability:
  - based on a specific user scenario (such as being the content owner or a project leader, or they're an administrator site role),  
OR
  - because they have been allowed the capability as a user,  
OR
  - because they are both in a group that has been allowed the capability and no rules deny them the capability as a user or member of another group.
- There is no conflicting permissions settings at another content level that takes precedence.

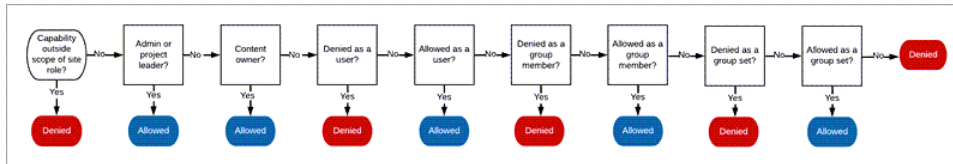
Any other situation denies the user the capability.

Hovering over a capability brings up a tooltip that explains the effective permission. Here are some common examples of why effective permissions – what the user can or can't do in actuality – might appear different than what a given permission rule states:

- A user might have a capability they are denied in a permission rule because their site role includes it (administrators).
- A user might have a capability they are denied in a permission rule because their user scenario allows it (because they own the content or are a project owner or leader).
- A user might lack a capability they are allowed in a permission rule because their site role doesn't allow it.
- A user might lack a capability they are allowed in a permission rule because a conflicting group or user rule denied it.
- A user might lack a capability they are allowed in a permission rule at one level of content (such as a workbook) because another level of content denied it (such as a view).

## Evaluate permission rules

Permissions in Tableau are restrictive. Unless a capability is granted to a user, they are denied permission. The following logic evaluates if a capability is allowed or denied for an individual:



1. **Site role:** If a site role doesn't permit a capability, the user is denied. If the user's site role does permit the capability, then specific user scenarios are evaluated.
  - For example, a Viewer site role can't web edit. See [General capabilities allowed with each site role](#) for more information on what each site role can do.
2. **Specific user scenarios:**
  - If the user is an admin they have all capabilities on all content.
  - If the user is a project owner or project leader, they have all capabilities on all content in their projects.
  - If the user is the content owner, they have all capabilities\* on their content.
  - If these scenarios do not apply to the user, then user rules are evaluated.

\*Exception: Content owners won't have the **Set Permissions** capability in projects where permissions are locked. Only administrators, project owners and project leaders can set permission rules in locked projects.

3. **User rules:** If the user is denied a capability, it is denied. If they are allowed a capability, it is allowed. If a capability is unspecified, then group rules are evaluated.
4. **Group rules:** If the user is in *any* group that is denied a capability, it is denied. If the user is in a group that is allowed a capability (and not in any groups that are denied that capability), it is allowed.
  - That is to say, if a user is a member in two groups, and one is allowed a capability and one is denied the same capability, the denial takes precedence for that user and they are denied.
5. **Group set rules:** If a user is a member of a group in a group set, any group in the group set that is denied a capability is then denied.
6. If none of the above conditions apply, the user is denied that capability. In effect, this means that capabilities left as unspecified will result in denied.



A final effective permission of **Allowed** therefore occurs in three circumstances:

- Allowed by site role (Server Administrator, Site Administrator Creator, Site Administrator Explorer)
- Allowed because the user is the content owner, project owner or project leader
- Allowed by a group, group set or user rule (and not denied by a rule of higher precedence)

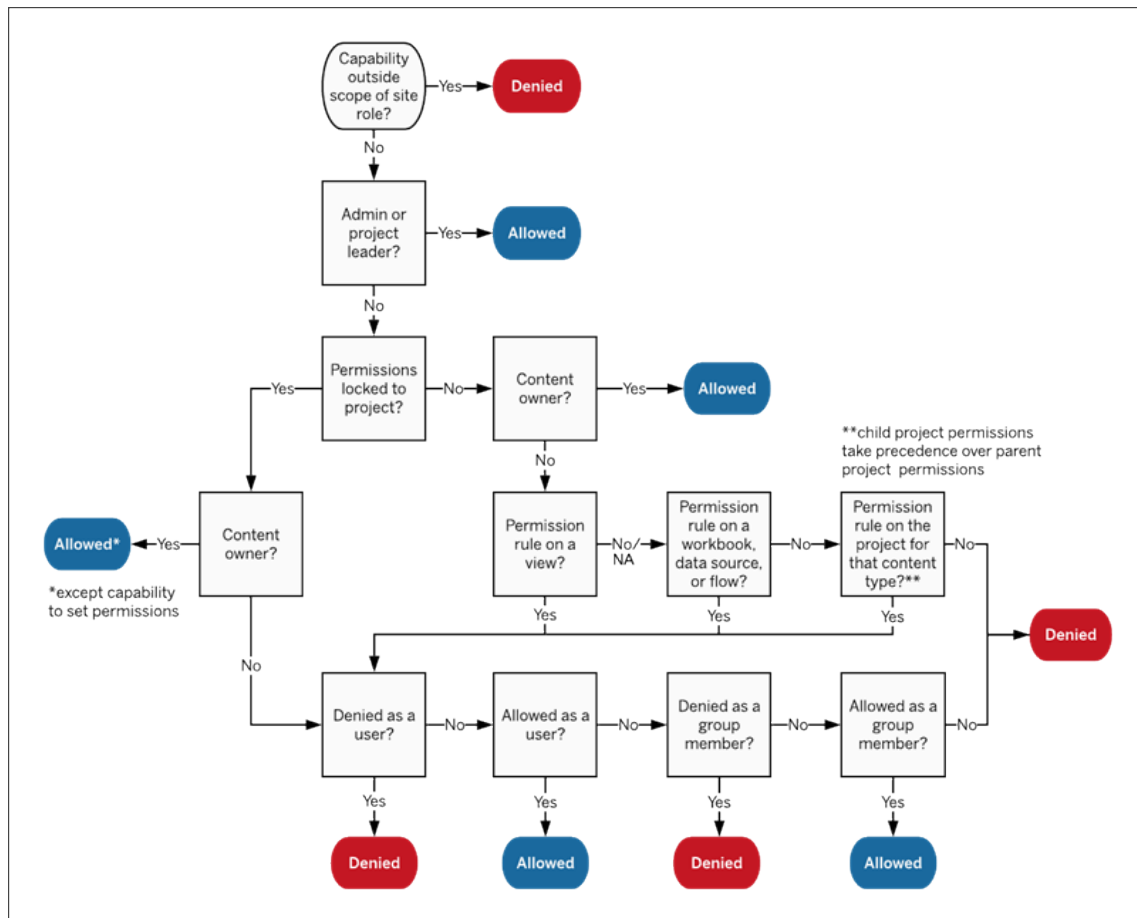
**Denied** occurs in three circumstances:

- Denied by site role
- Denied by a rule (and not allowed by a rule of higher precedence)
- Not granted by any rule

Evaluate permissions set at multiple levels

If **Asset permissions** are set to **Customisable**, it's possible to configure permission rules in multiple places. There are specific rules that determine what permissions are applied on the content.

- If there are nested projects, permissions set at the child level take precedence over permissions set at the parent level.
- Changes to permissions at the project level are not enforced for existing content.
- If there are permissions set on content (workbook, data source or flow) during or after publication, these take precedence over rules set at the project level.
- If a workbook doesn't show navigational sheet tabs, any changes to the workbook-level permissions *won't* be inherited by the views and any changes to permissions must be done on the view.
- Configuring the workbook to show navigational sheet tabs will override existing view-level permissions and sync them with the workbook-level permissions. See [Show or Hide Sheet Tabs](#).



This image shows how capabilities are evaluated through multiple levels of content.

### Permissions on views

In a workbook that is not in a locked project and does not show sheets as tabs for navigation, views (sheets, dashboards, stories) inherit the workbook permissions at publication, but any changes to permission rules must be made on individual views. View capabilities are the same as those for workbooks, except for **Overwrite**, **Download Workbook/Save a Copy** and **Move** which are only available at the workbook level.

We recommend showing navigational sheet tabs whenever possible so views continue to inherit their permissions from the workbook. For more information, see [Show or Hide Sheet Tabs](#).

## Permissions, Site Roles and Licences

Adding a user to Tableau Cloud requires an available licence. (Users can also be added as unlicensed and configured so they will consume a licence only when they first sign in. For more information, see [Grant Licence on Sign-in](#).) For each site the user belongs to they have exactly one site role, restricted by their licence. A user has permissions for content on the site, restricted by what their site role allows.

Licences and site roles apply to users. Permission capabilities apply to content.

**Licences** are assigned to a user when they are created (or sign in for the first time) on the Tableau Server or Tableau Cloud site. Users are licensed as a **Creator**, **Explorer** or **Viewer**.

- Licence levels are consumed based on the maximum *site role* a user can have on that server.
  - Server Administrator, Site Administrator Creator and Creator site roles use a Creator licence.
  - Site Administrator Explorer, Explorer (can publish) and Explorer site roles use at least an Explorer licence.
  - Viewer site role uses at least a Viewer licence.
  - An unlicensed user can exist on the site, but they cannot sign in unless they were added with grant site role on sign-in.
- For Tableau Server, a user consumes only one licence per server, even if they are a member of multiple sites. If a user is a member of multiple sites, their required licence level is determined by their highest site role. (For example, if a user has a Creator site role in one site and a Viewer site role in two others, they consume a Creator licence.)

**Site roles** are assigned to a user for each site they are a member of.

- Site roles determine the maximum capabilities a user can have in that site. (For example, a user with a site role of Viewer will never be able to download a data source even if that capability is explicitly granted to them on a specific data source.)
- Site roles do not inherently grant any capabilities in and of themselves – with the exception of the administrator site roles. Administrators always have all capabilities applicable to their licence level.











**Permissions** consist of *capabilities*, like the ability to save to a project, web edit a workbook, connect to a data source, etc. They apply to group or user on a specific piece of content (project, data source, workbook, view or flow).

- Permission capabilities are not given to a group or user in a vacuum but rather in the context of content. A user can have different capabilities for different content assets.
- Permissions are evaluated based on the interplay of a user's site role and the permission rules for that user or any groups they are members of.
- Some actions such as web authoring might require combinations of capabilities. For more information, see Permission settings for specific scenarios.

#### Site roles and their maximum capabilities

These tables indicate what capabilities are available for a site role. There may be other ways for a user with a site role to perform a similar action. For example, although Viewers can't be given the **Share Customised** capability to make their custom views visible to others on the workbook, they can share custom views by copying the view URL. See General capabilities allowed with each site role for more information on what each site role can do.

#### Projects

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Publish				

#### Workbooks












































Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Filter				

Tableau Server on Windows Help































 View Com-ments				
 Add Com-ments				
 Download Image/PDF				
 Download Summary Data				
 Run Explain				
Data †				
 Share Cus-tomised				
 Download Full Data				
Web Edit				
 Download Workbook/Save a Copy				
 Overwrite				
 Create/Re-fresh Metrics †				
 Move			*	

 Delete				
 Set Per- missions				

† Prior to Tableau 2021.3, the availability of Explain Data was controlled at the server level only using the tsm configuration set option ExplainDataEnabled. In 2021.3 and later, availability of Explain Data can be controlled in site settings and in a workbook using the Run Explain Data capability. The availability of Explain Data in viewing mode is controlled in a workbook in the Explain Data Settings dialog box.

























‡ Prior to Tableau 2021.3, the Create/Refresh Metrics capability was controlled by the Download Full Data capability.

#### Data Sources

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Connect				
 Download				
Data Source				
 Overwrite				
 Delete				
 Set Per- missions				


























## Tableau Server on Windows Help

### Data Roles

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Overwrite				
 Move			*	
 Delete				
 Set Per- missions				

























### Flows

To run flows on a schedule, you must have a Data Management licence. For information about configuring flow settings, see [Create and Interact with Flows on the Web](#). Explorer licence users can run flows on Tableau Cloud.

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Download				
Flow				
 Web Edit				
 Run Flow				
 Overwrite				

 Move			*	
 Delete				
 Set Per- missions				

Ask Data Lenses

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Overwrite				
 Move			*	
 Delete				
 Set Per- missions				

























Metrics

Retirement of the legacy metrics feature






Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.



## Tableau Server on Windows Help










Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Overwrite				
 Move			*	
 Delete				
 Set Per- missions				

## Collections

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				

## Virtual Connections

Virtual connections require a Data Management licence. See [About Data Management](#) for details.

Capability	Creator	Explorer (can publish)	Explorer	Viewer
 View				
 Connect				
 Overwrite				

 Move			*	
 Delete				
 Set Per- missions				

\* Although the Explorer role can be given the **Move** capability, they can't have the **Publish** capability on a project, and therefore there is no place for them to move content to. The **Move** capability should therefore be considered not possible for Explorer site roles.

## Quick Start: Permissions

A permission rule is a set of capabilities that defines what access a group or user has to a piece of content, such as a workbook, project or data source.

To efficiently manage permissions:

- Remove permissions from the **All Users** group before creating more groups
- Configure template permissions on the **Default** project before creating more projects
- Manage permissions for groups, not users
- Manage permissions for projects, not content

Create group permission rules for projects

For details on the following steps, see the [main article on permissions](#). This Quick Start guide is an overview and doesn't capture many important details about permissions and permission management.

### 1. Add users to groups

A common way to manage permissions is to use groups for users who should have the same permissions.

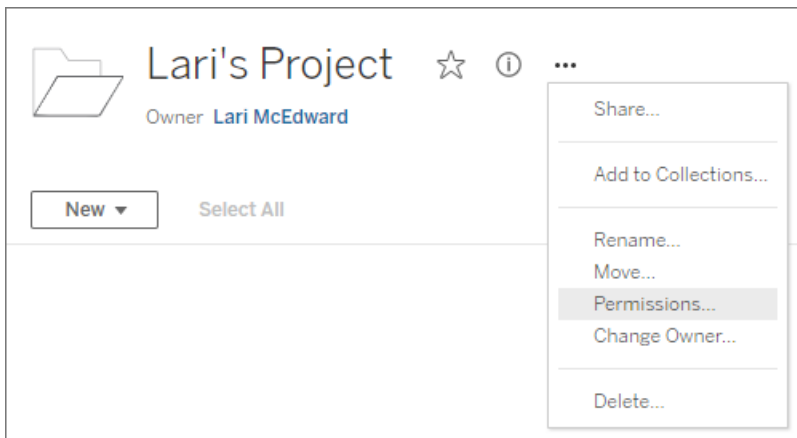
## Tableau Server on Windows Help

1. If necessary, add users to the site.
2. Within a site, select **Groups**.
3. If necessary, create a group using the **Add Group** option.
4. Click a group name to open it, then use the **Add Users** button to add existing users to the group.

### 2. Access project-level permissions settings

The **Explore** page displays the content on the site. Use the dropdown to display Top-Level Projects or All Projects (to see nested projects as well).

Navigate to the project you want to update, open the **Actions (...)** menu, then select **Permissions**.

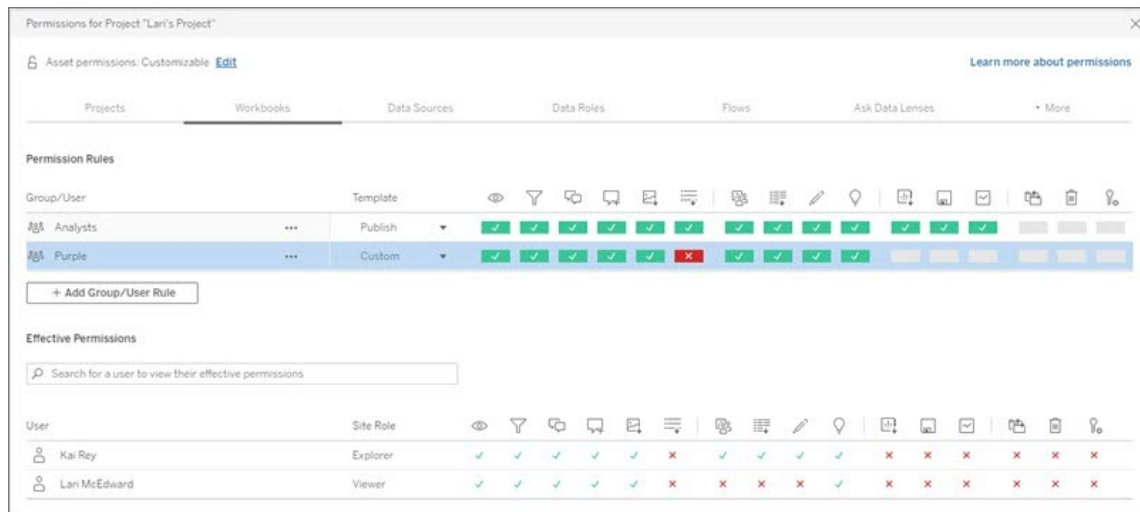


### 3. Create a permissions rule

Select **+ Add Group/User Rule** to create a new permission rule.

The template drop-down offers a shortcut to apply an initial set of capabilities for the group.

If desired, customise the permission rule by clicking a capability to set it to **Allowed** or **Denied**, or leave it **Unspecified**.



Whether a user can set permissions is based on their site role, content ownership and how their **Set Permissions** capability is set.

#### 4. View a user's effective permissions

After you save the permissions rule for the group, you can view the effective permissions for each user. Click a group name to see the group's users and their permissions. Hover over a capability box to see a tooltip with details on whether a capability is allowed or denied.

## Site roles

A user's site role determines the maximum permissions allowed for that user.

- Server and site administrators can access all site content and take actions on it.
- Owners always get full access to the content they've published. When the parent project permissions aren't locked, owners can change permissions for their published content.

For more information, see [Set Users' Site Roles](#) and [Use Projects to Manage Content Access](#).

## Permission logic

- **Denied** takes precedence over **Allowed**.
- **Unspecified** results in **Denied** if no other permissions are specified.

## Tableau Server on Windows Help

- Specific user permissions on content take precedence over group permissions on content. In other words, user permissions trump group permissions.

For more information, see [Effective permissions](#).



# Manage Content Ownership

When you publish a data source or workbook on Tableau Server or when you create a project, you become its *owner*. A content owner, a project leader with an appropriate site role, or an administrator can change ownership of a content asset. After ownership is reassigned, the original owner has no special connection to the content item, and their ability to access it is determined by their permissions on the project or that specific item.

Who can change or be given ownership, by content type

Whether you can change or be given ownership depends on your permissions and your relationship to the content asset, as described in the following table.

**Note:** Full project leader access is available only with some site roles. For information, see Project-level administration.

Content asset type	Who can change ownership	Who can be given ownership
Top-level projects	Server administrator <sup>1</sup>  Site administrator	Server administrator  Site administrator (Creator and Explorer)  Creator  Explorer (can publish)
Child (nested) projects	Server administrator  Site administrator  Project owner	Any administrator or owner, excluding Explorer and Viewer.
Workbooks and data	Server administrator	Server administrator

<b>sources</b>	<p>Site administrator</p> <p>Workbook or data source owner</p> <p>Project leader or owner of the project that contains the item</p>	<p>Site administrator</p> <p>Creator</p> <p>Explorer</p> <p>Viewer</p>
<b>Metrics</b> (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see <a href="#">Create and Troubleshoot Metrics (Retired)</a> .)	<p>Server administrator</p> <p>Site administrator</p> <p>Metric owner</p> <p>Project leader or owner of the project that contains the item</p>	<p>Any administrator or user of the site, excluding Explorer and Viewer.</p>
<b>Ask Data lenses</b>	<p>Server administrator</p> <p>Site administrator</p> <p>Lens owner</p> <p>Project leader or owner of the project that contains the item</p>	<p>Any administrator or user of the site, excluding Explorer and Viewer.</p>
<b>Flows</b>	<p>Server administrator</p> <p>Site administrator</p>	<p>Starting in version 2021.2, server and site administrators can only change the owner to themselves.</p>



<b>Data Roles</b>	Server administrator Site administrator Data role owner Project leader or owner of the project that contains the item	Any administrator or user of the site, excluding Explorer and Viewer.
<b>Collections</b>	Server administrator Site administrator Collection owner	Server administrator Site administrator Creator Explorer Viewer
<b>Virtual Connections<sup>2</sup></b>	Server administrator Site administrator Virtual connection owner	Server administrator Site administrator Creator

<sup>1</sup> The Server Administrator site role applies to Tableau Server only; not Tableau Cloud.

<sup>2</sup> Virtual connections require Data Management. See About Data Management for details.

Note that to edit a virtual connection, you must have the database credentials.

#### Considerations for changing content ownership

- Before you remove a user from Tableau Server, make sure they do not own any content assets.

If the user does own content, you must first reassign ownership of those assets before you can delete the user. Otherwise, their site role is set to **Unlicensed**, but they are not deleted, and only an administrator can take certain actions on that content.

- If you change the ownership of a workbook or data source that includes embedded credentials to connect to underlying data, the embedded credentials will be deleted. For flows, embedded credentials are preserved when changing ownership. Connections to published data sources are authenticated using the flow owner and authorised based on their permissions.

You can update the embedded credentials by editing the connection information on Tableau Server. For more information, see [Edit Connections](#). Alternatively, the new owner can download the flow, workbook or data source and open the item in Tableau Desktop to update the embedded credentials and then re-publish the content.

- If you do not lock permissions to projects, make sure users you give content ownership to know your permissions guidelines, or you account for permissions as you change ownership. In unlocked projects, by default, content owners can set permissions on their content. For more information, see [Permissions](#).
- While it is possible to change the owner of a metric to a user with a site role of Viewer or Explorer, it is not recommended, because doing so will cause the metric refresh to be suspended. A site role of Creator or Explorer (can publish) is required to refresh, overwrite or delete a metric.

#### Change the owner of a content resource

1. Sign in to the Tableau Server web environment, and from the navigation menu, select **Explore**.
2. Navigate to the content you want to assign to someone else.
  - If you want to reassign multiple of the same type of content, for example, multiple workbooks, select the content type from the drop-down menu.

## Tableau Server on Windows Help

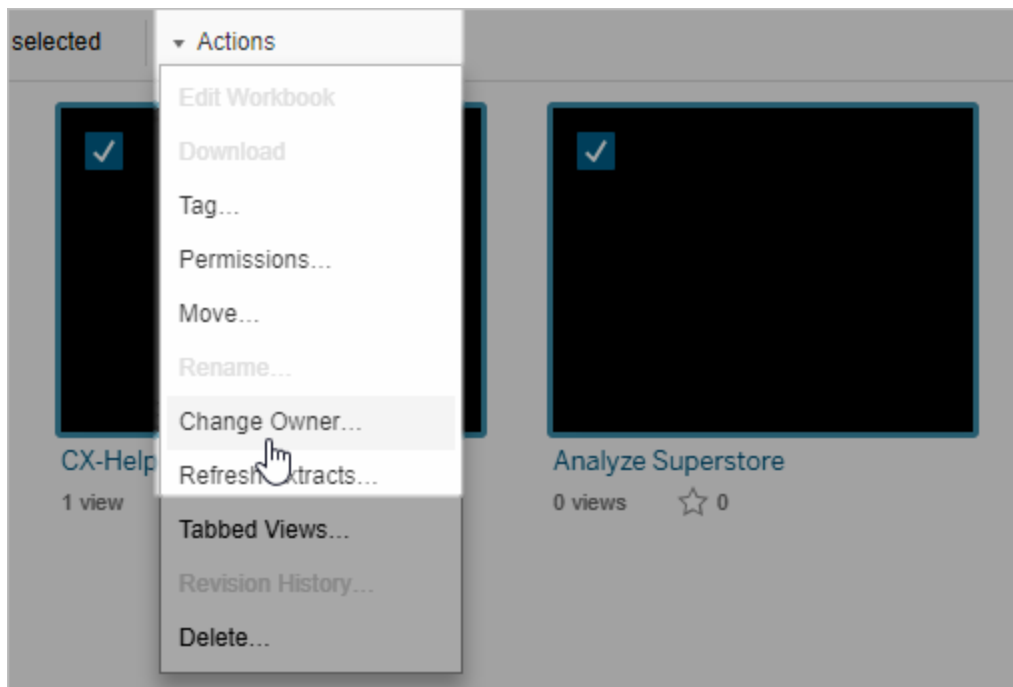
- If you want to reassign multiple items within the same project, navigate to the project.

If you're not sure where to find a child project, display filters, and select **Show all projects**.

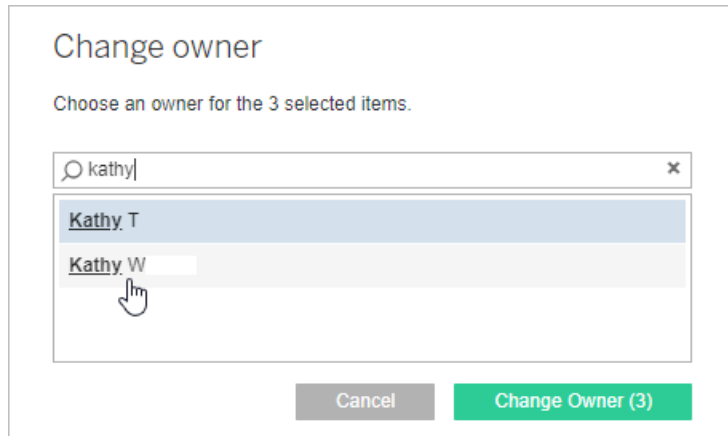
- If you want to reassign multiple content items with the same owner, find the user on the **Users** page.

3. Select the items you want to reassign, and then select **Actions > Change Owner**.

The other menu commands you see will depend on the content type.



4. Type the name of a user or select a user from the list.



5. Click **Change Owner**.

## Manage Permissions for External Assets

Tableau Cloud and Tableau Server provide a space for accessing and managing published content. When Tableau Cloud or Tableau Server is licensed with Data Management, you have access to Tableau Catalogue. Tableau Catalogue adds a complementary space and a set of features across your site to track and manage metadata and lineage of external assets used by the content published to your site.

Tableau Catalogue indexes content and assets

Catalog discovers, tracks and stores metadata from the content that you publish to Tableau Cloud or Tableau Server.

Catalogue indexes metadata for the following:

- **Tableau content:** Workbooks, data sources, flows, projects, metrics, virtual connections, virtual connection tables, users and sites. (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).)
- **External assets:** databases and tables associated with Tableau content

Catalogue classifies the metadata of any data that comes from outside the Tableau environment as external assets. The data that comes from outside the Tableau environment is stored in many different formats, such as a database server or a local .json file.

Catalogue tracks only the metadata of the external data and does not track the underlying data in any form (raw or aggregated).

Catalogue metadata includes the following:

- **Lineage information** or the relationship between items. For example, the Sales table has a relationship with both the Superstore data source and the Superstore Sample workbook.
- **Schema information.** Some examples include:
  - Table names, column names, and column types. For example, Table A contains Columns A, B and C, which are types INT, VARCHAR and VARCHAR.
  - Database name and server location. For example, Database\_1 is a SQL Server database at <http://example.net>.
  - Data source name, and the names and types of the fields the data source contains. For example, Superstore data source has fields AA, BB and CC. Field CC is a calculated field that refers back to both field AA and field BB.
- **User curated**, added, or managed information. For example, item descriptions, certifications, user contacts, data quality warnings and more.

How does Tableau Catalogue work?

Tableau Catalog indexes all content published to Tableau Cloud or Tableau Server to track lineage and schema metadata. For example, the metadata comes from workbooks, packaged workbooks, data sources and the Tableau Server or Tableau Cloud repository.

As part of the indexing process, lineage and schema metadata about external assets (databases, tables and other objects) used by the published content are also indexed.

**Note:** In addition to accessing Catalog from Tableau Cloud or Tableau Server, indexed metadata can also be accessed from the Tableau Metadata API and Tableau Server

REST API. For more information about the Tableau Metadata API or metadata methods in the REST API, see [Tableau Metadata API](#) and [Metadata Methods](#) in the Tableau Server REST API, respectively.

### Permissions on metadata

Permissions control who is allowed to see and manage external assets and what metadata is shown through lineage.

**Note:** If Tableau Cloud or Tableau Server is not licensed with Data Management, then by default, only admins can see database and table metadata through the Tableau Metadata API. This default can be changed to use "derived permissions", as described below.

### Access metadata

The permissions used to access metadata through Catalog (or Metadata API) work similarly to permissions for accessing content through Tableau Cloud or Tableau Server, with some additional considerations for sensitive data that can be exposed through lineage and the capabilities granted on external assets.

## Permissions on Tableau content

Catalogue follows the view and manage capabilities that are already in place on existing Tableau content to control the metadata that you can see and manage on Tableau content. For more general information on these capabilities, see [Permissions](#).

## Permissions on external assets using derived permissions

When Tableau Cloud or Tableau Server is licensed with Data Management, by default Catalogue uses *derived permissions* to automatically grant you capabilities to external assets in the following scenarios:

For **View** capability:

- If you are the owner of a workbook, data source or flow, you can see the database and table metadata used *directly* by that workbook, data source or flow. See Additional notes about lineage.
- If you are a project owner or project leader, you can see all the database and table metadata used by the content published to your project.
- Embedded files use the permissions of the source content (such as the workbook, data source or flow), rather than the derived permissions of the external asset (the database or table). For example, if you can see a workbook with an embedded file, you can see the embedded file and its metadata used by that workbook.

For both **Overwrite** and **Set Permissions** capabilities:

- If you are the owner of a flow, you can edit and manage permissions for the database and table metadata used by the flow output.

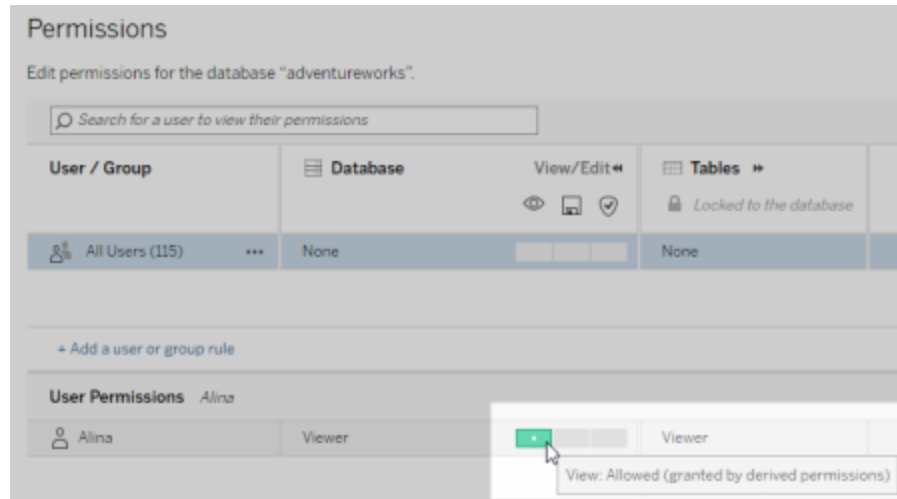
**Note:** In the case of flows, the capabilities mentioned above apply only after the flow has been run successfully at least once under the current owner of the flow.

### Check permissions

As an admin or someone who has been given the capability to set permissions for an asset, you can validate who has derived permissions by following the steps below.

1. Sign in to Tableau Cloud or Tableau Server.
2. From the left navigation pane, click **External Assets**.
3. From the drop-down menu, select **Databases and Files** or **Tables and Objects**.  
**Note:** Local files, like .json or .csv files are grouped as external assets under **Databases**.
4. Tick the box next to the database or table whose permissions you want to modify, and then select **Actions > Permissions**.

5. In the Permissions dialog box, click **+ Add Group/User Rule** and start typing to search for a group or user.
6. Validate the permissions by clicking a group name or username in the permission rules to see the effective permissions below.



### Order of precedence for derived permissions on external assets

When derived permissions are configured for your Tableau Cloud site or Tableau Server, each user's level of access to external assets depends on the associated Tableau content and the order of precedence of rules that Tableau uses for its content.

Tableau follows the rules below, continuing on to the next rule, only if the current rule evaluates to "denied". If any rule evaluates to "allowed", the capability is allowed and Tableau stops evaluating. This rules list is based on the Permissions.

For **View** capability:

1. Admin role
2. Licence
3. Project leader (Tableau content)
4. Project owner (Tableau content)
5. Content owner (Tableau content)



6. *Derived permissions* (applies only to external assets and the View capability)
  - a. Admin role
  - b. Licence
  - c. Project leader (external assets)
  - d. Project owner (external assets)
  - e. Content owner (external assets)
7. Explicit permissions

For **Overwrite** and **Set Permissions** capabilities:

1. Admin role
2. Licence
3. Project leader (Tableau content)
4. Project owner (Tableau content)
5. Content owner (Tableau content)
6. Explicit permissions (Tableau content)
7. *Derived permissions* (applies only to external assets and the Overwrite and Set Permissions capabilities for flow outputs)
  - a. Admin role
  - b. Licence
  - c. Project leader (external assets)
  - d. Project owner (external assets)
  - e. Content owner (external assets)

### Turn off derived permissions

As an admin, you can turn off the derived permissions default setting for a site in favour of manually granting explicit permissions to databases and tables.

1. Sign in to Tableau Cloud or Tableau Server as an admin.
2. From the left navigation pane, click **Settings**.
3. On the **General** tab, under **Automatic Access to Metadata about Databases and Tables**, clear the **Automatically grant authorised users access to metadata about databases and tables** tick box.

**Note:** Data quality warning messages on databases and tables that are visible to users though derived permissions remain visible to those users even when the box is not ticked.





### Set permissions on individual external assets

In order to grant additional users permissions to view, edit (overwrite) and manage external assets, an admin can grant those capabilities explicitly on individual databases or tables for users or groups.

Starting with Tableau Server 2022.3 and Tableau Cloud September 2022, you can organise external assets in projects. Permissions inheritance for external assets works in the same way as it does for Tableau content, as described in the [Permissions](#) topic and can simplify permissions management.

### Summary of permissions capabilities

The following table shows the capabilities you can set for external assets:

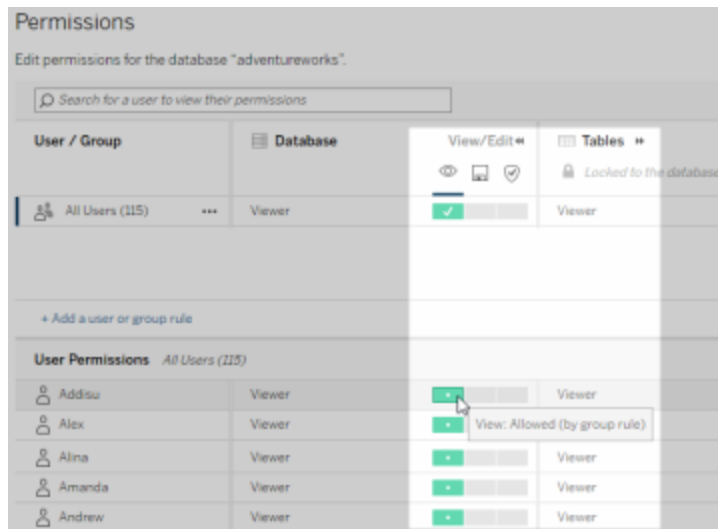
Capability	Description	Template
 View	See the database or table asset.	View
 Overwrite	Add or edit data quality warnings and descriptions of the database or table asset. Prior to version 2020.1, the Overwrite capability was called Save.	Publish
 Move	Move the database or table asset.	Administer
 Set Permissions	Grant or deny permissions for the database or table asset.	Administer

### Set permissions on a database or table

To set permissions on databases or tables, use the following procedure.

1. Sign in to Tableau Cloud or Tableau Server as an admin or someone who has been granted the "Set Permissions" capability.
2. Find the database or table. You can do this through **Explore** (starting with Tableau Server 2022.3 and Tableau Cloud September 2022) if you know the current location of the database or table, or through **External Assets** to see a list of all databases, tables and files.
  - **Explore** - From the left navigation pane, click **Explore** and locate the project the database or table is in.
  - **External Assets** - From the left navigation pane, click **External Assets**. From the drop-down menu, select **Databases and Files** or **Tables and Objects** (Note: Local files, like .json or .csv files are grouped as external assets under Data-bases.)
3. Tick the box next to the database or table whose permissions you want to modify, and then select **Actions > Permissions**.
4. In the Permissions dialog box, click **+ Add Group/User Rule** and start typing to search for a group or user.
5. Select a permission role template to apply an initial set of capability for the group or user, and then click **Save**. Available templates are: View, Publish, Administer, None and Denied.
6. To further customise the rule, click a capability in the rule to set it to Allowed or Denied, or leave it unspecified. Click save when you are done.
7. Configure any additional rules you want for other groups or users.
8. Validate the permissions by clicking a group name or username in the permission rules

to see the effective permissions below.



## External assets that are not in projects

There are some scenarios in which an external asset is not in a project:

- External assets that Catalogue discovered before the **External Assets Default Project** existed (Tableau Cloud December 2022/Server 2023.1) will not be in a project unless they've been moved into one since then.
- External assets that had their project deleted before the **External Assets Default Project** existed (Tableau Cloud December 2022/Server 2023.1) will not be in a project unless they've been moved into one since then.
- In Tableau Server 2022.1 and earlier, external assets cannot be moved to projects at all.

If an external asset is not in a project, permissions for external assets work as they did in Tableau Server 2022.1 and Tableau Cloud June 2022 and earlier. That is, database and table permissions are controlled independently of content in projects, and table permissions can be managed through database permissions. When permissions are set at the database level in this way, those permissions can serve as a template for any newly discovered and indexed

child tables of that database. Furthermore, database permissions can also be locked so that the child tables will always use the permissions set at the database level.

Note: You cannot lock (or unlock) permissions to a database if the database is in a project.

To lock (or unlock) permissions to the database, use the following procedure:

1. Sign in to Tableau Cloud or Tableau Server as an admin or someone who has been granted the "Set Permissions" capability.
2. From the left navigation pane, click **External Assets**. By default, the External Assets page shows a list of databases and files.
3. Tick the box next to the database whose permissions you want to lock, select **Actions > Permissions**, and then click the Table Permissions **Edit** link.
4. In the Table Permissions in Database dialog box, select **Locked** and click **Save**.
5. To unlock permissions, click **Edit** again, and select **Customised**.

### Access lineage information

Catalogue (and the Metadata API) can expose relationship and dependencies metadata, also referred to as *lineage*, among the Tableau content and external assets on Tableau Cloud or Tableau Server. Lineage shows three primary things:

- How items relate to each other, either directly or indirectly
- How many of those items relate to each other
- With the appropriate permissions, shows sensitive data about items in the lineage

### Sensitive lineage data

In some cases, lineage can contain sensitive data, such as data quality warning messages, content or asset names or related items and metadata.

By default, complete lineage information displays for all users while its sensitive data is blocked from specific users who don't have the appropriate View capabilities. The concept of blocking sensitive data is called obfuscation.

Obfuscation allows all metadata in the lineage to be visible while keeping its sensitive data blocked from specific users who don't have the appropriate View capabilities. This default enables workflows that rely on a complete impact analysis.

If obfuscating sensitive data in the lineage is not enough for your organisation, certain parts of the lineage, including its sensitive data, can be filtered.

Filtering omits certain parts of the lineage (and lineage-related areas like data details) for specific users who don't have the appropriate **View** capabilities for its sensitive data. Because filtering omits parts of lineage, it prevents workflows that rely on a complete impact analysis.

To change how sensitive data is handled, do the following:

1. Sign in to Tableau Cloud or Tableau Server as an admin.
2. From the left navigation pane, click **Settings**.
3. On the General tab, under **Sensitive Lineage Information**, select the radio button that best handles lineage information for all users on your Tableau Cloud site or Tableau Server.

### Additional notes about lineage

- **If you have the View capability on related assets**, you can see when and what assets and content are related to each other, and their sensitive metadata.

For example, you can see 1) the names, data quality warnings and total number of related upstream databases and tables and 2) the combined number of sheets (visible and hidden) in the lineage of the downstream workbook of the asset you are evaluating.

- **If you *don't* have the View capability on related assets**, you can always see when assets relate to each other.

For example, you can see 1) whether related upstream databases and tables exist in the lineage and 2) the total number of databases or total number of tables that are related to the asset you are evaluating.

However, you can't see the metadata associated with those assets when you don't have the view capability for them. When metadata is blocked because of limited permissions, or the asset is in a Personal Space, you see **Permissions Required**.

External Assets / Opportunities

About


Hostname: login.salesforce.com Database Type: Salesforce

	Type	Name	Workbooks
<input type="checkbox"/>	Table	Permissions Required	2
<input type="checkbox"/>	Table	Permissions Required	0
<input type="checkbox"/>	Table	Price	0
<input type="checkbox"/>	Table	Product	74
<input type="checkbox"/>	Table	User	109
<input type="checkbox"/>	Table	Permissions Required	1


- If you *don't* have the View capability on related assets, you can always see whether the assets are certified.

However, if you don't have View capability, you can't see sensitive information related to the certification, like the names of the related databases and tables. When metadata is blocked because of limited permissions, or the asset is in a Personal Space, you see **Permissions Required**.

Tables (6)

	Type	Name	Workbooks	Data Sources
<input type="checkbox"/>	Table	Permissions Required	1	1
<input type="checkbox"/>	Table	Permissions Required	0	1
<input type="checkbox"/>	Table	Permissions Required	0	1
<input type="checkbox"/>	Table	REI	2	4
<input type="checkbox"/>	 Table	Permissions Required	0	1
<input type="checkbox"/>			0	5

On this asset

 Under maintenance

Permissions Required

Set by workgroupuser

Aug 7, 2019, 10:23 AM

For more information about lineage see Use Lineage for Impact Analysis.

**Additional notes about tags discoverable through lineage data**

In addition to Tableau content, external assets can also be tagged. Although tags are always visible, tagged items that you see through lineage data can either be obfuscated (default) or filtered as described earlier in this topic.

When tagged items are obfuscated:

- **If you have the View capability for tagged items**, you can see the tagged items and related tagged items, and all metadata.
- **If you don't have the View capability for tagged items:**
  - You can see the type of tagged and related tagged items but you can't see sensitive metadata about the items. For example, suppose you use a tag filter to see items with the tag "Noteworthy". Although you can see that there are database items tagged with "Noteworthy", you can't see the names of the tagged databases.



- You can see how many related tagged items there are. For example, suppose you do a tag query on “Noteworthy”. Your query returns five tagged databases.

When tagged items are filtered, the tagged and related tagged items you see are limited to only the items that you have the View capability for.

For more information about tags, see [Tagged Items](#) in the Tableau User Help.

### Potential mismatch between asset results and content results

When Catalogue shows lineage information, it provides information about Tableau content and external assets. Catalogue lineage always shows the true count or result of associated items. However, in other areas of the site, you might see fewer items. This could be because of your **View** capabilities. Outside of Catalogue, you see only the content that your permissions allow.

For example, suppose you're looking at the Superstore data source. The lineage for the Superstore data source shows how many upstream underlying tables the data source connects to and how many downstream workbooks rely on the data source. However, because you might not have permissions to see all of those downstream workbooks, the number of related workbooks in the Catalogue lineage (actual total) might be greater than the number of workbooks in the **Connected Workbooks** tab (what you have permission to see).

There might be other reasons, unrelated to permissions, why you might see a mismatch between asset counts and content counts. For more information, see [Use Lineage for Impact Analysis](#).

Who can do this

The following information summarises the types of users who can do the tasks described in this topic.

## Tableau Cloud site or Tableau Server admin

<b>Data Management</b>	<b>Capability</b>	<b>Requirements</b>
<b>Licensed</b>	See assets and their metadata	None

Data Management	Capability	Requirements
	Edit assets and their metadata	None
	Change permission on assets and their metadata	None
	Grant users ability to see assets and their metadata	<p><b>Default:</b> When “derived permissions” is on, your users can see metadata on external assets for the content that they own, or for the content that is published to a project that they are a project leader or project owner of.</p> <p><b>Ad-hoc:</b> You can configure explicit <b>View</b> permissions on a specified external asset.</p>
	Grant users ability to edit assets and their metadata	You can configure explicit "write" or <b>Overwrite</b> permissions on a specified external asset (if not automatically granted because the user is a flow owner) .
	Grant users ability to change permissions on assets and their metadata	You can configure explicit "edit" or <b>Set Permissions</b> on a specified external asset (if not automatically granted because the user is a flow owner) .

Data Management	Capability	Requirements
Not licensed	See all assets and their metadata	<b>Applies to Metadata API only</b>
	Edit assets and their metadata	Requires Data Management
	Change permission on assets and their metadata	Requires Data Management
	Grant users ability to see assets and their metadata	<b>Applies to Metadata API only:</b>  You can turn on derived permissions as described above. If “derived permissions” is on, your users can see metadata on external assets for the content that they own, or for the content that is published to a project that they are a project leader or project owner of.
	Grant users ability to edit assets and their metadata	Requires Data Management
	Grant users ability to change permissions on assets and their metadata	Requires Data Management

## User with Creator or Explorer licence

Data Management	Capability	Requirements
<b>Licensed</b>	See assets and their metadata	<p><b>Default:</b> When "derived permissions" is enabled by your Tableau Cloud site admin or Tableau Server admin, you can see metadata on external assets for the content that you own, or for the content that is published to a project that you are a project leader or project owner of.</p> <p><b>Ad-hoc:</b> You can see metadata on external assets that you have been granted explicit <b>View</b> permissions to.</p>
	Edit assets and their metadata	You can edit metadata on an external asset that you have been granted explicit "write" or <b>Overwrite</b> permissions to (if not automatically granted because the user is a flow owner).
	Change permissions on assets and their metadata	You can change permissions on an external asset that you have been granted explicit "edit" or <b>Set Permissions</b> to ((if not automatically granted

Data Management	Capability	Requirements
		because the user is a flow owner).
	Grant other users permissions to see assets and their metadata	You can change permissions on an external asset that you have been granted explicit "edit" or <b>Set Permissions</b> to ((if not automatically granted because the user is a flow owner).
Not licensed	See assets and their metadata	<b>Applies to Metadata API only:</b>  If "derived permissions" is enabled by your Tableau Cloud site admin or Tableau Server admin, you can see metadata on external assets for the content that you own, or for the content that is published to a project that you are a project leader or project owner of.
	Edit assets and their metadata	Requires Data Management
	Change permissions on assets and their metadata	
	Grant other users permissions to see assets and their metadata	

# Manage Data

You can connect to and manage the data you that you use in Tableau.

## Tableau Server Data Sources

When your Tableau users want to share data connections they've defined, they can publish data sources to Tableau Server. When a data source is published to the server, other users can connect to it from their own workbooks, as they do other types of data. When the data in the Tableau data source is updated, all workbooks that connect to it pick up the changes.

Looking for Tableau Server on Linux? See [Tableau Server Data Sources](#).

A Tableau Server data source consists of metadata that describes the following:

- **The connection information:** Defines whether the data is in a live database or an extract, and which parts of that data to bring in to Tableau.
- **Customisation and cleanup:** Includes information that facilitates efficient use of the data. For example, calculations, sets, groups, bins, parameters, custom field formatting, and so on.
- **Data access and refresh instructions:** Includes the location of the underlying database server (whether on-premises or in the cloud), network paths for file-based data, security information such as credentials or access tokens, and related information.

In addition to helping your users create data consistency and reliability, using Tableau data sources offers advantages to you as the administrator. Because multiple workbooks can connect to one data source, you can minimise data source proliferation and save on storage space and processing time. When someone downloads a workbook that connects to a Tableau data source that, in turn, has an extract connection, the extract stays on the server, reducing network traffic. Finally, if a connection requires a database driver, you need to install

and maintain the driver only on the server, instead of on each user's computer. If you use Tableau Cloud, all supported drivers are available to data sources published to your site.

## Managing data sources

You can perform some or all management tasks on a data source if you have one of the following levels of access:

- Site or server administrator
- Project leader or owner of the project the data source is published to

Full project leader access is available only with some site roles. For information, see [Project-level administration](#).

- Data source owner

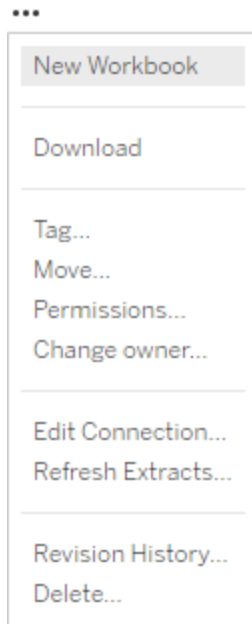
Unless you are a site or server administrator, you might not have access to all management tasks. For example, if the Permissions menu is not available, it is likely that the project permissions will be locked, so that permissions cannot be set on individual workbooks and data sources.

**Tip:** The best practice is to designate a person or team to manage all data sources published to a project or to the whole site, so that all data sources can be maintained under the same set of guidelines.

To perform the management tasks that you have access to, do the following:

1. Sign into the site, and on the **Content** tab, select **Explore > Data sources**.
2. On a data source, select the **Actions (...)** menu.





- **New workbook or Download:** Create a new workbook in the browser environment that connects to this data source. Or download the data source to use locally.
- **Tag:** Add or remove keyword tags. Tags can contain a single word or multiple words, delimited by a comma.
- **Move:** Move a data source from one project to another. This requires specific settings on each project. For information, see Requirements for moving assets.
- **Permissions:** View or update permissions that specify which users or groups can connect to, modify, or download the data source. As mentioned at the beginning of this section, if this action is not available, the project permissions might be locked, and only the project leader or administrator can change permissions.
- **Change owner:** Making someone an owner gives them complete access to it.
- **Refresh extracts:** If a data source includes an extract, you can assign the extract to a refresh schedule.

For information, see Refresh Data on a Schedule.

- **View the revision history of the data source**
- **Delete:** Deleting a data source affects workbooks that connect to the data source. Before you delete a data source, ensure that there are no workbooks that connect to the data source, or edit the workbooks to use another data source.

In addition, for data sources that are proxy connections, administrators can be kept aware of how users authenticate to the database, and whether the appropriate drivers are installed. For information, see [Database Drivers and Data Security](#).

## Restrictions

Published data sources often function as curated and trustworthy data sources. As such, there are restrictions on how they can be modified and used.

Aliases and calculations can't be edited.

- New aliases also can't be created. Fields can be duplicated and the copy can be aliased.
- New calculations can be created. Existing calculation can also be copied and the copy can be edited.

Relationships and joins can't be edited.

Published data sources cannot be used in joins or relationships.

- Use blends if you need to combine published data sources.

## Extract Upgrade to .hyper Format

In Tableau version 2018, we introduced the `.hyper` format for Tableau extracts to replace the old `.tde` format. The `.hyper` format has been the standard format used by Tableau to create extracts since 2018, and the large majority of extracts are now `.hyper` files. Beginning in early 2023, Tableau discontinued support for the `.tde` format on Tableau Cloud and Tableau Public. For more details, see this [Tableau Community post](#).

## Discontinuation of support for TDE extract files

Beginning in 2023, the `.tde` format for Tableau extracts was deprecated. This format was replaced by the `.hyper` format in 2018 but continued to be valid for uploaded files until March 2023.

- This change took place for Tableau Cloud and Tableau Public as of March 2023.
- Beginning with version 2023.1.0 of Tableau Server, the uploading of `.tde` format files is disabled by default. A Server Administrator can change this behaviour. For more information, see `features.Hyper_DisallowTDEPublishing`.

## Set the Site Time Zone for Extracts

The default time zone for extract-based data sources in a site is Coordinated Universal Time (UTC). Server administrators can set a different time zone.

To set the site time zone for extracts:

1. Sign in to Tableau as an administrator.
2. On the site you want to configure, click `Settings`.
3. In the `Site Time Zone for Extracts` section, select a time zone and then click `Save`.

In calculated fields, functions such as `NOW()` or `TODAY()` look at the time zone. For more information about Extracts, see [Extract Your Data](#) in the Tableau Desktop help.

The timezone setting, in addition to being used for extract-based data sources, also affects internal extracts. For example, when Tableau connects to file-based data sources like text files, an extract is automatically created internally. Similarly, this happens where Tableau uses an internal extract to integrate data from different sources.

## Create Extracts on the Web

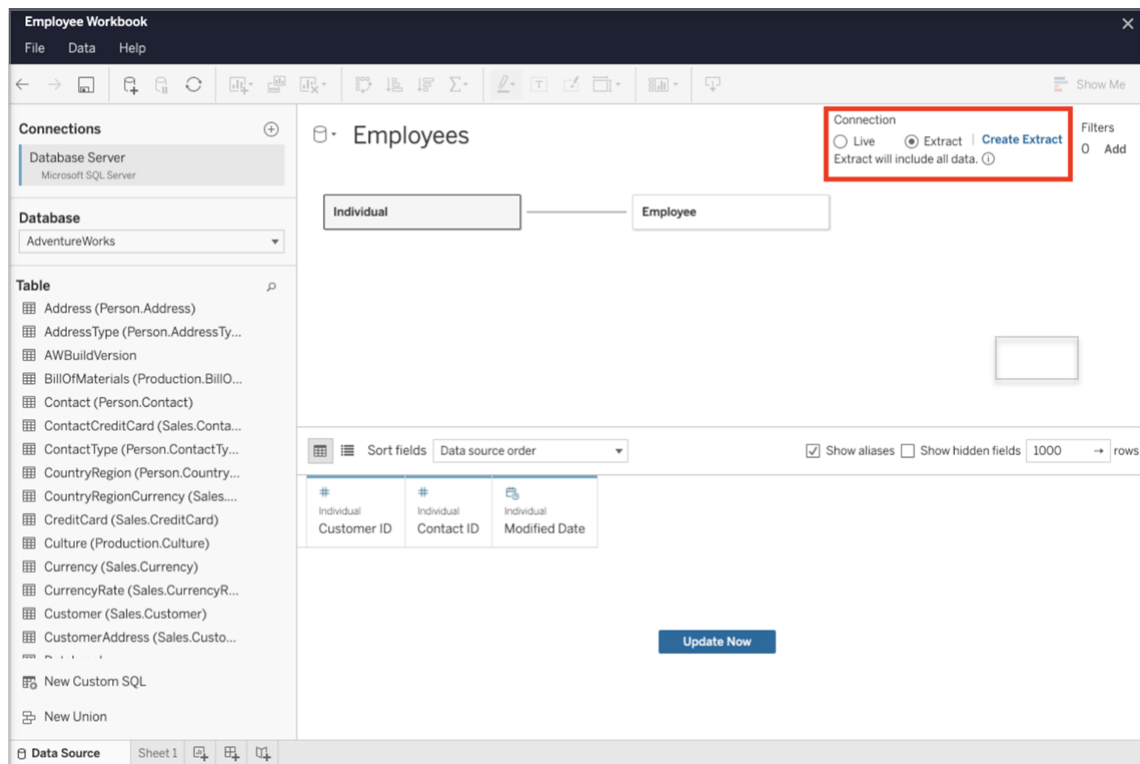
You can extract your data sources in the web (without using Tableau Desktop) to improve data source performance and support additional analytical functions. When you extract your data source, Tableau will copy the data from your remote data store to Tableau Server or Tableau

Cloud. To learn more about the benefits of extracting your data, see [Extract Your Data](#). In the web, you can extract while in Web Authoring or while in Content Server.

## Create extracts in Web Authoring

You can create extracts directly in web authoring with default extract settings.

### Extract an Embedded Data Source in Web Authoring



Complete the following steps to create an extract in web authoring.

**Tip:** It's recommended that you finalise your data model before you create the extract. Extract creation may take a long time and any changes to your data model, such as adding new logical tables, will invalidate the extract.

1. Select the **Data Source** tab in the bottom left corner of the web authoring pane. For new workbooks, you will start in the **Data Source** tab.
2. In the top-right corner, change the connection type from **Live** to **Extract**.

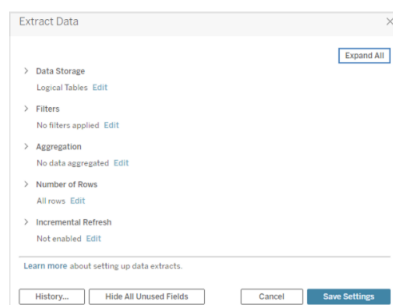
3. Select **Create Extract**. You will see the **Creating Extract** dialog box.

Extract creation might take a long time and you can close your authoring session while the extract is being created. To ensure your extract creation isn't lost, in the dialog box, choose **Notify Me When Complete** to specify a location for the extracted workbook to be saved. If your extract succeeds, your workbook will be saved to the specified location and you will be notified that you can continue your web authoring session.

If your extract creation fails, you will be notified that the extract couldn't be created and you can restore your unsaved changes by reopening the original workbook in web authoring.

### Define your Extract Settings

You can configure one or more of the following options to tell Tableau how to store, define filters for and limit the amount of data in your extract.



- **Decide how the extract data should be stored**

You can choose to have Tableau store the data in your extract using one of two structures (schemas): logical tables (denormalised schema) or physical tables (normalised schema). For more information about logical and physical tables, see [The Tableau Data Model](#). The option you choose depends on what you need.

- **Logical Tables**

Logical tables store data using one extract table for each logical table in the data source. Physical tables that define a logical table are merged and stored with that

logical table. For example, if a data source was made of a single logical table, the data would be stored in a single table.

If a data source was made of three logical tables (each containing multiple physical tables), the extract data would be stored in three tables - one for each logical table.

Select **Logical Tables** when you want to limit the amount of data in your extract with additional extract properties like extract filters, aggregation, Top N or other features that require denormalised data. Also use when your data uses pass-through functions (RAWSQL). This is the default structure Tableau uses to store extract data.

If you use this option when your extract contains joins, the joins are applied when the extract is created.

- **Physical Tables**

Physical tables store data using one extract table for each physical table in the data source.

Select **Physical Tables** if your extract is comprised of tables combined with one or more equality joins and meets the conditions for using the Physical Tables option listed below. If you use this option, joins are performed at query time.

This option can potentially improve performance and help reduce the size of the extract file. For more information about how Tableau recommends you use the Physical Tables option, see [Tips for using the Physical Tables option](#) in the Tableau Desktop help.

In some cases, you can also use this option as a workaround for row-level security. For more information about row-level security using Tableau, see [Restrict Access at the Data Row Level](#) in the Tableau Desktop help.

### Conditions for using the Physical Tables option

To store your extract using the Physical Tables option, the data in your extract must meet all of the conditions listed below.

- All joins between physical tables are equality (=) joins.
- Data types of the columns used for relationships or joins are identical.
- No pass-through functions (RAWSQL) used.
- No incremental refresh configured.
- No extract filters configured.
- No Top N or sampling configured.
- When the extract is stored as physical tables, you can't append data to it.
- For logical tables, you can't append data to extracts that have more than one logical table.

**Note:** Both the Logical Tables and Physical Tables options only affect how the data in your extract is stored. The options don't affect how tables in your extract are displayed on the Data Source page.

### Determine how much data to extract

Select **Add** to define one or more filters to limit how much data gets extracted based on fields and their values.

### Aggregate the data in the extract

Select **Aggregate data for visible dimensions** to aggregate the measures using their default aggregation. Aggregating the data consolidates rows, can minimise the size of the extract file, and increase performance.

When you choose to aggregate the data, you can also select **Roll up dates** to a specified date level such as Year, Month, etc. The following examples show how the data will be extracted for each aggregation option you can choose.

<b>Original data</b>	<p>Each record is shown as a separate row. There are seven rows in your data.</p> <table><thead><tr><th></th><th>Date</th><th>Region</th><th>Sales</th></tr></thead><tbody><tr><td>1</td><td>1/1/2009</td><td>South</td><td>\$500</td></tr><tr><td>2</td><td>1/1/2009</td><td>West</td><td>\$200</td></tr><tr><td>3</td><td>1/1/2009</td><td>West</td><td>\$100</td></tr><tr><td>4</td><td>1/1/2009</td><td>East</td><td>\$300</td></tr><tr><td>5</td><td>1/2/2009</td><td>South</td><td>\$600</td></tr><tr><td>6</td><td>1/2/2009</td><td>South</td><td>\$400</td></tr><tr><td>7</td><td>1/2/2009</td><td>East</td><td>\$100</td></tr></tbody></table>		Date	Region	Sales	1	1/1/2009	South	\$500	2	1/1/2009	West	\$200	3	1/1/2009	West	\$100	4	1/1/2009	East	\$300	5	1/2/2009	South	\$600	6	1/2/2009	South	\$400	7	1/2/2009	East	\$100
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<b>Aggregate data for visible dimensions</b>  <i>(no roll up)</i>	<p>Records with the same date and region have been aggregated into a single row. There are five rows in the extract.</p> <table><thead><tr><th></th><th>Date</th><th>Region</th><th>Sales</th></tr></thead><tbody><tr><td>1</td><td>1/1/2009</td><td>East</td><td>\$300</td></tr><tr><td>2</td><td>1/1/2009</td><td>South</td><td>\$500</td></tr><tr><td>3</td><td>1/1/2009</td><td>West</td><td>\$300</td></tr><tr><td>4</td><td>1/2/2009</td><td>East</td><td>\$100</td></tr><tr><td>5</td><td>1/2/2009</td><td>South</td><td>\$1,000</td></tr></tbody></table>		Date	Region	Sales	1	1/1/2009	East	\$300	2	1/1/2009	South	\$500	3	1/1/2009	West	\$300	4	1/2/2009	East	\$100	5	1/2/2009	South	\$1,000								
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<b>Aggregate data for visible dimensions</b>  <i>(roll up dates to Month)</i>	<p>Dates have been rolled up to the Month level and records with the same date and region have been aggregated into a single row. There are three rows in the extract.</p> <table><thead><tr><th></th><th>Date</th><th>Region</th><th>Sales</th></tr></thead><tbody><tr><td>1</td><td>1/1/2009</td><td>East</td><td>\$400</td></tr><tr><td>2</td><td>1/1/2009</td><td>South</td><td>\$1,500</td></tr><tr><td>3</td><td>1/1/2009</td><td>West</td><td>\$300</td></tr></tbody></table>		Date	Region	Sales	1	1/1/2009	East	\$400	2	1/1/2009	South	\$1,500	3	1/1/2009	West	\$300																
	Date	Region	Sales																														
1	1/1/2009	East	\$400																														
2	1/1/2009	South	\$1,500																														
3	1/1/2009	West	\$300																														

### Choose the rows to extract

Select the number of rows you want to extract.

You can extract All rows or the Top N rows. Tableau first applies any filters and aggregation and then extracts the number of rows from the filtered and aggregated results. The number of rows options depend on the type of data source you are extracting from.

### Notes:



- Not all data sources support sampling. So you might not see the Sampling option in the Extract Data dialog box.
- Any fields that you hide first in the Data Source page or on the sheet tab will be excluded from the extract.

### Configure Incremental Refresh Settings

Most data sources support an incremental refresh. Rather than refreshing the entire extract, you can configure a refresh to add only the rows that are new since the previous time you extracted the data.

For example, you may have a data source that is updated daily with new sales transactions. Rather than rebuild the entire extract each day, you can just add the new transactions that occurred that day. To have incremental as an option when you schedule a refresh, you must first define the settings.

Periodically you might want to do a full refresh to ensure you have the most up-to-date data.

**Note:** If the data structure of the source data changes (for example, a new column is added), you will need to do a full extract refresh before you can start doing incremental refreshes again.

### Set up Incremental Refresh

Follow the steps below to set up an extract to be refreshed incrementally but first ensure you've selected All rows as the number of Rows to extract.

Incremental refresh can only be defined when you are extracting all rows in the database. You can't increment a sample extract.

1. Select **Incremental refresh** box.
2. Choose a table to refresh.
3. Select a column to use for identifying new rows.
4. Enter a subdate range in **Minimum date range to refresh**. You have the option to choose a specific time range in days, hours, minutes or seconds within this field.

For example, when selecting a Date or Datetime column in Tableau, users can refresh extract data within a specified time frame, such as 14 days from the refresh date. This feature is beneficial for data sources that allow inserts and retroactive modifications within a defined time period. By using incremental extract refresh, users can capture these changes along with any new data efficiently.

The screenshot shows the 'Incremental Refresh' settings dialog. It has a title bar with a dropdown arrow and the text 'Incremental Refresh'. Inside, there is a checked checkbox labeled 'Incremental Refresh'. Below this, there are three dropdown menus: 'Table to refresh' with 'myData' selected, 'Identify new rows using column' with 'Date' selected, and 'Minimum date range to refresh' with '14' and 'Days' selected. A text label below the date range dropdown states: 'The last 14 days of data from the refresh date will always be refreshed.' Below this is a link '> Advanced Settings'. At the bottom, there is a link 'Need help with extract settings? Learn more' and three buttons: 'Save Settings', 'Cancel', and 'Create Extract'.

### Use Advanced Settings

You can expand **Advanced Settings** to establish how new rows are retrieved.

**Note:** If you have set a Minimum date range for refreshing, the Advanced Settings feature won't be accessible.

Advanced Settings allow you to either replace the last rows added by refreshing values equal to or greater than the last recorded value, or retain the last rows added by only refreshing the extract with values greater than the last recorded value.

In the first approach, Tableau allows users to incrementally refresh extracts with a non-unique key column such as date, datetime or ID.

This method adds a new step when performing an incremental refresh. Tableau will first delete rows in the extract that are equal to the previous highest value seen. Tableau then queries for all rows that are higher than or equal to the previous highest value which will pick up all the deleted rows and any new ones.

Conversely, you can still opt to not replace the last rows added and only add rows with values greater than the last recorded value.

To finish, select **Create Extract**.

### **Considerations when doing a Incremental refresh**

#### **Editing an extract:**

If you're editing an existing extract, the last refresh is shown so you can be sure you are updating the extract with the correct data.

#### **Full Refresh:**

A Full Refresh replaces all of the rows with the data in the original data source every time you refresh the extract. A Full Refresh can take longer and be expensive on the database.

#### **Data Engine:**

The data engine, which is the underlying mechanism that Tableau uses to create extracts, stores time values with a precision of up to 3 decimal places.

If you specify a datetime or timestamp column for Identify new rows using column, and your database uses a higher precision than Tableau, you can end up with duplicate rows after an incremental refresh.

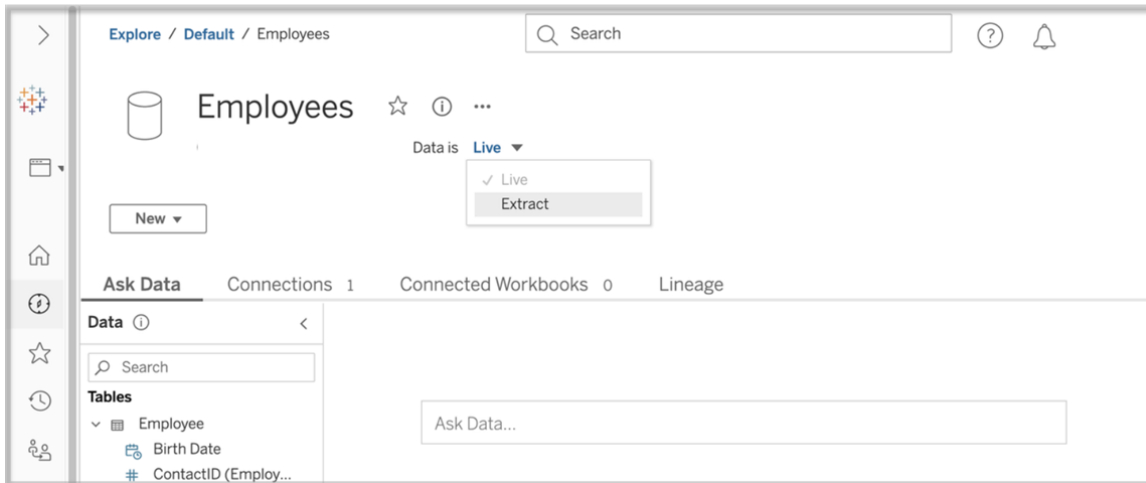
For example, if the database has two rows, one with a datetime value of 2015-03-13 17:30:56.502352 and one with a datetime value of 2015-03-13 17:30:56.502852, Tableau will store both rows using a datetime value of 2015-03-13 17:30:56.502 thereby creating duplicate rows.

### Limitations

- You can't create extracts for embedded data sources that reference published data sources. As a workaround, create the extract directly on the published data source. For more information, see [Extract a Published Data Source on Content Server](#).
- You can't create extracts for file-based data sources. File-based data sources already have special performance features, and adding extraction will have no performance benefit.
- This feature doesn't apply to bridge-based data sources in Tableau Cloud.
- Custom SQL Limitation: Custom SQL queries aren't supported with Advanced Settings. Users relying on custom SQL will need to adjust their approach if they wish to use the Advanced Settings for incremental refresh.

## Create extracts in Content Server

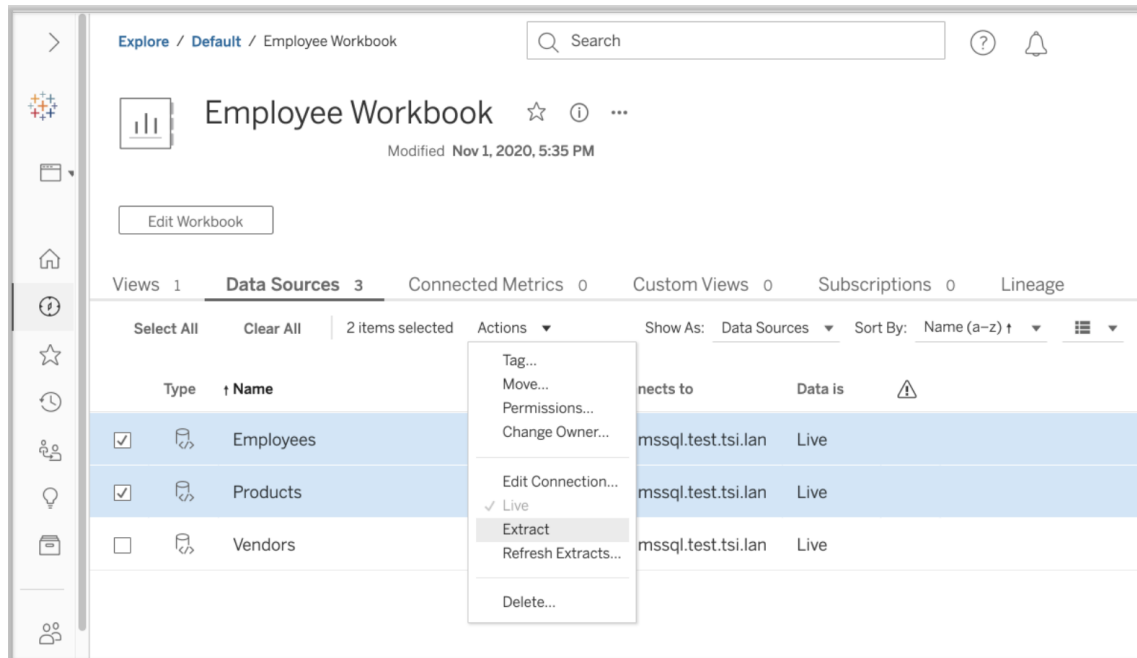
### Extract a Published Data Source on Content Server



Complete the following steps to extract a published data source.

1. Sign in as an administrator or as the owner of the data source.
2. On the Content tab, select **Explore** and then select **Data sources**.
3. Select a data source by clicking on the Data Source name.
4. At the top of the screen, under the Data Source name, select the drop-down menu that says **Live**.
5. Change the connection type from **Live** to **Extract**. If the extract encryption at rest feature is enabled on the site, select either **Encrypted** or **Unencrypted**.
6. If you see an error message about embedded credentials, embed your credentials in the data source. To do this, choose **Edit Connection**. Select 'Embedded password in connection' and then choose **Save**.

## Extract an Embedded Data Source on Content Server



Complete the following steps to extract one or more data sources that are embedded in a published workbook.

1. Sign in as an administrator or as the owner of the data source.
2. Navigate to the published workbook.
3. Navigate to the Data Sources tab
4. Select one or more of the data sources.
5. Choose the **Action** button.
6. Select **Extract**. If the extract encryption at rest feature is enabled on the site, select either **Encrypted** or **Unencrypted**.

## Limitations

- Your connection credentials must be embedded in the data source.
- You can't create extracts for embedded data sources that reference published data sources. As a workaround, create the extract directly on the published data source.

- You can't create extracts for file-based data sources. File-based data sources already have special performance features, and adding extraction will have no performance benefit.
- This feature doesn't apply to bridge-based data sources in Tableau Cloud.

## Keep Extracted Data Fresh

After data is extracted, you can optionally set up an extract refresh schedule to keep the data fresh. For more information, see [Refresh Data on a Schedule](#).

## Monitor and Manage Extracts

Server administrators can monitor extract creation on the **Background Tasks for Extracts** admin view. For more information, see [Background Tasks for Extracts](#).

Server administrators can manage extracts on the [Jobs](#) page. For more information, see [Managing Background Jobs in Tableau Server](#).

Extract creation jobs, like extract refresh jobs, have a maximum query limit before they timeout. This is to prevent jobs from running forever and using an unbounded amount of server resources. The extract query limit timeout can be configured by server admins using the TSM. command line interface configuration setting `backgrounder.querylimit`. For more information, see [tsm configuration set Options](#).

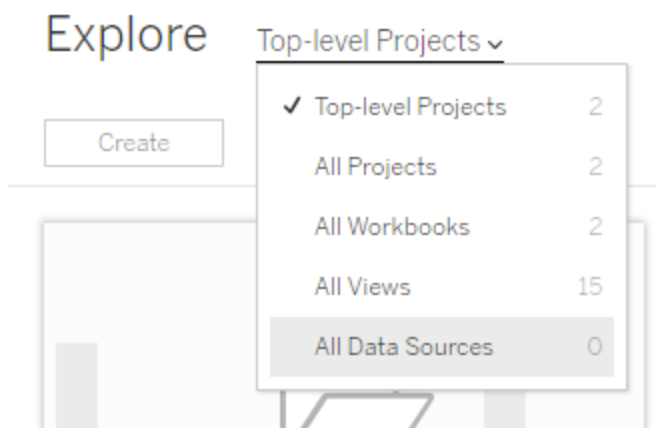
Server administrators can manage web authoring. For more information, see [Set a Site's Web Authoring Access and Functions](#).

## View Data Source Attributes

In the **Content** area of the Tableau Server web authoring environment, you can filter the view to show only data sources or connections and their attributes.

### View data sources by name

To filter by data source name, under **Explore**, select **Data sources**.



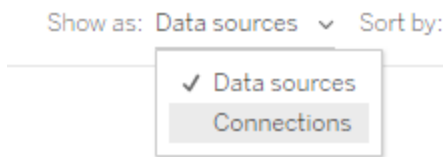
Attributes in the data source name list include the following:

- **Type** – The icon next to the data source name indicates whether the data source is published as a live connection (🔌), an extract connection (📦) or is embedded in a workbook (📖).
  - Select the name of a published data source to open its data source page, with tabs for viewing connections and workbooks that connect to it.
  - Select the name of an embedded data source to open the workbook associated with it, as well as tabs for viewing other data it connects to.
- **Connects To** – Indicates the name of the database server or data file. This could be a database outside of Tableau Server, an extract or a published data source.
- **Live or Last Extract** – This column tells you whether the connection to the data is live, or, if it is a connection to an extract, when the extract was last updated.

## View a list of connections

To filter by connection type, in the **View** list, select **Connections**.





Connection attributes include:

- **Connects to** – Indicates the name of the database server or data file. This could be a database outside of Tableau Server, an extract or a published data source.
- **Connection type** – Shows the type of data. **Tableau Server** indicates that the connection is to a data source published on the site. **Tableau Data Engine** means the data source has an extract stored on the Tableau data server.

## Keep Data Fresh

You can manually refresh data, as well as schedule data refreshes.

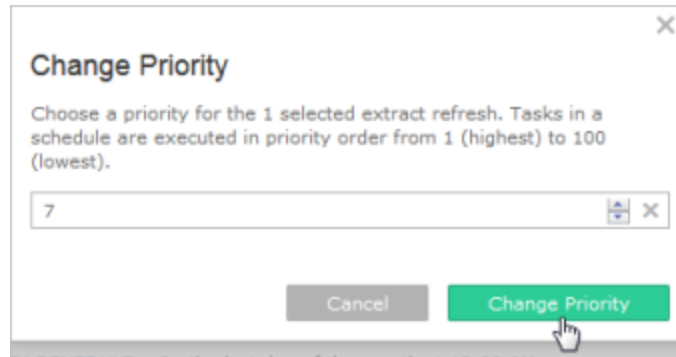
## Manage Refresh Tasks

Administrators can change the priority of scheduled extract refreshes relative to other server tasks, manually refresh extracts or delete their schedules.

1. Sign in to the site that has the schedules you want to manage, and then click **Tasks**.
2. Select one or more scheduled extract refreshes.
3. From the **Actions** menu, do any of the following:
  - Select **Change Schedule**, and choose a new schedule from the list.
  - Select **Run Now** to refresh manually.

**Note:** If an extract does not have a scheduled refresh, you can refresh it on demand from the Data Connections page.

- Select **Change Priority**, and enter a number between 1 and 100 to move the extract up or down in the priority list.



- Select **Delete** to completely remove the schedule for the selected data sources.

See also

Enable Extract Refresh Scheduling and Failure Notification

## Refresh Data on a Schedule

You can schedule refresh tasks for published extract data sources and published workbooks that connect to extracts. New schedules can be created by Tableau Server Administrators on the **Schedules** page. For more information, see [Create or Modify a Schedule](#).

For information on how to refresh flow outputs, see [Schedule Flow Tasks](#)

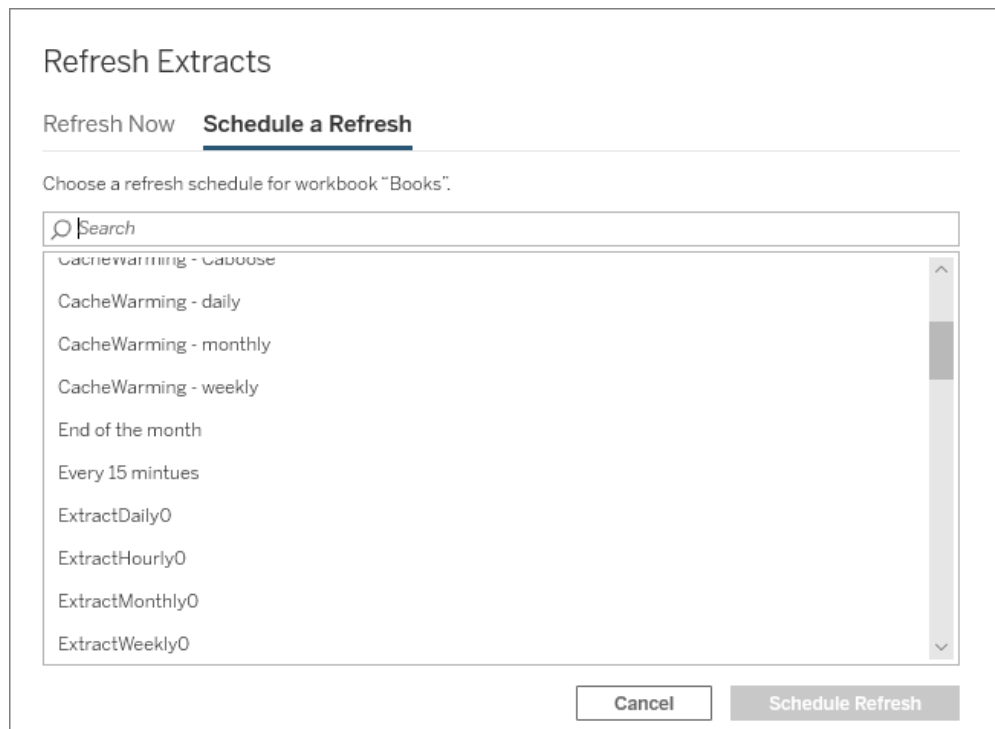
1. When you're signed in to Tableau Server, select **Explore** from the left navigation pane, and then, depending on the type of content you want to refresh, select **All Workbooks** or **All Data Sources** from the drop-down menu.
2. Select the check box for the workbook or data source you want to refresh, and then select **Actions > Refresh Extracts**.

3. In the Refresh Extracts dialog, select **Schedule a Refresh**, and complete the following steps:

- Select the schedule you want.
- If available, specify whether you want a full or incremental refresh.

A full refresh is performed by default. Incremental refresh is available only if you configured for it in Tableau Desktop before publishing the extract. For more information, see [Refreshing Extracts](#) in the Tableau Help.

- Click **Schedule Refresh**.



## Quick Start: Refresh Extracts on a Schedule

For published workbooks that connect to data extracts, you can set up the server to refresh the extracts on a recurring schedule, so all workbooks connected to them always show the most up-to-date data.

To schedule refreshes you need to have administrator or data owner permissions.

**Note:** This topic applies to extracts published to Tableau Server. For Tableau Cloud, how you refresh extracts depends on the underlying data they connect to. For more information, see [Keep Data Fresh](#).

## 1 Set up a schedule on the server

Sign in to the server, go to the **Schedules** page, and click **New Schedule**.

Schedules 4							
+ New Schedule		▼ 1 selected		▼ Actions			
† Name		Frequency	Task type	Tasks	Execution	Next run at	
<input checked="" type="checkbox"/>	End of the month	*** Monthly	Extract Refresh	0	Parallel	Jul 31, 2016, 11:00 PM	
<input type="checkbox"/>	Saturday night	*** Weekly	Extract Refresh	1	Parallel	Jul 16, 2016, 11:00 PM	
<input type="checkbox"/>	Weekday early mornings	*** Weekly	Extract Refresh	1	Parallel	Jul 18, 2016, 4:00 AM	
<input type="checkbox"/>	Weekday mornings	*** Weekly	Subscription		Parallel	Jul 18, 2016, 6:00 AM	

Tableau provides a few refresh schedules. You create additional schedules you need.

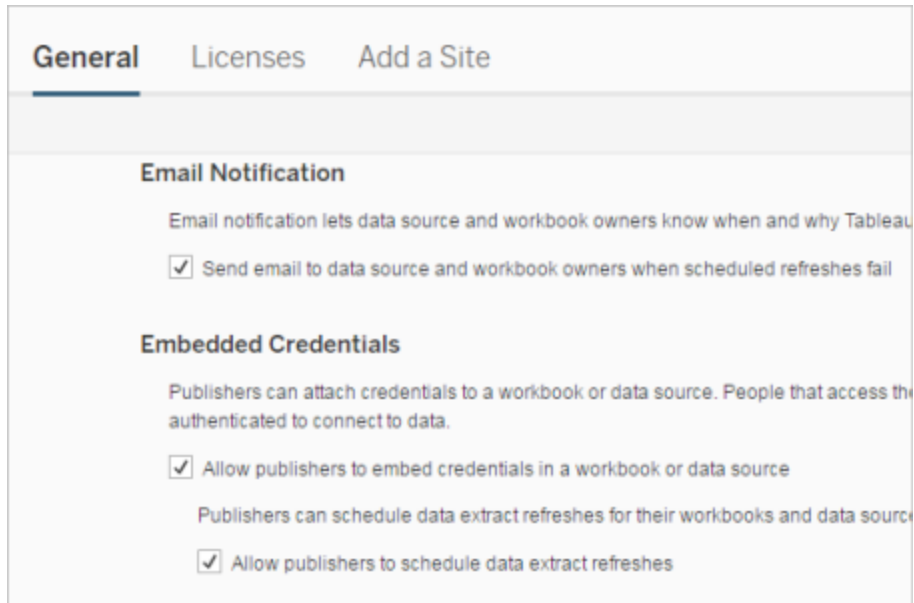
## 2 Enable scheduled extract refreshes and failure emails

As a server or site administrator, you can enable schedules, as well as email notification when extract refreshes fail.

Select **Settings**, and then go to the **General** page.

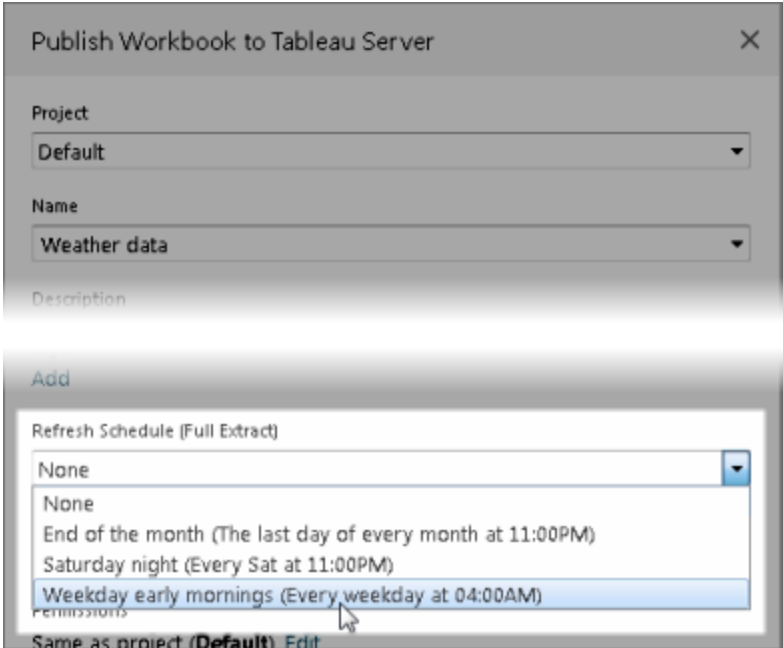
- Under Email Notification, select **Send email to data source and workbook owners when scheduled refreshes fail**.
- Under **Embedded Credentials**, select both tick boxes to allow publishers to embed

credentials and schedule extract refreshes.



### 3 Publish a workbook with an extract

In Tableau Desktop, select **Server > Publish Workbook**. Sign in to the server if you're not already. In the **Publish Workbook to Tableau Server** dialog box, click **Schedules & Authentication**. Under **Extract Schedule**, select the schedule from the list.



If the original data requires authentication, you will also need to select how you want people to access it.

4 Monitor refresh performance

You can monitor scheduled tasks by viewing **Background Tasks for Extracts** on the **Status** page.

Server Status	
Traffic to Views	Usage and users for published views.
Traffic to Data Sources	Usage and users for published data sources.
Actions by All Users	Actions for all users.
Actions by Specific User	Actions for a specific user, including items used.
Actions by Recent Users	Recent actions by users, including last action time and idle time.
Background Tasks for Extracts	Completed and pending extract task details.

## Automate Refresh Tasks

You can associate extract refresh tasks with schedules in Tableau Server to automate refreshing extracts. You can also automate extract refreshes using `tabcmd`, a command line utility that you can download for use with Tableau Server. In particular, you can use the `refreshextracts` command in combination with other commands in your own script. For example:

```
tabcmd login - http://mytabserver -u jsmith -p P@ssw0rd! refreshextracts --datasource salesq4
```

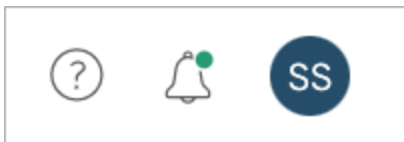
**Note:** When an extract refresh is performed on extracts created in Tableau 10.4 and earlier (that is, a `.tde` extract), the extract is upgraded to `.hyper` extract automatically. While there are many benefits of upgrading to a `.hyper` extract, your users won't be able open the extract with earlier versions of Tableau Desktop. For more information, see [Extract Upgrade to .hyper Format](#).

For information about downloading the `tabcmd` utility, see [tabcmd](#).

## Handle Extract Refresh Alerts

When Tableau Server cannot complete a scheduled refresh, an alert appears to indicate that the refresh has failed. If a scheduled refresh fails five consecutive times, Tableau Server suspends the refresh. When a refresh is suspended, Tableau Server does not try to run it again until someone takes an action that attempts to correct the cause of the failure.

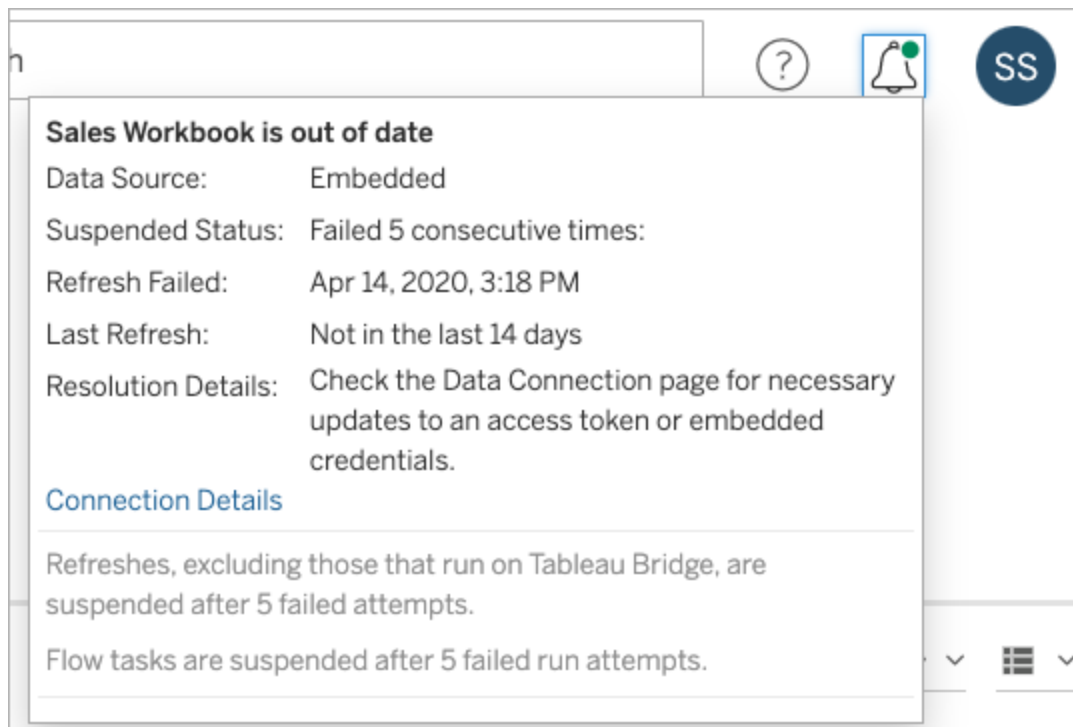
**Note:** The number of consecutive failures for a refresh is set to five by default, but can be changed by a Tableau Server administrator, using the `backgrounder.failure_threshold_for_run_prevention` option. For more information, see [tsm configuration set Options](#).



You will see the Alerts menu only if an extract refresh failed and you are:

- A system or site administrator
- The author of the workbook or data source that couldn't be refreshed
- The author of a workbook that connects to a data source that couldn't be refreshed

When you open the Alerts menu you can see more information about the refresh failure(s):

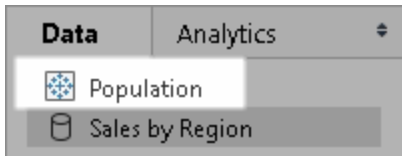


When a **Data source** is listed as **Embedded** it means that the data source definition (which includes things like the data source credentials or the database name) is embedded, or resides, within the workbook itself, originally created in Tableau Desktop.

When a data source name or workbook name is listed as the **Data source** (for example, **Data source: sales\_data**), it means that the data source is a Tableau Server data source. The data source definition resides on Tableau Server.



In the Data pane on Tableau Desktop, you can determine whether the data source is on Tableau Server or is local. If the data source is on the server, a Tableau icon is displayed next to the data source name instead of a database icon :



### Resolving Extract Refresh Problems

To resolve refresh issues, you can take any of these actions, based on the cause indicated in the alert:

- **Errors related to access token validation or user credentials**

You can resolve some extract refresh problems by clicking the **Connection Details** in the alert. Tick the box next to the problematic data source, click **Actions > Edit Connection**, and then enter the missing information. Click **Save** when you're done. After you update the connection information, Tableau Server restarts the refresh schedule.

If you originally embedded the credentials or other data connection information when you published the workbook or data source from Tableau Desktop, you can also republish the workbook or data source. As part of the publishing process, you can choose to set a new refresh schedule. If you don't choose a new schedule, Tableau Server restarts the existing schedule.

- **Errors that indicate the database was unreachable**

Confirm that the database is online and that you can sign in to access the data. You can use the **Try again** link in the alert to restart the refresh schedule.

- **Errors when using user filters or impersonation**

See the [Tableau Knowledge Base](#).

If the problem cannot be corrected by editing the data connection, you will need to resolve it in Tableau Desktop and republish the workbook.

**Tip:** Administrators can edit data connections at any time on the **Data Connections** page, accessible from each site by clicking the **Content** tab and Data Connections

## Automatically Suspend Extract Refreshes for Inactive Workbooks and Data Sources

To save resources you can automatically suspend extract refresh tasks for inactive workbooks and published data sources. This feature applies to full extract refreshes that occur more frequently than once a week. Incremental refreshes and those that occur less frequently than weekly are not impacted.

**Note:** Support for automatic suspension of extract refreshes for data sources is available beginning in Tableau Server version 2023.3.

**Note:** Support for automatic suspension of extract refreshes for data sources is available beginning in the Tableau Cloud July 2023 release.

For a workbook, if any of the following events occur, the workbook's inactivity countdown timer is reset:

- Viewing the workbook sheets
- Having any data-driven alert or subscription set up on the workbook
- Downloading the workbook
- Moving the workbook's location or changing the owner

For a published data source, any event which fetches the data from the data source will cause its inactivity countdown timer to be reset. These include:

- Loading a workbook view that is connected to the data source
- Visiting the data source's Ask Data page
- Tableau Desktop connecting to the data source

## Tableau Server on Windows Help

### Configure the feature

1. Sign in to Tableau Server as a server administrator.
2. Go to the General tab of the Settings page for the site:
  - If you have a single site, at the top the browser window, click **Settings** and **General**.
  - If you have multiple sites, select the site you want to configure and click **Settings** and **General**.
3. On the **General** page, do the following:
  - Under **Automatically Suspend Extract Refresh Tasks**, select the **Automatically suspend extract refresh tasks for inactive workbooks and data-sources** tick box.
  - Specify the number of days, from 7 through 100, that a workbook should be inactive before extract refresh tasks are suspended. The default is 32 days.
  - Click **Save**.

### Notifications

An email notification is sent three days before the extract refresh schedule is suspended.

Another email notification is sent when the extract refresh schedule is suspended.

### Resume suspended extract refreshes

Suspended extract refreshes won't automatically resume if someone uses the workbook. It must be done manually by a server or site administrator.

To view and resume extract refreshes that were suspended:

1. Sign in to the site as an administrator and click **Tasks**.
2. Click the **Extract Refreshes** tab.
3. Select one or more items.
4. From the **Actions** menu, select **Resume**.

## Edit Connections on Tableau Server

Administrators and data source owners can manage the information that describes how a published data source connects to the underlying data. This information includes the database server name or address, the server port, the database user name, and whether or not the password is embedded in the connection.

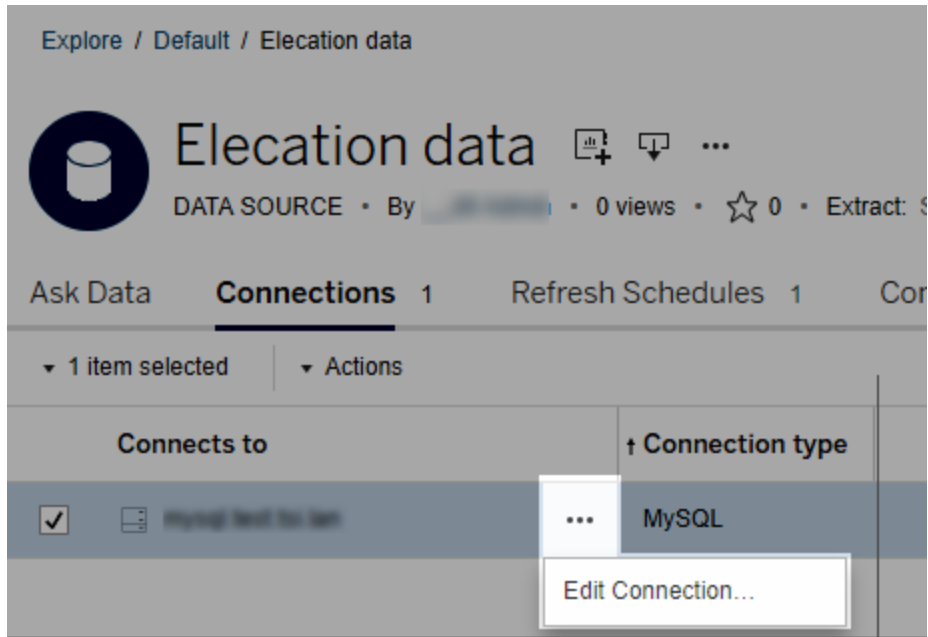
**Note:** Ability to edit connections is determined primarily by your site role, rather than by your permissions on the data source. To edit connections, your site role must be **Server Administrator**, **Site Administrator**, or **Creator**. If your site role is **Creator**, you also must be the data source owner.

1. Sign in to the site that has the data sources you want to modify, and on the **Content** tab, select **Explore > Data sources**.

2. Select the name of the data source with the connection you want to update.

Display filters to search for the data source or narrow the scope of the data source list. The values you type into the **Server name** and **Database username** fields are treated as regular expressions.

3. In the **Connections** view, select the **Actions (...)** menu for the data source, and then select **Edit Connection**.

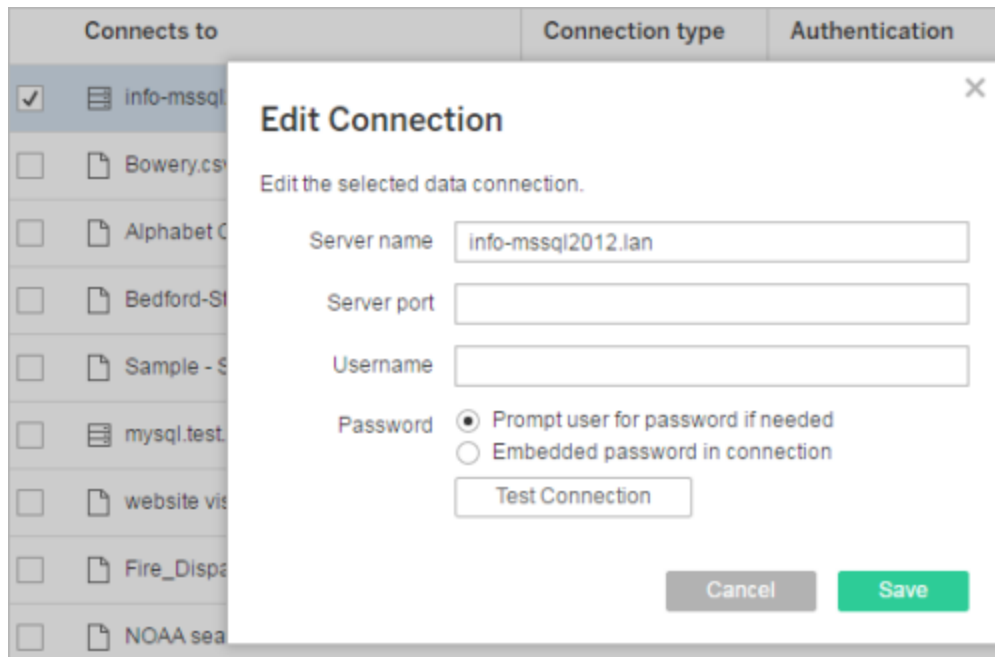


To edit multiple data sources, select the data sources you want to edit, then click the **Actions** menu and **Edit Connection**.

4. Update the connection information.

For **Server name**, if you want to use an IP address, make sure the database or its driver supports that type of connection. If it doesn't, enter the database server name.

See also Authentication types for Google, Salesforce, and WDC data later in this topic.



**Note:** The **Test Connection** button is disabled in versions 2021.4 and later when **Prompt user for password if needed** is selected.

5. Click **Save**.
6. Refresh the browser page for your changes to take effect.

## Authentication types for Google, Salesforce, and WDC data

Google BigQuery, Google Analytics, Salesforce.com, and many web data connector (WDC) connections use the OAuth authentication standard, which uses secure access tokens instead of “raw” user name and password credentials. With OAuth, database credentials do not need to be stored in Tableau, and all users connect through this access token, including Tableau Desktop users who want to create or edit workbooks that connect to the data source.

The following sections describe Google and Salesforce connection options. Web data connector options vary, but all involve signing in through the provider’s web-based sign-in form to establish the access token.

## Google authentication options

When you edit Google BigQuery or Google Analytics connections, select either of the following options in the **Edit Connection** dialog box:

- Select **Embed Google BigQuery (or Google Analytics) credentials in the connection** to authenticate through a designated account, and then select an existing account from the list or select **authenticate account now...** to add a new one.

When you add a new account, the Google sign-in page appears. After you provide your database credentials, Google prompts you to confirm Tableau access to the data. When you click **Accept**, Google returns an access token to use for connecting to the data.

**Note:** If you create extracts of your Google data source, select this first option, so that you can schedule refresh tasks.

- Select **Prompt user for Google BigQuery/Analytics credentials** to require users to connect through their own individual access tokens or sign in each time they connect.

## Salesforce.com authentication options

**Note:** This applies only if Tableau Server is configured to use saved credentials for Salesforce with OAuth. If the server is not configured for this, use the standard process above for modifying connections. For more information about configuring Tableau Server to use saved credentials with OAuth, see [Change Salesforce.com OAuth to Saved Credentials](#).

When you edit Salesforce.com connections, you can select any of the following options in the Edit Connection dialog box:

- Select **Embedded Salesforce username and password in the connection** to use a traditional authentication method.

- Select **Embedded Salesforce credentials in the connection** to use an OAuth connection and schedule refresh tasks, and then select an existing account from the list or click **Add a Salesforce Account** to add a new one.

When you add a new account, the Salesforce.com sign-in page appears. After you provide your database credentials, Salesforce.com prompts you to confirm Tableau access to the data. When you allow Tableau access, Salesforce.com creates an access token through which it connects to the data.

**Edit Connection**

Edit the selected data connection.

**Authentication**

☒ Embedded Salesforce username and password in the connection

Username

Password

☐ Embedded Salesforce credentials in the connection

☐ No Salesforce authentication

Use this option if you do not need to schedule data extract refreshes

Test Connection

Cancel Save

- Select **No Salesforce authentication** to require users to sign in to Salesforce.com each time they connect. (This option does not allow scheduled extract refreshes.)



## Monitor progress

When you save your changes in the **Edit Connection** dialog box, the dialog displays the progress. If you close the dialog box, the modifications continue to run in the background until completed. Tableau Server will make as many changes as possible. Any failures will be skipped, but they will not impede other changes. For example, if you try to change the server name and add a password to several connections, the server names will be changed, and the passwords on workbooks will be changed. However, because you cannot add a password to a data source, the passwords for the data sources will not be changed.

For information about checking the progress of these tasks, see [Background Tasks for Extracts](#).

## Cube Data Sources

Cube (multidimensional) data sources have certain characteristics that make them unique in Tableau.

Cube data sources do not support pass-through connections. This means that when a cube data source is published, you cannot make a connection from Tableau Server using the data source. It also means you cannot create a workbook using the data source in Tableau Server.

Publishing a cube data source to Tableau Server gives you the ability to store the data source on the server. However, to use the data source, you must download the data source to Tableau Desktop and use it locally. To download a published data source you need:

- The **Download/Save As** permission for the data source. For more information, see [Permissions](#).
- Correct drivers installed and ports opened on computer running Tableau Desktop.

For information about using cube data sources with Tableau Desktop, see [Cube Data Sources](#).

## Web Data Connectors in Tableau Server

Web data connectors (WDCs) are web pages that provide a data connection that is accessible over HTTP for data sources that don't already have a connector in Tableau. WDCs allow users to connect to almost any data that is accessible over the web and to create extracts for their workbooks. Data sources for a WDC can include internal web services, JSON data, REST APIs, and other sources that are available over HTTP or HTTPS. Users can create their own WDC or use connectors that have been created by others.

For information about how to use a WDC in Tableau Desktop, see [Web Data Connector](#) in the Tableau Desktop documentation.

For information on how to create a WDC, see the [Web Data Connector documentation](#) on Github.

### Before you run connectors on Tableau Server

As a security measure, Tableau Server won't run WDCs unless you approve the connector, as explained in this topic.

**Note:** You must be a server administrator to approve WDCs for use on Tableau Server.

WDCs require your approval because they contain executable code and typically make requests to third-party websites. Before a user can use a WDC with Tableau Server, you must add the domain and port used by the connector to a safe list and also include the domains that a connector can send requests to and receive requests from on a secondary safe list. Before you do this, we recommend that you vet and test the connector so that you know what the connector does and what sites it connects to. For more information, see [Testing and Vetting Web Data Connectors](#).

When you add a connector to the safe lists, you configure Tableau Server to allow connections to a particular URL where the connector is hosted and from a URL which the connector can query. This is the only way to allow Tableau Server to run WDCs. The connectors

can then be hosted on a server inside your organisation's firewall or on an external domain. Importing WDCs is not supported for Tableau Server.

## Manage connectors in a safe list

To add a WDC to the safe list, use the `tsm data-access web-data-connectors add` command. This command and the related commands described below let you perform the following tasks:

- Add WDCs to the safe list and secondary safe list.
- Allow or disallow all WDCs, or WDC refreshes.
- Remove one or more connectors from the safe list.
- List all WDCs on the safe list and secondary safe list.

Updating WDC safe lists requires a server restart

After running any commands that make changes to WDCs, you need to apply your pending changes using the `tsm pending-changes apply` command.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Add connectors to the safe list and secondary safe list

To add a connector to the safe list and secondary safe list, use the `tsm data-access web-data-connectors add` command, providing the name, safe list URL, and secondary safe list URLs. You can also manage WDCs using the web-data-connector-settings Entity. After running this command, you need to apply your pending changes using the `tsm pending-changes apply` command. A prompt warns you that the command will restart Tableau Server. If

Tableau Server is currently running it is restarted, and if it is stopped it is left in a stopped state with no restart.

```
t-sm data-access web-data-connectors add --name "USGS Earthquakes" -  
-url https://t-  
ableau-  
.github.io:443/webdataconnector/Examples/html/earthquakeUSGS.html -  
-secondary https://t-  
ableau-  
.git-  
hub.io/.*,ht-  
tps://earth-  
quake.usgs.gov-  
/.*,ht-  
tps://max-  
cdn.-  
boot-  
strap-  
cdn.-  
com/.*,ht-  
tps://ajax.googleapis.com/.*,https://connectors.tableau.com/.*
```

Notes on formatting:

- Be sure to use straight quotes (" and '), not curly or "smart" quotes, around the name of the WDC. Use double quotes (") if the name contains a space.
- For many WDCs, the port specified for the `--url` option is 443 or 80, but you can check the value for your connector by looking at the data source details on Tableau Server. You must specify the port number as part of the URL if the WDC is using SSL (HTTPS). For example, to use the default port for HTTPS, the URL might look like the following: `https://example.com:443/WDC/`.

- A URL or comma-delimited list of URLs must be specified for the `--secondary` option, which indicates the domains that provide the libraries and sources that the WDC needs to access. This option cannot be omitted or left empty unless the WDC does not use any secondary domains. If you don't know whether the WDC uses secondary domains, or what the secondary domains are, you might need to contact the developer of the WDC. You can also choose to use `http://.*` and `https://.*` wildcard URLs to allow all domains. However, we strongly recommend that you use more specific URLs to increase security.
- To add an entire domain to the secondary safe list, end the domain URL with a wildcard expression. Use `.*` as the wildcard to indicate the entire domain, as in the following example: `https://example.com/.*`.

### Allow or disallow WDCs or WDC extract refreshes

To allow or disallow WDCs, or WDC extract refreshes, use the `tsm data-access web-data-connectors allow` command with the `-t` or `-r` options. By default, WDCs and WDC extract refreshes are allowed. If you change this setting, you need to run the `tsm pending-changes apply` command. For more information about the command and the command options, see `tsm data-access web-data-connectors allow`.

### Remove one or more WDCs from the safe list

To remove one or more WDCs from the safe list, use the `tsm data-access web-data-connectors delete` command. If you change this setting, you need to run the `tsm pending-changes apply` command. For more information, see `tsm data-access web-data-connectors delete`.

### List all WDCs on the safe list

To list all WDCs on the safe list, use the `tsm data-access web-data-connectors list` command. For more information, see: `tsm data-access web-data-connectors list`.

## Refresh the extract for a connector

When a user creates a workbook that uses a WDC, Tableau Server creates an extract from the data returned by the connector. If the user then publishes the workbook, the publish process sends the workbook and the data extract to the server.

Tableau can refresh an extract that was created by a WDC, the same as it can refresh any extract. If the connector requires credentials to sign in to the web-based data source, you need to ensure that the credentials are embedded with the data source, and that the WDC is on the safe list for the server. Tableau Server cannot refresh the extract if the connector requires credentials and they are not embedded with the data source. This is because the refresh can occur on a schedule or in some other background context, and the server cannot prompt for credentials.

Currently, there is no way to re-authenticate a data source from Tableau Server directly. If the data source has credentials that expire, or was published without embedding the credentials, the workbook and data extract need to be published again with the new embedded credentials.

If the background process that performs the refresh operation fails, it creates an alert and a log entry that indicates this issue. Users will be able to see that the timestamp on the extract does not change.

To disable refresh for all WDCs, use the `tsm data-access web-data-connectors allow -r false` command.

### Troubleshooting

If the server experiences problems with adding connectors to the safe list, you can examine the log files. Be sure to check the log files on both the initial server node and on the other nodes that are running the gateway process. For more information about log files, Tableau Server Logs and Log File Locations.

If the issue is that Tableau Server will not refresh an extract that was created by a WDC, make sure that the `webdataconnector.refresh.enabled` configuration setting has been set

to `true`. If it is set to `false`, run the following command to allow extract refreshes for all WDCs on the server:

```
tsm data-access web-data-connectors allow -r true
```

**Note:** The safe list is the only way of allowing Tableau Server to run web data connectors. Importing web data connectors was deprecated starting with version 10.5.

## Testing and Vetting Web Data Connectors

Web Data Connectors (WDCs) contain JavaScript that typically connects to data on another site. Because of this, you should test and vet web data connectors before users use them as data sources for a workbook, and before you use them with Tableau Server.

This topic includes some suggestions for testing and vetting web data connectors.

### Examine the source

The code in a web data connector is in JavaScript, so you can open the file (and any external files that the connector uses) and examine the source code.

Many connectors reference external JavaScript libraries, such as the jQuery library or API libraries for third parties. Validate that the URL for external libraries points to a trusted location for the library. For example, if the connector references the jQuery library, make sure that the library is on a site that is considered standard and safe. If it is practical for you to change the source code of the connector, use HTTPS protocol (`https://`) to reference external libraries (if the source site supports HTTPS) to help verify the site's authenticity.

To the extent possible, make sure you understand what the code is doing. In particular, try to understand how the code is constructing requests to external sites, and what information is being sent in the request.

**Note:** Experienced JavaScript programmers often compress (minify) their code to reduce the size of the code for download. Dense blocks of code that use cryptic function and variable names are not uncommon. While this can make it more difficult to examine the code, it is not a sign that the code was written to be deliberately difficult to understand.

## Test the web data connector in an isolated environment

If possible, test the web data connector in an environment that is isolated from your production environment and from user computers. For example, add a web data connector to a safe list on a test computer or virtual machine that's running a version of Tableau Server that is not used for production.

## Monitor the traffic created by the web data connector

When you test a web data connector, use a tool like [Fiddler](#), [Charles HTTP proxy](#) or [Wire-shark](#) to examine the requests and responses that the connector makes. Make sure that you understand what sites the connector makes requests to and what content the connector is requesting. Similarly, examine the responses and their content to be sure that the connector is not reading data or code that is not directly related to the connector's purpose.

## Test the performance and resource usage of the web data connector

When you test a web data connector, use tools to monitor its CPU and memory usage. Remember that the web data connector will run on Tableau Server, which is an environment in which many processes are already running. You want to make sure that when the connector fetches data, the connector does not have an undue impact on server performance.

Check whether the connector writes to disk. If it does, check how much disk space it occupies, and examine the output to make sure you understand what it's writing and why.



## Enable Tableau Catalog

**Tableau Catalog** discovers and indexes all of the content on your Tableau Cloud site or Tableau Server, including workbooks, data sources, sheets, metrics and flows. (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).) Indexing is used to gather information about the content, or metadata, about the schema and lineage of the content. Then from the metadata, Catalog identifies all of the databases, files and tables used by the content on your Tableau Cloud site or Tableau Server.

Catalog is available with the Data Management licence. For more information, see [About Data Management](#).

In addition to Catalogue, metadata about your content can also be accessed from both the [Tableau Metadata API](#) and the Tableau REST API using [Metadata Methods](#).

### Before enabling Catalogue

As a Tableau Server admin, there are a few things that you need to consider before and while enabling Catalogue to ensure optimal performance of Catalogue in your Tableau Server environment.

#### Required versions

Before enabling Catalogue, make sure you're running *one* of the following versions of Tableau Server:

- At least Tableau Server 2019.3.4 or later
- At least Tableau Server 2019.4.2 or later
- At least Tableau Server 2020.1.0 or later
- At least Tableau Server 2020.2.15 or later
- Tableau Server 2020.3 and later

For more information about why these versions are required, see the [Tableau Knowledge Base](#).

## What to expect when enabling Catalogue

When Catalogue is enabled, the content that already exists on your Tableau Server is immediately indexed.

### Initial ingestion

The indexing process is comprised of two primary components, one of which is called initial ingestion. Initial ingestion can be broken down into two additional components:

- Content backfill
- Lineage backfill

The status of content backfill and lineage backfill are important to note later on when monitoring progress and validating that Catalogue has been successfully turned on and is running in your Tableau Server environment.

### Initial ingestion speed

The time it takes Catalogue to index the content for the first time depends on a couple of factors:

- **Amount of content on Tableau Server:** The amount of content is measured by the total number of workbooks, metrics, published data sources and flows published to Tableau Server. For more information, see [Disk space to store metadata](#).
- **Number of non-interactive microservice containers:** Catalogue uses the non-interactive microservice containers to index all the content on Tableau Server. For more information, see [Memory for non-interactive microservice containers](#).

Understanding the factors that impact initial ingestion can help you gauge how long it might take to enable and run Catalogue in your environment.

### Disk space to store metadata

During initial ingestion, metadata is generated and stored in the Tableau Server repository ("relationship" PostgreSQL database). The amount of disk space needed to store the

metadata is roughly up to half of the disk space currently used by the repository ("workgroup" PostgreSQL database).

For example, suppose the repository uses 50 GB of disk space prior to enabling Catalogue, the repository can use up to 75 GB of disk space after enabling Catalogue.

#### Memory for non-interactive microservice containers

Initial ingestion runs inside the non-interactive microservice container. The non-interactive microservice container is one of two **Tableau Server microservice container** processes. By default, one instance of the non-interactive microservice container process is added to every node that has a backgrounder process installed.

By default, initial ingestion on a single instance of the non-interactive microservice container can use up to 4 GB of memory on the backgrounder node. If the amount of content on Tableau Server exceeds 10,000, a non-interactive microservice container process may require up to 16 GB of memory on the backgrounder node. Therefore, when enabling Catalogue, ensure that every backgrounder node has the available capacity to support each non-interactive microservice container during the initial ingestion process. If capacity needs to be increased, you must update the JVM heap size for non-interactive microservice containers to allocate up to 16 GB of memory on the backgrounder nodes. For more information, see `non-interactive.vmopts`.

If you are planning to add more non-interactive microservice containers to decrease the time of initial ingestion, first determine how many total containers are needed (using **Step 2: Estimate how long initial ingestion will take**, below) and then verify whether your Tableau Server environment is configured with enough capacity to support *all* non-interactive microservice containers. Depending on how your Tableau Server environment is already configured, you might not be able to add all the additional non-interactive microservice containers that you need to decrease initial ingestion time.

## Best practices for enabling Catalogue

Because the speed of initial ingestion and requirements are unique to each Tableau Server environment, Tableau recommends that when you enable Catalogue you do one or more of the following:

- Make sure there is enough disk space that the Tableau Server repository can use to support the additional metadata that initial ingestion will generate and store. As a general rule, the repository will need an additional 50% of disk space currently used by the repository. For more information about Tableau Server disk usage, see [Server Disk Space](#).
- Depending on the amount of content on Tableau Server, make sure each background node has at least 4–16 GB of available memory for each instance of a non-interactive microservice container during initial ingestion.
- Perform the process over the weekend to allow initial ingestion to complete before your users start using Catalogue capabilities.
- Perform the process in a test environment with production content first. This is because the type of content that needs to be ingested can play a significant role on ingestion speed.

## Summary of steps to enable Catalogue

The following steps summarise the process to turn on and run Catalogue on Tableau Server. The steps must be performed sequentially.

1. [Determine the amount of content on Tableau Server](#)
2. [Estimate how long initial ingestion will take](#)
3. [Decrease the time of initial ingestion](#)
4. [Activate the Data Management licence](#)
5. [Turn off Catalogue capabilities](#)
6. [Run the `tsm maintenance metadata-services` command](#)
7. [Monitor initial ingestion progress and validate its status](#)

8. [Configure SMTP](#)
9. [Turn on Catalogue capabilities](#)

**Note:** Because indexing metadata about Tableau content on Tableau Sever is powered by the Metadata API, enabling the Metadata API is required to run and use Catalogue.

## Enable Catalogue

Step 1: Determine the amount of content on Tableau Server

To determine the amount of content on Tableau Server, do the following:

1. Sign in to Tableau Server using your admin credentials.
2. Go to the **Explore** page.
3. Click the Top-Level Project drop-down menu and add the numbers next to **All Workbooks**, **All Metrics**, **All Data Sources**, and **All Flows** together. This is the total amount of content on Tableau Server.

Step 2: Estimate how long initial ingestion will take

To estimate the time it will take Catalogue to ingest content on Tableau Server for the first time (initial ingestion), compare *your* Tableau Server setup to a *baseline* Tableau Server setup.

For a Tableau Server with the following setup, initial ingestion could take about 6 hours to complete.

Components	Baseline values
Content	17,000 workbooks, metrics, published data sources and flows
Non-interactive microservice containers	10
Ingestion	~6 hours

If you have roughly *half* the content in your Tableau Server environment, initial ingestion might take half the time to complete.

For example: 8,500 (workbooks, metrics, published data sources and flows) + 10 non-interactive microservice containers = ~3 hours (initial ingestion)

If you have roughly *double* the content in your Tableau Server environment, initial ingestion might take double the time to complete.

For example: 34,000 (workbooks, metrics, published data sources and flows) + 10 non-interactive microservice containers = ~12 hours (initial ingestion)

### Step 3: Decrease the time of initial ingestion

As a general rule, the time it takes for Catalogue to perform initial ingestion is correlated to the number of non-interactive microservice containers. To help decrease the time of initial ingestion, you can increase the number of non-interactive microservice containers.

### **Increase the number of non-interactive microservice containers**

By default, one non-interactive microservice container is added to every node that has a background. To help decrease the time of initial ingestion, Tableau recommends that you increase the number of non-interactive microservice containers using the `tsm topology set-process` command.

1. Open a command prompt as an admin on the initial node (where TSM is installed) in the cluster.
2. Run the command: `tsm topology set-process --count <process_count> --node <node_ID> --process <process_name>`

For example, to increase the non-interactive microservice containers on the initial node to 4 containers, run the following command:

```
tsm topology set-process --count 4 --node node1 --process non-interactive
```

For more information about running the command and its global options, see [tsm topology](#).

**Important:** Before increasing the number of non-interactive microservice containers, review the following:

- The recommendation for increasing non-interactive microservice containers is for the total number of non-interactive microservice containers, not the total non-interactive microservice containers per node. For example, suppose you have 4 nodes but you want to increase the number of non-interactive microservice containers to 8. The `--count` value you use in the `tsm` command is 2.
- For each non-interactive microservice container added, 4 GB of additional memory will be used on the node, and the load will be added to the Tableau Server repository (PostgreSQL database).
  - Tableau recommends that you incrementally increase non-interactive microservice containers by no more than 2 at a time while closely monitoring your Tableau Server environment to avoid issues with CPU utilisation of the Tableau Server repository (PostgreSQL database).
  - Be aware that when too many non-interactive microservice containers are added, CPU utilisation of the PostgreSQL database might spike and failover. Symptoms to watch for include `SQLException` errors in the `vizportal` logs. For more information, see [Repository Failover](#) topic.

### Step 4: Activate the Data Management licence

(Requires Data Management)

If not already done, you can activate Data Management. For more information, see [Licence Data Management](#).

### Step 5 (optional): Turn off Catalogue capabilities for each site

(Requires Data Management)

As part of Data Management activation, Catalog capabilities are turned on by default. Because of the indexing process and the estimated time it takes to complete, consider temporarily turning off Catalogue capabilities for each site so that Tableau Server users can't access Catalogue capabilities until Catalogue is ready and able to provide complete and accurate results.

1. Sign in to Tableau Server using your admin credentials.
2. From the left navigation pane, click **Settings**.
3. On the General tab, under Tableau Catalogue, clear the **Turn on Tableau Catalogue** tick box.
4. Repeat steps 2-3 for each site on your Tableau Server.

Step 6: Run the `tsm maintenance metadata-services` command

Run the `tsm maintenance metadata-services` command to enable the Tableau Metadata API. Running the command begins initial ingestion. If your Tableau Server is licensed with Data Management, running the command also turns on Catalog capabilities (if it wasn't turned off earlier).

1. Open a command prompt as an admin on the initial node (where TSM is installed) in the cluster.
2. Run the command: `tsm maintenance metadata-services enable`

For more information about running the `tsm` command, see [tsm maintenance](#).

**Notes:** When running this command, keep the following points in mind:

- This command stops and starts some services used by Tableau Server, which causes certain functionality, such as the Recommendations capability, to be temporarily unavailable.



- A new index of metadata is created at this time. Running this command any subsequent times will create and replace the previous index.

#### Step 7: Monitor initial ingestion progress and validate its status

Running the tsm command above starts the initial ingestion process. To ensure that the initial ingestion process is going smoothly, you can monitor its progress using the Backfill API. For more information, see [Get Initial Ingestion Status](#).

#### Step 8: Configure SMTP Setup

If not already set up for Tableau Server, configure SMTP Setup. SMTP supports sending email to owners who need to be contacted about changes to data. For more information about configuring SMTP, see [Configure SMTP Setup](#).

#### Step 9 (optional): Turn on Catalogue capabilities for each site

(Requires Data Management)

If you turned off Catalogue capabilities before enabling Catalogue in one of the procedures above, you must turn on Catalogue to make its capabilities accessible to your users.

1. Sign in to Tableau Server using your admin credentials.
2. From the left navigation pane, click **Settings**.
3. On the General tab, under Tableau Catalogue, tick the **Turn on Tableau Catalogue** box.
4. Repeat steps 2-3 for each site on your Tableau Server.

## Troubleshoot Catalogue

You or your users might encounter one of the following issues when using Catalogue.

#### Timeout limit and node limit exceeded messages

To ensure that Catalogue tasks that have to return a large number of results don't take up all Tableau Server system resources, Catalogue implements both timeout and node limits.

- **Timeout limit**

When tasks in Catalogue reach the timeout limit, you and your users see the following message:

*“Showing partial results, Request time limit exceeded. Try again later.”* or TIME\_LIMIT\_EXCEEDED

To resolve this issue, as a Tableau Server admin, you can increase the timeout limit using the `tsm configuration set -k metadata.query.limits.time` command. For more information, see the [tsm configuration](#) and [tsm configuration set Options](#) topics.

**Important:** Increasing the timeout limit can utilise more CPU for longer, which can affect the performance of other processes on Tableau Server.

- **Node limit**

When tasks in Catalogue reach the node limit, you and your users see the following message:

NODE\_LIMIT\_EXCEEDED

To resolve this issue, as a Tableau Server admin, you can increase the node limit using the `tsm configuration set -k metadata.query.limits.count` command. For more information, see the [tsm configuration](#) and [tsm configuration set Options](#) topics.

**Important:** Increasing the timeout limit can affect system memory.

## Missing content

- If you suspect, after initial ingestion, content is missing from Catalogue, you can use the Eventing API to help troubleshoot. Eventing handles indexing content on Tableau Server after initial ingestion. For more information, see [Get Eventing Status](#).

- When the connection between an embedded external asset and its downstream Tableau content is removed, it remains in Catalogue (or the Tableau Metadata API) until it's automatically deleted by a background process that runs everyday at 22:00:00 UTC (coordinated universal time). For example, suppose a workbook, initially published with an embedded text file A, is republished with an embedded text file B. File A remains visible (or query-able) as an external asset until the background processes is able to delete it.

You can disable this background process from running if you do not want to remove these types of external assets or if you believe that it takes up system resources that you don't want to dedicate to this process. Alternatively, you can adjust the number of external embedded assets that are deleted. For more information, see `features.DeleteOrphanedEmbeddedDatabaseAsset` and `databaseservice.max_database_deletes_per_run`.

You can monitor this process in one of two ways:

- Filter on the **One-time job re-canonicalise existing database/table assets after a canonicalisation logic change** task type in the [Background Tasks for Non Extracts](#) admin view.
- Refer to the **Finished removal of orphaned embedded databases or database\_service\_canonicalisation\_change** events in the [Tableau Server log files](#).

### Performance after initial ingestion

In some Tableau Server environments where specific content that is updated very frequently (for example, through high-frequency schedules or command line or API requests), the indexing process might get over saturated. In these cases, as the server admin, you might consider enabling event throttling to better preserve Catalogue performance. For more information, see `metadata.ingestor.pipeline.throttleEventsEnable`.

**Note:** When event throttling is enabled, users might notice an intended delay in content changes in Catalogue.

## Out of memory errors

In some cases, Tableau Server out of memory errors can occur as a result of problems with ingesting complex content. If you suspect ingestion is the cause of the out of memory errors on your Tableau Server, contact and work with Tableau Support to metadata.ingestor.blocklist from being ingested to help resolve the issue.

## Disable Catalogue

You can disable Catalog in one of two ways.

Turn off Catalogue capabilities for each site

(Requires Data Management)

You can turn off Catalogue capabilities at any time. When Catalog capabilities are turned off, the features of Catalog, such as adding data quality warnings or the ability to explicitly manage permissions to database and table assets, are not accessible. However, Catalogue continues to index published content and the metadata is accessible from the Tableau Metadata API and metadata methods in the Tableau REST API.

1. Sign in to Tableau Server using your admin credentials.
2. From the left navigation pane, click **Settings**.
3. On the General tab, under Tableau Catalogue, clear the **Turn on Tableau Catalogue** tick box.

## Stop indexing metadata

To stop indexing the published content on Tableau Server, you can disable the Tableau Metadata API. To disable the Metadata API, run the `tsm maintenance metadata-services disable` command. For more information, see [tsm maintenance](#).

## Get Initial Ingestion Status

After enabling the Tableau Metadata API using the `tsm maintenance metadata-services` command, you can use the Backfill API to monitor progress of initial ingestion and get status information for content and lineage backfills.

## Tableau Server on Windows Help

The steps described below must be performed by a server admin and recommended to be used in conjunction with Step 7: Monitor initial ingestion progress and validate its status in the [Enable Tableau Catalog](#) topic.

### Step 1: Authenticate using the REST API

To access the Backfill API, you must first authenticate against Tableau Server and get a token. You can do this using the Tableau REST API. For more information, see [Signing In and Signing Out \(Authentication\)](#) in the REST API Help.

Alternatively, you can sign in to Tableau Server using your admin credentials.

### Step 2: Make a GET request

Make the following GET request or paste the URL into your browser:

```
http://my_tableau_server/api/metadata/v1/control/backfill/status
```

The request initially returns information about content backfill. When content backfill is complete, lineage backfill information is returned.

- For content backfill, the request returns a status summary and additional status information for each content type depending on what content is available on Tableau Server. Indexing for each content type happens concurrently.
- For lineage backfill, the request returns a status summary.

Status values from the response

The following values are returned by the Backfill API.

- **contentBackfillTotalDurationSeconds** and **lineageBackfillTotalDurationSeconds** is how much time has progressed, in seconds, on the respective backfill type. When **backfillComplete** is true, **contentBackfillTotalDurationSeconds** and **lineageBackfillTotalDurationSeconds** is the total time spent to complete the respective backfill type.

For content backfill:

- **contentType** can show the following content types: PublishedDatasource, Database, DatabaseTable, Metric, Workbook and Flow.
- **contentId** is the identifier of the last indexed item.
- **successfullyIngestedCount** is the number of items successfully indexed.
- **failedIngestedCount** is the number of items that could not be indexed.
- **durationSeconds** is the time spent, in seconds, to index items for the content type.
- **totalCount** is the total number of items to index.
- **checkpointCreatedTime** is the last recorded time, in UTC, an item was indexed. The Backfill API checks for the last indexed item every five minutes.
- **backfillComplete** is `true` when indexing is complete for all items of the content type.

For lineage backfill:

- **totalCount** is the total number of lineage relationships to index.
- **processedCount** is the number of indexed lineage relationships.
- **lastLineageConnection** is the last indexed lineage relationship.
- **backfillComplete** is `true` when indexing is complete for all lineage relationships.

Example response

The request returns JSON text. To view the JSON in a more readable format, you can use a JSON viewer or browser add-on.

```
{
  "contentBackfillTotalDurationSeconds": 362,
  "lineageBackfillTotalDurationSeconds": 14,
  "contentBackfillStatuses": [
    {
      "contentType": "PublishedDatasource",
      "contentId": "sites/1/datasources/-631379806-1912815680",
      "successfullyIngestedCount": 20,
```

## Tableau Server on Windows Help

```
    "failedToIngestCount": 0,

    "durationSeconds": 312,

    "totalCount": 20,

    "checkpointCreatedTime": "2020-07-29T23:50:25.763Z",

    "backfillComplete": true

  },

  {

    "contentType": "Database",

    "contentId": "sites/1/databases/e1331f9d-4d73-ee04-9edf-96fd1c37cb8e",

    "successfullyIngestedCount": 35,

    "failedToIngestCount": 0,

    "durationSeconds": 26,

    "totalCount": 35,

    "checkpointCreatedTime": "2020-04-29T23:50:25.769Z",

    "backfillComplete": true

  },

  {

    "contentType": "DatabaseTable",

    "contentId": "sites/1/tables/d946d084-53a8-09b6-2ad2-93301e6b4b15",
```

```

    "successfullyIngestedCount": 64,

    "failedToIngestCount": 0,

    "durationSeconds": 49,

    "totalCount": 64,

    "checkpointCreatedTime": "2020-04-29T23:50:25.774Z",

    "backfillComplete": true
  },

  {

    "contentType": "Metric",

    "contentId": "sites/1/metrics/metric1",

    "successfullyIngestedCount": 2,

    "failedToIngestCount": 0,

    "durationSeconds": 254,

    "totalCount": 2,

    "checkpointCreatedTime": "2020-04-29T23:50:25.779Z",

    "backfillComplete": true
  },

  {

    "contentType": "Workbook",

    "contentId": "sites/1/workbooks/6749399-1501801290",

```



## Tableau Server on Windows Help

```
      "successfullyIngestedCount": 10,

      "failedToIngestCount": 0,

      "durationSeconds": 267,

      "totalCount": 10,

      "checkpointCreatedTime": "2020-04-29T23:50:25.784Z",

      "backfillComplete": true
    },

    {

      "contentType": "Flow",

      "contentId": "sites/1/flows/4",

      "successfullyIngestedCount": 4,

      "failedToIngestCount": 0,

      "durationSeconds": 195,

      "totalCount": 4,

      "checkpointCreatedTime": "2020-04-29T23:50:25.788Z",

      "backfillComplete": true
    }
  ],

  "lineageBackfillStatus": {

    "totalCount": 45,
```

```

    "processedCount": 18,

    "lastLineageConnection": "CloudFile downstreamWorkbooks Workbook",

    "backfillComplete": false

  }

}

```

## Get Eventing Status

After you have enabled Tableau Catalogue (or the Tableau Metadata API) in your Tableau Server environment, you can use the Eventing API to gauge indexing performance.

The steps described below must be performed by a server admin.

### Step 1: Authenticate using the REST API

To access the Eventing API, you must first authenticate against Tableau Server and get a token. You can do this using the Tableau REST API. For more information, see [Signing In and Signing Out \(Authentication\)](#) in the REST API Help.

Alternatively, you can sign in to Tableau Server using your admin credentials.

### Step 2: Make a GET request

Make the following GET request or paste the URL into your browser:

```
http://my_tableau_server/api/metadata/v1/control/eventing/status
```

Status values from the response

The following values are returned by the Eventing API.

- **contentType** is the content type that was most recently indexed.
- **queueSize** is the number of items in the indexing queue. The larger the queue size, the longer it can take for items to show in Catalogue or Metadata API. If the queue size increases over time, you might need to adjust background capacity to support the

non-interactive containers and indexing process. For more information, see [Memory for non-interactive microservice containers](#).

- **checkpointCreatedTime** is the last recorded time, in UTC, an item was indexed. The Eventing API checks for the last indexed item every five minutes.

#### Example response

The request returns JSON text. To view the JSON in a more readable format, you can use a JSON viewer or browser add-on.

```
{  
  
  "contentType": "PublishedDatasource",  
  
  "queueSize": 312,  
  
  "checkpointCreatedTime": "2020-07-29T23:50:25.763Z"  
}
```

## Use Lineage for Impact Analysis

Knowing where your data comes from is key to trusting the data, and knowing who else uses it means you can analyse the impact of changes to data in your environment. The lineage feature in Tableau Catalog helps you do both these things.

When you have a Data Management licence and Tableau Catalogue enabled, you have access to lineage information for your content. For more information about Tableau Catalog, see "About Tableau Catalog" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

### Navigate lineage

To see the lineage for an asset, first navigate to the asset's page. Your options for this step include:

- Search for the asset and select it.
- Navigate to it from **Explore**.

- If it's an external asset (such as a database or table) that's not in a project, navigate to it through **External Assets**. (This option also works for external assets that *are* in projects.)

Then select the **Lineage** tab.

**Note:** Lineage data for flows won't appear if the flow includes parameter values. For more information about using parameters in flows see [Create and Use Parameters in Flows](#) in the Tableau Prep help.

The screenshot displays the Tableau interface for the 'Orders (superstore)' data source. The 'Lineage' tab is selected, showing a table of fields and a sidebar with a lineage diagram.

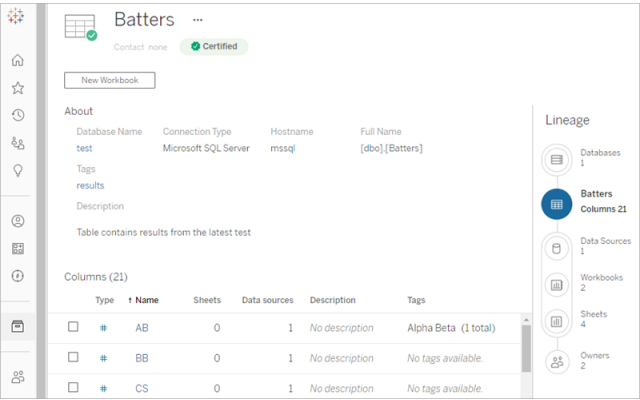
Type	Name	Sheets	Description	Sensitivity
ABC	Ship Mode	0	No description	
📅	Ship Date	3	No description	
#	Orders (Count)	0	No description	
ABC	Order ID	3	No description	
📅	Order Date	3	No description	
ABC	Customer ID	0	No description	
#	Address ID	3	No description	

The 'Lineage' sidebar on the right shows the following hierarchy:

- Databases: 1
- Tables: 1
- Orders (superstore): Fields 7
- Workbooks: 3
- Sheets: 3
- Owners: 1

Lineage shows dependencies in relationship to the lineage anchor, which is the asset selected. A lineage anchor can be a database, table, workbook, published data source, virtual connection, virtual connection table or flow. (In the image above, the anchor is the "Orders (superstore)" data source, and in the image below, the anchor is the "Batters" table.) All the

assets below the anchor depend, either directly or indirectly, on the anchor and are called outputs or downstream assets. The assets above the anchor are the assets the anchor is either directly or indirectly dependent on and are called inputs or upstream assets.



Starting in Tableau Cloud June 2023 and Tableau Server 2023.3, lineage pages for data sources include search and filtering (in the top right of the fields list) that allow you to quickly find fields of interest or relevance.

When you select a field in a data source or a column in a table, the lineage is filtered to show only downstream assets that depend on the field (or column) or upstream inputs to the field (or column), as in this 'Batters' table example that shows the lineage filtered for the 'Games' column:

Batters

...

Contact **Caroline**

Project **Default**

Certified

Quality Warning (11)

Sensitivity (11)

New

About

Database Name

test

Connection Type

Microsoft SQL Server

Hostname

mssql

Full Name

[dbo].[Batters]

Tags

No tags available.

Description

No description available.

Columns (21)

Clear

1 item selected

Actions

	Type		Name	Actions	Sheets	Data sources	Description
<input type="checkbox"/>	#		CS	...	3	7	No description
<input type="checkbox"/>	#		Doubles	...	1	7	No description
<input checked="" type="checkbox"/>	#		Games	...	8	7	No description
<input type="checkbox"/>	#		GDP	...	1	7	No description
<input type="checkbox"/>	#		H	...	0	7	No description

Lineage

Filter: Games

Batters

Columns 21

1 column selected

Virtual Connections

4/4

Virtual Connection Tables

4/4

Data Sources

7/9

Workbooks

6/23

Sheets

8/26

Owners

8/13

You can select an upstream or downstream asset in the Lineage pane to see its details. For example, when you select Data Sources, the list of data sources that depend on this table appear to the left of the Lineage pane.

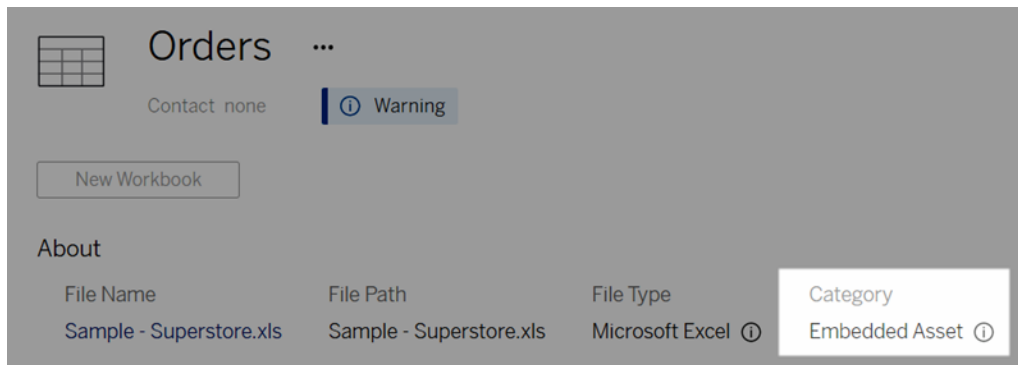
From the Lineage pane, you can navigate to any asset related to your initial choice, in this case the table, by following the links that interest you.

Embedded asset appears in External Assets

Tableau Catalogue treats an external asset as ‘embedded’ if the **Include external files** box is ticked when a data source or workbook is published. When an external asset (database, table or file) is embedded in published Tableau content (workbooks, data sources and flows), the external asset is used by the content, but is not shareable with other users. That embedded external asset appears in the lineage upstream from its Tableau content and is listed in External Assets.

## Tableau Server on Windows Help

To see if an external asset is embedded, go to the external asset's detail page and see if 'Embedded Asset' is listed under **Category**.



For information about embedded data, see [Publishing data separately or embedded in workbooks](#) in Tableau Desktop and Web Authoring Help.

### Lineage and custom SQL connections

When you view the lineage of a connection that uses custom SQL, keep in mind the following:

- Lineage might not be complete.
- Catalogue doesn't support showing column information for tables that it only knows about through custom SQL.
- Field details cards might not contain links to connected columns, or might not show any connected columns at all.
- Column details cards might not contain links to fields that use the column, or might not show any fields at all.

For more information, see [Tableau Catalogue support for custom SQL](#) in the Tableau Desktop and Web Authoring Help.

### Catalogue doesn't support cubes

Cube data sources (also known as multidimensional or OLAP data sources) are not supported by Tableau Catalogue. Tableau content (such as a data source, view or workbook) that relies on cube data does not display any cube metadata or cube lineage in Catalogue.

## Mismatch between lineage count and tab count

You might notice a mismatch in the count of assets between the Tableau Catalog Lineage tool and the tabs in Tableau Server or Tableau Cloud.

The count mismatch is explained by the fact that each – lineage count vs tab count – counts assets a different way. For example, at any given point in time, Catalog can count only assets that are indexed, whereas Tableau Server or Tableau Cloud counts any assets that are published. Other reasons for count differences include whether:

- You have 'View' permissions for the asset.
- An asset is hidden.
- Any fields are used in a workbook.
- An asset is directly or indirectly connected to.
- An asset is in a Personal Space.

### Workbook count mismatch example

As an example, here's how the tab count vs. the lineage count is determined for workbooks.

The screenshot shows the Tableau Catalog Lineage tool interface for a workbook named 'Batters'. The interface includes a header with the workbook name, owner (Amanda), data source (Live connection), and a 'Certified' status. Below the header, there are tabs for 'Ask Data', 'Connections', 'Connected Workbooks', and 'Lineage'. The 'Connected Workbooks' tab is selected, showing a table of fields with columns for Type, Name, Sheets, and Description. The 'Lineage' tab is also visible, showing a tree view of the workbook's lineage, including Databases, Tables, Workbooks, Sheets, and Owners.

Type	Name	Sheets	Description
#	AB	0	No description
#	Batters (Count)	0	No description
#	BB	0	No description
#	CS	0	No description
#	Doubles	5	No description
#	Games	0	No description
#	Gidp	0	No description
#	H	5	No description

Lineage tree view:

- Databases: 1
- Tables: 1
- Batters: Fields 22
  - Workbooks: 6
  - Sheets: 16
  - Owners: 2

Connected Workbooks tab counts workbooks that meet both these criteria:

- Connects to the data source (whether or not any fields are actually used in the workbook).
- The user has permissions to view (whether it's a worksheet, dashboard or story).



Tableau Catalogue Lineage counts workbooks that meet all these criteria:

- Has been indexed by Tableau Catalogue.
- Connects to the data source and uses at least one field in the data source.
- Contains worksheets, including dashboards or stories that contain a worksheet, that use at least one field in the data source.

When metadata is blocked because of limited permissions, or the asset is in a Personal Space, Catalogue still counts the workbook. But instead of seeing some of the sensitive metadata, you see **Permissions required**. For more information, see Access lineage information.

## Use email to contact owners

At the end of the lineage is Owners. The list of owners includes anyone assigned as the owner or contact for any content downstream from the lineage anchor.

You can email owners to let them know about changes to the data. (To email owners, you must have the 'Overwrite' (Save) capability on the lineage anchor content.)

1. Select **Owners** to see the list of people who are impacted by the data in this lineage.
2. Select the owners you want to send a message to.
3. Click **Send Email** to open the email message box.
4. Enter the Subject and your message in the text box, and click **Send**.

## Data Labels

Data labels are metadata that you can attach to data assets. Data labels help classify data and pass information to users. For example:

- One published data source is more authoritative than other, similarly named ones. The certification data label can help you inform users which data source is recommended.
- A column in a database contains outdated information. A warning data label can help you tell workbook authors and viewers that the data isn't up to date.
- A table of employee income contains sensitive information that shouldn't be shared. A sensitivity data label can inform users that they must take care when using data from the table.

- Some published data sources can be grouped based on the department that published them. A custom label category with custom labels can identify the departments responsible for the data sources.

Note: Data labels are a more recent and extensible way of thinking about ways to classify metadata. Certifications and data quality warnings, which were part of the Data Management licence long before the term "data labels" existed, are now considered categories in the broader data label concept, along with the Sensitivity Labels released in Tableau Cloud June 2023 and Tableau Server 2023.3.

A Data Management licence is required for all data label operations except for ones related to the certification of published data sources.

## Assets you can label

You can add labels to the following Tableau content and external assets:

- Databases
- Tables
- Columns (except for certification) (*column labels introduced in Tableau Cloud October 2022 / Server 2022.3*)
- Data sources
- Flows
- Virtual connections
- Virtual connection tables

## Label names and categories

Each label has a name and category. The names and categories built into Tableau are:

Name	Category
Certified	Certification
Deprecated	Data Quality Warning

Stale data	Data Quality Warning
Under maintenance	Data Quality Warning
Warning	Data Quality Warning
Extract refresh failed	Data Quality Warning
Flow run failed	Data Quality Warning
Sensitive data <sup>1</sup>	Sensitivity

<sup>1</sup>*In Tableau Cloud March 2023/Server 2023.1 and earlier, the Sensitive data label uses the Data Quality Warning category.*

Starting with Tableau Cloud October 2023 and Tableau Server 2023.3, using the label manager on the Data Labels page or the REST API, an administrator can customise the built-in labels or create new label names and categories. (Using the REST API, Tableau Cloud Administrators have been able to modify some built-in labels and add others in certain categories since June 2023.) For more information, see [Manage Data Labels](#).

## Label categories

A label's category affects where and how the label appears, whether it appears on downstream assets and which parts are customisable, among other things.

### Certification

In a self-service environment with multiple publishers and numerous assets, it can be difficult to find recommended content. Using certification, you can mark assets as trusted, and the assets display badges in various places across Tableau. For complete information, see [Use Certification to Help Users Find Trusted Data](#).

### Data quality warnings

Identifying problematic data is important for building trust with users. Data quality warnings allow you to mark data assets that have known issues. When you attach a data quality warning

to an asset, a warning shows on it and any downstream assets that use it, making data consumers aware of problems with the source data. For example, if you mark a database table as deprecated, users viewing workbooks based on that table may see a warning.

Furthermore, data quality warnings can be set automatically when an extract refresh or flow run fails, and removed again when it succeeds. And using the Data Labels page or the REST API, administrators can create new, customised data quality warning labels, adding nuance and specificity to the warnings that users can choose from. For complete information, see [Set a Data Quality Warning](#)

### Sensitivity labels

Some data needs to be handled differently. Using Sensitivity labels, you can relay data sensitivity information to consumers of that data. When you mark an asset as sensitive, users browsing Tableau Cloud see badges on it and any downstream assets that use it. For example, if you mark a table column as sensitive, a user authoring a new workbook based on that table may see a warning. Furthermore, using the **Data Labels** page or the REST API, administrators can create customised sensitivity labels, adding nuance and specificity to the range of classifications that users can choose from when using sensitivity labels.

**Note:** Sensitivity labels were introduced in Tableau Cloud June 2023 and Tableau Server 2023.3. Earlier versions of Tableau Cloud and Tableau Server relay data sensitivity through the "Sensitive data" data quality warning instead of using a dedicated sensitivity category.

For complete information, see [Sensitivity Labels](#).

### Custom label categories

Sometimes you need to classify data in a way that isn't covered by certification, data quality warnings or sensitivity labels. Using custom categories that administrators define, you can use labels to categorise assets in any way that your organisation sees fit. For example, an administrator in your organisation might create a category called "Department" with labels in it

## Tableau Server on Windows Help

for sales, marketing and other departments, ready to be applied to assets on your site. For complete information, see [Labels with Custom Categories](#).

Note: The ability for administrators to create label names and categories through the label manager was released with Tableau Cloud October 2023 and Tableau Server 2023.3. Tableau Cloud administrators could use the REST API in a more limited way to create custom label names with built-in categories in June 2023.

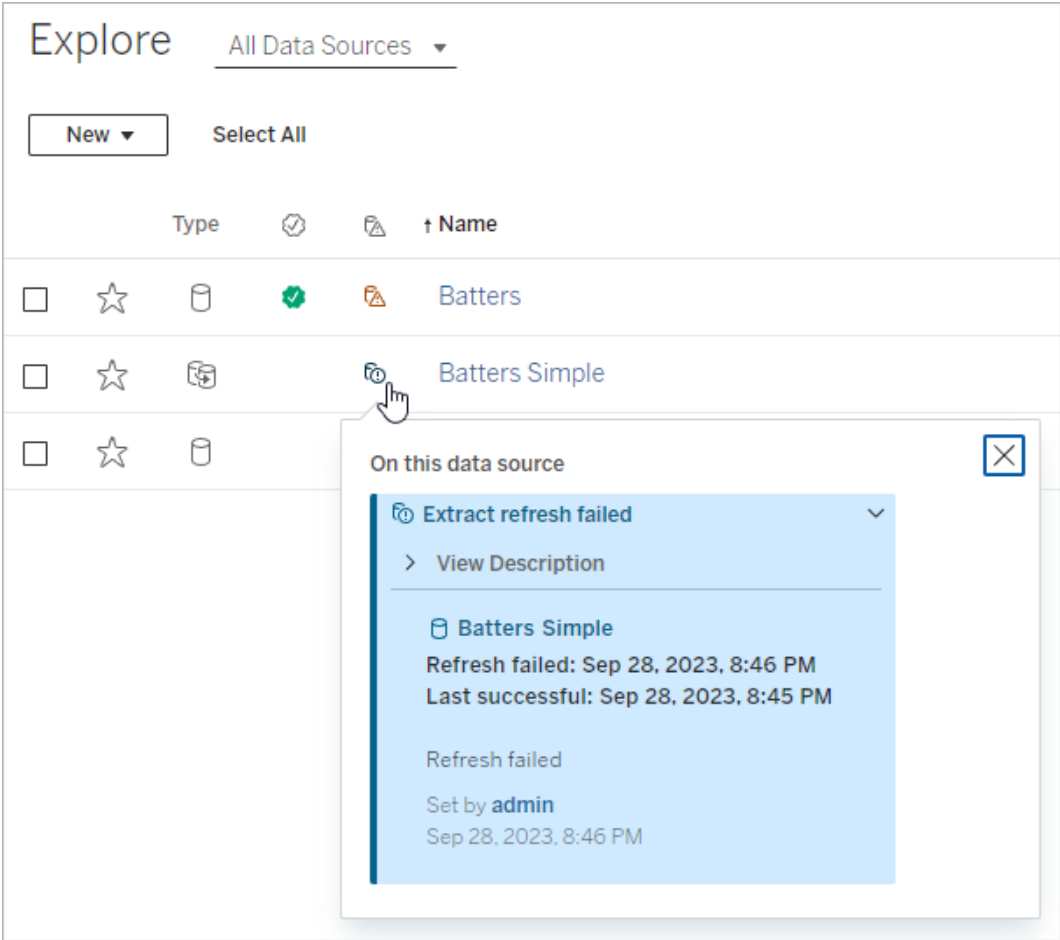
## Where data labels appear

Data labels appear in various places, such as

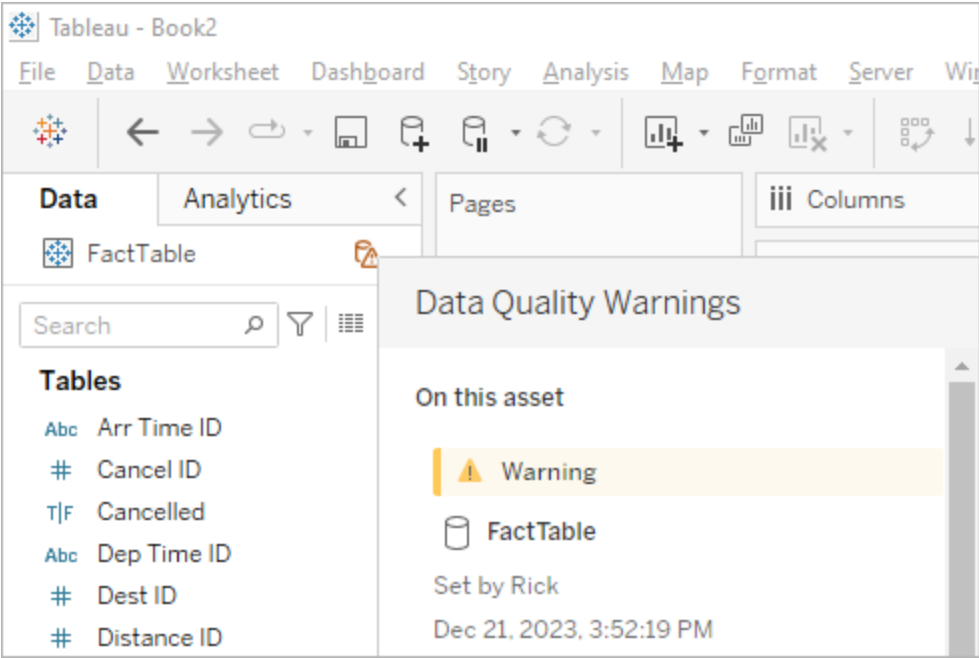
- the tops of asset pages (workbooks, data sources, tables and so forth)



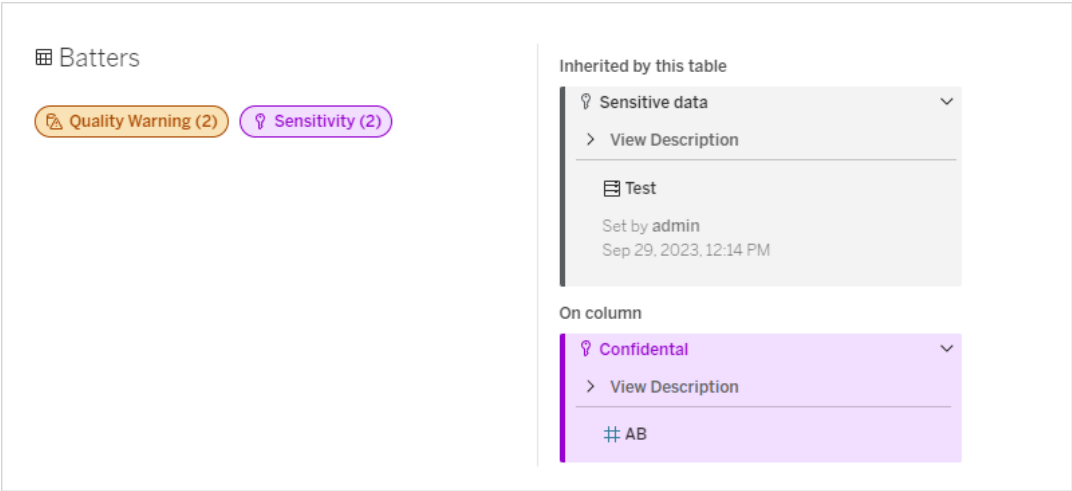
- lists of assets (**Explore** pages, **External Assets** page and so forth)



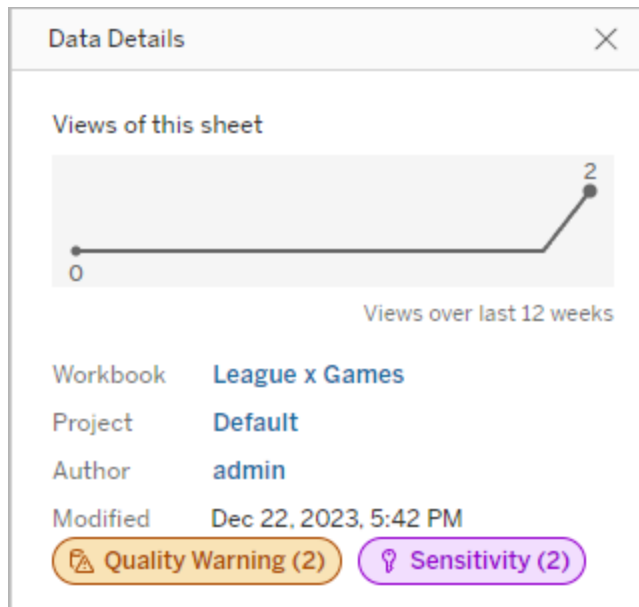
- the Desktop and web authoring **Data** pane



- the web authoring **Catalogue Details** window



- the **Data Details** pane



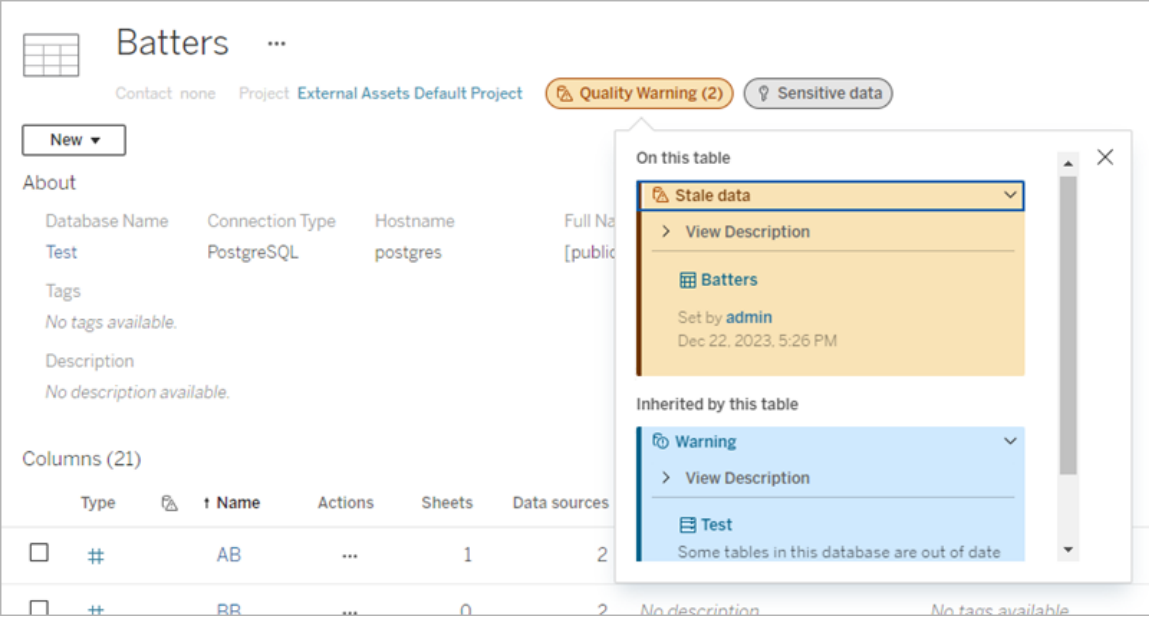
Colour indicates the category and visibility level of a label:

- **Green** indicates the asset is certified
- **Blue** indicates a standard-visibility quality warning
- **Yellow** indicates a high-visibility quality warning
- **Grey** indicates a standard-visibility sensitivity label or label with a custom category
- **Purple** indicates a high-visibility sensitivity label

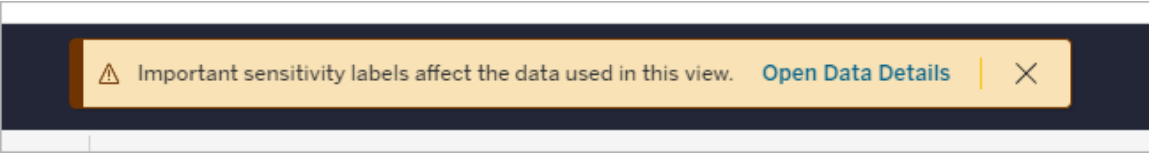
Select a label badge to see details for labels of that category on the asset. In the case of quality warning labels and sensitivity labels, the details will include labels inherited from upstream assets. If you're examining quality warning labels or sensitivity labels on a table, the details will include labels on downstream columns. To go to the related asset's page, select it. Certification labels and custom category labels are not inherited from upstream assets.

There's a single indicator for each label category, no matter how many labels of that category are on the asset or inherited by it. The indicator is coloured for high visibility if one or more of the labels it represents are high-visibility labels. For example, suppose that a table has a standard-visibility quality warning on it and the table's upstream database has a high-visibility quality warning on it. You'll see a yellow **Quality Warning (2)** indicator because the indicator represents two quality warnings, one of which is high visibility.





High visibility quality warnings and high visibility sensitivity labels that affect views and web authoring sessions cause alerts to be shown.



These alerts inform users that the data they're seeing needs to be treated with care. Selecting the Open Data Details link shows more information on the labels affecting the data.

The Data Labels dialog

Starting in Tableau Cloud February 2024 and Tableau Server 2024.2, you add, remove and modify data labels on assets using the consolidated **Data Labels** dialog. (Extract refresh monitoring and flow refresh monitoring are still controlled through separate dialogs.)

To open the **Data Labels** dialogue for an asset, select the actions (...) menu next to the asset, then select **Data Labels**. Choose **Certification**, **Data Quality Warning**, **Sensitivity Label** or **All Labels** to open the **Data Labels** dialogue with the appropriate tab showing.

Data Labels: (Batters)

Search for labels

**All Labels**

Selected Labels (1)

Certification

Quality Warning

Sensitivity

Department

☐ Certified

☐ Deprecated

☐ Under maintenance

☐ Stale data

☒ Warning

☐ Confidential

☐ Sensitive data

☐ Operations

☐ Sales

☐ Service

Quality Warning: Warning

Description ▾

**Warning:** This asset has a general quality issue.

Quality warnings let users know about assets that may have problems. The labels show on the asset and any assets downstream from it. [Learn more](#)

Visibility level ⓘ

☒ Standard visibility

☐ High visibility

Message (optional) Edit Preview

0 of 4,000 characters used ⓘ [Formatting Guide](#)

[Manage labels](#) Cancel Save

The vertical tabs on the dialogue's left side correspond to data label categories, except for the **All labels** and **Selected labels** tabs at the top of the list.

- The **All labels** tab lists all the site's data labels across all categories. Each label selected for the asset is checked. This includes data labels that were selected for the asset when the dialogue was opened, in addition to any labels that have been selected since then.
- The **Selected labels** tab lists all the data labels that have been selected for the asset. This includes data labels that were selected for the asset when the dialogue was opened, in addition to any labels that have been selected since then.
- The other tabs correspond to data label categories. Those tabs list all data labels associated with the category. Each label selected for the asset is checked. This includes data labels that were selected for the asset when the dialogue was opened, in addition to any labels that have been selected since then.

The search bar at the top of the dialogue returns data labels that match the search term you provide. You can select or deselect any labels you want from the results.

To change the data labels on an asset:

1. Navigate to the label by using the search bar or vertical tabs to find the label.
2. To add a data label to the asset, tick the box next to it.
3. Select a visibility level (if applicable) and a message if desired.
4. To remove a data label from an asset, clear the box next to it.
5. Add, remove or modify more labels for the asset by repeating these steps
6. To commit your changes to the data labels on the asset and close the dialog, click **Save**.  
Or, if you want to abandon all your changes since the dialog was opened, click **Cancel** and confirm you want to abandon the changes.

Note: Selecting the data label instead of the tick box next to it will show details about the label without changing the status of the tick box. This action is useful for seeing the label description or making changes to the message without changing the status of the label on the asset.

The consolidated Data Labels dialogue isn't available in Tableau Server.

For detailed information on the labels in specific categories, see the appropriate topic:

- Use Certification to Help Users Find Trusted Data
- Set a Data Quality Warning
- Sensitivity Labels
- Labels with Custom Categories

## Permissions required to interact with data labels on assets

Permissions required to view, add, update and delete labels on assets are as follows:

- To view a data label, you must have **read** permissions on the associated asset.
- To add, update, or delete a data label other than a certification label, you must have **write** permission on the associated asset.
- To add, update, or delete a certification label, you must be an administrator, or else you must be a project leader or product owner for the project the asset is in.

- To add, update, or delete a certification label for an external asset *not* in a project, you must have the **change permissions** permission on the associated asset.

## Comparison of data labels and tags

Tableau Cloud and Tableau Server also feature another solution for asset classification:

Tags. Data labels and tags differ in significant ways:

Area	Data Labels	Tags
Structure and control	Administrators control the range of data labels	No administrative control over the range of tags users add
Permissions	Ability to add/update/remove data labels is controlled through asset permissions	Explorers and Creators can tag any assets that they can view
Appearance	Data label iconography is easily seen and colour-coded by category and visibility level	Tags appear in fewer places than data labels and have no iconography
Inheritance	Some data labels (like warnings and sensitivity labels) show on downstream assets	No inheritance
Searching/Filtering	Certification and quality warnings can be used as filters in some asset lists	Search results return assets with matching tags, and tags can be used as filters in some asset lists
API accessible	Access via REST API and Metadata API is possible	Access via REST API and Metadata API is possible
Licence requirements	Requires a Data Management license (except for the certification of published data sources)	No licensing requirements
Use	Structured categorization	Open-ended method to cat-

focused on providing important information that can influence users' use of data

ategorise assets

For more information on tags, see [Use Tags](#) in the Tableau Desktop and Web Authoring Help.

## Use Certification to Help Users Find Trusted Data

In a self-service environment with multiple publishers, it's common for a project on Tableau Server to contain a variety of content that is named similarly, is based on the same or similar underlying data or is published without any descriptive information about it. When this is the case, analysts might lack confidence about the data they should use.

To help your users find the data that's trusted and recommended for their type of analysis, you can *certify* the data that complies with your organisation's data standards.

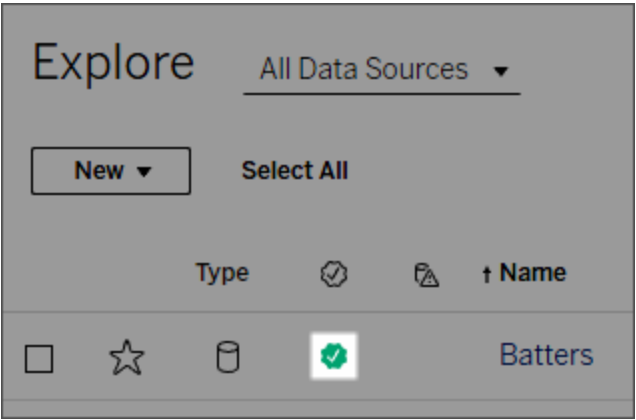
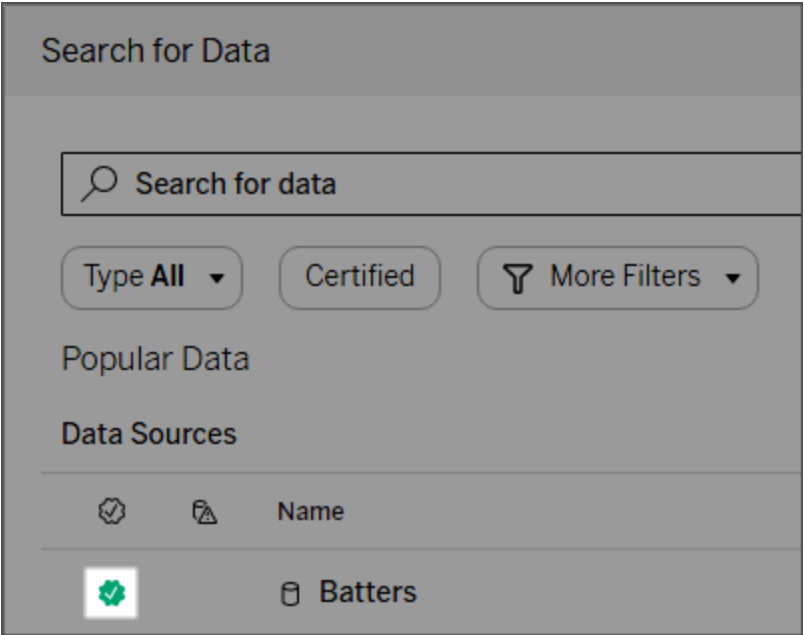
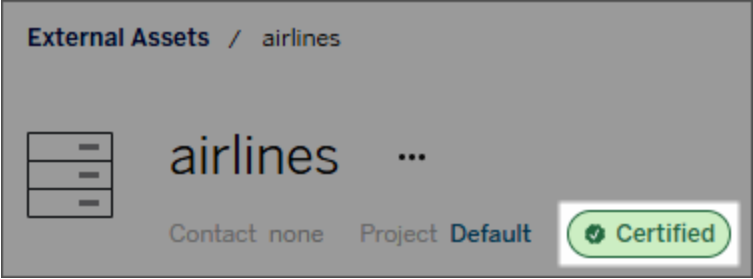
Certification complements the Recommendations Training Schedule feature by offering a way to promote data through curation.

In addition to certifying published data sources, if you have a Data Management licence for Tableau Server or Tableau Cloud:

- If Tableau Catalog is enabled, you can certify databases and tables that are associated with your Tableau content. (For more information about Tableau Catalog, see "About Tableau Catalog" in the [Tableau Server](#) or [Tableau Cloud](#) Help.)
- Starting in Tableau 2022.1, you can certify virtual connections and virtual connection tables.

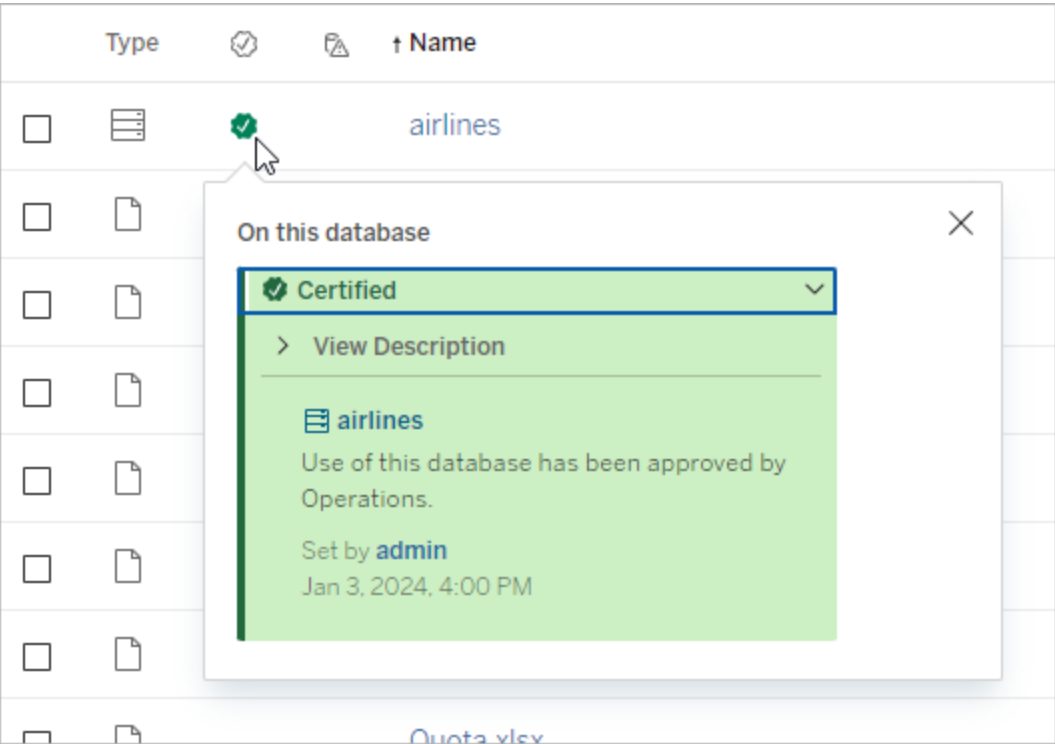
### How certification helps users find trusted data

When you certify an asset, users see a green badge or green tick, depending on where the asset is being viewed.



Certified data sources rank higher in search results and are added to recommended data sources.

In addition, you can provide notes about the certification status, which appear when users click on the badge or in a tooltip when they hover over the data source icon in web authoring or Tableau Desktop. The information also shows who certified the data source.



Create guidelines for selecting data to certify

As with most Tableau functionality, certification is flexible. You can define for your organisation the criteria you use to determine when to certify an asset. As you do so, document and share your guidelines. The guidelines can help you, other administrators and project leaders to be consistent with your certification choices. They can also help users understand what certification means.

Whether you use the same certification criteria across all projects, or define unique criteria for each project, the important thing is to be clear about what certification means in your environment.

Who can certify data

To certify a data source, you must

- be a Server or Site Administrator, *or*
- have a site role of **Explorer (Can Publish)** or **Creator** *and* be the project owner or have the **Project Leader** capability for the project containing the data you want to certify.

To certify virtual connections and virtual connection tables, you must have a Data Management licence in your environment, and you must

- be a Server or Site Administrator, *or*
- have a site role of **Explorer (Can Publish)** or **Creator** *and* be the project owner or have the **Project Leader** capability for the project containing the data you want to certify.

To certify databases or tables, you must have Tableau Catalogue enabled in your environment, and you must

- be a Server or Site Administrator, *or*
- have the **Set permissions** capability on the database to certify that database or any tables within that database.

#### How to certify data

The data you can certify depends on the permissions you have, and whether you have a Data Management licence and Tableau Catalog enabled in your environment.

- All users with permissions can certify data sources.
- If you have a Data Management licence, users with permissions can also certify virtual connections and virtual connection tables.
- If you have a Data Management licence and Tableau Catalog is enabled, users with permissions can also certify databases, tables and files.

To certify an asset:

**Note:** Starting in Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove certifications using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see The Data Labels dialog.



1. Search for or navigate to the asset. The steps to navigate depend on the type of asset you want to certify:
  - Data source or virtual connection – on the **Explore** page, select **All Data Sources** or **All Virtual Connections**.
  - Virtual connection table – on the **Explore** page, select **All Virtual Connections**, and select the virtual connection that contains the virtual connection table you want to certify. Then select the virtual connection table.
  - Database or table – on the **Explore** page, navigate to the database or table. Or on the **External Assets** page, select **Databases and Files** or **Tables and Objects**.
2. On the page, select the More actions menu (...) next to the asset name you want to certify.
3. Select **Data Labels > Certification** (or **Edit Certification** in Tableau Server 2023.1 and earlier)
4. Select the **Certified** tick box. (In earlier versions of Tableau Server, use the switch.)
5. Add a message if desired. The message gives users context for the certification status, intended use for the data or other helpful information. Information you add to the **Message** section appears in the certification badge or tooltip, mentioned earlier in How certification helps users find trusted data. You can format the text in a message with bold, underline and italics, and include a link or an image. To see text formatting tips, click on the information (i) icon above the **Save** button. (Starting in Tableau Cloud February 2024, the message is optional. Earlier versions of Tableau Cloud and Tableau Server required it.)

Data Labels: (Airline Flights)

Search for labels

All Labels

Selected Labels (1)

Certification

Quality Warning

Sensitivity

Department

Certification

Certification: Certified

Description ▾

**Certified:** This asset is trusted and recommended.

Certification lets users know that an asset is trusted. The label doesn't show on downstream assets. [Learn more](#)

Message (optional) Edit Preview

Use of this data source has been approved by Operations

55 of 4,000 characters used ① Formatting Guide

[Manage labels](#) Cancel Save

## 6. Select **Save**.

### Customise certification

Beginning with Tableau Cloud June 2023 and Tableau Server 2023.3, using the label manager on the Data Labels page or the REST API, an administrator can change the certification description that users see in the certification dialog. For more information, see [Manage Data Labels](#).

### Set a Data Quality Warning

Data quality warnings are a feature of Tableau Catalog, part of the Data Management offering for Tableau Server and Tableau Cloud. For more information about Tableau Catalog, see "About Tableau Catalog" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

When Tableau Catalogue is enabled in your environment, you can set data quality warnings on data assets so that users of that data are aware of issues. For example, you might want to

let users know that a data source has been deprecated, or that a refresh has failed for an extract data source.

You can set data quality warnings on data sources, databases, tables, flows, virtual connections, virtual connection tables and columns.

Data quality warnings for data sources, databases, tables and flows were introduced in version 2019.3 for Tableau Cloud and Tableau Server. Data quality warnings for virtual connections and virtual connection tables were added in Tableau Cloud March 2022 and Tableau Server 2022.1, and for columns in Tableau Cloud October 2022 and Tableau Server 2022.3.

### About data quality warnings

There are two kinds of data quality warnings: Quality warnings that you set, and quality warnings that Tableau sets when an extract refresh or flow run fails, are also known as monitoring quality warnings.

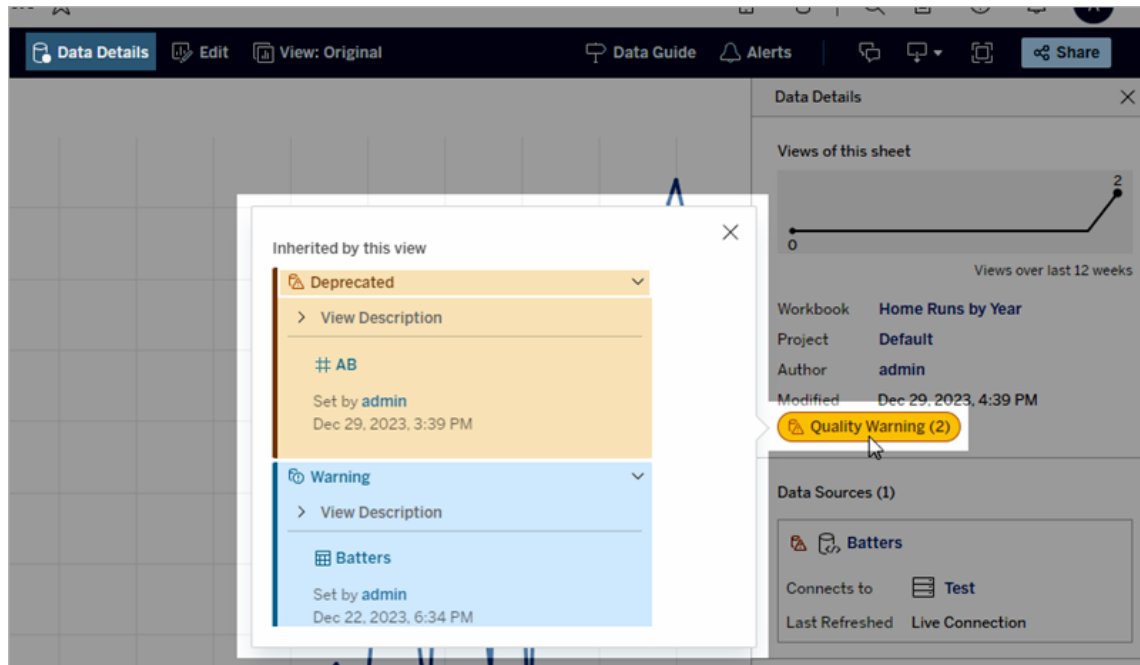
- **Quality warnings that you set:** A quality warning that you set is visible to users until you or another user removes it.
- **Monitoring quality warning:** If you enable a monitoring quality warning for an extract or flow asset, Tableau automatically adds a quality warning to the asset when an extract refresh or flow run fails. Later, if the extract refresh or flow run succeeds, Tableau automatically removes the quality warning.

Starting with Tableau Cloud October 2023 and Tableau Server 2023.3, in addition to setting monitoring warnings at the asset level, you can also turn extract refresh and flow run monitoring on or off for the entire site at once. For information about site-wide monitoring, see [Site-wide monitoring for extract refresh and flow run failures](#).

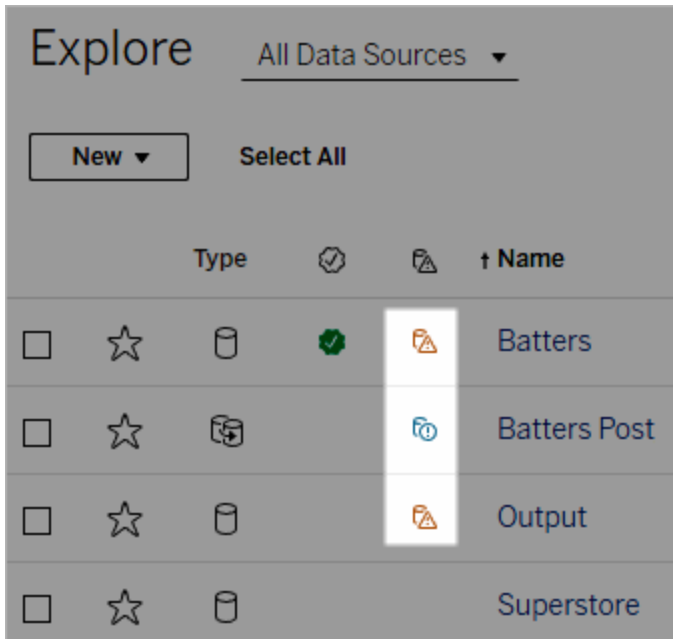
**Note:** You can enable and modify both kinds of data quality warnings using the REST API. For more information, see the [Label and Data Quality Warning Metadata Methods](#) in the Tableau REST API Help.

## Where data quality warnings appear

In Tableau Cloud and Tableau Server, when you set a warning on a data source, flow, data-base, table, column, virtual connection or virtual connection table, the warning is visible to users of the asset and any assets downstream from it. For example, a warning set on a table is visible to users looking at a dashboard that depends on that table. The users see a warning icon on the dashboard's Data Details tab and can open the pane to see more information.



Data quality warnings appear when exploring some types of content in a list view:



Data quality warnings also appear at the top of asset pages:

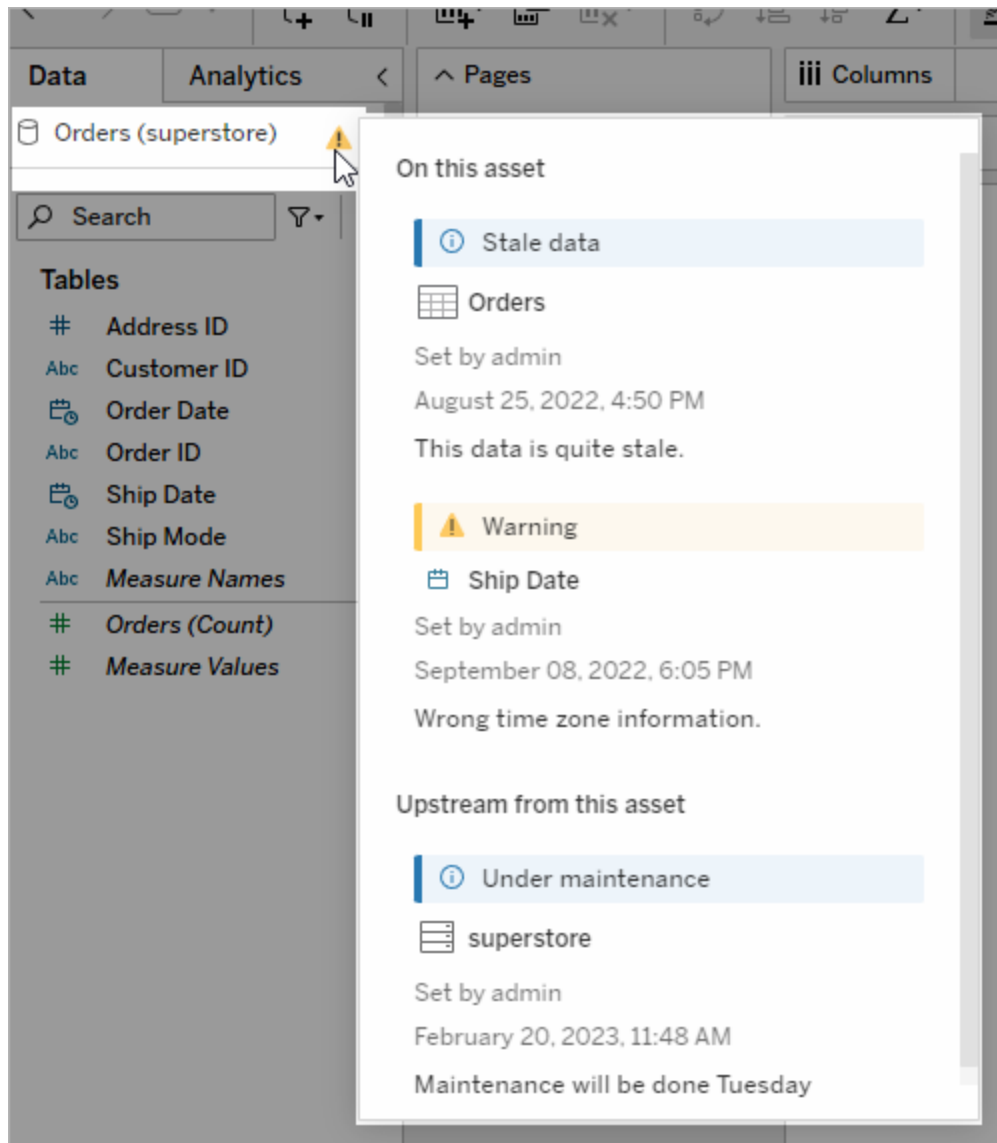


In Tableau Desktop and Tableau web authoring, users see an icon next to the data source in the **Data** pane when

- there's a warning on a data source used in the workbook or
- there's a warning upstream from the data source used in the workbook

Note: Data quality warnings for columns and virtual connections don't appear in Tableau Desktop.

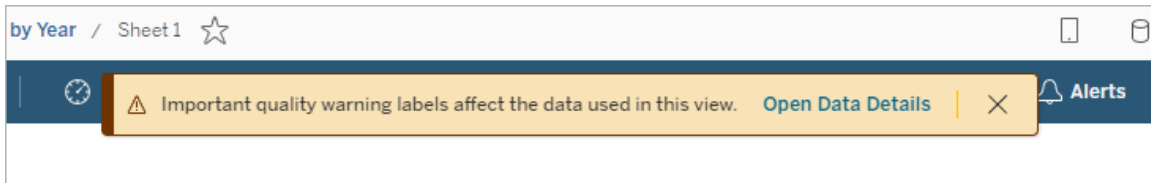
To see the details of the warning, hover over the icon with the cursor. Or, in web authoring, you can select a data source or a column and then select **Catalogue Details** to see all its labels.



In Tableau Cloud web authoring, you can look at all label properties for an object in the data pane (data connection or field) by selecting **Catalogue Details** on the data connection or field.

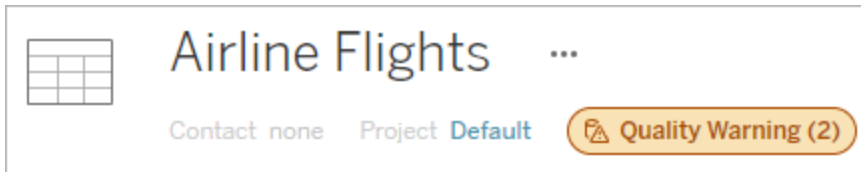
### Visibility

Data quality warnings can be classified as high visibility. High-visibility quality warnings appear more urgent and appear in more places. For example, a high visibility warning on a data source generates a notification when anyone opens a view that depends on it.



The icon and badge for high-visibility quality warnings is yellow or orange, while standard-visibility quality warnings are blue.

If more than one quality warning applies to an asset (because the asset has more than one quality warning or is inheriting upstream ones), the badge includes a number and the colour is determined by the highest visibility label. For example, if two quality warnings apply to an asset, one of which is standard visibility and one of which is high visibility, the badge is yellow or orange.



### Data quality warnings in subscriptions

Administrators can turn on data quality warnings in email subscriptions. If this feature is turned on, emails the users receive include high-visibility data quality warnings for that view, with links to:

- Relevant views or workbooks with their **Data Details** pane open.
- Relevant upstream assets, such as data sources, tables or databases.

Administrators can turn on data quality warnings in email subscriptions by selecting the **High-Visibility Data Labels in View and Workbook Subscriptions** option (previously the **Data Quality Warnings in Subscriptions** option) on the Tableau Server or Tableau Cloud site settings page. For more information, see High-Visibility Data Labels in View and Workbook Subscriptions in the Site Settings Reference.

## How to set a quality warning

You can set several different data quality warnings on an asset. Starting with Tableau Cloud June 2023 and Tableau Server 2023.3, an administrator can add to the list of available data quality warnings by [customizing data labels](#).

Starting with Tableau Cloud June 2023 and Tableau Server 2023.3, "Sensitive data" is no longer a data quality warning, but is a sensitivity label instead. For more information, see Sensitivity Labels. In Tableau Server 2023.1 and earlier, "Sensitive data" remains a data quality warning.

The following data quality warnings are built in:

- Warning
- Deprecated
- Stale data
- Under maintenance

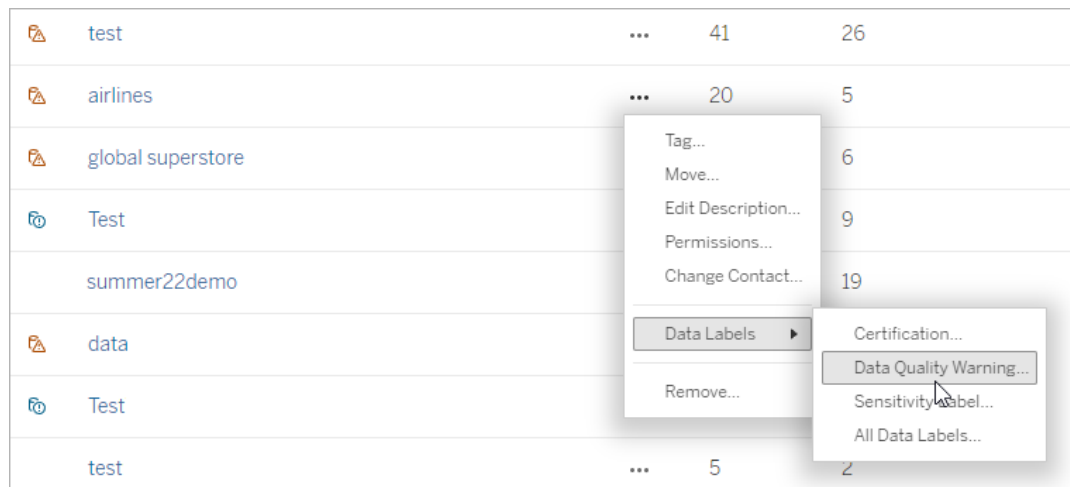
To attach a data quality warning to an asset:

Note: Starting with Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove quality warnings using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see The Data Labels dialog.

1. Search for or navigate to the asset. The steps to navigate depend on the type of asset you want to add the quality warning to:
  - Data source or virtual connection – on the **Explore** page, select **All Data Sources** or **All Virtual Connections**.
  - Virtual connection table – on the **Explore** page, select **All Virtual Connections**, and select the virtual connection that contains the virtual connection table you want to certify. Then select the virtual connection table.



- Database or table – on the **Explore** page, navigate to the database or table. Or on the **External Assets** page, select **Databases and Files** or **Tables and Objects**.
  - Column – on the **Explore** page, navigate to the table. Or on the **External Assets** page, select **Tables and Objects** and navigate to the table. Then find the column in the list.
2. Select the actions menu (. . .) next to the asset, and then select **Data Labels > Data Quality Warning**. (For columns in Tableau Server 2022.3 and earlier, instead select the column and then click the actions drop-down and select **Quality Warning**.)



3. Select the tick box beside quality warnings you want attached to the asset. Optionally, if you know the name of a quality warning, you can search for it at the top of the dialog, and then select the tick box beside it. (In Tableau Server 2023.3 and earlier, you can only attach one quality warning to each asset. Use the **Show warning** switch or **Enable warning** tick box to turn on a quality warning for that asset, then select the desired warning from the dropdown list.)
4. Set the visibility level.
5. If desired, enter a message to display to users. (In Tableau Server 2023.3 and earlier, a message is required.) You can format the text in a message with bold, underline and italics, and include a link or an image. To see text formatting tips, click on the information (i)

icon above the **Save** button.

The screenshot shows the 'Data Labels: (Batters)' dialog box. On the left, there's a sidebar with 'All Labels', 'Selected Labels (3)', 'Certification', 'Quality Warning' (selected), 'Sensitivity', and 'Department'. The 'Quality Warning' section has three options: 'Under maintenance' (checked), 'Stale data', and 'Warning'. The right panel is titled 'Quality Warning: Under maintenance' and contains a description, a visibility level selector (Standard visibility is selected), and a message field with a character count of 57 of 4,000 characters used. At the bottom, there are 'Manage labels', 'Cancel', and 'Save' buttons.

6. Select **Save**.

## Remove a data quality warning

When a warning no longer applies, you can remove it by navigating to the data asset with the warning.

**Note:** Starting with Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove quality warnings using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see The Data Labels dialog.

1. Select the actions menu (. . .) next to the asset, and then select **Quality Warning**. (For columns in Tableau Server 2022.3 and earlier, instead select the column and then click the actions drop-down and select **Quality Warning**.)

2. Untick the boxes beside quality warnings you want to remove from the asset. (In Tableau Server 2023.3 and earlier, use the **Show warning** switch or **Enable warning** tick box to turn off a quality warning for that asset.)
3. Turn off the warning.
4. Select **Save**.

### How to turn on a monitoring quality warning

You can set Tableau to monitor for two events: extract data source refresh failure and flow run failure. When the event occurs, Tableau generates a quality warning that appears in the same places that a manual quality warning appears.

You can turn on monitoring explicitly on the extract or flow, or, starting with Tableau Cloud October 2023 and Tableau Server 2023.3, you can enable site-wide monitoring for all extract refresh and flow run failures. For information on site-wide monitoring, see [Site-wide monitoring for extract refresh and flow run failures](#).

To explicitly monitor for either an extract refresh or flow run failure:

1. Select the actions menu (. . .) next to the extract data source or flow you want to create a warning for, and then select the appropriate option:
  - In Tableau Cloud and Tableau Server 2023.3 and later:
    - **Data Labels > Extract Refresh Monitoring**
    - **Data labels > Flow Run Monitoring**
  - In Tableau Server 2023.1 and earlier:
    - **Quality Warning > Extract Refresh Monitoring**
    - **Quality Warning > Flow Run Monitoring**
2. Enable the warning.
3. Set the visibility level. (Older versions of the dialogs have a tick box for high visibility.)
4. If desired, enter a message for users to see in the warning details if the extract refresh or flow run fails. You can format the text in a message with bold, underline and italics, and include a link or an image. To see text formatting tips, click on the information (i) icon above the **Save** button.
5. Click **Save**.

Flow Run Monitoring

Superstore Flow ⓘ

Flow run monitoring ☒

This flow's most recent run failed.

[Manage labels](#)

Set visibility level ⓘ

☒ Standard visibility

☐ High visibility

Message (optional) Edit Preview

This flow run failed. Please contact Ashley Garcia.

52 / 4,000 ⓘ [Formatting Guide](#)

[Clear Settings](#) Cancel Save

How to turn off a monitoring quality warning

To turn off monitoring for either an extract refresh or flow run failure:

1. Select the actions menu (⋮) next to the extract data source or flow you want to create a warning for, and then select the appropriate option:

- In Tableau Cloud and Tableau Server 2023.3 and later:
    - **Data Labels > Extract Refresh Monitoring**
    - **Data labels > Flow Run Monitoring**
  - In Tableau Server 2023.1 and earlier:
    - **Quality Warning > Extract Refresh Monitoring**
    - **Quality Warning > Flow Run Monitoring**
2. Turn off the warning.
  3. Click **Save**.

#### Site-wide monitoring for extract refresh and flow run failures

Starting with Tableau Cloud October 2023 and Tableau Server 2023.3, an administrator can turn on site-wide monitoring to add or remove data quality warnings for extract refresh failures and flow run failures. You can control this feature through the Settings page, under the Extract Refresh and Flow Run Monitoring section:

**Extract Refresh and Flow Run Monitoring**

- ☒ Turn on extract refresh monitoring for all extracts on this site (recommended)
- ☒ Turn on flow run monitoring for all flows on this site (recommended)

These settings are turned on by default for all new sites. Sites that existed before the change will have the settings turned off, but an administrator can turn them on.

**Note:** Data quality warning notifications aren't displayed for extract refreshes that use Tableau Bridge.

#### Interaction of site-wide monitoring and explicit monitoring

The interaction of explicit monitoring on assets and site-wide monitoring of all assets is as follows:

- If monitoring is explicitly turned on for an asset *and* site-wide monitoring is turned on, explicit settings on the asset take precedence over the site-wide settings. Settings include properties like visibility level and message.

- When you turn off site-wide monitoring:
  - Assets *with* monitoring explicitly turned on aren't changed.
  - Assets *without* monitoring explicitly turned on stop monitoring for extract refresh or flow run failures, and warnings that previously arose from extract refresh or flow run failures on those assets are removed.
  - Catalogue ingestion performance might be temporarily reduced as Catalogue re-ingests assets that may no longer have warning labels.

Site-wide monitoring was released in Tableau Cloud October 2023 and Tableau Server 2023.3. There's no interaction of explicit monitoring and site-wide monitoring in earlier versions.

Who can set quality warnings

To set a data quality warning, you must either

- be a server or site administrator, or
- have the **Overwrite** capability for the asset.

Customise data quality warnings

Starting with Tableau Cloud June 2023 and Tableau Server 2023.3, using the label manager on the Data Labels page or the REST API, an administrator can change the data quality warnings that users see in the data quality warning dialogue, or create new ones. For more information, see Manage Data Labels.

## Sensitivity Labels

Some data needs to be handled more carefully. To ensure trust and security, it's important that users know which data that is. Starting in Tableau Cloud June 2023 and Tableau Server 2023.3, if you have a Data Management licence, Tableau offers a new category of data label: *Sensitivity labels*. Users can use sensitivity labels to indicate the level of care that should be taken when creating views or sharing information. Furthermore, sensitivity labels can co-exist on the same asset as other labels, such as certification and data quality warnings. And, using the label manager on the **Data Labels** page or the REST API, an administrator can create sensitivity labels to suit the needs of their organisation.

Note: In Tableau Cloud March 2023 and Tableau Server 2023.1 and earlier, data sensitivity was expressed using the "sensitive data" data quality warning. With the upgrade to Tableau Cloud June 2023 and Tableau Server 2023.3, "sensitive data" data quality warnings were migrated to sensitivity labels.

Sensitivity labels can be attached to the same types of assets that other **data labels** can.

Attach a sensitivity label to an asset

To attach a sensitivity label to an asset:

Note: Starting with Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove sensitivity labels using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see The Data Labels dialog.

1. Search for or navigate to the asset. The steps to navigate depend on the type of asset you want to add the sensitivity label to:
  - Data source or virtual connection – on the **Explore** page, select **All Data Sources** or **All Virtual Connections**.
  - Virtual connection table – on the **Explore** page, select **All Virtual Connections**, and select the virtual connection that contains the virtual connection table you want to certify. Then select the virtual connection table.
  - Database or table – on the **Explore** page, navigate to the database or table. Or on the **External Assets** page, select **Databases and Files** or **Tables and Objects**.
  - Column – on the **Explore** page, navigate to the table. Or on the **External Assets** page, select **Tables and Objects** and navigate to the table. Then find the column in the list.
2. Select the actions menu (. . .) next to the asset, and then select **Data Labels > Sensitivity Label**.
3. Select the tick box beside sensitivity labels you want attached to the asset. Optionally, if you know the name of a sensitivity label, you can search for it at the top of the dialog,

and then select the tick box beside it. (In Tableau Server 2023.3 and earlier, you can only attach one sensitivity label to each asset. Use the **Show label** switch to turn on a sensitivity label for that asset, then select the desired sensitivity label from the drop-down list.)

4. If desired, enter a message to display to users. You can format the text in a message with bold, underline and italics, and include a link or an image. To see text formatting tips, hover over the information (i) icon above the **Save** button.
5. Select **Save**.

Data Labels: (airlines)

Search for labels

All Labels

Selected Labels (1)

Certification

Quality Warning

Sensitivity

Department

Sensitivity

☐ Non-Sensitive PII

☐ Sensitive PII

☒ Sensitive data

Sensitivity: Sensitive data

Description

**Sensitive data:** This asset contains sensitive information.

Sensitivity labels let users know about assets that need to be treated differently. The labels show on the asset and any assets downstream from it. [Learn more](#)

Message (optional) **Edit** **Preview**

The airlines database contains some confidential information.

61 of 4,000 characters used

[Manage labels](#) **Cancel** **Save**

## Remove a sensitivity label from an asset

To remove a sensitivity label from an asset:

**Note:** Starting with Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove sensitivity labels using the consolidated Data Labels dialog instead of sep-

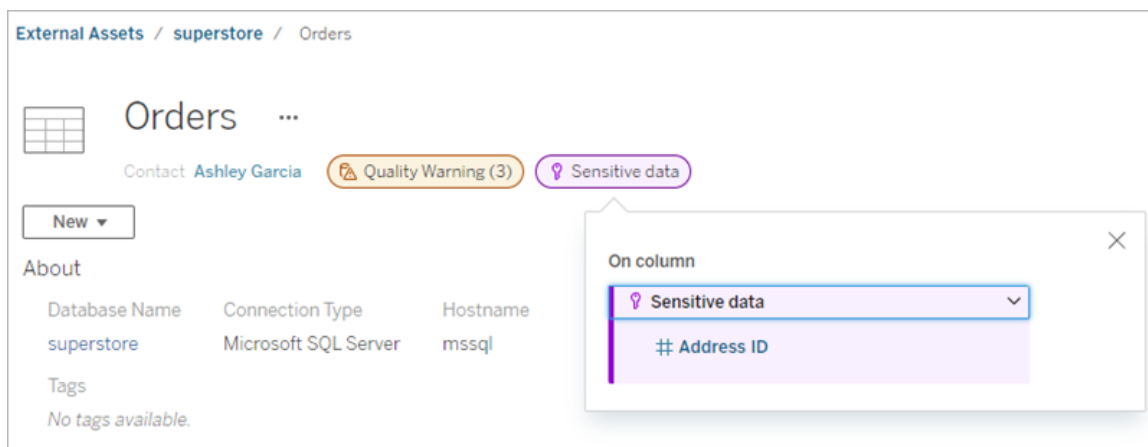


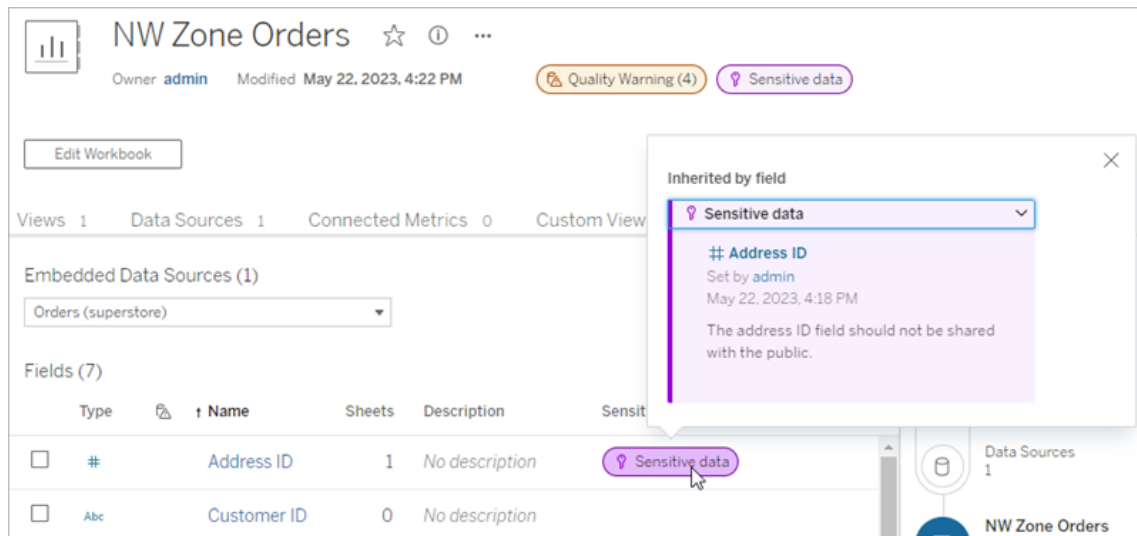
arate dialogs for each type of label. For information on the Data Labels dialog, see The Data Labels dialog

1. Select the actions menu ( . . . ) next to the asset, and then select **Data Labels > Sensitivity Label**.
2. Untick the boxes beside sensitivity labels you want to remove from the asset. (In Tableau Server 2023.3 and earlier, turn off the label with the **Show label** switch.)
3. Select **Save**.

### Where sensitivity labels appear

Sensitivity labels appear on assets when navigating Tableau Server. Like data quality warnings, sensitivity labels appear downstream from the assets on which they're attached. For example, a sensitivity label on a column appears in the columns row of the table page, again at the top of the table page, and on the database page.





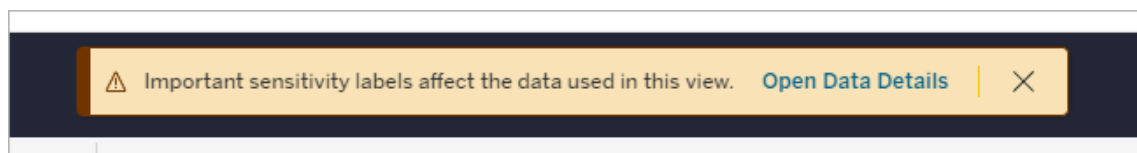
In web authoring, users see an icon next to the data source in the **Data** pane when

- there's a sensitivity label on a data source used in the workbook, or
- there's a warning upstream from the data source used in the workbook

To see the details, hover over the icon with the cursor. Or, in Tableau Cloud web authoring, you can select a data source or a column and then select **Catalogue Details** to see all its labels.

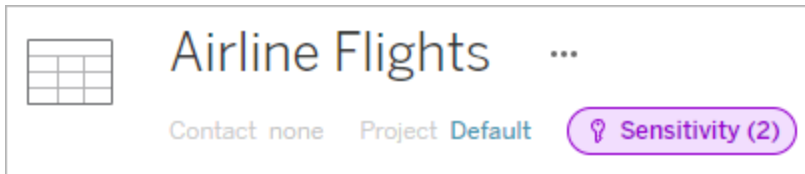
### Visibility

High-visibility sensitivity labels appear more urgent and appear in more places. For example, a high visibility sensitivity label on a table generates a notification when anyone authors a view or opens a published view that depends on it.



The icon and badge for high-visibility sensitivity labels are purple, while standard-visibility ones are grey. By default, the built-in sensitivity label called "Sensitive data" is high visibility.

If more than one sensitivity label applies to an asset (because the asset has more than one sensitivity label or is inheriting upstream ones), the badge includes a number, and the colour is determined by the highest visibility label. For example, if two sensitivity labels apply to an asset, one of which is standard visibility and one of which is high visibility, the badge is purple.



### Sensitivity labels in email subscriptions

Administrators can turn on sensitivity labels in email subscriptions so that when users subscribe to a view, the email they get includes high-visibility sensitivity labels associated with that view. Emails with high-visibility sensitivity labels contain:

- Links to relevant views or workbooks with their **Data Details** pane open.
- Links to relevant upstream assets, such as data sources, tables or databases.

Administrators can turn on sensitivity labels in email subscriptions by selecting the **High-Visibility Data Labels in View and Workbook Subscriptions** option (previously the **Data Quality Warnings in Subscriptions** option) on the Tableau Server or Tableau Cloud site settings page. For more information, see [High-Visibility Data Labels in View and Workbook Subscriptions](#) in the Site Settings Reference.

### Who can set sensitivity labels

To set a sensitivity label, you must either

- be a server or site administrator, or
- have the **Overwrite** capability for the asset.

### Customise sensitivity labels

There's only one built-in sensitivity label: *Sensitive data*. Starting with Tableau Cloud June 2023 and Tableau Server 2023, using the labels manager on the **Data Labels** page or the

REST API, an administrator can create sensitivity labels or change the name and description of an existing ones. Typical additions (name and description) might be:

- **Public:** Available to the public to view.
- **Internal:** Restricted to company employees and contractors. This data must not be shared publicly, but it can be shared with customers, partners and others under a non-disclosure agreement (NDA).
- **Confidential:** Available to an approved group of employees and contractors. This data isn't restricted by law, regulation, or a company master service agreement (MSA). It can be shared with customers, partners and others under an NDA.
- **Restricted:** Available only to an approved group of employees and contractors. This data is likely restricted by law, regulation, an NDA or a company MSA.
- **MissionCritical:** Available only to a small group of approved employees and contractors. Third parties who are given access could be subject to heightened contractual requirements. This data is almost always restricted by law, regulation, an NDA or a company MSA.

For more information, see [Manage Data Labels](#).

## Labels with Custom Categories

Tableau offers several data labels – certification, quality warnings and sensitivity labels – that cover a wide variety of ways to classify data. Still, there may be times that users need other labels and categories that match other use cases. Starting in Tableau Cloud October 2023 and Tableau Server 2023.3, users can classify assets using labels with custom categories that an administrator has defined. For example, an administrator could create a category called "Department" with labels for the sales, service and operations departments ready to be applied to assets.

Labels with custom categories require a Data Management licence with Tableau Catalogue enabled, and can be attached to the same kinds of assets that other data labels can.

However, labels with custom categories don't show on downstream assets the way that data quality warnings and sensitivity labels do.

Note: If you're an administrator who wants to create custom categories and labels, see [Manage Data Labels](#).

### Attach labels with custom categories to an asset

Note: Starting in Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove labels with custom categories using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see [The Data Labels dialog](#).

To attach a label with a custom category to an asset:

In Tableau Cloud and Tableau Server 2024.2 and later

1. Search for or navigate to the asset. The steps to navigate depend on the type of asset you want to add the label to:
  - Data source or virtual connection – on the **Explore** page, select **All Data Sources** or **All Virtual Connections**.
  - Virtual connection table – on the **Explore** page, select **All Virtual Connections**, and select the virtual connection that contains the virtual connection table you want to certify. Then select the virtual connection table.
  - Database or table – on the **Explore** page, navigate to the database or table. Or on the **External Assets** page, select **Databases and Files** or **Tables and Objects**.
  - Column – on the **Explore** page, navigate to the table. Or on the **External Assets** page, select **Tables and Objects** and navigate to the table. Then find the column in the list.
2. Select the actions menu (...) next to the asset, and then select **Data Labels > All Data Labels**.
3. Select the vertical tab on the left side of the dialog that corresponds to the custom label category. Optionally, if you know the name of a label, you can search for it at the top of the dialog.
4. Select the tick box beside labels you want attached to the asset.

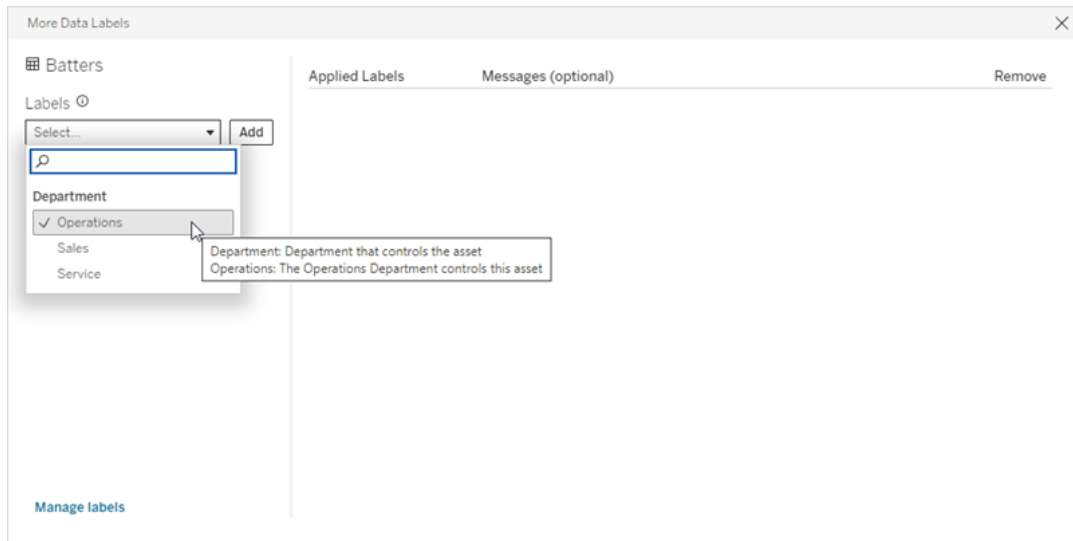
5. If desired, enter a message to display to users. You can format the text in a message with bold, underline and italics, and include a link or an image. To see text formatting tips, hover over the information (i) icon above the **Save** button.
6. Repeat steps 3 to 5 for each label you want to add.
7. Select **Save**.

The screenshot shows the 'Data Labels: (airlines)' dialog box. On the left, there is a sidebar with a search bar and a list of labels: 'All Labels', 'Selected Labels (2)', 'Certification', 'Quality Warning', 'Sensitivity', and 'Department'. The 'Department' label is selected. The main area shows the configuration for the 'Department' label. Under the 'Department' heading, there are three options: 'Operations' (checked), 'Sales', and 'Service'. To the right, the 'Department: Operations' section shows a description: 'Department: Department that controls the asset' and 'Operations: The Operations Department controls this asset'. Below this is a message field with the text 'The airlines database is controlled by the Operations Department.' and a character count '65 of 4,000 characters used'. At the bottom right, there is a 'Formatting Guide' icon. The bottom of the dialog has a 'Manage labels' link and 'Cancel' and 'Save' buttons.

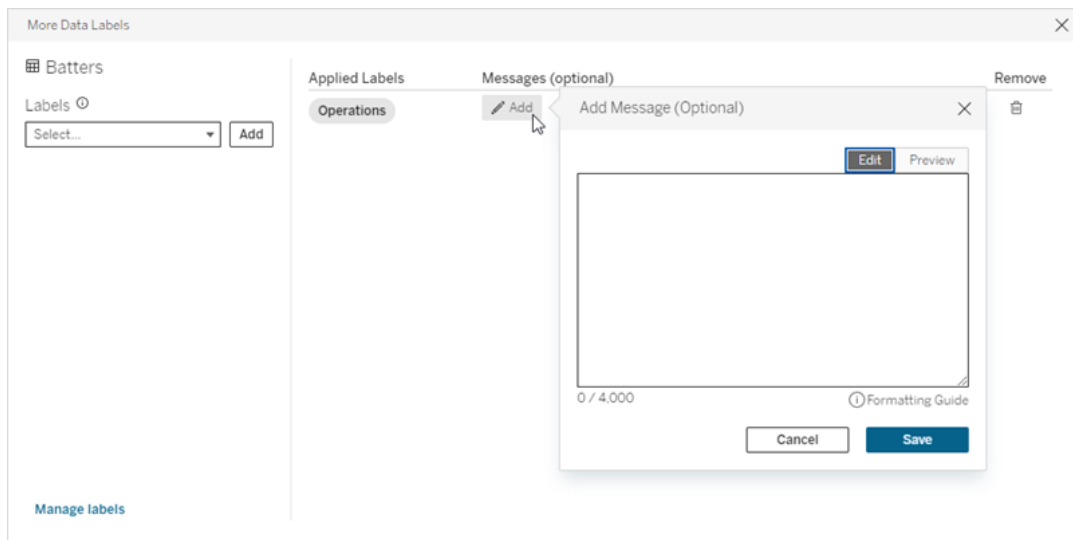
In Tableau Server 2023.3

1. Select the actions menu (...) next to the asset, and then select **Data Labels > More Data Labels**.

2. Select the **Labels** drop-down. The label names are arranged by label category, and you can scroll through them.



3. Select the label to attach, then select **Add** next to the **Labels** dropdown. The label appears in the **Applied Labels** list on the right side of the dialog.
4. To add an optional label message on this specific asset, select the pencil in the **Messages (Optional)** column, then select **Save**.



5. Repeat steps 2 to 5 for each label you want to add.
6. When you're finished adding labels, close the dialog. (Select the X in the dialog box's upper right corner or select something outside of the dialog box to close it.)

## Remove labels with custom categories from an asset

Note: Starting in Tableau Cloud February 2024 and Tableau Server 2024.2, you add and remove labels with custom categories using the consolidated Data Labels dialog instead of separate dialogs for each type of label. For information on the Data Labels dialogue, see The Data Labels dialog.

To remove a label with a custom category from an asset:

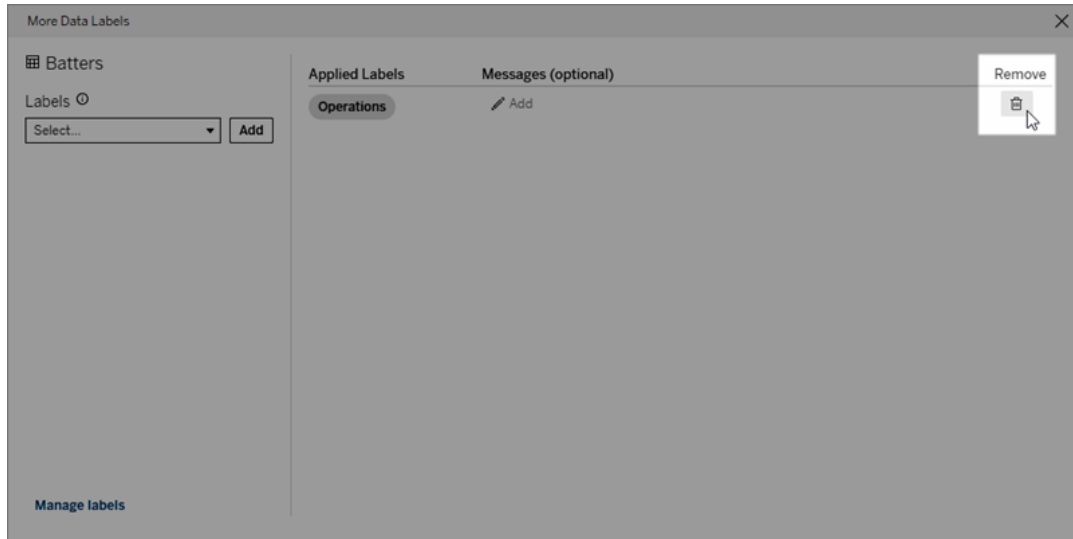
In Tableau Cloud and Tableau Server 2024.2 and later.

1. Search for or navigate to the asset. The steps to navigate depend on the type of asset you want to add the label to:
  - Data source or virtual connection – on the **Explore** page, select **All Data Sources** or **All Virtual Connections**.
  - Virtual connection table – on the **Explore** page, select **All Virtual Connections**, and select the virtual connection that contains the virtual connection table you want to certify. Then select the virtual connection table.
  - Database or table – on the **Explore** page, navigate to the database or table. Or on the **External Assets** page, select **Databases and Files** or **Tables and Objects**.
  - Column – on the **Explore** page, navigate to the table. Or on the **External Assets** page, select **Tables and Objects** and navigate to the table. Then find the column in the list.
2. Select the actions menu (...) next to the asset, and then select **Data Labels > All Data Labels**.
3. Select the vertical tab on the left side of the dialog that corresponds to the custom label category. Optionally, use the **Selected Labels** vertical tab to see all the labels attached to the asset. Or, if you know the name of a label, you can search for it at the top of the dialog.
4. Deselect the tick box beside labels you want removed from the asset.
5. Repeat steps 3 and 4 for each label you want to remove.
6. Select **Save**.



In Tableau Server 2023.3

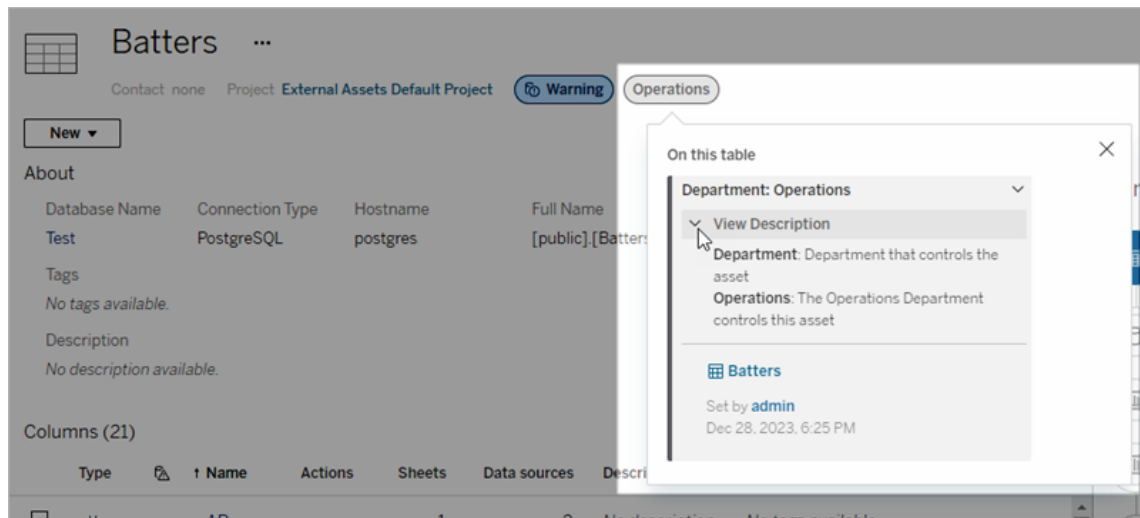
1. Select the actions menu (...) next to the asset, and then select **Data Labels > More Data Labels**.
2. In the **Applied Labels** section of the dialogue, select the trash icon in the row for the label to remove.



3. Repeat step 2 for each label you want to remove.
4. When you're finished removing labels, close the dialog. (Select the X in the dialog box's upper right corner or select something outside of the dialog box to close it.)

Where labels with custom categories appear

Custom labels appear on assets when navigating Tableau Cloud and Tableau Server.



In web authoring, you can select a data source or a column and then select **Catalogue Details** to see all its labels.

Unlike quality warnings and sensitivity labels, labels with custom categories don't appear downstream from assets they're attached to. For example, suppose your organisation has a custom label category named "Department" to which a custom label named "Sales" belongs. If you attach the "Sales" label to a table called "Orders", the label only appears on the "Orders" table and not on workbooks downstream from it.

#### Who can add custom category labels

To add a label with a custom category to an asset (or to remove one from an asset), you must either

- be a server or site administrator, or
- have the Overwrite capability for the asset.

#### Customise a label with a custom category

For information on how administrators can create or edit custom categories and labels that appear in the **More Data Labels** dialogue, see Manage Data Labels.

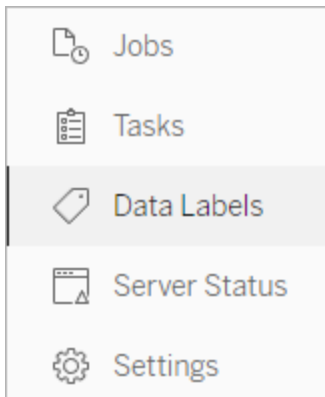
## Manage Data Labels

Starting in Tableau Cloud October 2023 and Tableau Server 2023.3, if you have a Data Management licence and are an administrator, you can use the label manager to create or edit label names and label categories. These customisations affect the way that labels appear throughout Tableau when users interact with labels.

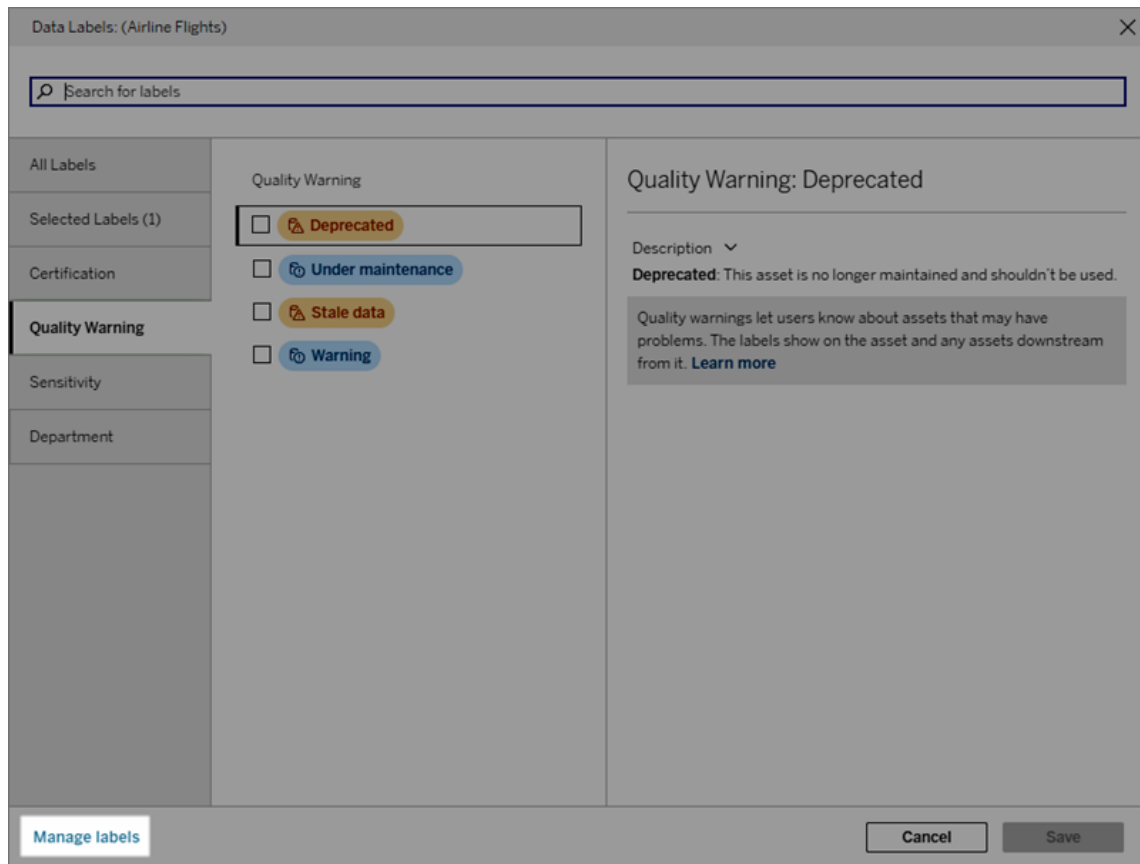
Note: You can also use the REST API's `labelValues` methods and `labelCategories` methods to create and edit labels and label categories. (Tableau Cloud administrators have been able to create and modify label names and descriptions using the `labelValues` methods since Tableau Cloud June 2023.) For more information, see the Metadata Methods in the [REST API Reference](#).

### Label Manager


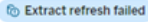
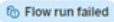


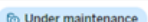

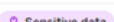



To use the label manager, log in as an administrator and select **Data Labels** from the left navigation pane.



Alternatively, if you're logged in as an administrator and you open the **Data Labels** dialogue to label an asset, a **Manage labels** link shows in the lower-left corner. The **Manage labels** link leads to the **Data Labels** page. (In Tableau Server 2023.3 and earlier, the **Manage labels** link shows in the label selection drop-downs of the individual certification, data quality warning, sensitivity label and custom label dialogs instead.)



The label manager page shows a row for each label, sorted by label category. Each row includes the label category, name (here known as the value), an **Actions** menu (...) to perform actions on that label, visibility and description.

Data Labels					
Use labels to classify data.					
<input type="button" value="New Label"/> <input type="button" value="Select All"/>					
Category	Value	Actions	Visibility	Description	
<input type="checkbox"/> Certification	 Certified	...	-	This asset is trusted and recommended.	
<input type="checkbox"/> Warning - Extract refresh failed	 Extract refresh failed	...	Standard ⓘ	This asset's most recent extract refresh failed.	
<input type="checkbox"/> Warning - Flow run failed	 Flow run failed	...	Standard ⓘ	This flow's most recent run failed.	
<input type="checkbox"/> Data Quality Warning	 Deprecated	...	High ⓘ	This asset is no longer maintained and shouldn't be used.	
<input type="checkbox"/> Data Quality Warning	 Stale data	...	High ⓘ	This asset is outdated.	
<input type="checkbox"/> Data Quality Warning	 Under maintenance	...	Standard ⓘ	This asset is undergoing maintenance.	
<input type="checkbox"/> Data Quality Warning	 Warning	...	Standard ⓘ	This asset has a general quality issue.	
<input type="checkbox"/> Sensitivity	 Sensitive data	...	High	This asset contains sensitive information.	
<input type="checkbox"/> Department	 Operations	...	-	The Operations Department controls this asset	
<input type="checkbox"/> Department	 Sales	...	-	The Sales Department controls this asset	
<input type="checkbox"/> Department	 Service	...	-	The Service Department controls this asset	

Use the label manager to:

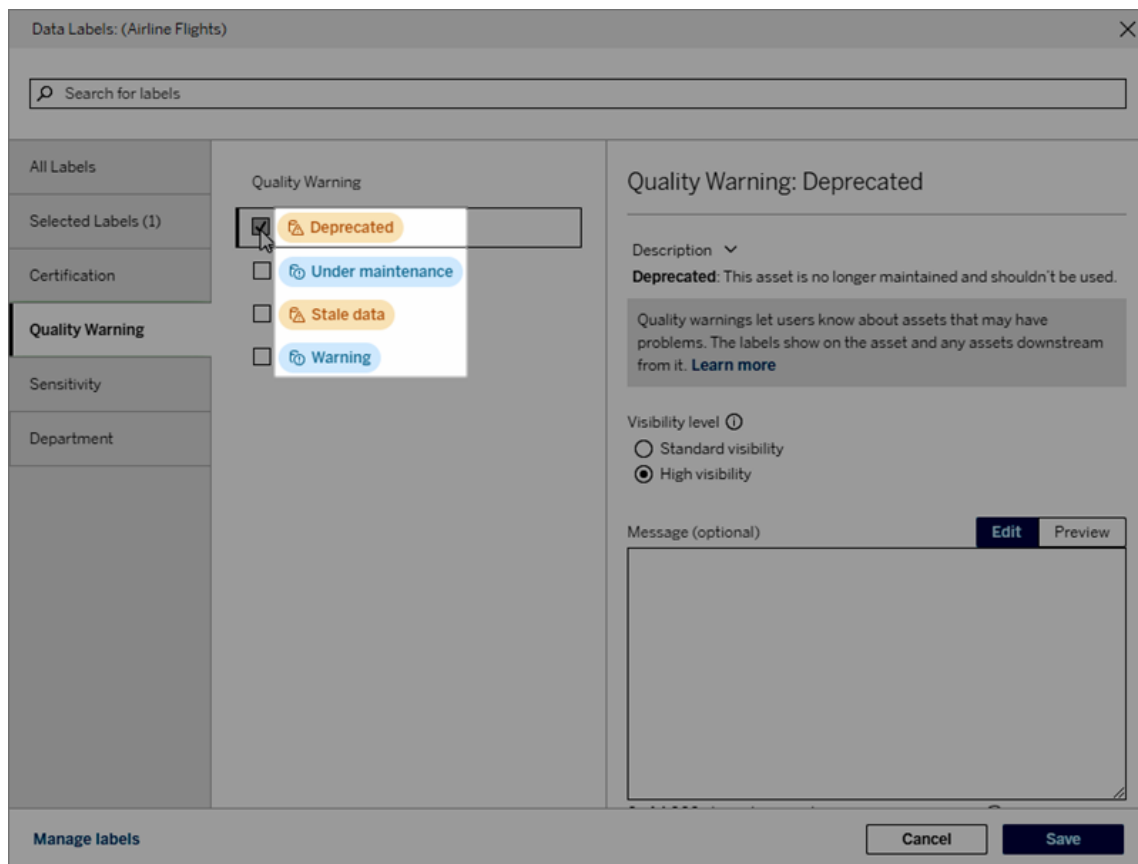
- **Edit built-in labels**
  - Example: You change the name of the built-in "Under maintenance" quality warning to "Maintenance mode".
  - Example: You change the visibility of extract refresh monitoring labels from standard visibility to high visibility so that they show in views.
- **Create new labels for the existing, built-in categories**
  - Example: You add a new sensitivity label called "Confidential".
- **Revert a built-in label to its default name, description and visibility**
  - Example: You previously changed the "Stale data" quality warning name to "Outdated", and you want to revert it to its default name.
- **Create custom categories**
  - Example: You create a new label category called "Department" with the intention of adding labels for different business units.
- **Create new labels in custom categories**
  - Example: You create new "Sales", "Service" and "Operations" labels for your newly created "Department" category.

## Properties of Data Labels

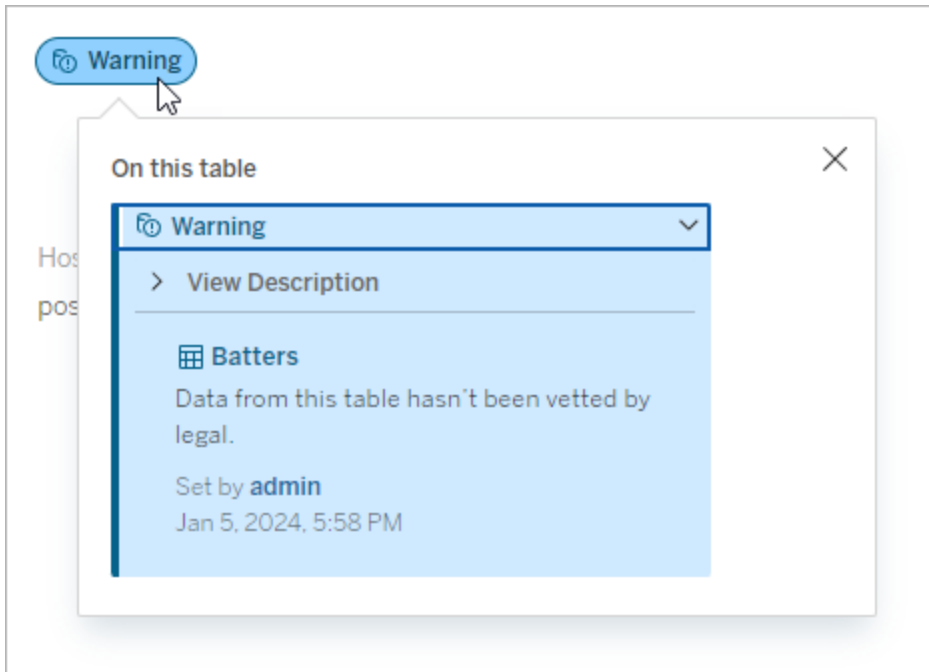
A label has a name, a category and a description. Labels with a Quality Warning or Sensitivity category also have a visibility level.

### Name

The label name is the common name for the label as it appears in various places. For example, here the label name "Deprecated" is selected in the **Quality Warning** tab of the **Data Labels** dialog.



Here the label name "Warning" shows at the top of the "Batters" table page, and again in the label details.

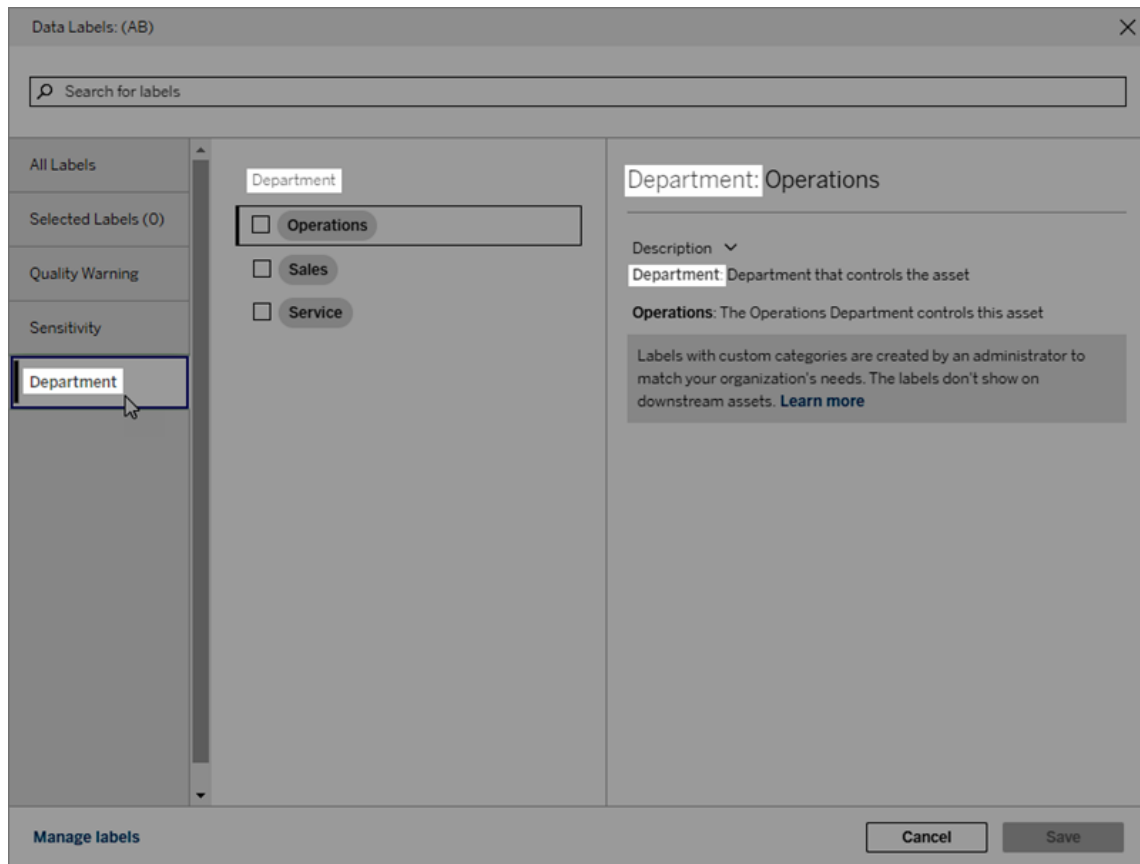


## Category

The label category affects where and how the label appears, whether it appears on assets that are downstream from the one it's attached to, and which parts are customisable, among other things. For example, quality warnings and sensitivity labels appear on downstream assets, but other labels with other categories don't. Another example: You can change the description of a certification label, but not the name.

The built-in categories are **certification**, **quality warning** and **sensitivity**.

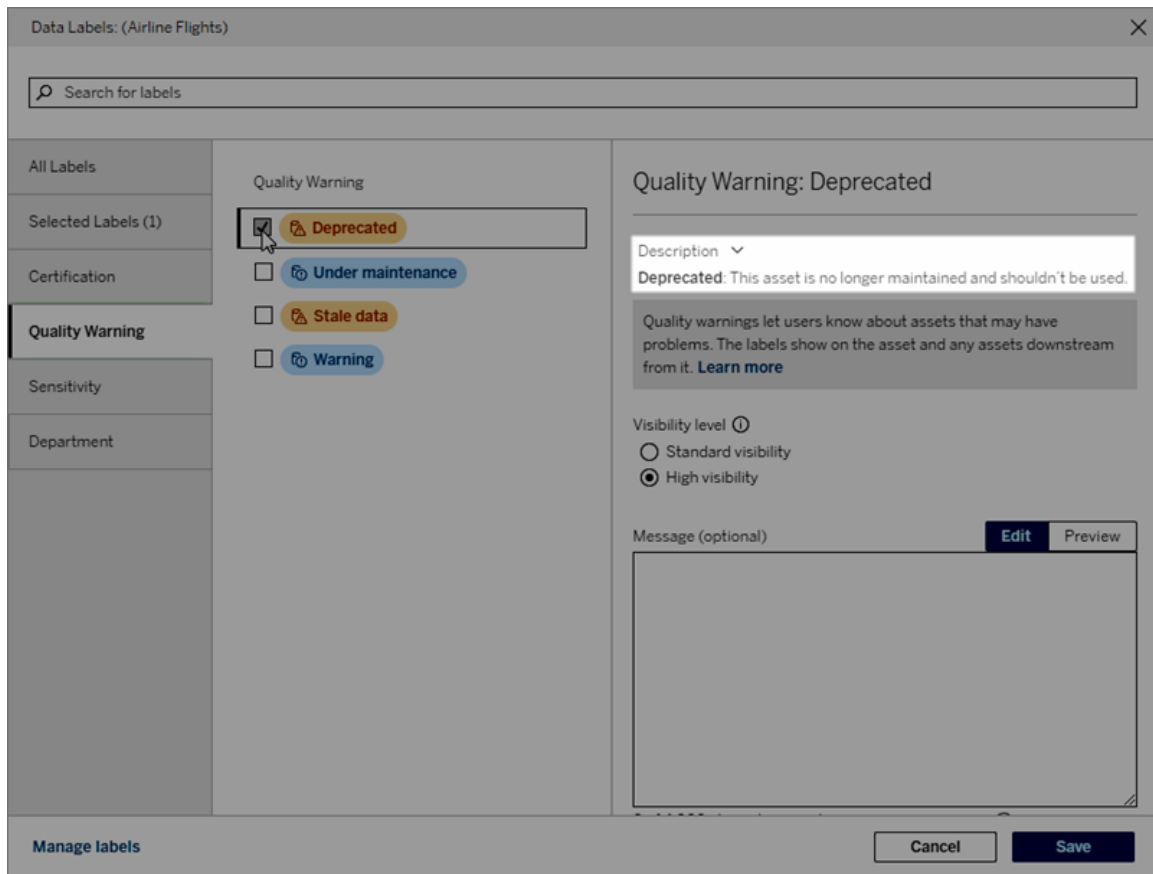
For custom categories, users see the category name in the vertical category tabs of the **Data Labels** dialog, among other places. For example, here the category name "Department" appears in the vertical category tabs, the top of the label name list and other places.



## Description

The label description appears in various places, including in the **Data Labels** dialog, and helps the user understand what the label is used for. For example, the label description for this quality warning says "This asset is no longer maintained and shouldn't be used."





## Visibility

The visibility of a label determines its appearance. High-visibility labels appear in more places and may appear more urgent to the user. You can only set the visibility level on Quality Warning or Sensitivity labels. Furthermore, if a label has a category of Quality Warning, users with permissions can override the default visibility on each asset that they attach a Quality Warning label to. For more information, see the [Set a Data Quality Warning](#) and [Sensitivity Labels](#) topics.

## Create a data label

To create a label:

1. From the **Data Labels** page, select **New Label**.
2. Select a category from the **Label** category drop-down.
3. Enter the label name in the **Label value** field.

4. Enter the label description in the **Label description** field. You can format the text with bold, underline and italics, and include a link or an image. To see text formatting tips, hover over the information (i) icon above the **Save** button.
5. If the label has a category of Quality Warning or Sensitivity, set the visibility level. For more information, see [Visibility](#).
6. Select **Save**.

The screenshot shows the 'New Label' dialog box. On the left, under 'Label category', 'Department' is selected. Below it, 'Category description' has an edit icon. Further down, 'Department that controls the asset' is shown with a note: 'Data labels with custom categories don't appear on downstream assets. [Learn more](#)'. At the bottom left is a 'New Category' button. The main area on the right has 'Label value' set to 'Sales' with a character count of '5 / 128'. Below that, 'Label description (required)' contains the text 'The Sales Department controls this asset' with a character count of '40 of 500 characters used'. There are 'Edit' and 'Preview' buttons for the description. At the bottom right are 'Cancel' and 'Save' buttons, with a 'Formatting Guide' icon above the 'Save' button.

### Limitations for creating labels

- You can't create a label in the certification category. The certification category allows only the single, built-in label.
- You can't create new monitoring warnings. However, the extract refresh failure warning and flow run failure warning can be edited in limited ways, as described in the "Edit a label" section.
- The maximum length for a label name is 128 characters in Tableau Cloud and Tableau Server 2024.2 and later. The maximum length for a label name is 24 characters in Tableau Server 2023.3 and earlier.
- The maximum length for a label description is 500 characters.

### Edit a data label

To edit an existing label:

1. From the **Data Labels** page, select the **Actions (...)** menu in the label's row. Or select the row using its tick box on the left and click the **Actions** drop-down at the top of the

- label list.
2. Select **Edit**.
  3. (Optional) Change the label name using the **Label value** field.
  4. (Optional) Change the label description using the **Label description** field.
  5. (Optional) If the label has a category of Quality Warning or Sensitivity, set the visibility level. For more information, see [Visibility](#).
  6. Select **Save**.

Limitations for editing labels

- You can't change the category on an existing label.
- The maximum length for a label name is 128 characters in Tableau Cloud and Tableau Server 2024.2 and later. The maximum length for a label name is 24 characters in Tableau Server 2023.3 and earlier.
- The maximum length for a label description is 500 characters.

The different label categories allow different degrees of label editing. The following table lists the editable properties of labels with the given categories:

Label category	Can edit label category	Can edit label names	Can edit label descriptions	Can edit label visibility
Certification	No	No	Yes	N/A
Quality Warning	No	Yes <sup>1</sup>	Yes	Yes <sup>2</sup>
Sensitivity	No	Yes	Yes	Yes
Custom	No	Yes	Yes	N/A

<sup>1</sup> You can't edit the label name (label value) of the extract refresh or flow run monitoring warnings.

<sup>2</sup> The visibility level you set for quality warnings is the default visibility. Users with permission can override the default visibility when they attach a quality warning to an asset. For more information, see [Visibility](#).

## Delete a data label

To delete an existing label:

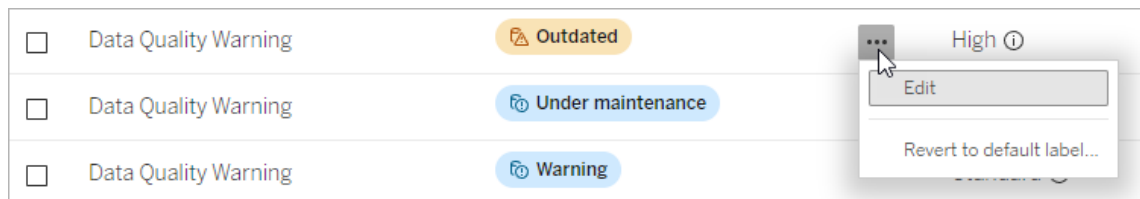
1. From the **Data Labels** page, select the **Actions (...)** menu in the label's row. Or select the row using its tick box on the left and click the **Actions** drop-down at the top of the label list.
2. Select **Delete**.

## Limitations for deleting labels

- You can't delete a built-in label. Built-in labels are the default labels in Tableau Server.

## Revert a built-in data label to its defaults

If an administrator previously edited a built-in label, the **Actions** menu for that label contains **Revert to default label**. Reverting a label to its defaults returns the label's name (value), description and visibility to its built-in defaults.



## Create a data label category

To create a label category:

1. From the **Data Labels** page, select **New Label**.
2. In the **New Label** dialog, select **New Category**.
3. Enter the category name in the **Category name** field.
4. Enter the category description in the **Category description** field. You can format the text with bold, underline and italics, and include a link or an image. To see text formatting tips, hover over the information (i) icon above the **Save** button.
5. Select **Save**.

**Add New Category** [X]

Category name  
  
 10 / 128

Category description (required) **Edit** Preview  
  
 34 / 500

[Formatting Guide](#)

**Cancel** **Save**

### Limitations for creating label categories

- The maximum length for a category name is 128 characters in Tableau Cloud and Tableau Server 2024.2 and later. The maximum length for a category name is 24 characters in Tableau Server 2023.3 and earlier.
- The maximum length for a category description is 500 characters.

### Edit a data label category

To edit a label category:

1. From the **Data Labels** page, select the label category, then select the pencil icon. Or from the **New Label** or **Edit Label** dialogs, select the category in the **Label category** drop-down and then select the pencil icon next to **Category description**.
2. (Optional) Change the category name using the **Category name** field.
3. (Optional) Change the category description using the **Category description** field.
4. Select **Save**.

### Limitations for editing label categories

- You can't edit a built-in category.
- The maximum length for a category name is 128 characters in Tableau Cloud and Tableau Server 2024.2 and later. The maximum length for a category name is 24 characters in Tableau Server 2023.3 and earlier.
- The maximum length for a category description is 500 characters.

### Delete a data label category

Currently, there isn't a method to delete a label category through the regular Tableau Server interface. To delete a category using the REST API, see the [Delete Label Category method](#) in the REST API Reference.

### Scenarios for customisation

#### Scenario: Customise a built-in data label

Suppose you decide that the data quality warning called "Warning" could be more specific. As an administrator, you change the label name from the default ("Warning") to something you think is more useful to your organisation: "Not approved". The label name "Not approved" now appears in label dialogs when users are selecting labels.

Alternatively, you could change the label description so that the user learns more about the warning in the label dialog. For example: "This asset doesn't meet quality standards required by the marketing department."

#### Scenario: Create a custom data label

Suppose you want users to have more granular control over classifying the sensitivity of assets. You create two sensitivity labels with the names "Public" and "PII". The custom label names "Public" and "PII" now appear in the label dialog drop-downs and descriptions, alongside the built-in sensitivity label.

#### Scenario: Create a new data label category and associated data labels

Suppose you need a way to identify the business units that are responsible for assets. You create a label category called "Department". Then you create three labels – "Sales", "Service"

and "Operations" – with "Department" as their category. The category "Department" and the three associated labels now appear in the **More Data Labels** dialog for users to attach to assets.

## Manage Dashboard and Viz Extensions in Tableau Server

Dashboard extensions are web applications that run in custom dashboard zones and can interact with the rest of the dashboard using the [Tableau Extensions API](#). Dashboard extensions give users the ability to interact with data from other applications directly in Tableau. Like dashboard extensions, viz extensions are web applications that use the Tableau Extensions API and allow developers to create new viz types. Tableau users can access viz extensions through the worksheet Marks card.

**Note:** You must be a server administrator to enable dashboard and viz extensions on the server, or to block specific extensions from running. You must be a server administrator to add extensions to the safe list and to control the type of data the extensions can access. The server administrator can also configure whether users on the site see prompts when they add or view extensions. For information about extension security and recommended deployment options, see [Extension Security - Best Practices for Deployment](#)

For information about using dashboard extensions in Tableau, see [Use Dashboard Extensions](#).

For information about using viz extensions, see [Add Viz Extensions to Your Worksheet](#).

Looking for Tableau Cloud? See [Manage Dashboard Extensions in Tableau Cloud](#).

### Before you run extensions on Tableau Server

Tableau supports two ways of hosting extensions:

- Network-enabled extensions, which are hosted on web servers located inside or outside of your local network. Network-enabled extensions have full access to the web.
- Sandboxed extensions, which run in a protected environment without access to any other resource or service on the web.

**Note:** Beginning with version 2021.1.0 Tableau supports integration with Einstein Discovery through the Einstein Discovery Dashboard extension. This is a special extension that has access to data in Salesforce.com and is allowed by default. It is not considered a Network-enabled extension or a Sandboxed extension. For more information on Einstein Discovery integration, see Tableau Server Release Notes.

Sandboxed extensions are hosted by Tableau and employ W3C standards, such as Content Security Policy (CSP), to ensure the extension can't make network calls outside of the hosting Tableau Server. A Sandboxed extension can query data in the dashboard, but it can't send that data anywhere outside of the sandbox. Sandboxed Extensions are supported in Tableau 2019.4 and later. By default, Sandboxed extensions are allowed to run if extensions are enabled for the site.

Network-enabled extensions are web applications and could be running on any computer set up as a web server. This includes local computers, computers in your domain and third-party web sites. Because Network-enabled extensions could be hosted on third-party sites and could have access to the data in the workbook, you want only to allow the extensions you trust. See Test Network-enabled extensions for security.

For security, you can use the settings for extensions on Tableau Server to control and limit the extensions that are allowed to run.

- By default, Sandboxed extensions are allowed to run if extensions are enabled for the site.
- By default, no Network-enabled extensions are allowed unless they've been explicitly added to the safe list.



- By default, only extensions that use the HTTPS protocol are allowed, which guarantees an encrypted channel for sending and receiving data (the only exception is for `http://localhost`).
- If the Network-enabled extension requires full data (access to the underlying data), the extension can't run on Tableau Server unless you explicitly add the extension to the safe list and grant the extension access to full data.

## Control extensions and access to data

Server administrators can control a global setting to allow extensions for all sites on the server. Server administrators can also put extensions, including Sandboxed extensions, on a global block list to prevent them from running (see Block specific extensions). By default, all Sandboxed extensions are enabled on the server, but site administrators can choose to override the default and prohibit Sandboxed extensions for the site.

Change the global setting enabling extensions on the server

1. To change this setting for the server, go to **Manage All Sites > Settings > Extensions**. If the server just has a single site, the global controls appear on the settings page for the site.
2. Under Dashboard and Viz Extensions, select or clear the **Let users run extensions on this server** tick box. If this option is not selected, extensions are not allowed to run. This global setting overrides the **Let users run extensions on this site** settings for each site.

Change the default settings for a site

Server administrators can control whether to enable extensions for the site and whether to allow Sandboxed extensions on the site. That is, if extensions are enabled on the server, the default site settings allow Sandboxed extensions to run on the site, provided the extension is not specifically blocked on the server. The default site settings allow Network-enabled extensions to run that appear on the safe list for the site. Individual Sandboxed extensions can also be added to the safe list, if Sandboxed extensions are not allowed by default.

1. To change these settings for the site, go to **Settings > Extensions**.
2. Under Dashboard and Viz Extensions, configure these options:
  - **Let users run extensions on this site**
  - **Let Sandboxed extensions run unless they are specifically blocked by a server administrator**

Server administrators can add or remove Network-enabled and Sandboxed extensions from the safe list for a site. When you add an extension to the safe list, you can control whether to allow the extension to have access to full data. See [Add extensions to the safe list and configure user prompts](#).

## Identifying the URL of an extension

As a web application, an extension is associated with a URL. You can use this URL to test and verify the extension. You also use the URL to add the extension to the safe list to allow full data access, or to the block list to prohibit any access.

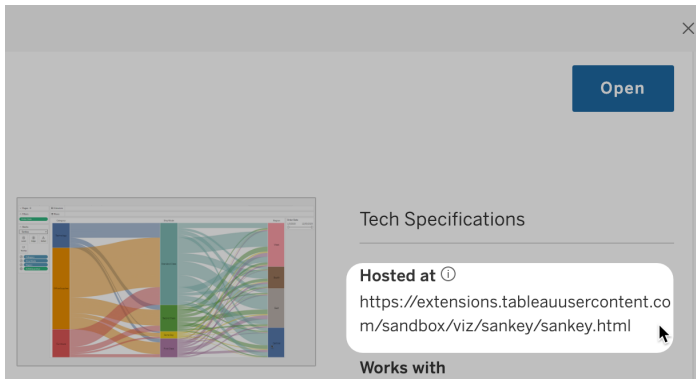
### From the manifest file

If you have the extension manifest file (.trex), an XML file that defines properties for the extension, you can find the URL from the `<source-location>` element.

```
<source-location>  
  <url>https://www.example.com/myExtension.html</url>  
</source-location>
```

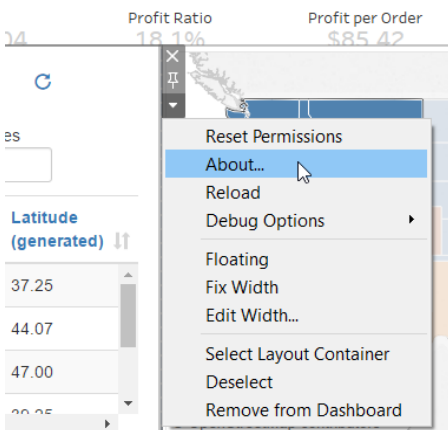
### From Tableau Exchange

If you added or downloaded an extension from the Tableau Exchange, you can find the URL for the extension on the Exchange. Open the tile for the extension, and under Tech Specifications, look for the URL under the heading **Hosted at**.

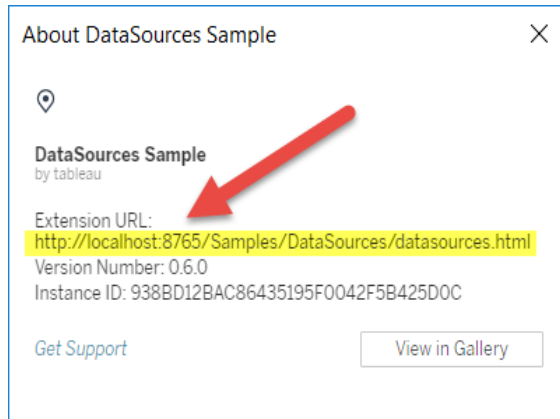


### Identifying a dashboard extension using the About dialog box

If you have added the extension to the dashboard, you can find the URL from the extension properties. From the **More Options** menu, click **About**.



The About dialog box lists the name of the extension, the author, the website of the author and the URL of the extension.



## Add extensions to the safe list and configure user prompts

To ensure that users can use Network-enabled extensions that are trusted, you can add them to the safe list for the site. You can also add Sandboxed extensions to the safe list, if Sandboxed extensions aren't enabled by default on the site.

On the safe list, you can control whether to grant the extension full data access. By default, when you add an extension to the safe list, the extension only has access to the summary (or aggregated) data. You can also control whether users see a prompt asking them to allow the extension access to data. You might want to add an extension to the safe list (for example, a Sandboxed extension) so that you can configure whether users see the prompts. When you hide the prompt from users, the extension can run immediately.

1. Go to **Settings > Extensions**.
2. Under **Enable Specific Extensions**, add the URL of the extension. See Identifying the URL of an extension.

**Tip:** You can use a full stop and asterisk ( . \* ) as a wildcard in the URL to allow all extensions in a certain domain or location. For example, to allow all extensions in the domain under example.com that use port 8080, you would add the URL: `https://example.com:8080/.*`. For more information, see Using regular expressions in the safe list URL.

3. Choose to **Allow** or **Deny** the extension **Full Data Access**.

Full data access is access to the underlying data in the view, not just the summary or aggregated data. Full data access also includes information about the data sources, such as the names of the connection, fields and tables. Usually, if you are adding an extension you want to use to the safe list, you will also want to allow the extension to have access to full data, if the extension requires it. Before adding extensions to the safe list, be sure to Test Network-enabled extensions for security.

4. Choose to **Show** or **Hide** the **User Prompts**.

Users see the prompts by default when they are adding a dashboard extension to a dashboard, or a viz extension to a worksheet, or when they are interacting with a view that has an extension. The prompt tells users details about the extension and whether the extension has access to full data. The prompt gives users the ability to allow or deny the extension from running. You can hide this prompt from users, allowing the extension to run immediately.

## Block specific extensions

The default global policy allows all Sandboxed extensions and those Network-enabled extensions that appear on the safe list for a site. Server administrators can keep specific extensions from running by adding them to the block list for the server. If an extension is on the global block list it overrides any settings for the extension on the safe list for a site.

1. To add an extension to the blocked list for the server, go to **Manage All Sites > Settings > Extensions**. On single-site installations, the block list is on the site **Extensions** settings page.
2. Under **Block Specific Extensions**, add the URL of the extension. See Identifying the URL of an extension.

Using regular expressions in the safe list URL

In general, when you add an extension to the safe list, you should use the specific URL of the extension. However, there are times when you might want to allow multiple extensions that are

hosted from the same domain and location. In this case, it is convenient to use a wildcard in the URL. The extension settings support the use of regular expressions.

Regular expres- sion	Description
.	A full stop (.) is a wildcard you can use to match any character. If you need to specify a full stop (.) in the URL instead of a wildcard, you can escape the character with a backslash (\.).
*	An asterisk (*) is a quantifier that specifies one or more instances of the previous character.

Take care, if you use wildcards, not to make the safe list too permissive and inadvertently allow access to extensions that should not have access.

The following table shows some examples of using regular expressions in the URL. Note that these examples do not show the protocol and the full URL of the extension. Only extensions that use the HTTPS protocol are allowed (with the exception of `http://localhost`).

To specify...	Example	Specifies
Range of domains	.*\example.com	All subdomains under example.com.
All ports	example.com:.*	Extensions are allowed access from all ports on example.com.
All extensions under domain, port and path	example.com:8080/xyz/.*	All extensions under the domain example.com that use port 8080 and are located in xyz, are allowed access.
All ports for a range of domains	.*\example.com:.*	Allows access to extensions on all ports on all subdomains under example.com.

All extensions under a domain and path that match the pattern	example.com/t.c/.*	Allows access to extensions running on example.com under folders that match the pattern t.c. For example, tic, tac, toc.
---	--------------------	--

## Test Network-enabled extensions for security

Dashboard and viz extensions are web applications that interact with data in Tableau using the Extensions API. Network-enabled extensions could be hosted on web servers inside or outside of your domain, and can make network calls and have access to resources on the Internet. Because of the potential vulnerabilities, such as cross-site scripting, you should test and vet Network-enabled extensions before they are used in Tableau Desktop, and before you allow the extensions on Tableau Server.

### Examine the source files

Dashboard and viz extensions are web applications and include various HTML, CSS and JavaScript files, and an XML manifest file (\*.trex) that defines the properties in the extension. In many cases, the code for an extension is publicly available on GitHub and can be examined there or downloaded. In the manifest file (\*.trex), you can find the source location, or URL indicated where the extension is hosted, the name of the author and the web site of the author or company to contact for support. The `<source-location>` element specifies in the URL, the `<author>` element, specifies the name of the organisation and the website to contact for support (`website="SUPPORT_URL"`). The website is the **Get Support** link user see in the **About** dialog box for the extension.

Many extensions reference external JavaScript libraries, such as the jQuery library or API libraries for third parties. Validate that the URL for external libraries points to a trusted location for the library. For example, if the connector references the jQuery library, make sure that the library is on a site that is considered standard and safe.

All extensions are required to use the HTTPS protocol (`https://`) for hosting their extensions. You should examine the source files for the extension to ensure that any reference to

external libraries is also using HTTPS or is hosted on the same website as the extension. The one exception to the requirement of HTTPS is if the extension is hosted on the same computer as Tableau (`http://localhost`).

To the extent possible, make sure you understand what the code is doing. In particular, try to understand how the code is constructing requests to external sites, and what information is being sent in the request. In particular, check if any user-supplied data is validated to prevent cross-site scripting.

### Understand data access

The Tableau Extensions API provides methods that can access the names of the active tables and fields in the data source, the summary descriptions of the data source connections and the underlying data in a worksheet. If an extension uses any of these methods in a view, the extension developer must declare that the extension requires full data permission in the manifest file (`.trex`). The declaration looks like the following.

```
<permissions>
  <permission>full data</permission>
</permissions>
```

Tableau uses this declaration to provide a prompt to users at run time that gives them the option of allowing this access. If the extension uses any one of these methods, without declaring full-data permission in the manifest file, the extension loads but the method calls fail.

For information about how an extension accesses data from the dashboard, and the JavaScript methods used, see [Accessing Underlying Data](#) in the Tableau Extensions API. To get a better understanding about what the extension can find out about the data, you can use the [DataSources](#) sample dashboard extension (available from the [Tableau Extensions API GitHub repository](#)) to see what data is exposed when the `getDataSourcesAsync()` method is called.

### Test the extension in an isolated environment

If possible, test the extension in an environment that is isolated from your production environment and from user computers. For example, add a dashboard or viz extension to a safe



list on a test computer or virtual machine that's running a version of Tableau Server that is not used for production.

Monitor traffic created by the dashboard extension

When you test a Network-enabled extension, use a tool like [Fiddler](#), [Charles HTTP proxy](#) or [Wireshark](#) to examine the requests and responses that the extension makes. Make sure that you understand what content the extension is requesting. Examine the traffic to be sure that the extension is not reading data or code that is not directly related to the purpose of the extension.

## Configure Connections with Analytics Extensions

Tableau supports a set of functions that your users can use to pass expressions to analytics extensions for integration with R, Python and Einstein Discovery.

**Note:** You can use R and Python scripts to perform complex cleaning operations in your Tableau Prep flows, but configuration and functionality supported can be different. For information see [Use R and Python Scripts in your Flow](#) in the Tableau Prep help.

This topic describes how to configure sites on Tableau Server with analytics extensions.

Because Tableau Server provides an authentication mechanism, it can be more secure to expose analytics extensions functionality to users through Tableau Server than in Tableau Desktop.

For more information about user scenarios and configuring Tableau Desktop, see [Pass Expressions Analytics Extensions](#), in the *Tableau Desktop and Web Authoring Help*.

The configuration steps in this article are specific to Workbooks. For information about how you can use R and Python scripts to incorporate predictive modelling data into your flow, see [Use R and Python scripts in your flow](#) in the *Tableau Prep Help*.

**Feature change history:**

- 2021.2 – You can configure multiple analytics extension connections for each site. (You are limited to a single Einstein Discovery connection per site.)

For information about how to determine analytics extension usage in workbooks, see [Determining analytics extensions usage](#).

- 2021.1 – Einstein Discover is included as an analytics extension option. Einstein Discovery in Tableau is powered by [salesforce.com](#). Consult your agreement with [salesforce.com](#) for applicable terms.
- 2020.2 – You can configure a different analytics extension connection for each site on your server. Prior to this change a single analytics extension configuration applied globally to all sites on the server.
- 2020.1 – This functionality is now called *analytics extensions*. Previously the feature was called "external services".

## Server SSL

To configure SSL for analytics extensions, you must install a valid certificate on the computer running Tableau Server. The certificate must be trusted by the computer running Tableau Server. The certificate Subject field or one of the SAN entries on must exactly match the URI of the analytics extensions service configuration.

## Enable analytics extensions

Before you configure extensions, you must enable analytics extensions server-wide.

1. Sign in to the Tableau Server Admin Area.
  - If you only have a single site (default) on your server, click **Settings**, and then go to Step 2.
  - If you have multiple sites on your server:
    - a. Under **All Sites**, click **Manage all sites**.
    - b. Click the **Extensions** tab.
2. Scroll to **Analytics Extensions**, select **Enable analytics extensions** and then click

**Save.**

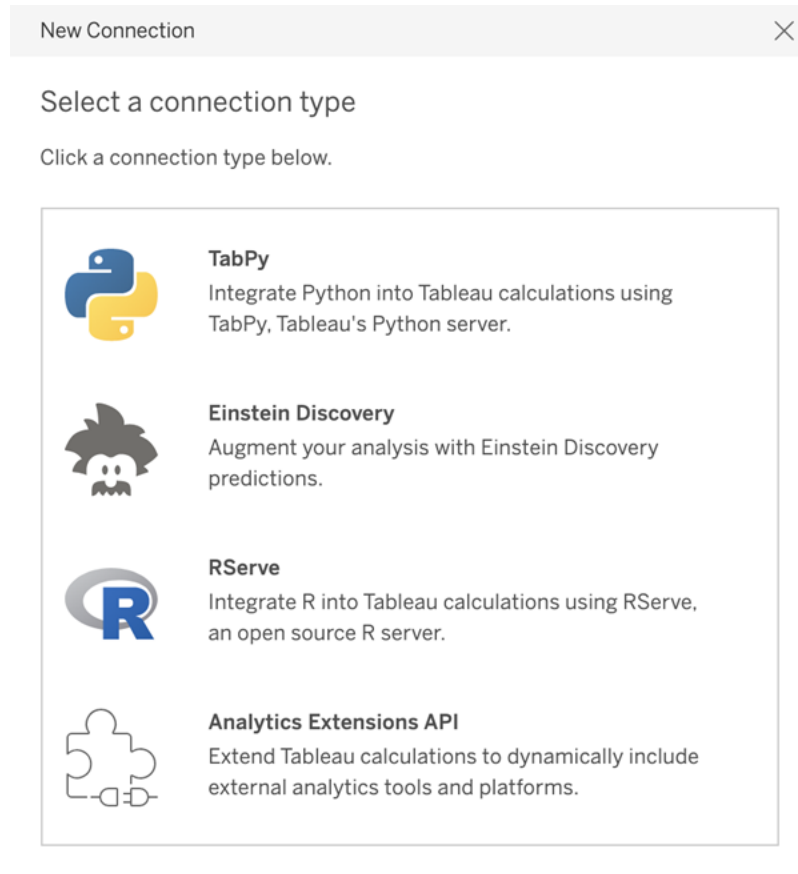
**Analytics Extensions**

Enable and configure analytics extensions on this server. Analytics extensions allow you to extend Tableau dynamic calculations with programming languages like R and Python, and with other external tools and platforms. [Learn more](#)

☒ Enable analytics extensions

## Configure analytics extensions settings

1. Sign in to the Tableau Server Admin Area.
2. On the Settings page, click the **Extensions** tab and then scroll to **Analytics Extensions**. (On multi-site deployments of Tableau Server, navigate to the site where you want to configure analytics extensions, and then click **Settings>Extensions**.)
3. **Multi-site deployments only:** you must enable Analytics Extensions on each site. Under Analytics Extensions, select **Enable analytics extensions for site**.
4. Under Analytics Extensions, click **Create new connection**.
5. In the **New Connection** dialog, click the connection type you want to add, then enter the configuration settings for your analytics service:



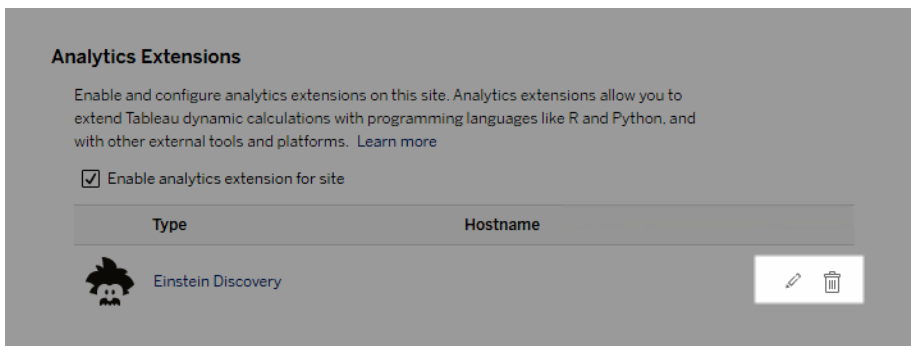
6. The options you need to configure depend on the connection type you choose:
- For an Einstein Discovery connection, click **Enable**.
  - For TabPy, RServer and Analytics Extensions API connections, enter the following information:
    - **Connection Name** (Required): Specify the server type you are connecting to. RSERVE supports connections to R using the RServe package. TABPY supports connections to Python using TabPy, or to other analytics extensions.
    - **Require SSL** (Recommended): Select this option to encrypt the connection to the analytics service. If you specify a `HTTPS` URL in the **Hostname** field, then you must select this option.
    - **Hostname** (Required): Specify the computer name or URL where the analytics service is running. This field is case sensitive.
    - **Port** (Required): Specify the port for the service.

- **Sign in with a username and password** (Recommended): Select this option to specify username and password that is used to authenticate to the analytics service.

7. Click **Create**.

Edit or delete an analytics extension connection

To edit or delete a configuration, navigate to **Analytics Extensions** on the **Extensions** tab of your site.



Click the **Edit** or **Delete** icon and follow the prompts to change the configuration.

## Client requirement: Intermediate certificate chain for Rserve external service

As of Tableau Server version 2020.1, you must install a full certificate chain on Tableau Desktop computers (Windows and Mac) that are connecting to a Rserve external connection through Tableau Server. This requirement is due to how Rserve manages the handshake on secure connections.

Importing a root certificate on the Tableau Desktop is not sufficient, the entire certificate chain must be imported onto the client computer.

## Script errors

Tableau cannot verify that workbooks that use an analytics extension will render properly on Tableau Server. There might be scenarios where a required statistical library is available on a

user's computer but not on the analytics extension instance that Tableau Server is using.

A warning will be displayed when you publish a workbook if it contains views that use an analytics extension.

This worksheet contains external service scripts, which cannot be viewed on the target platform until the administrator configures an external service connection.

## Determining analytics extensions usage

Beginning with version 2021.2, analytics extensions configurations are mapped at the workbook level. This allows administrators to use custom views to query the Tableau Repository and determine which workbooks are using which extensions, and how often they are used.

To do this you need to join the workbook connections table to tables showing workbook usage. For details about creating and using custom administrative views, see [Collect Data with the Tableau Server Repository](#) and [Create Custom Administrative Views](#).

## Table Extensions

Table Extensions allow you to create new data tables with an analytics extensions script. You can write a custom TabPy or Rserve script and optionally add one or more input tables. Table extensions are supported by Tableau Cloud, Tableau Server and Tableau Desktop. This document focuses on Tableau Server.

**Note:** The data refreshes every time you open up a workbook or refresh a data source.

### Benefits

Table Extensions have the following benefits for both new and experienced users.

- Faster data processing
- Low code editor
- Integrates with [Ask Data](#) and [Explain Data](#)

- Integrates with TabPy and Rserve
- Results can be used to construct dashboards or visualisations.

## Prerequisites

Before you can use table extensions, you must complete the following list.

- Configure an analytics extension
  - For steps to configure analytics extension connections, see [Configure Connections with Analytics Extensions](#).
- Publish your workbook.

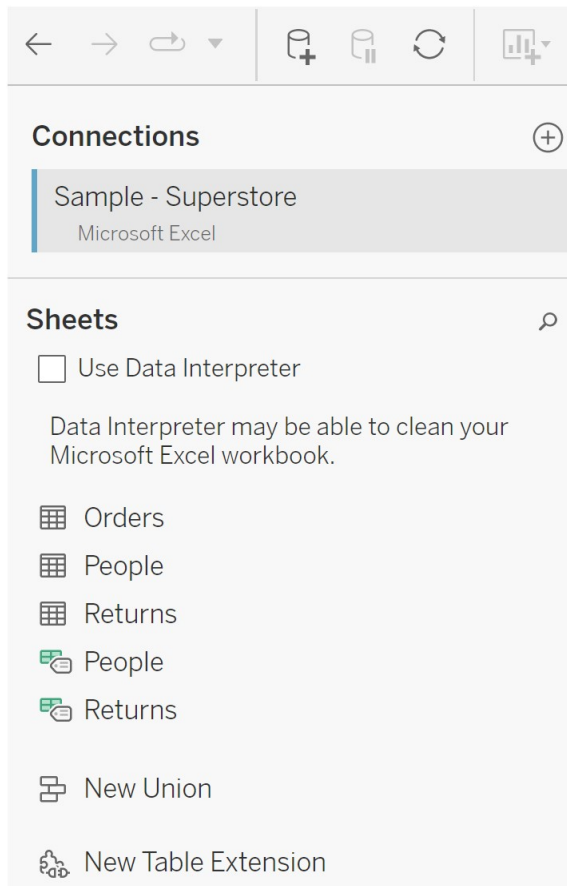
## Create a Table Extension

To create a new table extension, complete the steps below.

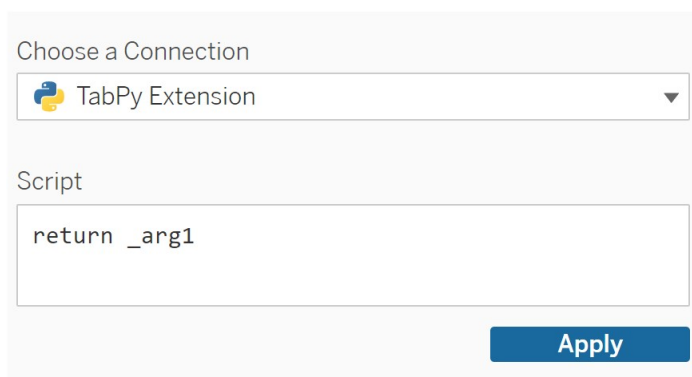
1. Open a published workbook.

**Note:** The workbook must be published before you can add a table extension.

2. Under **Sheets**, choose **New Table Extension**.



3. (Optional) Drag sheets into the table extension pane.
4. Under **Choose a Connection**, select an analytics extension.



5. In **Script**, enter your script.



6. Select **Apply**.
7. Choose **Update Now** and the results will appear in the **Output Table** tab.

Table Extension test			
Type	Field Name	Phys...	Rem...
Abc	Catego...	Tablea...	Categ...
	City	Tablea...	City
	Countr...	Tablea...	Count...

Category	City
Office Supplies	Houston
Office Supplies	Naperville
Office Supplies	Naperville
Office Supplies	Naperville
Office Supplies	Philadelphia

8. In the **Name** field, enter a unique name for your new table extension.
9. Go to the sheet tab and publish the workbook to save it.

**Note:** If you edit the input table, you have to press **Apply** again before you can see or use the updated output table data.

**Troubleshooting tip:** If your table extension is hitting an error, try using the circular **Refresh Data Source** button, located next to the **Save** button.

### Table Extensions vs Analytics Extensions

Tableau has a few different features with "extension" in the name. While some of these products aren't related, table extensions and analytics extensions are. The table extensions feature relies on a connection with analytics extensions to work. Let's break down each feature.

#### Table Extensions

The table extensions feature lets you create workbook calculations that send data and a processing script to your analytics extension. The returned results are displayed as a table on the Data Source tab and as measures and dimensions in the workbook.

## Analytics Extensions

The analytics extensions feature allows you to extend Tableau dynamic calculations with programming languages like Python, external tools and external platforms. After you create a connection to an analytics extension, you can communicate with your external server through calculated fields. For more information, see [Configure Connections with Analytics Extensions](#).

## Configure Einstein Discovery Integration

Beginning with version 2021.1.0, Tableau Server supports integration with Einstein Discovery, making Einstein Discovery predictions available to authors and viewers of workbooks and dashboards. Starting in version 2021.2.0, Einstein Discovery predictions is also now available when authoring flows on the web.

Einstein Discovery in Tableau is powered by [salesforce.com](#). Consult your agreement with [salesforce.com](#) for applicable terms.

To integrate Einstein Discovery with Tableau Server, there are several necessary configuration steps, including some in Tableau Server, and some in the Salesforce org running Einstein Discovery. This overview outlines these steps for Dashboard extensions, Analytics extensions and Tableau Prep extensions, and provides links to specific topics with steps for completing the server configuration.

For details on how to use Einstein Discovery predictions in Tableau, including licensing and permission requirements, see [Integrate Einstein Discovery Predictions in Tableau](#) in the Tableau Desktop and Web Authoring Help. For information about adding predictions in flows, see [Add Einstein Discovery Predictions to your flow](#).

## Einstein Discovery dashboard extensions

The Einstein Discovery dashboard extension allows workbook authors to surface real-time predictions in Tableau. The dashboard extension delivers predictions interactively, on-

demand, using source data in a Tableau workbook and an Einstein Discovery-powered model deployed in Salesforce.

To configure Tableau Server for the Einstein Discovery dashboard extension you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. Allow Saved Access Tokens
  - b. Enable Dashboard extensions for the server. See: Manage Dashboard and Viz Extensions in Tableau Server
2. In Salesforce, in the organisation running Einstein Discovery:
  - a. Configure CORS in Salesforce.com for Einstein Discover Integration in Tableau Server.
  - b. In Salesforce, in the organisation running Tableau CRM, create a connected app. See Step 1: Create a Salesforce connected app.
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. Step 2: Configure Tableau Server for Salesforce.com OAuth

## Einstein Discovery analytics extensions

The Einstein Discovery analytics extension gives your users the ability to embed predictions directly in Tableau calculated fields. A table calc script requests predictions from a model deployed in Salesforce by passing its associated prediction ID and input data that the model requires. Use Model Manager in Salesforce to auto-generate a Tableau table calculation script, and then paste that script into a calculated field for use in a Tableau workbook.

To configure Tableau Server for either the Einstein Discovery analytics extension you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. Allow Saved Access Tokens
  - b. Enable analytics extensions for the server and configure a connection type. See: Configure Connections with Analytics Extensions

2. In Salesforce, in the organisation running Einstein Discovery, create a connected app. See Step 1: Create a Salesforce connected app.
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. Step 2: Configure Tableau Server for Salesforce.com OAuth

## Einstein Discovery Tableau Prep extensions

*Supported in Tableau Server and Tableau Cloud, starting in version 2021.2.0*

The Einstein Discovery Tableau Prep extension enables users to embed Einstein predictions directly in their flows when authoring flows on the web.

To configure Tableau Server or Tableau Cloud for the Einstein Discovery Tableau Prep extension, you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. See Allow Saved Access Tokens
  - b. Enable Tableau Prep Extensions for the server. See Enable Tableau Prep Extensions.
2. In Salesforce, in the organisation running Einstein Discovery, create a connected app. See Step 1: Create a Salesforce connected app.
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. Step 2: Configure Tableau Server for Salesforce.com OAuth


## Configure External Actions Workflow Integration

**Note:** External Actions in Tableau rely on functionality provided by Salesforce Flow. The feature sends your selected data to Salesforce Flow, which runs on separate Salesforce infrastructure. Use of Salesforce Flow and other Salesforce products and services is subject to your agreement with Salesforce.

For more information on how to use External Actions, see [Integrate External Actions](#).

## Editions, site roles, and permissions requirements

To configure and use External Actions workflows, you and anyone who will be using workflows must have certain site roles and permissions in editions of Salesforce and Tableau that support External Actions.

Product	Editions	Site Roles and Permissions
Tableau	Tableau Cloud, Tableau Desktop or Tableau Server ver- sions 2022.3 or later	<p><b>To create or edit a workflow:</b> <a href="#">Creator</a> or <a href="#">Explorer</a> (can publish) site role, and permissions to edit and save workbooks (<a href="#">Linux</a>   <a href="#">Windows</a>)</p> <p><b>To send data:</b> Download Summary Data  per- mission capability</p> <p><b>To use a workflow:</b> Any site role</p>
Salesforce	Essentials, Pro- fessional, Enterprise, Performance, Unlim- ited or Developer edi- tion (see <a href="#">Salesforce Editions</a> )	<p><b>To create or edit a flow:</b> <a href="#">Manage Flows per- mission</a></p> <p><b>To use a flow:</b> <a href="#">Run Flows permission</a> or <a href="#">Flow User setting on the user detail page</a> or <a href="#">Override default behaviour and restrict access to enabled profiles or permission sets</a> setting in Flow node (See <a href="#">How Does Flow Security Work?</a>)</p>

## Deployment requirements for External Actions

To use the External Actions workflow extension, the Salesforce administrator must [create a connected app](#) in Salesforce for Tableau Server.

Also, the domain for the Tableau Server or Tableau Cloud site where the extension will be deployed must be added to the [Salesforce Cross-Origin Resource Sharing \(CORS\) allowlist](#).

## Turn External Actions On or Off

In Tableau 2022.3 and later, the Tableau External Actions feature is turned on by default. To turn off the feature, you can use the Tableau Services Manager (TSM) command line interface (CLI) or configure site-level settings.

Use the TSM CLI

Use the **TSM CLI** to set the value for the `vizqlserver.workflow_objects_enabled` configuration key to `tsm configuration set -k vizqlserver.workflow_objects_enabled -v false`.

After changing the configuration key value, be sure to apply the change using the `tsm pending-changes apply` command. If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt is displayed even if the server is stopped, but in that case there's no restart. You can suppress the prompt using the `--ignore-prompt` option, but this option doesn't change the restart behaviour. If the changes don't require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

Modify Site-Level Settings

For more information on how to customise site-level settings in Tableau Server, see [Site Settings Reference](#).

## Integrate Tableau with a Slack Workspace

Beginning with version 2021.3, Tableau Server and Tableau Cloud support integration with the Tableau App for Slack, so your team can collaborate – share Tableau snapshots, search for Tableau content and receive notifications about Tableau data – right where they're working in a Slack workspace.

The Tableau App for Slack lets you connect your Tableau site with a Slack workspace. After it's enabled, Tableau users can:

## Tableau Server on Windows Help

- See notifications in Slack when team mates share content with them, when they're mentioned in a comment or when data meets a specified threshold in a data-driven alert. If a site administrator in Tableau Cloud or a server administrator in Tableau Server enables notifications on a site, users can control which notifications they receive in Slack by configuring their [Account Settings](#).
- See a preview of a viz when a Tableau URL is pasted into Slack, allowing users to share data-related content with context directly in Slack.
- Search for Tableau views or workbooks in Slack DMs and channels.
- Access Recents and Favourites from the Tableau App for Slack.

For more information, see [Receive Notifications, Search and Share Using the Tableau App for Slack](#).

**Note:** Some notifications preferences might not be available if the features are turned off for your site. For example, if the User Visibility setting is set to Limited, notifications are turned off. For more information, see [Site Settings Reference and Manage Site User Visibility](#).

To integrate Slack with your Tableau site, there are a few necessary configuration steps, including some in your Tableau site and some in the Slack workspace you want to connect. This overview outlines these steps for both Tableau site administrators on Tableau Cloud or a Tableau Server Administrator on Tableau Server and Slack workspace administrators.

### Requirements

Enabling Tableau in Slack requires both a Slack workspace administrator and either a Tableau site administrator in Tableau Cloud or a Tableau server administrator in Tableau Server.

### Connect a Tableau Server site to a Slack workspace

A Tableau Server administrator can connect a Slack workspace to one Tableau Server site. Connecting your Tableau site to a Slack workspace consists of three tasks:

- **Slack workspace administrator:** Create a private Slack application on the Slack API platform.

- **Tableau server administrator:** Use the app information to add an OAuth client.
- **Tableau server administrator:** Connect your Tableau site to Slack.

Each Tableau site can connect to one Slack workspace per Tableau site. For information about creating Slack apps, see Slack's [Best practices and guidelines for Slack platform](#).

Note: If using a proxy server, make sure you've followed proxy settings guidance in [Configuring Proxies and Load Balancers for Tableau Server](#) before you begin.

Additionally, for **Windows**:

- Make sure that the Windows environment variables already have `http_proxy` and `https_proxy` specified. For more information and instructions on specifying environment variables, see [Configuring Proxies and Load Balancers for Tableau Server](#).
- Add the Slack domains [in this list](#) to the allowlist. For more information, see [Communicating with the Internet](#).

Step 1: Create a Tableau App for Slack

**Slack workspace administrator:**

1. Go to Slack's [API documentation](#) and select **Create New App**
2. Select **From Scratch**, then add an app name and the workspace for the app to exist within. Select **Create New App**.
3. Give your app a name and select a Slack workspace.
4. You'll be taken to the app's basic information settings. From here, you can modify the app's privileges, description and more.
5. Select **Bots** from the Add features and functionality section, then select **Review Scopes to Add**.
6. Under Bot Token Scopes, add these scopes:
  - `chat:write`
  - `files:write`
  - `users:read`
  - `users:read.email`



7. Select **OAuth & Permissions** from the navigation menu.

**Important:** Opting in to token rotation for your Tableau App for Slack will cause notifications to stop working in Slack. Token rotation can't be removed after it's added.

8. Select **Add New Redirect URL**.
9. Add a fully qualified URL `https://<Tableau Server URL>/auth/add_oauth_token`
10. Select **Basic Information** from the navigation menu.
11. Give the Client ID, Client Secret and Redirect URL to the Tableau server administrator.
12. Add the Tableau App for Slack into the Slack workspace by selecting Basic Information from the Settings menu, then **Install**.

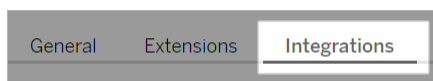
**Note:** Administrators can share their app with other Slack workspaces by activating a distribution option. For more information, see [Manage Distribution](#) in Slack's documentation.

Step 2: Add an OAuth client to the Tableau site

**Tableau server administrator:**

The Tableau server administrator will add the OAuth client from the Slack workspace administrator, then connect the Tableau site to Slack.

1. Sign in to the site you'd like to connect to Slack. On the Settings page of your site, select the **Integrations** tab.



2. Under Slack Connectivity, select **Add OAuth Client**.
3. Add the **Client ID**, **Client Secret** and **Redirect URL** from the Slack workspace administrator, then select **Add OAuth Client** in the dialog.
4. The connection type and Client ID will appear in the table.

Step 3: Finalise the connection

**Tableau server administrator:**

When the OAuth client is added under Slack Connectivity:

1. Select **Connect to Slack**.
2. Follow the prompt to sign in to your Slack workspace.
3. Select **Allow** to give your Tableau site access to the Slack workspace.

The Tableau site and Slack workspace are now connected. In the Slack workspace, licensed Tableau users can receive Slack notifications when someone shares Tableau content, when a data-driven alert is triggered or when someone is @mentioned in a comment on a view or workbook.

## Disconnect a Tableau site from Slack

As a site admin, you can disconnect a Tableau site from a Slack workspace by selecting **Disconnect from Slack** in the **Integrations** tab of site settings. Users continue to receive notifications for some time. The OAuth client information you added in Step 2 is retained and can be used to connect to a new workspace if needed.

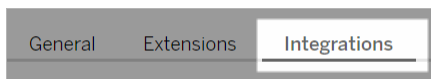
As a Slack user, you can disconnect from Slack by selecting **Disconnect from Tableau** from the **Home** tab in the Tableau App for Slack.

## Update your Tableau App for Slack

When a new version of the Tableau App for Slack is available, Tableau recommends updating the application to maintain app performance and use new features.

To update the Tableau App for Slack:

1. From the **Settings** page of your site, select the **Integrations** tab.



2. Under **Slack Connectivity**, select **Connect to Slack**.
3. Select **Update**.

**Note:** App updates applied by any Tableau admin affect all Tableau sites connected to the same workspace.

## Troubleshoot the Tableau App for Slack

It's a best practice to [Manage app approvals for your Slack workspace](#). However, if your Slack workspace allows users who aren't admins to remove apps, it's possible that a user can remove the Tableau App for Slack for the site. In this scenario, other users will see the Tableau App for Slack, but its features won't work as expected. To resolve this issue, have your Slack admin uninstall and reinstall the Tableau App for Slack. Then, have your admin follow the steps to connect Slack with your Tableau site.

## Creators: Connect to Data on the Web

Before you can create a workbook and build a view on the web to analyse your data on the web, you must connect to your data. Tableau supports connecting to data sources on the web published through Tableau Desktop, or connecting to data directly through Tableau Cloud, Tableau Server or Tableau Public.

Starting in 2019.3, Tableau Catalog is available as part of the Data Management offering for Tableau Server and Tableau Cloud. When Tableau Catalog is enabled in your environment, in addition to navigating and connecting to data from Explore, you can navigate and connect to more types of data, like databases and tables, from Tableau Catalog. For more information about Tableau Catalog, see "About Tableau Catalogue" in the [Tableau Server](#) or [Tableau Cloud](#) Help. Starting in 2021.4, Data Management includes virtual connections, a central access point to data. For more information, see "About Virtual Connections and Data Policies" in the [Tableau Server](#) or [Tableau Cloud](#) help.

## Open the Connect to Data page

On the web, you use the Connect to Data page to access data to connect to. After you sign in to Tableau Server or Tableau Cloud, you can open this page two ways:

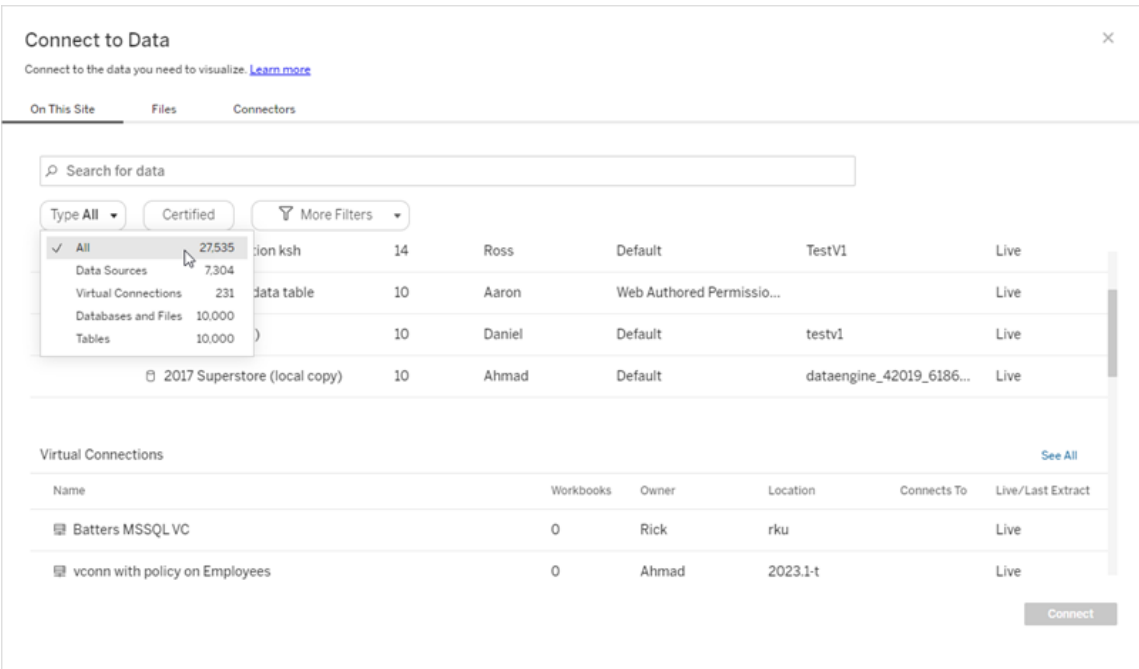
- **Home > New > Workbook**
- **Explore > New > Workbook**

If you're on Tableau Public, you can open this page from your author profile:

- **My Profile > Create a Viz**

The **Connect to Data** dialog displays a scrollable list of mixed content that’s popular. If you have a Data Management licence, you can connect to data with a virtual connection, and if you have Data Management with Tableau Catalogue enabled, you can also connect to external assets, like databases, files and tables.

The responsive search field shows a list of suggestions that updates as you enter text. Filter search results by type of data, certification status or other filters that depend on the type of data selected. For example, some types of data may allow you to filter based on tags, connection type, data quality warnings or other criteria. Older versions of the dialog look and function slightly differently, but the overall function is similar.



On the Connect to Data page, the tabs you see depend on the product you have.

## Tableau Server

On Tableau Server, select from the following tabs to connect to data: On this site, Files and Connectors.

### Connect to data On this site

1. Select **On this site** to browse to or search for published data sources.
2. Select the data source under **Name** and click the **Connect** button.

**Note:** In addition to connecting to data sources, when you have Data Management, you can use **On this site** to connect to data using a virtual connection. When Tableau Catalogue is enabled, you can also connect to databases, files and tables.

### Connect to files

Tableau supports uploading Excel, text-based data sources (.xlsx, .csv, .tsv), and spatial file formats that only require one file (.kml, .geojson, .topojson, .json and Esri shapefiles and Esri File Geodatabases packaged in a .zip) directly in your browser. In the **Files** tab of the **Connect to Data** pane, connect to a file by dragging and dropping it into the field or clicking **Upload from Computer**. The maximum file size you can upload is 1 GB.

### Use connectors

From the **Connectors** tab, you can connect to data housed in a cloud database or on a server in your enterprise. You must supply connection information for each data connection that you make. For example, for most data connections, you must supply a server name and your sign-in information.

[Supported Connectors](#) contains information on how to connect Tableau to each of these connector types to set up your data source. If the connector you need doesn't appear in the Connectors tab, you can connect to data through Tableau Desktop and publish your data source to Tableau Cloud or Tableau Server for web authoring. Learn more about how to [Publish a Data Source](#) in Tableau Desktop.

When Tableau successfully connects to your data, the Data Source page opens so that you can prepare the data for analysis and begin building your view. To learn more, see [Creators: Prepare Data on the Web](#).

## Tableau Server connectors

Action Matrix*	Google BigQuery**‡	OData‡
Alibaba AnalyticDB for MySQL‡	Google BigQuery JDBC**‡	OneDrive‡
Alibaba Data Lake Analytics‡	Google Cloud SQL‡	Oracle‡
Alibaba MaxCompute‡	Google Drive‡	Pivotal Greenplum Database‡
Amazon Athena‡	Impala‡	PostgreSQL‡
Amazon Aurora for MySQL‡	Kognito*	Progress OpenEdge*
	Kyvos‡	Presto‡
Amazon EMR Hadoop Hive‡	Hortonworks Hadoop Hive	Qubole Presto‡
Amazon Redshift‡	IBM BigInsights	SAP HANA (for virtual connections only)‡
	IBM DB2‡	SAP Sybase ASE*
Apache Drill‡	IBM PDA (Netezza)*	SAP Sybase IQ*
Aster Database*	Kyvos‡	Salesforce‡
	MariaDB‡	SharePoint Lists‡
Azure Data Lake Storage Gen2‡	MarkLogic*	SingleStore (formerly MemSQL)‡
Box‡	Microsoft Azure SQL Database‡	Snowflake‡
Cloudera Hadoop‡	Microsoft Azure Synapse Analytics‡	Spark SQL‡
Databricks‡	Microsoft SQL Server‡	Teradata***‡
Datorama by Salesforce‡	MonetDB*	Vertica‡
Denodo‡		

## Tableau Server on Windows Help

Dremio by Dremio‡	MongoDB BI Connector‡
Dropbox‡	MySQL‡
Esri Connector‡	
Exasol‡	

\*Not available on Linux servers.

\*\*Google BigQuery needs OAuth when creating data sources from the web. Learn more about how server administrators can [Set up OAuth for Google](#).

\*\*\*Teradata web authoring currently doesn't support query banding functionality. See [Teradata](#) for details.

‡Supports virtual connections if you have Data Management. See [About Virtual Connections and Data Policies](#) in the Tableau Server help for details.

### Tableau Catalog Supported Connectors

Tableau Catalogue supports making a connection with a subset of the data connectors that Tableau Server supports. If a data source, database, file or table is greyed out, you can't connect from Tableau Server. You can, however, connect from the Tableau Desktop **Connect** pane, if you have the correct permissions.

## Tableau Cloud

On Tableau Cloud, select from the following tabs to connect to data: On this site, Files, Connectors and Dashboard Starters.

### Connect to data On this site

1. Select **On this site** to browse to or search for published data sources.
2. Select the data source under **Name** and click the **Connect** button

**Note:** In addition to connecting to data sources, when you have Data Management, you can use **On this site** to connect to data using a virtual connection. When Tableau Catalogue is enabled, you can also connect to databases, files and tables.

### Connect to files

Tableau supports uploading Excel or text-based data sources (.xlsx, .csv, .tsv) directly in your browser. In the **Files** tab of the Connect to Data pane, connect to an Excel or text file by dragging and dropping it into the field or clicking **Upload from Computer**. The maximum file size you can upload is 1 GB.

### Use connectors

From the **Connectors** tab, you can connect to data housed in a cloud database or on a server in your enterprise. You must supply connection information for each data connection that you make. For example, for most data connections, you must supply a server name and your sign-in information.

[Supported Connectors](#) has information on how to connect Tableau to your data using connectors. If the connector you need doesn't appear in the Connectors tab, you can connect to data through Tableau Desktop and publish your data source to Tableau Cloud or Tableau Server for web authoring. Learn more about how to [Publish a Data Source](#) in Tableau Desktop.

**Note:** If you're unable to connect to your data from Tableau Cloud, check to see if the database is publicly accessible. Tableau Cloud can only connect to data that's accessible from the public internet. If your data is behind a private network, you can connect using Tableau Bridge. To learn more, see [Publishers: Use Tableau Bridge to Keep Tableau Cloud Data Fresh](#).



## Tableau Cloud Connectors

Alibaba AnalyticsDB for MySQL‡	Dropbox*‡	OData‡
Alibaba Data Lake Analytics‡	Esri Connector‡	OneDrive*‡
Amazon Athena‡	Exasol‡	Oracle‡
Amazon Aurora for MySQL‡	Google BigQuery*‡	Pivotal Greenplum Database‡
Amazon EMR Hadoop Hive‡	Google Cloud SQL (MySQL compatible)‡§	PostgreSQL‡
Amazon Redshift‡	Google Drive‡	Presto‡
Apache Drill‡	Hortonworks Hadoop Hive	Qubole Presto‡
Azure Data Lake Storage Gen2‡	Impala‡	Salesforce‡
Azure Synapse Analytics (SQL Server compatible)	Kyvos‡	SAP HANA (for virtual connections only)‡
Box‡	MariaDB‡	SharePoint Lists‡
Cloudera Hadoop‡	Microsoft Azure SQL Database‡	SingleStore (formerly MemSQL)‡
Databricks‡	Microsoft Azure Synapse Analytics‡	Snowflake‡
Datorama by Salesforce‡	Microsoft SQL Server‡	Spark SQL‡
Denodo‡	MongoDB BI Connector‡	Teradata**‡
Dremio by Dremio‡	MySQL‡	Vertica‡

\*For more information about using OAuth 2.0 standard for Google BigQuery, OneDrive and Dropbox connections in Tableau Cloud, see [OAuth Connections](#).

\*\*Teradata web authoring currently doesn't support query banding functionality. See [Teradata](#) for details.

‡Supports virtual connections if you have Data Management. See [About Virtual Connections and Data Policies](#) in the Tableau Cloud help for details.

§Tableau Cloud doesn't support SSL using Google Cloud SQL.

## Tableau Catalog Supported Connectors

Tableau Catalog supports making a connection with a subset of data connectors that Tableau Cloud supports. If a data source, database, file or table is greyed out, you can't connect from Tableau Cloud. You can, however, connect from the Tableau Desktop **Connect** pane, if you have the correct permissions.

## Use Dashboard Starters

On Tableau Cloud, you can author and analyse data from LinkedIn Sales Navigator, Oracle Eloqua, Salesforce, ServiceNow ITSM and QuickBooks Online using Dashboard Starters. On the **Dashboard Starter** tab, from the list of pre-built designs, select an option and click **Use Dashboard**. See [Dashboard Starters for Cloud-based Data Sources](#) for details.

## Tableau Public

On Tableau Public, you can connect to data by uploading a supported file.

### Connect to files

Tableau supports uploading Excel or text-based data sources (.xlsx, .csv, .tsv) directly in your browser. In the **Files** tab of the Connect to Data pane, connect to an Excel or text file by dragging and dropping it into the field or clicking **Upload from Computer**. The maximum file size you can upload is 1 GB.

If you don't have a data set, check out the free [sample data sets](#) on the Tableau Public website.

### Use connectors

From the **Connectors** tab, you can connect to data housed in a cloud database. You must supply connection information for each data connection that you make. For example, for most data connections, you must supply your sign-in information.

**Supported Connectors** has information on how to connect Tableau to your data using connectors. If the connector you need doesn't appear in the Connectors tab, you can connect to data through Tableau Desktop and create a data extract.

**Note:** If you're unable to connect to your data from Tableau Public, check to see if the database is publicly accessible. Tableau Public can only connect to data that's accessible from the public internet.

### Tableau Public Connectors

Google Drive

OData

### After you connect

When Tableau connects to your data, the Data Source page opens so that you can prepare the data for analysis and begin building your view. To learn more, see [Creators: Prepare Data on the Web](#).

### Keep data fresh in web authoring

**Update uploaded files in Tableau Cloud or Tableau Server:** If you manually upload a file (Excel or text) for web authoring, Tableau can't refresh the file automatically. To update your data, select "Edit Connection" to upload a new version of the file.

In Tableau Public, go to your viz and click **Request Update**. You can also keep your data fresh automatically by selecting "Keep this data in sync" in Tableau Desktop Public Edition.

**Update file-based published data sources in Tableau Cloud:** If you have a published data source in Tableau Cloud (published through Tableau Desktop) that uses file-based data, you can keep it fresh using Tableau Bridge. For more information, see [Expand Data Freshness Options by Using Tableau Bridge](#).

## Run Initial SQL

**Note:** Tableau Prep Builder version 2019.2.2 and later supports using Initial SQL, but doesn't yet support all of the same options supported by Tableau Desktop. For information about using Initial SQL with Tableau Prep Builder, see [Use Initial SQL to query your connections](#) in the Tableau Prep Builder Salesforce Help.

When connecting to some databases, you can specify an initial SQL command that will run or use a cached value when a connection is made to the database, for example, when you open the workbook, refresh an extract, sign in to Tableau Server or publish to Tableau Server.

**Note:** Initial SQL is different than a custom SQL connection. A custom SQL connection defines a relation (or table) to issue queries against. For more information, see [Connect to a Custom SQL Query](#).

You can use this command to:

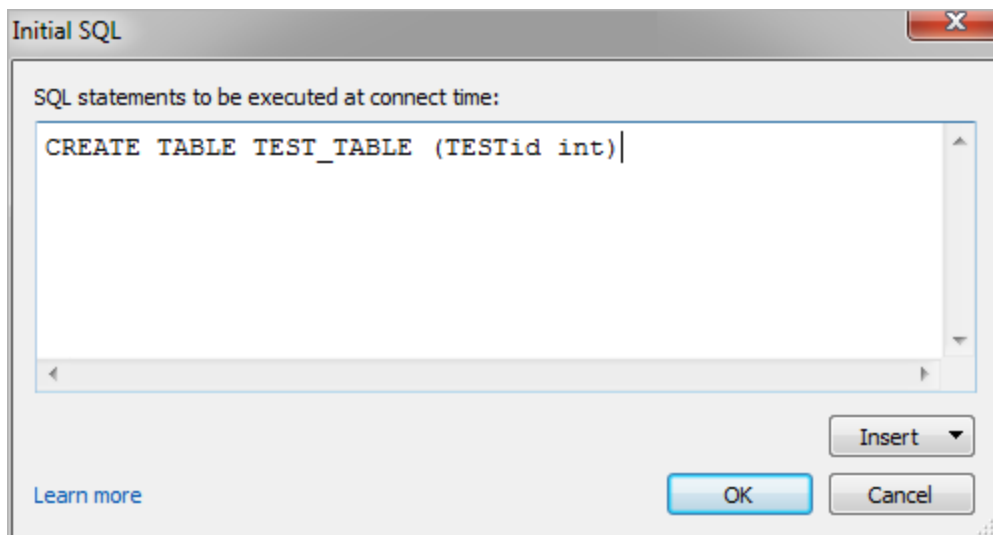
- Set up temporary tables to use during the session.
- Set up a custom data environment.

You have the option to add an initial SQL command in the Server Connection dialog box or on the Data Source page.

**Note:** If your data source supports running an initial SQL statement, an **Initial SQL** link will appear in the lower left corner of the Server Connection dialog box. For information about your data source, see [Supported Connectors](#).

## To use initial SQL

1. In the Server Connection dialog box, click **Initial SQL**. Or, on the Data Source page, select **Data > Initial SQL** or **Data > Query Banding and Initial SQL** depending on the database you are connecting to.
2. Enter the SQL command into the Initial SQL dialog box. You can use the **Insert** drop-down menu to pass parameters to your data source.



**Note:** Tableau doesn't examine the statement for errors. This SQL statement is sent to the database when you connect.

Your software licence may restrict you from using initial SQL with your connection. If you publish to Tableau Server, the server must be configured to allow Initial SQL statements. By

default, the server software is configured to allow these statements to run when the workbook is loaded in a web browser.

Administrators can configure the server to ignore initial SQL statements by using the `tsm configuration set` command:

```
tsm configuration set -k vizqlserver.initialsql.disabled -v true
```

If the server doesn't allow initial SQL statements, the workbook opens, but the initial SQL commands aren't sent.

For more information about the `tsm configuration set` command, see the [Tableau Server Help](#).

## Parameters in an initial SQL statement

You can pass parameters to your data source in an initial SQL statement. The following list has several benefits of using parameters in a initial SQL statement.

- You can configure impersonation using the **TableauServerUser** or **Tableau-ServerUserFull** parameters.
- If your data source supports it, you can set up row-level security (for example, for Oracle VPD or SAP Sybase ASE) to make sure that users see only the data that they're authorised to see.
- You can provide more details in logging, for example, the Tableau version or the workbook name.

The following parameters are supported in an initial SQL statement:

Parameter	Description	Example of returned value
<b>TableauServerUser</b>	The username of the current server user. Use when setting up impersonation on the server. Returns an	jsmith

	empty string if the user isn't signed in to Tableau Server.	
<b>TableauServerUserFull</b>	The username and domain of the current server user. Use when setting up impersonation on the server. Returns an empty string if the user isn't signed in to Tableau Server.	domain.lan\jsmith
<b>TableauApp</b>	The name of the Tableau application.	Tableau Desktop Professional  Tableau Server
<b>TableauVersion</b>	The version of the Tableau application.	9.3
<b>WorkbookName</b>	The name of the Tableau workbook. Use only in workbooks with an embedded data source.	Financial-Analysis

**Warning:** Tableau Desktop doesn't include domain. You can include it if you aren't using delegation and you set tsm configuration set -k DelegationUseFullDomainName=-v true--force-keys

The following examples show different ways you can use parameters in an initial SQL statement.

- This example sets the security context on Microsoft SQL Server:

```
EXECUTE AS USER = [TableauServerUser] WITH NO REVERT;
```

- This example shows how, on a DataStax data source, you can use parameters to add detail to logging or to set up a session variable to track the data:

```
SET TABLEAUVERSION [TableauVersion];
```

- This example can be used to help set up row-level security for Oracle VPD:

```
begin

    DBMS_SESSION.SET_IDENTIFIER([TableauServerUser]);

end;
```

**Note:** Oracle PL/SQL blocks require a trailing semicolon to terminate the block. Consult Oracle documentation for the proper syntax.

### Defer execution to the server

You can defer an initial SQL statement so that it's executed only on the server. One reason to defer execution to the server is if you don't have permission to execute the commands that set up impersonation. Use `<ServerOnly>` tags to enclose the commands to be executed only on the server.

#### Example:

```
CREATE TEMP TABLE TempTable(x varchar(25));
INSERT INTO TempTable VALUES (1);
<ServerOnly>INSERT INTO TempTable Values (2);</ServerOnly>
```

### Security and impersonation

When you use the **TableauServerUser** or **TableauServerUserFull** parameter in an initial SQL statement, you'll create a dedicated connection that can't be shared with other users. This can also restrict cache sharing, which can enhance security, but may also slow performance.

### Troubleshoot 'create table' for MySQL and Oracle connections

For MySQL connections, tables aren't listed after using initial SQL to create a table

After you connect to MySQL and run an initial SQL statement, the tables might not show because of the way Tableau constructs the query.

```
CREATE TABLE TestV1.testtable77(testID int);
```



To resolve this issue, add `IF NOT EXISTS` to the SQL statement:

```
CREATE TABLE IF NOT EXISTS TestV1.TestTable(testID int);
```

For Oracle connections, using initial SQL to create a table causes Tableau to stall

After you connect to Oracle and run an initial SQL statement, Tableau is stalled with a spinning wheel because of the way Tableau constructs the query.

```
CREATE TABLE TEST_TABLE (TESTid int)
```

To resolve this issue, use the following SQL statement:

```
BEGIN  
EXECUTE IMMEDIATE 'create table test_table(testID int)';  
EXCEPTION  
WHEN OTHERS THEN NULL;  
END;
```

## Create and Interact with Flows on the Web

Starting in version 2020.4, you can create and interact with flows on Tableau Server to clean and prepare your data. Connect to your data, build a new flow or edit an existing flow and your work is automatically saved every few seconds as you go. Create draft flows that are only available to you or publish your flow to make it available for others. Run your individual flows directly from the web or run your flows automatically on a schedule using Tableau Prep Conductor if Data Management is licensed. For more information, see [Tableau Prep on the Web](#).

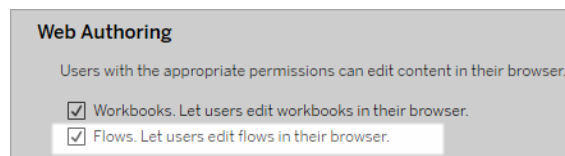
For more information about configuring the Tableau Prep Flow Authoring process on Tableau Server, see [Tableau Prep Flow Authoring](#).

Complete the tasks described in this article to enable web authoring for flows and other flow features on the web.

## Turn flow web authoring on or off for a site

Enabled by default, this option controls whether users can create and edit flows on Tableau Server or Tableau Cloud

1. In a web browser, sign in to the server as an administrator, go to the site and click **Settings**.
2. In the **Web Authoring** section, clear or select **Flows. Let users edit flows in their browser** to turn the functionality off or on.



3. If you want the change to take effect immediately, restart the server. Otherwise, the change takes effect after server session caching expires or the next time users sign in after signing out.

## Enable linked tasks

*Supported in Tableau Cloud and Tableau Server version 2021.3 and later.*

Use the **Linked Tasks** option to schedule up to 20 flows to run sequentially, one after the other. Linked tasks can only be run on schedules with the **Linked Tasks** option selected. For more information about setting up linked tasks, see [Schedule Linked Tasks](#).

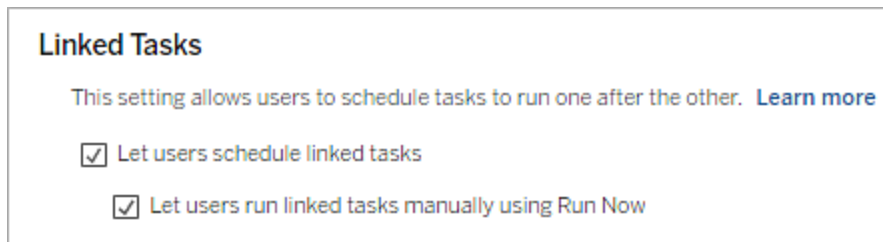
Starting in version 2022.1, **Linked Tasks** is enabled by default on the **Server Settings** and for any new flow schedules that you create. In prior versions, administrators must first enable the option.

If you have multiple sites, you can turn off **Linked Tasks** for individual sites by clearing the tick boxes described below.

If the setting is turned off after linked tasks are scheduled, any tasks that are running will complete and the scheduled linked tasks are hidden and no longer show on the **Scheduled Tasks** tab.

#### **Enable Linked Tasks** (version 2021.4 and earlier)

1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable **Linked Tasks** for flows. In that site, click **Settings**.
2. In the **Linked Tasks** section, select **Let users schedule linked tasks** to enable administrators to configure schedules to run linked tasks.
3. Select **Let users run linked tasks manually using Run Now** to enable users to run linked flow tasks using **Run Now**.



## Enable flow parameters

Enable users to schedule and run flows that include parameters. Parameters enable users to scale their flows by building them once, then changing the parameter values to accommodate different data scenarios.

Parameters can be entered in an input step for file name and path, table name or when using custom SQL queries, in an output step for file name and path and table name, and in any step type for filters or calculated values.

Starting in Tableau Prep Builder and Tableau Cloud version 2023.2, you can add system parameters to flow output names to automatically include the flow run start date and time.

Flow parameter settings can be applied at the server level to include all sites on Tableau Server. The settings can be disabled at the site level to include only specific sites.

For more information about using parameters in flows, see [Create and Use Parameters in Flows](#) in the Tableau Prep help.

1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable **Flow Parameters**. In that site, click **Settings**.
2. In the **Flow Parameters** section, select **Let users run and schedule flows that use parameters** to enable the functionality.
3. (version 2023.2 and later) Select **Allow system generated parameters like timestamps to be applied to output names** to enable users to add a date or time stamp to the flow output name at runtime for file and published data source output types.
4. Select **Allow parameters that can accept any input** to enable anyone running the flow to enter any parameter value in the flow at run time.

**Important:** Setting this option enables any flow user to enter any value in a parameter, potentially exposing data that the user should not have access to.

If this option is not selected, users can only select from a predefined list of parameter values, and any flows that include parameters that accept any value cannot be run or scheduled to run.

### Flow Parameters

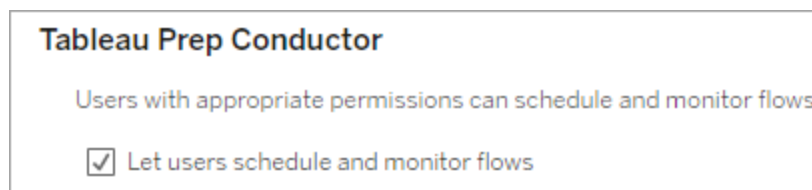
This setting allows flows that include parameters to be scheduled and run on the site, and enables anyone running the flow to set flow parameters at run time or when scheduling a task. [Learn more](#)

- ☒ Let users run and schedule flows that use parameters
  - ☒ Allow system generated parameters like timestamps to be applied to output names.
  - ☒ Allow parameters that can accept any input. This can impact security.

## Enable Tableau Prep Conductor

If Data Management is licensed, enable this option to let users schedule and track flows in Tableau Server and Tableau Cloud. For information about the additional configuration requirements for Tableau Prep Conductor, see [Tableau Prep Conductor](#).

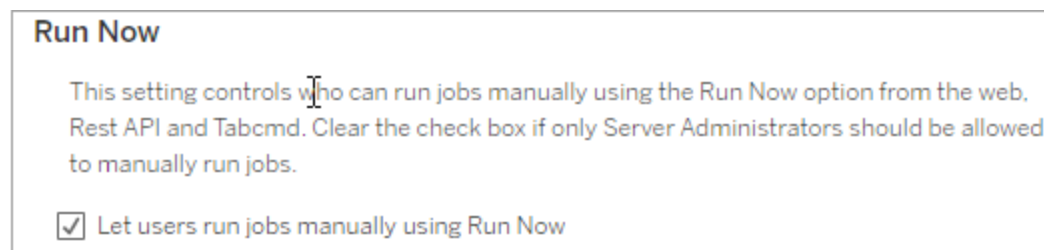
1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable Tableau Prep Conductor. In that site, click **Settings**.
2. In the **Tableau Prep Conductor** section, select **Let users schedule and monitor flows** to enable the functionality.



## Enable Run Now

Control whether users or only administrators can run flows manually using the **Run Now** option. Data Management is not required to run flows manually.

1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable Run Now for flows. In that site, click **Settings**.
2. In the **Run Now** section, select **Let users run jobs manually using Run Now** to enable the functionality.



Clear the tick box if only Server Administrators can run flows manually.

## Flow Subscriptions

Control whether users can receive flow notifications about scheduled tasks for successful flow runs. Data Management is required to enable notifications.

1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable flow subscriptions. In that site, click **Settings**.
2. In the **Flow Subscriptions** section, select **Let users send or receive emails that include flow output data** to enable the functionality.

### Flow Subscriptions

Flow owners can schedule and send emails with flow output data to themselves and others. [Learn more](#)

☒ Let users send or receive emails that include flow output data

☐ Attach .csv and .xlsx flow output files. This option sends data outside of Tableau and is not recommended

**Note:** The option to attach either a .csv or .xlsx file type to the email is only available for on-premise environments.

## Enable Tableau Prep Extensions

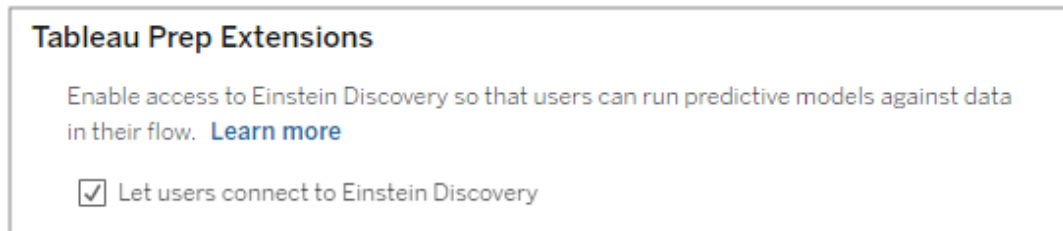
*Supported in Tableau Server and Tableau Cloud, starting in version 2021.2.0*

Set this option to control whether users can connect to Einstein Discovery to run predictive models against data in their flow.

You can use Einstein Discovery-powered models to bulk score predictions for the data in your flow when authoring flows on the web. Predictions can help you make better informed decisions and take actions to improve your business outcomes.

You'll need to configure additional settings to include predictions in our flow. For more information, see [Add Einstein Discovery Predictions to your flow](#) and [Configure Einstein Discovery Integration](#).

1. In a web browser, sign in to the server as an administrator and go to the site in which you want to enable Tableau Prep Extensions. In that site, click **Settings > Extensions**.
2. In the **Tableau Prep Extensions** section, select **Let users connect to Einstein Discovery** to enable the functionality.



## Turn autosave off or on

Enabled by default, this feature automatically saves a user's flow work every few seconds.

While not recommended, administrators can disable autosave on a site using the Tableau Server REST API method "Update Site" and `flowAutoSaveEnabled` setting. For more information, see [Tableau Server REST API Site Methods: Update Site](#). For more information about autosave on the web, see Turn autosave off or on.

For more information about configuring site settings, see [Site Settings Reference](#) in the Tableau Server help.

## Tableau Prep on the Web

*Internet Explorer 11 on Windows and compatibility mode for Internet Explorer is not supported.*

Starting in version 2020.4, Tableau Prep supports web authoring for flows. Now you can create flows to clean and prepare your data using Tableau Prep Builder, Tableau Server or Tableau Cloud. You can also manually run flows on the web and the Data Management is not required.

While most of the same Tableau Prep Builder functionality is also supported on the web, there are a few differences when creating and working with your flows.

**Important:** To create and edit flows on the web you must have a Creator licence. Data Management is only required if you want to run your flows on a schedule using Tableau Prep Conductor. For more information about configuring and using Tableau Prep Conductor, see Tableau Prep Conductor in the [Tableau Server](#) or [Tableau Cloud](#) help.

## Installation and Deployment

To enable users to create and edit flows on the web, you'll need to configure several settings on your server. For more information about each of these settings, see [Create and Interact with Flows on the Web](#).

- **Web Authoring:** Enabled by default, this option controls whether users can create and edit flows on Tableau Server or Tableau Cloud.
- **Run Now:** Controls whether users or only administrators can run flows manually using the **Run Now** option. The Data Management isn't required to run flows manually on the web.
- **Tableau Prep Conductor:** If Data Management is licensed, enable this option to let users schedule and track flows.
- **Tableau Prep Extensions** (version 2021.2.0 and later): Controls whether users can connect to Einstein Discovery to apply and run predictive models against data in their flow.
- **Autosave:** Enabled by default, this feature automatically saves a user's flow work every few seconds.

On Tableau Server, administrators can fine-tune the configuration of the Tableau Prep Flow Authoring processes. For more information, see [Tableau Prep Flow Authoring](#).

## Sample data and processing limits

To maintain performance while working with flows on the web, limits are applied to the amount of data you can include in a flow.

The following limits apply:



## Tableau Server on Windows Help

- When connecting to files, the maximum file size is 1GB.
- The data sampling option to include all data is not available. The default sample data limit is 1 million rows.
- The maximum number of rows that a user can select when using large data sets is configured by the administrator. As a user, you can select the number of rows up to that limit. For more information, see [tsm configuration set Options](#).

For more information about setting your data sample, see [Set your data sample size](#) in the Tableau Prep help section.

### Available features on the web

When you create and edit flows on the web you may notice a few differences in navigation and the availability of certain features. While most features are available across all platforms, some features are limited or not yet supported in Tableau Server or Tableau Cloud. The following table identifies features where differences might apply.

Feature area	Exceptions	Tableau Prep Builder	Tableau Server	Tableau Cloud
<a href="#">Connect to Data</a>	Some connectors may not be supported on the web. Open the <b>Connect</b> pane on your server to see supported connectors.	✓	✓	✓
<a href="#">Build and Organise your Flow</a>		✓	✓	✓
<a href="#">Set your data sample size</a>	In Tableau Server and Tableau Cloud, the data sample size is subject to limits set by your administrator	✓	✓	✓
<a href="#">Union files and database tables in the</a>	Input unions can't be edited or created in Tableau Server or Tableau Cloud. Only in	✓	✓	✓

input step	Tableau Prep Builder.			
Clean and Shape Data		✓	✓	✓
Copy data grid values	Available in Tableau Prep Builder and Tableau Server starting in version 2022.3 and Tableau Cloud starting in 2022.2 (August)	✓	✓	✓
Aggregate, Join or Union Data		✓	✓	✓
Use R and Python Scripts in your Flow	Script steps can't be added when creating or editing a flow in Tableau Cloud. This is currently supported only in Tableau Prep builder and Tableau Server.	✓	✓	✗
Create reusable flow steps		✓	✗	✗
Automatically save your flows on the web		Not Applicable	✓	✓
Automatic file recovery		✓	Not Applicable	Not Applicable
View flow output in Tableau Desktop		✓	✗	✗
Create an extract to a file		✓	✗	✗

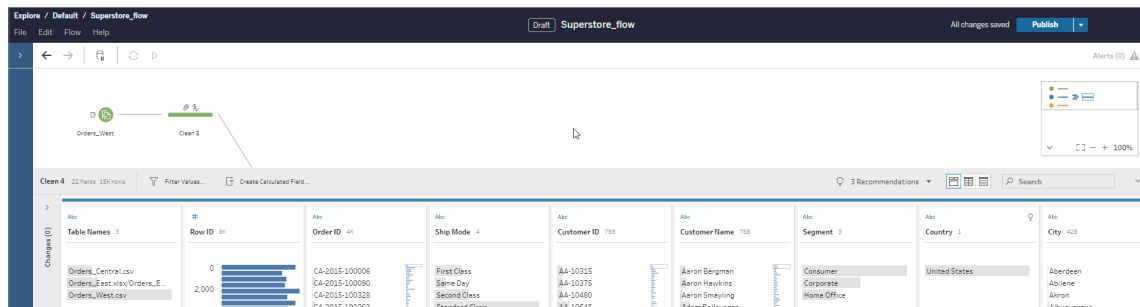
## Tableau Server on Windows Help

Create an extract to a Microsoft Excel worksheet		✓	✗	✗
Connect to a Custom SQL Query		✓	✓	✓
Create a published data source		✓	✓	✓
Save flow output to external databases		✓	✓	✓
Add Einstein Discovery Predictions to your Flow		✓	✓	✓

### Autosave and working with drafts

When you create or edit flows on the server, your work is automatically saved as a draft every few seconds so that in the event of a crash, or when closing a tab by accident, you don't lose your work.

Drafts are saved to the server and project you are signed into. You can't save or publish a draft to another server, but you can save the flow to another project on that server using the **File > Publish As** menu option.



Draft content can only be seen by you until you publish it. If you publish changes and need to revert them, you can use the **Revision History** dialog to view and revert to a previously published version. For more information about saving flows on the web, see [Automatically save your flows on the web](#).

### Publishing flows on the web

Whether you create a flow from scratch on the web or edit an existing flow, before you can run the flow, you'll need to publish it.

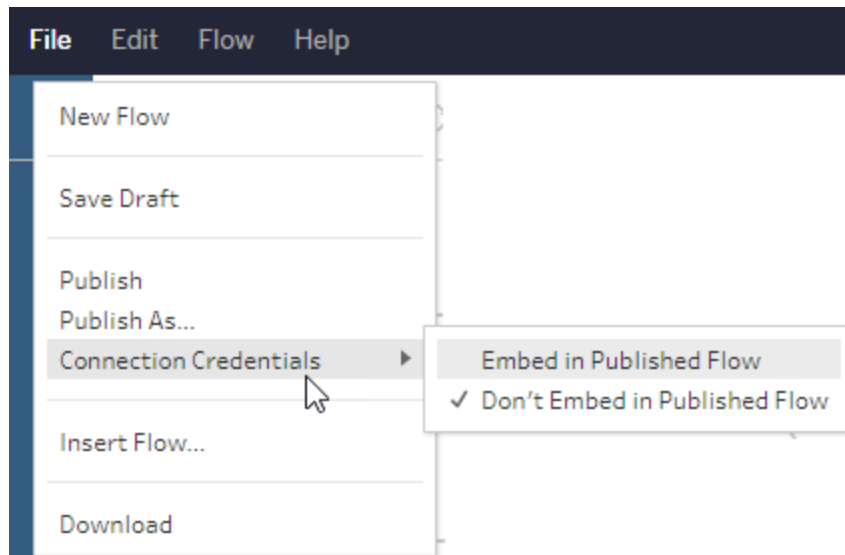
- You can only publish draft flows to the same server you are signed into.
- You can publish a draft to a different project using the **File** menu and selecting **Publish As**.
- You can embed credentials for your flow's database connections to enable the flow to run without having to manually enter the credentials when the flow runs. If you open the flow to edit it, you'll need to re-enter your credentials.

### Embed credentials

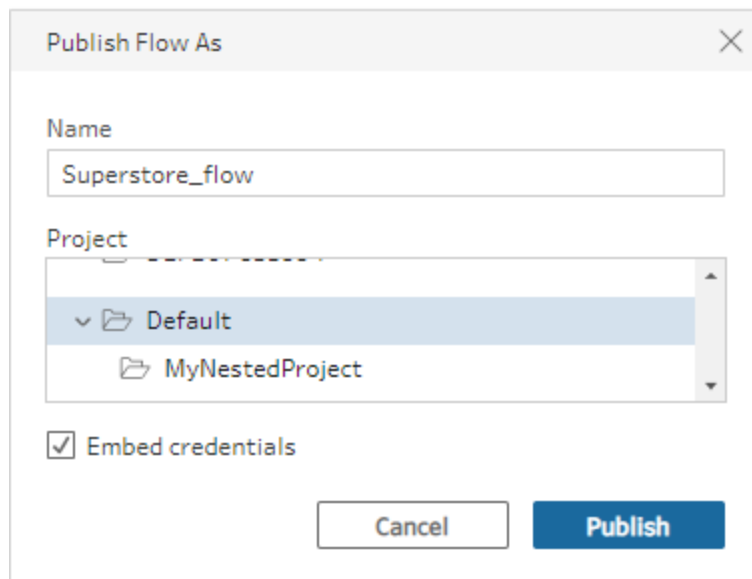
Embedding credentials only applies to running flows on your server. Currently, you will manually need to enter your credentials when editing a flow connected to a database. Embedding credentials can only be set at the flow level and not at the server or site level.

Do one of the following:

- From the top menu, select **File > Connection Credentials > Embed in Published Flow**.



- When publishing a flow, select the **Embed credentials** tick box. This option shows when you select **Publish As** to publish the flow to a new project for the first time or when you are editing a flow that was last published by someone else.



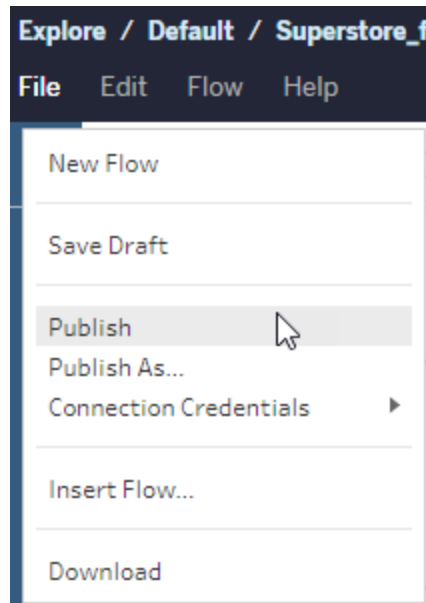
### Publish a flow

When you publish your flow, it becomes the current version of the flow and can be run and seen by others who have access to your project. Flows that are never published or flow

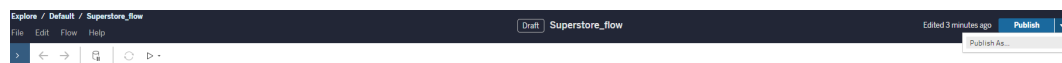
changes that you make to a draft can only be seen by you until you publish the flow. For more information about flow statuses, see [Automatically save your flows on the web](#).

To publish your flow, do one of the following:

- From the top menu, select **File > Publish** or **File > Publish As**



- From the top bar, click the **Publish** button or click the drop arrow to select **Publish As**.



Who can do this

- Server Administrator, Site Administrator Creator and Creator allow full connecting and publishing access.
- Creator can perform web authoring tasks.

## Create Views and Explore Data on the Web

You can create and interact with views on Tableau Server. For more information, see the following topics in the Tableau Help for users.

[Using Tableau on the Web](#)

[Tour your Tableau Site](#)

[Edit Views on the Web](#)

[Join your Data](#)

[Create a Dashboard](#)

[Create a Story](#)

[Embed Views and Dashboards in Web Pages](#)

[Make Workbooks Compatible Between Versions](#)

## Alerts and subscriptions

[Troubleshoot Subscriptions](#)

[Send Data-Driven Alerts from Tableau Cloud or Tableau Server](#)

## Manage Saved Credentials for Data Connections

Saved credentials enable you to connect to a data source without being prompted for your credentials. The credentials saved for your connection can be OAuth access tokens, or other credentials, such as user name and password. You can manage saved credentials on your account settings page.

On Tableau Server, if your server administrator has allowed you to save credentials, you can find and manage them in the **Saved Credentials** section on your **My Account Settings** page. If you don't see the **Saved Credentials** section, consult with your admin about allowing saving credentials. For more information, see [Allow Saved Access Tokens](#).

**Note:** When editing Tableau Prep flows on the web, you may still be prompted to re-authenticate.

## Test connections using saved credentials

If the connector supports test functionality, you can test the connection using saved credentials.

1. While you're signed in to Tableau Server or Tableau Cloud, display your Account Settings page.
2. In the Saved Credentials section, select the **Test** link next to the stored connection that you want to test.

This test confirms that Tableau Cloud or Tableau Server can access your account using this corresponding saved credential. If the test succeeds, but you can't access your data through this managed connection, confirm that the credentials you provided for this connection can access your data.

For example, if you accidentally created the connection using your personal Gmail account, but you use a different account to access a Google Analytics database, you'll need to delete the saved credentials and sign in to the data using the appropriate Gmail account.

## Update saved credentials

To help ensure uninterrupted data access from existing Tableau content after a custom OAuth client has been configured for your site, we encourage you to update your saved credentials. To update saved credentials, you can delete the previous saved credentials for a particular connector and then add them again.

When you add saved credentials again, both new and existing Tableau content will access the data using the custom OAuth client configured by your server administrator. For more information about custom OAuth clients, see [Configure a custom OAuth for a site](#).



1. Sign in to Tableau Server and navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the saved credentials for a connector.
  2. Next to the same connector, click **Add** and follow the prompts to 1) connect to the custom OAuth client that your site admin notified you about and 2) save the latest credentials.

## Clear all saved credentials

When you select **Clear All Saved Credentials**, the following items are removed from your user account:

- All saved credentials for connections that are stored in your account.

**Caution:** If any of these saved credentials are stored with published workbooks or data sources, deleting them also removes access to the data source from those locations. Effectively, this is like "changing the locks" anywhere the affected saved credentials are used.

- Passwords you've used to access published data extracts or workbooks that connect to them.

## Remove saved credentials

To remove Tableau access to data, delete the associated saved credentials for that data from your account. After you delete the credentials, you'll need to sign in to the data the next time you access it. This creates new saved credentials.

Your administrator might choose for all users to use the same shared credentials for connecting to a data source. If this is the case, the saved credential is associated with the data connection for all users, and it doesn't appear under Saved Credentials on your Account Settings page.

**Note:** If you're a Tableau Server user and can't delete saved credentials, ask your administrator if they've cleared the Allow users to save data source access tokens option in the server settings.

## Create and Edit Private Content in Personal Space

Personal Space is a private location for all Explorers and Creators to save content to when working in a Tableau Site. Content saved in Personal Space can't be shared with other users but can be moved to a project when you're ready for others to see it. Within Personal Space, you can create a new workbook or save a workbook to Personal Space as a separate copy. You can also move existing content you own into Personal Space for editing, then move it back to a project later. Explorers can download workbooks in Personal Space, including all data included in the workbook.

### Privacy in Personal Space

Content saved to your Personal Space is only visible to you and site administrators. Site administrators can't directly access any user's Personal Space or edit content in someone else's Personal Space, but they can view and manage Personal Space workbooks. Personal Space workbooks appear in administrator search results and as a workbook location on the Explore page. In addition, the permissions menu is unavailable when a workbook is in Personal Space because the workbook is private.

#### Tableau Catalogue and Personal Space

Starting in 2019.3, Tableau Catalog is available with Data Management in Tableau Server and Tableau Cloud. For more information, see "About Tableau Catalog" in the Tableau Server or Tableau Cloud Help.

When Tableau Catalog is enabled in your work environment, the information about workbooks you save in your Personal Space is indexed by Catalog. These workbooks are included

in lineage counts. However, only you can see the workbooks. Furthermore, users who browse through the lineage tool see Permissions required instead of information about workbooks in your Personal Space.

### Collaboration tools

When a workbook is in Personal Space, some functionality is disabled, including share, metrics, comments, alerts and subscriptions. Existing alerts and subscriptions to you will continue running, but alerts and subscriptions to others will fail, since the content is now private. Metrics can't be created in Personal Space but will continue to work if a connected workbook is moved there. (The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see [Create and Troubleshoot Metrics \(Retired\)](#).)

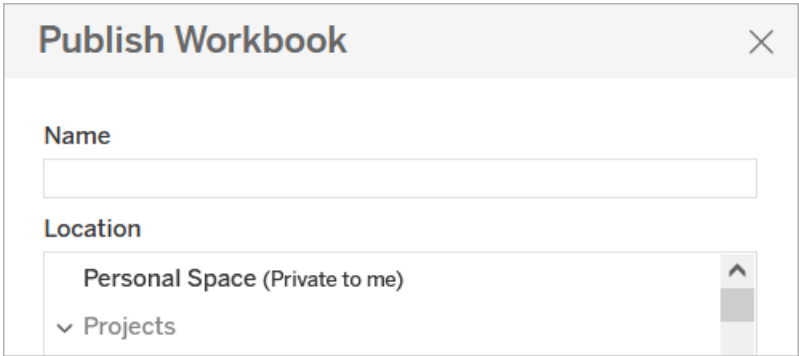
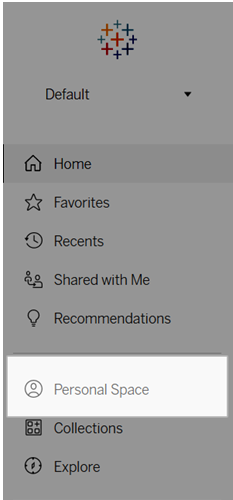
These limitations are removed when the workbook is moved or saved to another location. For example, if a workbook contains comments and moves to Personal Space, existing comments are hidden. Comments are restored when the workbook is moved to another location.

### Extract refreshes in Personal Space

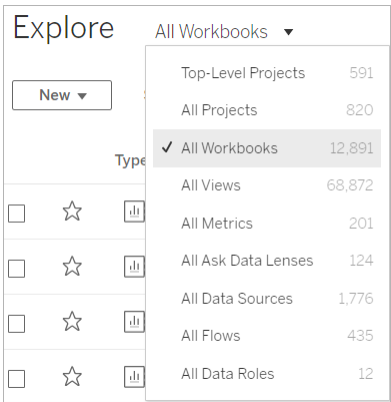
To limit resource consumption, existing extract refreshes continue to run if they've been scheduled, but new extract refreshes can't be scheduled while a workbook is in Personal Space.

## Find content in Personal Space

You can access Personal Space from the left navigation menu to see all your Personal Space content or create a new workbook, and you can save to Personal Space when creating or editing a workbook anywhere on the site.



You can also see workbooks in Personal Space from the Explore page when All Workbooks is selected, and you can filter down to Personal Space content.

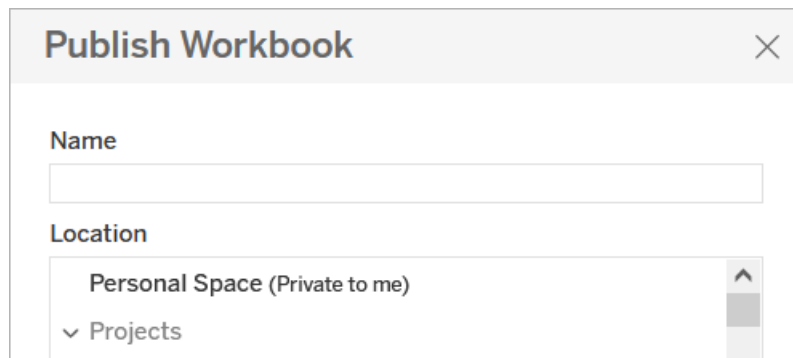


## Publish a workbook to Personal Space

Personal Space works much like a private project for you to publish a new or existing workbook to from Tableau Cloud, Tableau Server or Tableau Desktop.

Publish a workbook to Personal Space on Tableau Server or Tableau Cloud

1. With the workbook open, select **File > Publish As**.
2. Under Location, select **Personal Space**.



**Note:** Explorers can only save workbooks to Personal Space and may not see a location selection dialog.

Publish a workbook to Personal Space from Tableau Desktop

Starting in 2023.1, you can publish a workbook to Personal Space from Tableau Desktop.

1. With the workbook you want to publish open in Tableau Desktop, select **Server > Publish Workbook**.
2. Under Project, select **Personal Space**.
3. Under Data Sources, select **Edit**.

4. In the Manage Data Sources popup under Publish type, select **Embedded in workbook** for all data sources. You must embed data sources when publishing from Tableau Desktop, because you can't publish data sources separately to Personal Space.
5. Fill out the remainder of the publishing options as usual. For more information, see [Comprehensive Steps to Publish a Workbook](#).

## Move workbooks to Personal Space

You can move an existing workbook to Personal Space if you are the owner of the workbook and there is room in your Personal Space. Personal Space storage limits are set by administrators.

To move a workbook to Personal Space:

- Select a workbook, then click the **Actions** drop-down menu.
- Select **Move**.
- Under Location, Select **Personal Space**.

**Note:** Explorers can only save workbooks to Personal Space and may not see the move action or location selection dialog.

For more information, see [Perform actions](#) in the Manage Web Content help topic.

When you move an existing workbook or data source to Personal Space, tools like share, alerts and subscriptions become hidden. Existing extract refreshes continue to run if they've been scheduled, but users can't schedule new extract refreshes within their Personal Space.

Existing subscriptions and alerts also continue but can't be edited from Personal Space and will fail if other users are recipients. Existing connected metrics will continue to refresh, but the connected view will not be visible to other users.

## Move workbooks from Personal Space

When you move a workbook out of Personal Space, collaboration tools like share, alerts and subscriptions become visible, and any existing comments reappear.

## Use Relationships for Multi-table Data Analysis

Tables that you drag into this canvas use relationships. Relationships are a flexible way to combine data for multi-table analysis in Tableau.

Think of a relationship as a contract between two tables. When you are building a viz with fields from these tables, Tableau brings in data from these tables using that contract to build a query with the appropriate joins.

We recommend using relationships as your first approach to combining your data because it makes data preparation and analysis easier and more intuitive. [Use joins only when you absolutely need to](#). Learn more about the basics of creating relationships in this 5-minute video.

**Note:** The interface for editing relationships shown in this video differs slightly from the current release but has the same functionality.

Learn more about how relationships work in these Tableau blog posts:

- [Relationships, part 1: Introducing new data modelling in Tableau](#)
- [Relationships, part 2: Tips and tricks](#)
- [Relationships, part 3: Asking questions across multiple related tables](#)

Also see video podcasts on relationships from [Action Analytics](#), such as [Why did Tableau Invent Relationships?](#) Click "Video Podcast" in the [Library](#) to see more.

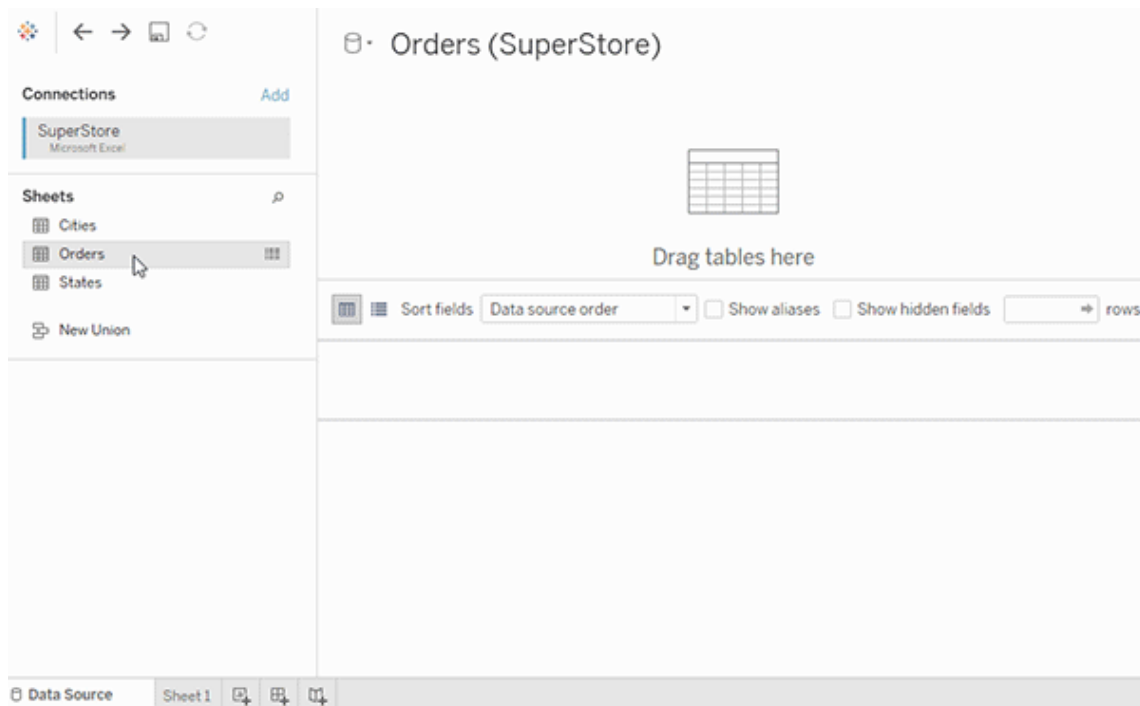
In Tableau version 2024.2 and later, the Tableau data model supports multi-fact analysis and shared dimensions through multi-fact relationships. For more information, see [About Multi-fact](#)

Relationship Data Models, [When to Use a Multi-fact Relationship Model](#) and [Build a Multi-fact Relationship Data Model](#).

## Are you building a new data source and workbook?

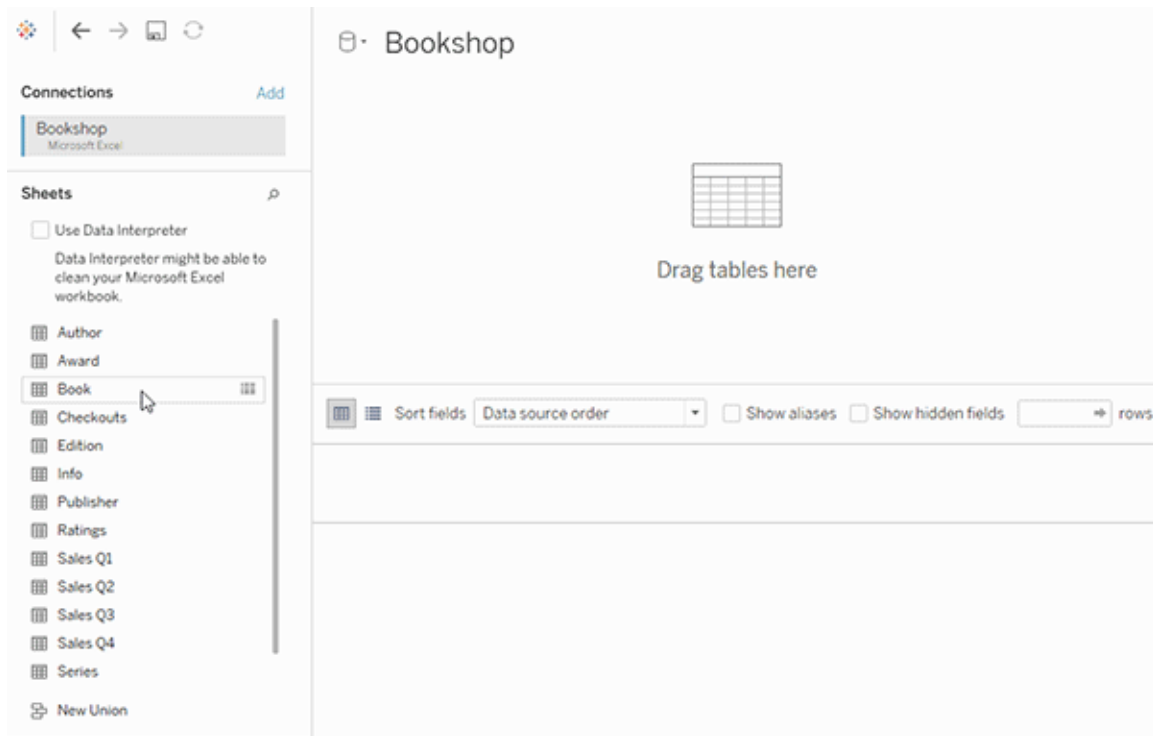
Drag a table to the Data Source page canvas to start building your data source.

A data source can be made of a single table that contains all of the dimension and measure fields you need for analysis...



Or, you can create a multi-table data source by dragging out more tables and defining their relationships...





Watch this 1-minute video about getting started with using relationships.

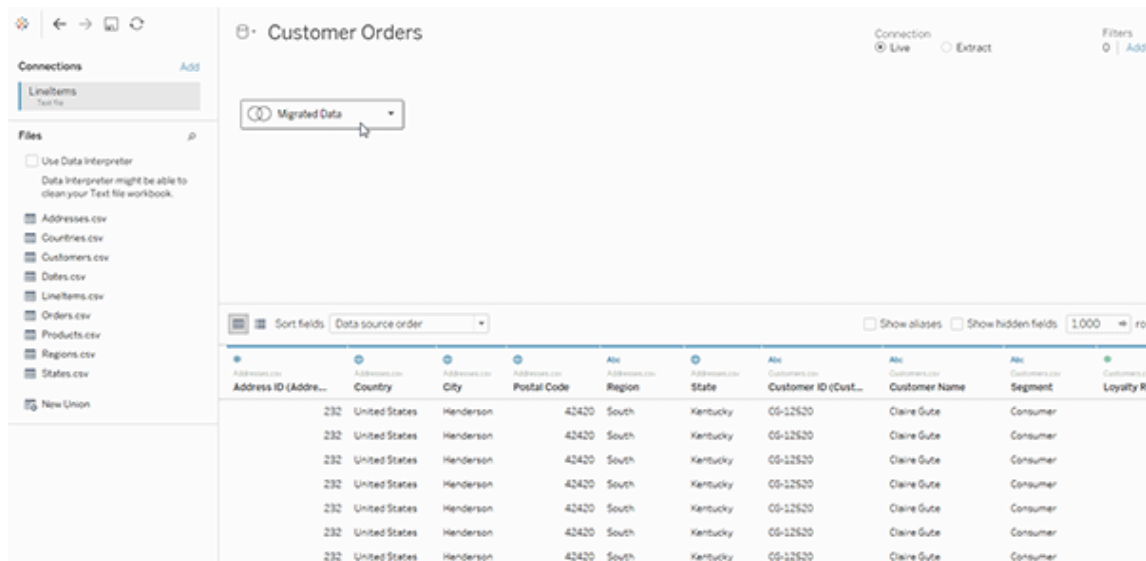
**Note:** The interface for editing relationships shown in this video differs slightly from the current release but has the same functionality.

For more information about using relationships, see [Relate Your Data](#), [How Relationships Differ from Joins](#), [The Tableau Data Model](#), and [Create and define relationships](#).

For more information on changes to data sources and analysis in Tableau 2020.2 and later, see [What's Changed with Data Sources and Analysis](#) and [Questions about Relationships, the Data Model and Data Sources](#).

## Are you opening an older workbook or data source?

When you open a pre-2020.2 workbook or data source in 2020.2, your data source will appear as a single logical table in the canvas, with the name "Migrated Data" or the original table name. Your data is preserved and you can continue to use the workbook as you did before.



To see the physical tables that make up the single logical table, double-click that logical table to open it in the physical layer. You will see its underlying physical tables, including joins and unions.

For more information on changes to data sources and analysis in Tableau 2020.2 and later, see [What's Changed with Data Sources and Analysis](#) and [Questions about Relationships, the Data Model and Data Sources](#).

## The Tableau Data Model

Every data source that you create in Tableau has a data model. You can think of a data model as a diagram that tells Tableau how it should query data in the connected database tables.

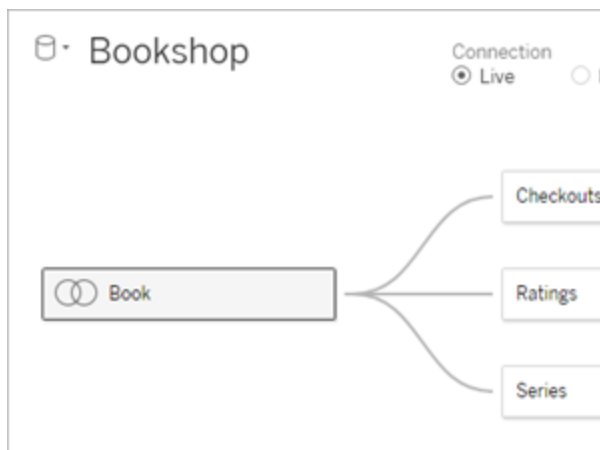
The tables that you add to the canvas in the **Data Source** page create the structure of the data model. A data model can be simple, such as a single table. Or it can be more complex, with multiple tables that use different combinations of relationships, joins and unions.

The data model has two layers:

- The default view that you first see in the Data Source page canvas is the *logical layer* of the data source. You combine data in the logical layer using relationships (or noodles). Think of this layer as the Relationships canvas in the Data Source page. For more information, see [Use Relationships for Multi-table Data Analysis](#).
- The next layer is the physical layer. You combine data between tables at the physical layer using [joins](#) and unions. Each logical table contains at least one physical table in this layer. Think of the physical layer as the Join/Union canvas in the Data Source page. Double-click a logical table to view or add joins and unions.

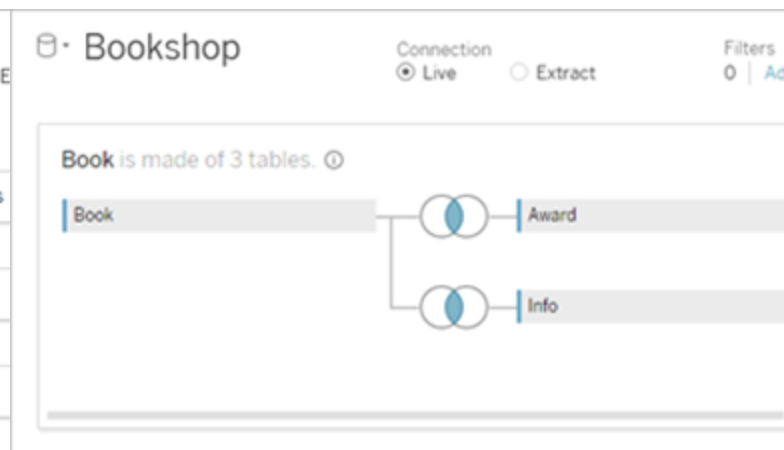
### Logical Layer

Noodles = Relationships



### Physical Layer

Venn diagram = Joins



The top-level view of a data source with multiple, related tables. This is the logical layer. Logical tables can be combined using relationships (noodles). They don't use join types. They act like containers for physical tables.

Double-click a logical table to open it and see its physical tables. Physical tables can be combined using joins or unions. In this example, the Book logical table is made of three, joined physical tables (Book, Award, Info).

Logical Layer	Physical Layer
Relationships canvas in the Data Source page	Join/Union canvas in the Data Source page
Tables that you drag here are called logical tables	Tables that you drag here are called physical tables
Logical tables can be related to other logical tables	Physical tables can be joined or unioned to other physical tables
Logical tables are like containers for physical tables	Double-click a logical table to see its physical tables
Level of detail is at the row level of the logical table	Level of detail is at the row level of merged physical tables
Logical tables remain distinct (normalised), not merged in the data source	Physical tables are merged into a single, flat table that defines the logical table

#### Layers of the data model

The top-level view that you see of a data source is the **logical layer** of the data model. You can also think of it as the Relationships canvas, because you combine tables here using relationships instead of joins.

When you combine data from multiple tables, each table that you drag to the canvas in the logical layer must have a relationship to another table. You do not need to specify join types for relationships; during analysis Tableau automatically selects the appropriate join types based on the fields and context of analysis in the worksheet.

The **physical layer** of the data model is where you can combine data using joins and unions. You can only use pivots in this canvas. You can think of it as the Join/Union canvas. In previous versions of Tableau, the physical layer was the only layer in the data model. Each logical table can contain one or more *physical tables*.

**Important:** You can still create single-table data sources in Tableau that use joins and unions. The behaviour of single-table analysis in Tableau has not changed. Your upgraded workbooks will work the same as they did before 2020.2.

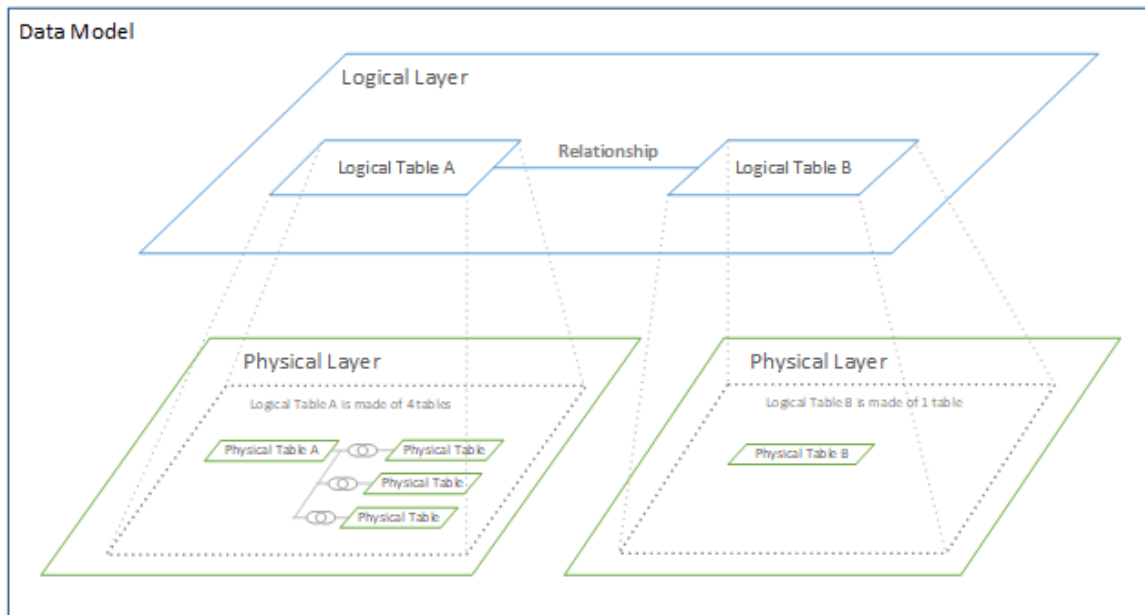
**Learn more:** For related information on combining data using relationships, also see these topics and blog posts:

- [How Relationships Differ from Joins](#)
- [Use Relationships for Multi-table Data Analysis](#)
- [Relate Your Data](#)
- [Relationships, part 1: Introducing new data modelling in Tableau](#)
- [Relationships, part 2: Tips and tricks](#)
- [Relationships, part 3: Asking questions across multiple related tables](#)

Also see video podcasts on relationships from [Action Analytics](#), such as [Why did Tableau Invent Relationships?](#) Click "Video Podcast" in the [Library](#) to see more.

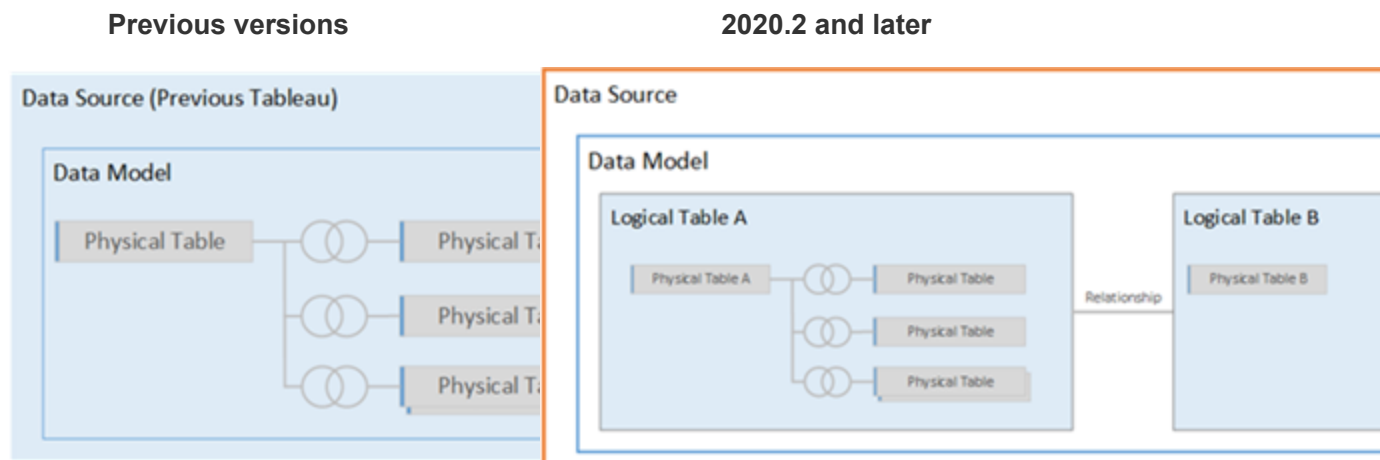
### Understanding the data model

In previous versions of Tableau (pre-2020.2), the data model is a physical layer only. In Tableau 2020.2 and later, the data model has the logical (semantic) layer and a physical layer. This gives you more options for combining data using schemas to fit your analysis.



In Tableau 2020.2 and later, a logical layer has been added in the data source. Each logical table contains physical tables in a physical layer.

In earlier versions of Tableau (pre-2020.2), the data model in your data source consisted of a single, physical layer where you could specify joins and unions. Tables added to the physical layer (joined or unioned) create a single, flattened table (denormalised) for analysis.



In versions of Tableau before 2020.2, the data model has only the physical layer

In 2020.2 and later, the data model has two layers: the logical layer and the physical layer

In Tableau 2020.2 and later, the data model in your data source includes a new semantic layer above the physical layer – called the logical layer – where you can add multiple tables and relate them to each other. Tables at the logical layer are not merged in the data source, they remain distinct (normalised), and maintain their native level of detail.

Logical tables act like containers for merged physical tables. A logical table can contain a single, physical table. Or it can contain multiple physical tables merged together through joins or unions.

#### Build a new model

When you add one or more tables to the logical layer, you are essentially building the data model for your data source. A data source can be made of a single, logical table or you can

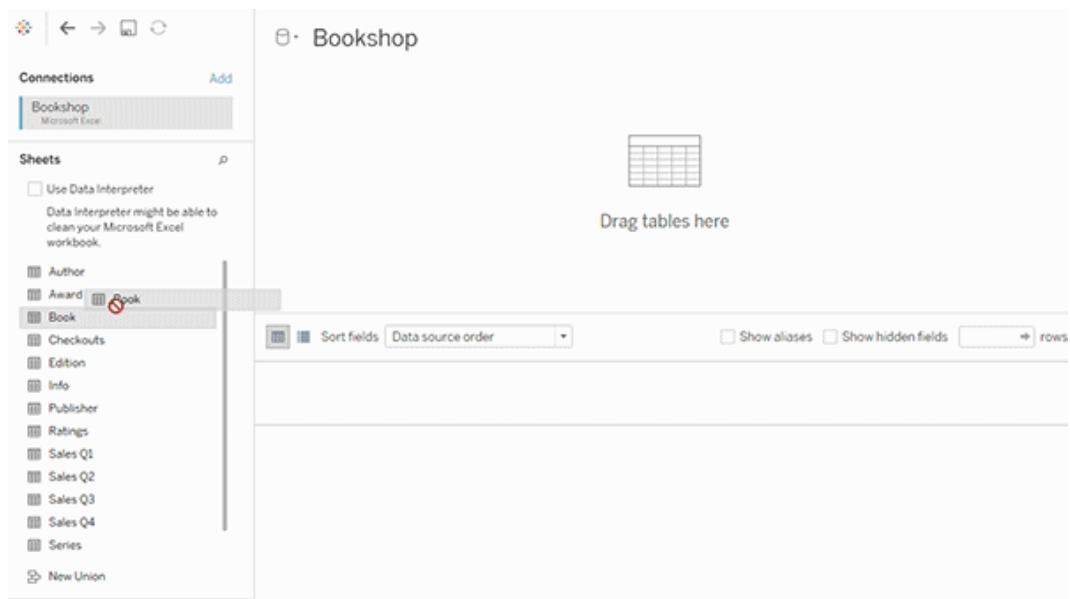
drag multiple tables to the canvas to create a more complex model.

- The first table that you drag to the canvas becomes the root table for the data model in your data source.
- After you drag out the root table, you can drag out additional tables in any order. You will need to consider which tables should be related to each other, and the matching field pairs that you define for each relationship.
- If you are creating a star schema, it can be helpful to drag the fact table out first, and then relate dimension tables to that table.
- Deleting a table in the canvas automatically deletes its related descendants as well. If you delete the root table, all other tables in the model are also removed.
- Each relationship must be made of at least one matched pair of fields. Add multiple field pairs to create a compound relationship. Matched pairs must have the same data type. Changing the data type in the Data Source page does not change this requirement. Tableau will still use the data type in the underlying database for queries.
- Relationships can be based on calculated fields.
- You can specify how fields used in the relationships should be compared by using operators when you define the relationship.

For more information about relationships, see [Create and define relationships](#) in [Relate Your Data](#).

#### Multi-table model

- To create a multi-table model, drag tables to the logical layer of the Data Source page canvas.



Tables that you drag to the logical layer of the Data Source page canvas must be related to each other. When you drag additional tables to the logical layer canvas, Tableau automatically attempts to create the relationship based on existing key constraints and matching fields to define the relationship. If it can't determine the matching fields, you will need to select them.

If no constraints are detected, a **Many-to-many** relationship is created and referential integrity is set to **Some records match**. These default settings are a safe choice and provide the most a lot of flexibility for your data source. The default settings support full outer joins and optimise queries by aggregating table data before forming joins during analysis. All column and row data from each table becomes available for analysis.

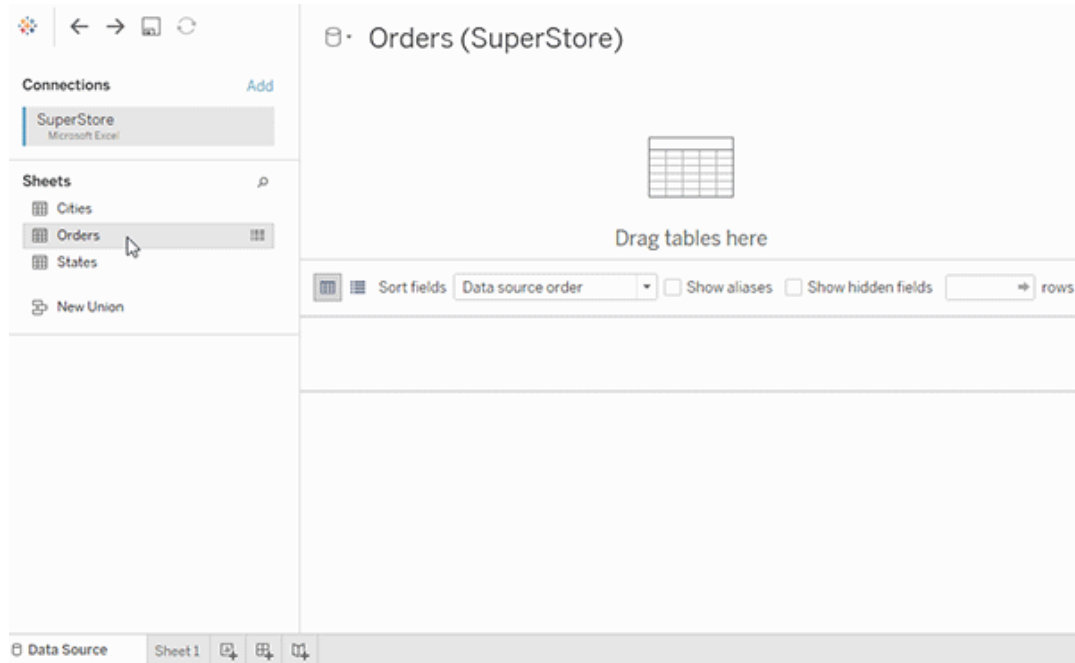
You can add more data inside any logical table by double-clicking the table. This opens the physical layer of the Data Source page canvas. If you need to use joins or unions, you can drag the tables you want to join or union into the physical layer canvas. The physical tables are merged in their logical table.

Follow the steps in [Create and define relationships](#) to combine multiple tables.



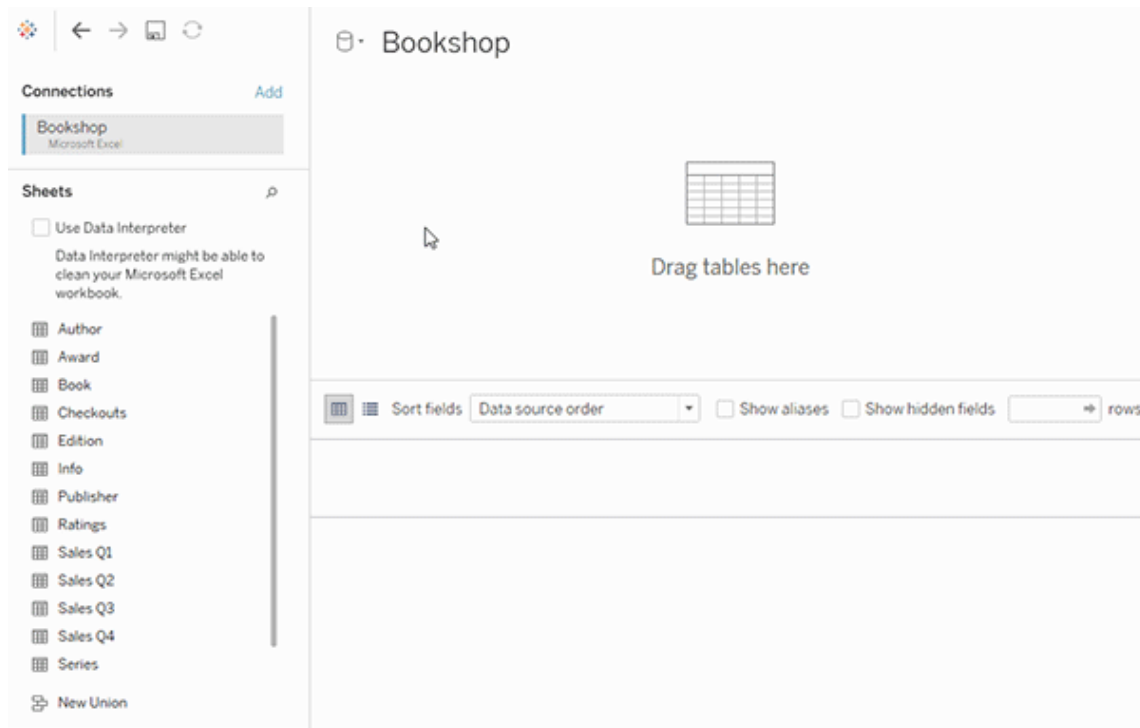
## Single-table model

- To create a single-table model, drag a table into the logical layer canvas of the Data Source page. You can then use the fields from that table in the Data pane for analysis.



## Single-table model that contains other tables

You can add more data inside the single, logical table by double-clicking the table. This opens the physical layer of the Data Source page canvas. If you need to use joins or unions, you can drag the tables you want to join or union into the physical layer canvas. The physical tables are merged in their logical table.



This example shows the Book table in the Relationships canvas (logical layer) of the data source. Double-clicking the Book logical table opens the Join/Union canvas (physical layer).

In this example, the joins merge the Award and Info tables with the Book table. In this case, the join between Book and Award will be one-to-many, at the level of detail of awards. This would duplicate measure values for Book and Info. To avoid duplication, you could relate Award and Info to Book instead of joining them inside of the Book logical table.

### Supported data model schemas

The data modelling capabilities in Tableau (version 2020.2 and later) are designed to make analysis over common multi-table data scenarios – including star and snowflake data models – easy. The following types of models are supported in Tableau data sources.

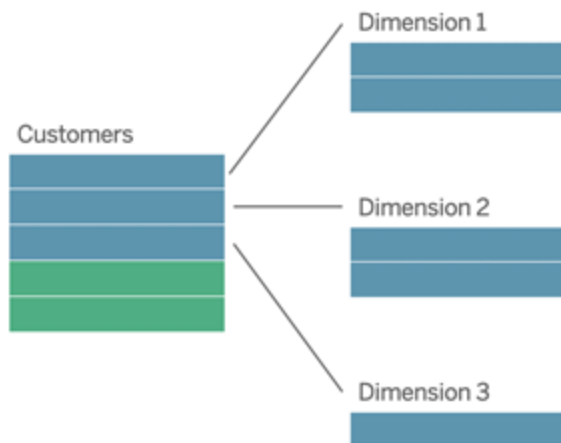
#### Single-table

Analysis over a single logical table that contains a mixture of dimensions and measures works just as in Tableau pre-2020.2. You can build a logical table using a combination of joins, unions, custom SQL and so on.



### Star and snowflake

In enterprise data warehouses, it is common to have data structured in star or snowflake schemas where measures are contained in a central fact table and dimensions are stored separately in independent dimension tables. This organisation of data supports many common analysis flows including rollup and drill down.



These models can be directly represented with relationships in the data modelling capabilities available in Tableau 2020.2 and later.

Drag the fact table into the model first and then relate the dimension tables to the fact table (in a star schema) or to other dimension tables (in a snowflake).

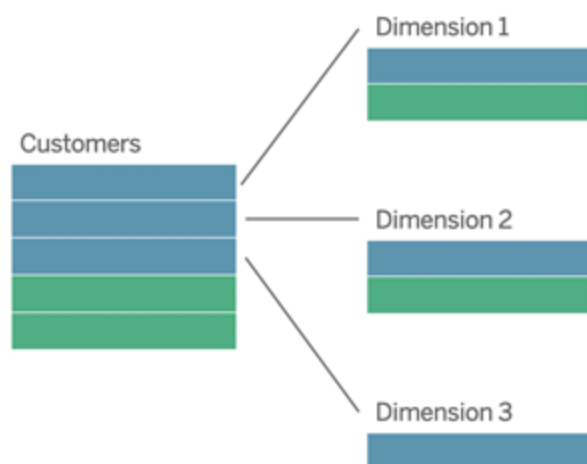
Typically, in a well-modelled star or snowflake schema, the relationships between the fact table and the dimension tables will be many-to-one. If this information is encoded in your data warehouse, Tableau will automatically use this to set the relationship's Performance Options.

If not, you can set this information yourself. For more information, see [Optimise Relationship Queries Using Performance Options](#).

In a well-modelled star or snowflake schema, every row in the fact table will have a matching entry in each of the dimension tables. If this is true and captured in your data warehouse integrity constraints, Tableau will automatically use this information to set the referential integrity setting in Performance Options. If some fact table rows do not have a matching row in a dimension table (sometimes called “late-arriving dimensions” or “early-arriving facts”), Tableau will default to retaining all rows when computing measures, but may drop values when showing dimension headers. For more information, see [Optimise Relationship Queries Using Performance Options](#).

#### Star and snowflake with measures in more than one table

In some star or snowflake schemas, all the measures for your analysis are contained in the fact table. However, it is often true that additional measures of interest may be related to the dimension tables in your analysis. Even if the dimension tables do not contain measures, it is common in analysis to want to count or otherwise aggregate dimension values. In these cases, the distinction between fact tables and dimension tables is less clear. To create clarity when viewing your data model, we recommended adding the finest grain table to the data source canvas first, and then relating all other tables to that first table.



If you were to join these tables together into a single logical table, the measures in the dimension tables would be replicated, resulting in distorted aggregates unless you took precautions to deduplicate the values using LOD calculations or COUNT DISTINCT. However, if you instead create relationships between these tables, Tableau will aggregate measures before performing joins, avoiding the problem of unnecessary duplication. This relieves you of the need to carefully track the level of detail of your measures.

### Multi-fact analysis

In version 2024.2 and later, Tableau's data modelling capabilities support multi-fact analysis through the use of multi-fact relationships. For in-depth information on how to create multi-fact relationships data models, see:

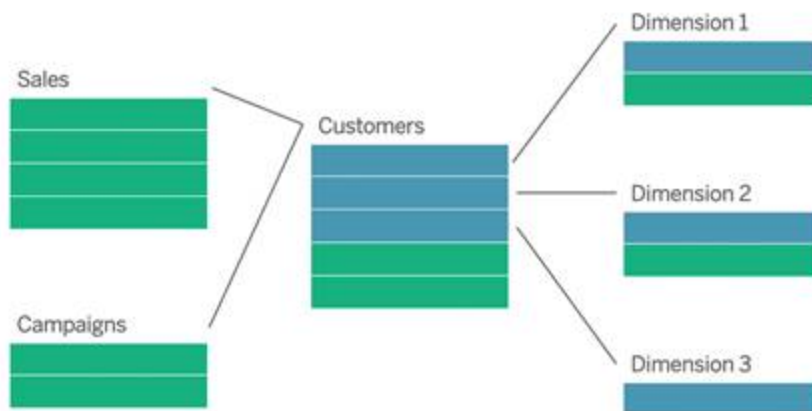
- [About Multi-fact Relationship Data Models](#)
- [When to Use a Multi-fact Relationship Model](#)
- [Build a Multi-fact Relationship Data Model](#)

A multi-fact relationship model – a data model with multiple base tables – permits unrelated tables in the model as long as shared tables exist in the model, too. During analysis, fields from a shared table "stitch" together otherwise unrelated tables of data based on the shared dimensions they have in common (such as happening in the same place or at the same time). All the benefits of relationships are maintained, including the retention of each table's grain or native level of detail.

Similar to a single base table data model, Tableau determines the best join type to use behind the scenes based on the structure of the viz. But in a multi-fact relationship model, the join options are expanded to include outer and cross joins to handle different levels of relatedness. For more information, see [About Multi-fact Relationship Data Models](#).

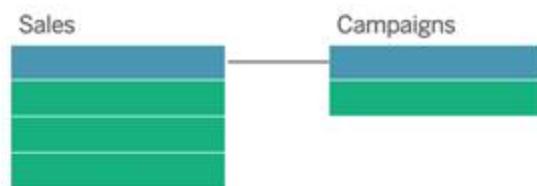
**Note:** In versions 2020.2 to 2024.1, you can add fact tables (containing measures) to star and snowflake models only if they are related to a single dimension table.

For example, you can bring two or more fact tables together to analyse a shared dimension, such as in Customer 360-like analyses. These fact tables can be at a different level of detail than the dimension table, or from each other. They can also have a many-to-many relationship with the dimension table. In these scenarios, Tableau will ensure that values are not replicated before aggregation.



If you don't have a shared dimension table that relates your fact tables, you can sometimes dynamically build one using custom SQL or by using joins or unions of other dimension tables.

Two fact tables can be related directly to each other on a common dimension. This type of analysis works best when one of the fact tables contains a superset of the common dimension.



There are various scenarios that may indicate you should build a multi-fact relationship model with multiple base tables rather than a single base table data source:

- **Circular relationships.** Circular relationships are not supported. If you're trying to build a data source with a cycle, use multi-fact relationships and make the downstream

table another base table instead.

- **Conformed dimensions** and **Contextual OR relationships**. If you have a series of tables that are related on the same sets of relationship clauses (such as date and location), those dimensions should be pulled out and made into shared tables instead.
  - This is especially useful because multiple relationship clauses must all be true (logically, an AND) for the tables to be related for those records.
  - If, instead, you want to analyse records where one may be true at a time (a contextual OR), this flexibility is provided by setting up a data model with shared dimension tables instead.
- **Equivalent blends**. If you're using a blend but want to have an equivalent blend without primary and secondary data sources, build a data model that combines the data sources from the blend with their linking fields in a shared table or tables.

#### Requirements for relationships in a data model

- When relating tables, the fields that define the relationships must have the same data type. Changing the data type in the Data Source page does not change this requirement. Tableau will still use the data type in the underlying database for queries.
- You can't define relationships based on geographic fields.
- Circular relationships aren't supported in the data model.
- You can't define relationships between published data sources.

#### Factors that limit the benefits of using related tables

- Dirty data in tables (i.e. tables that weren't created with a well-structured model in mind and contain a mix of measures and dimensions in multiple tables) can make multi-table analysis more complex.
- Using data source filters will limit Tableau's ability to do join culling in the data. Join culling is a term for how Tableau simplifies queries by removing unnecessary joins.
- Tables with a lot of unmatched values across relationships.
- In versions 2020.2 to 2024.1: Interrelating multiple fact tables with multiple dimension tables (attempting to model shared or conformed dimensions). In version 2024.2 and later, you can use multi-fact relationships to address these cases.

## How Relationships Differ from Joins

Relationships are a dynamic, flexible way to combine data from multiple tables for analysis.

You don't define join types for relationships, so you won't see a Venn diagram when you create

them.

Think of a relationship as a contract between two tables. When you are building a viz with fields from these tables, Tableau brings in data from these tables using that contract to build a query with the appropriate joins.

- **No up-front join type.** You only need to select matching fields to define a relationship ([no join types](#)). Tableau first attempts to create the relationship based on existing key constraints and matching field names. You can then check to ensure they are the fields you want to use, or add more field pairs to better define how the tables should be related.
- **Automatic and context-aware.** Relationships defer joins to the time and context of analysis. Tableau automatically selects join types based on the fields being used in the visualisation. During analysis, Tableau adjusts join types intelligently and preserves the native level of detail in your data. You can see aggregations at the level of detail of the fields in your viz rather than having to think about the underlying joins. You don't need to use LOD expressions such as FIXED to deduplicate data in related tables.
- **Flexible.** Relationships can be many-to-many and support full outer joins. When you combine tables using relationships, it's like creating a custom, flexible data source for every viz, all in a single data source for the workbook. Because Tableau queries only tables that are needed based on fields and filters in a viz, you can build a data source that can be used for a variety of analytic flows.

For more information, see [Relate Your Data](#) and [Don't Be Scared of Relationships](#).

Joins are still available as an option for combining your data. Double-click a logical table to go to the join canvas. For more information, see [Where did joins go?](#)

**Watch a video:** For an introduction to using relationships in Tableau, see this 5-minute video.

**Note:** The interface for editing relationships shown in this video might differ slightly from the current release but has the same functionality.

Also see video podcasts on relationships from [Action Analytics](#), such as [Why did Tableau Invent Relationships?](#) Click "Video Podcast" in the [Library](#) to see more.



For related information about how relationship queries work, see these Tableau blog posts:

- [Relationships, part 1: Introducing new data modelling in Tableau](#)
- [Relationships, part 2: Tips and tricks](#)
- [Relationships, part 3: Asking questions across multiple related tables](#)

### Characteristics of relationships and joins

Relationships are a dynamic, flexible way to combine data from multiple tables for analysis.

We recommend using relationships as your first approach to combining your data because it makes data preparation and analysis easier and more intuitive. **Use joins only when you absolutely need to.**

Here are some advantages to using relationships to combine tables:

- Make your data source easier to define, change, and reuse.
- Make it easier to analyse data across multiple tables at the correct level of detail (LOD).
- Do not require the use of LOD expressions or LOD calculations for analysis at different levels of detail.
- Only query data from tables with fields used in the current viz.

### Relationships

- Are displayed as flexible noodles between logical tables
- Require you to select matching fields between two logical tables
- Do not require you to select join types
- Make all row and column data from related tables potentially available in the data source
- Maintain each table's level of detail in the data source and during analysis
- Create independent domains at multiple levels of detail. Tables aren't merged together in the data source.
- During analysis, create the appropriate joins automatically, based on the fields in use.
- Do not duplicate aggregate values (when Performance Options are set to Many-to-Many)
- Keep unmatched measure values (when Performance Options are set to Some Records Match)

## Joins

Joins are a more static way to combine data. Joins must be defined between physical tables up front, before analysis and can't be changed without impacting all sheets using that data source. Joined tables are always merged into a single table. As a result, sometimes joined data is missing unmatched values, or duplicates aggregated values.

- Are displayed with Venn diagram icons between physical tables
- Require you to select join types and join clauses
- Joined physical tables are merged into a single logical table with a fixed combination of data
- May drop unmatched measure values
- May duplicate aggregate values when fields are at different levels of detail
- Support scenarios that require a single table of data, such as extract filters and aggregation

### Requirements for using relationships

- When relating tables, the fields that define the relationships must have the same data type. Changing the data type in the Data Source page does not change this requirement. Tableau will still use the data type in the underlying database for queries.
- You can't define relationships based on geographic fields.
- Circular relationships aren't supported in the data model.
- You can't define relationships between published data sources.

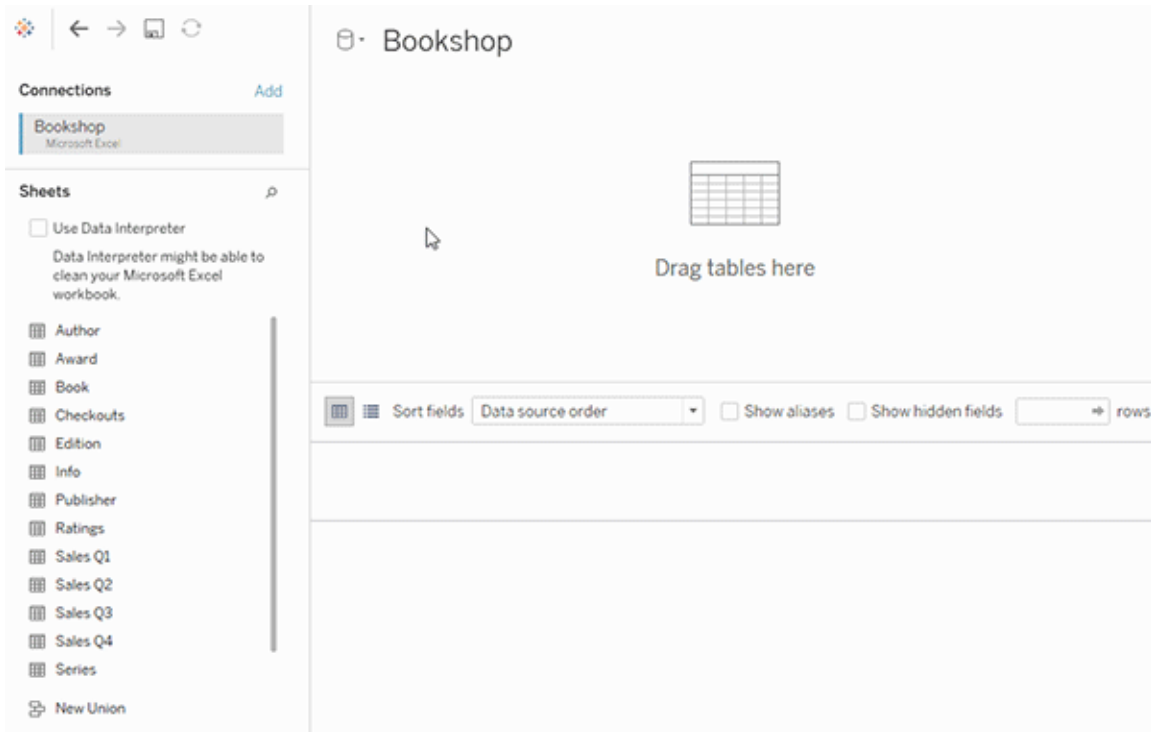
### Factors that limit the benefits of using related tables

- Dirty data in tables (i.e. tables that weren't created with a well-structured model in mind and contain a mix of measures and dimensions in multiple tables) can make multi-table analysis more complex.
- Using data source filters will limit Tableau's ability to do join culling in the data. Join culling is a term for how Tableau simplifies queries by removing unnecessary joins.
- Tables with a lot of unmatched values across relationships.
- Interrelating multiple fact tables with multiple dimension tables (attempting to model shared or conformed dimensions).

Where did joins go?

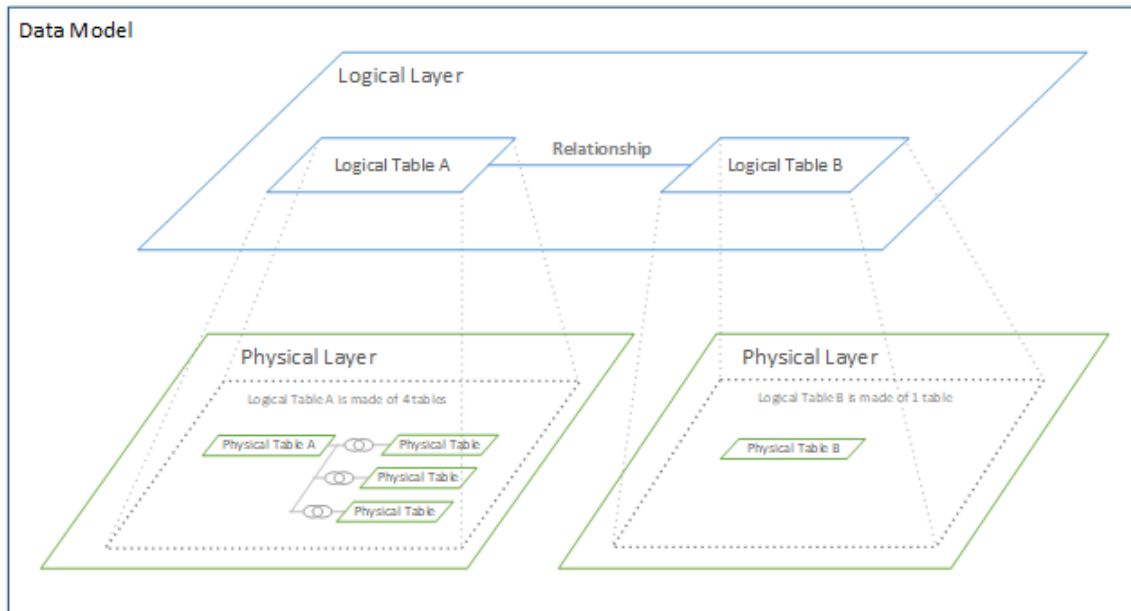
You can still specify joins between tables in the physical layer of a data source. Double-click a logical table to go to the Join/Union canvas in the physical layer and add joins or unions.

Every top-level, logical table contains at least one physical table. Open a logical table to view, edit or create joins between its physical tables. Right-click a logical table, and then click **Open**. Or, just double-click the table to open it.



When you create a data source, it has two layers. The top-level layer is the logical layer of the data source. You combine data between tables in the logical layer using relationships.

The next layer is the physical layer of the data source. You combine data between tables at the physical layer using joins. For more information, see [Logical and physical tables in the data model](#).



## Optimise Relationship Queries Using Performance Options

Performance Options are optional settings that define the cardinality (uniqueness) and referential integrity (matching records) between the two tables in a relationship. These settings help Tableau optimise queries during analysis.

- **If you aren't sure what to choose**, use the recommended default settings indicated by Tableau. Using the defaults is safe and will automatically generate correct aggregations and joins during analysis. If you don't know the cardinality or referential integrity, you don't need to change these settings.
- **If you know the shape of your data**, you can optionally change these settings to represent uniqueness and matching between the records in the two tables.

In many analytical scenarios, using the default settings for a relationship will give you all of the data you need for analysis. In some scenarios, you might want to adjust the Performance Options settings to describe your data more accurately. For more details about using relationships to combine and analyse data, see [Relate Your Data](#) and this Tableau blog post: [Relationships, part 1: Introducing new data modelling in Tableau](#).

What the Cardinality and Referential Integrity settings mean

The screenshot shows the 'Edit Relationship' dialog box. At the top, it shows the relationship between 'Orders' and 'States'. Under 'Orders', the field 'State' is selected. Under 'States', the field 'State Name' is selected. Below this, there is a section for 'Performance Options'. Under 'Cardinality', both fields are set to 'Many'. Under 'Referential Integrity', both fields are set to 'Some records match'. At the bottom, there is a 'Revert to Default' button.

### Cardinality options

Cardinality settings determine if Tableau aggregates table data before or after automatically joining the data during analysis.

- Select **Many** if the field values aren't unique, or you don't know. Tableau will aggregate the relevant data before forming joins during analysis.
- Select **One** if field values are unique. During analysis, the relevant data will be joined before aggregation. Setting this option correctly optimises queries in the workbook when the field values in the relationship are unique. However, selecting **One** when field values aren't unique can result in duplicate aggregate values being shown in the view.

**Note:** Selecting **One** treats records as if each key value is unique and there is at most only one row with a null value.

### Referential Integrity options

Referential Integrity settings determine the type of join used to get the dimension values for a measure during analysis.

- Select **Some Records Match** if some values in the field don't have a match in the other table, or you don't know. During analysis, Tableau uses outer joins to get dimensions values for a measure. All measure values will be shown in the view, even unmatched measures.
- Select **All Records Match** if values in the field are guaranteed to have a match in the other table. This setting generates fewer and simpler joins during analysis, and optimises queries. You might see inconsistent results during analysis (unmatched values removed or missing in view) if there are unmatched values in this table.

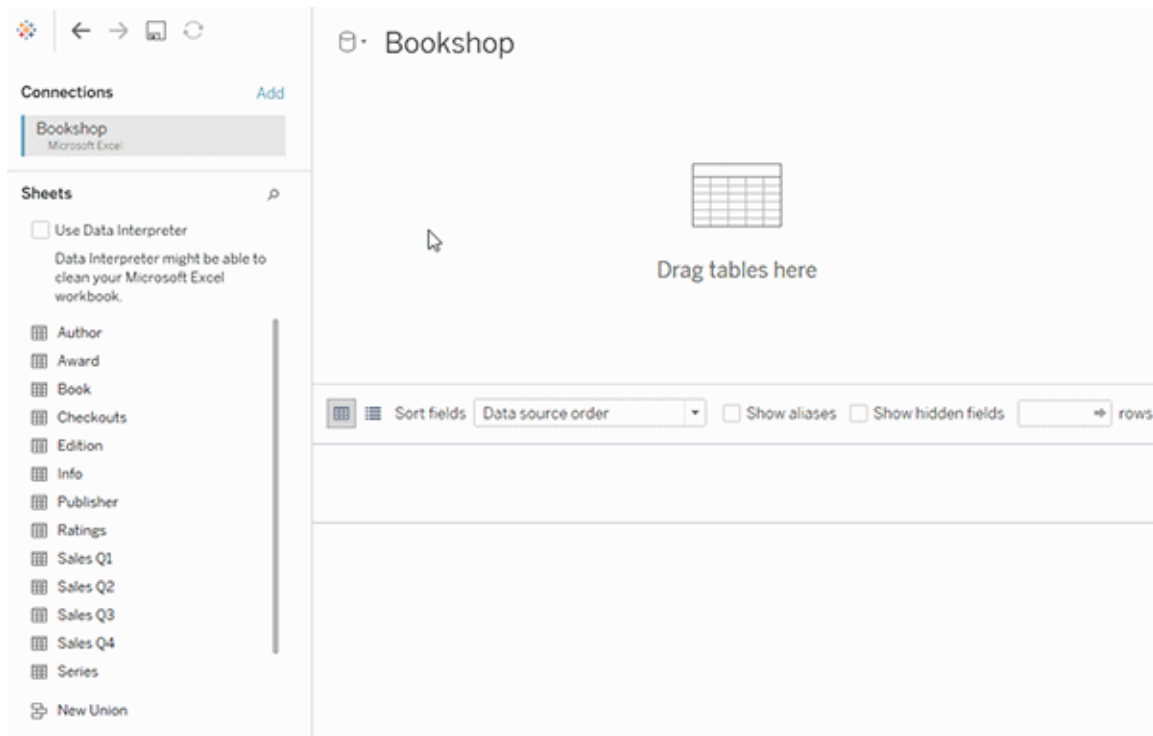
**Notes:** Selecting **All Records Match** treats records as if no null values exist in the fields used for the relationship. During analysis, Tableau will use inner joins to get dimension values for a measure. By default, Tableau will never join null keys.

For more information about Cardinality and Referential integrity as concepts, see [Cardinality and Referential Integrity](#).

Where did joins go?

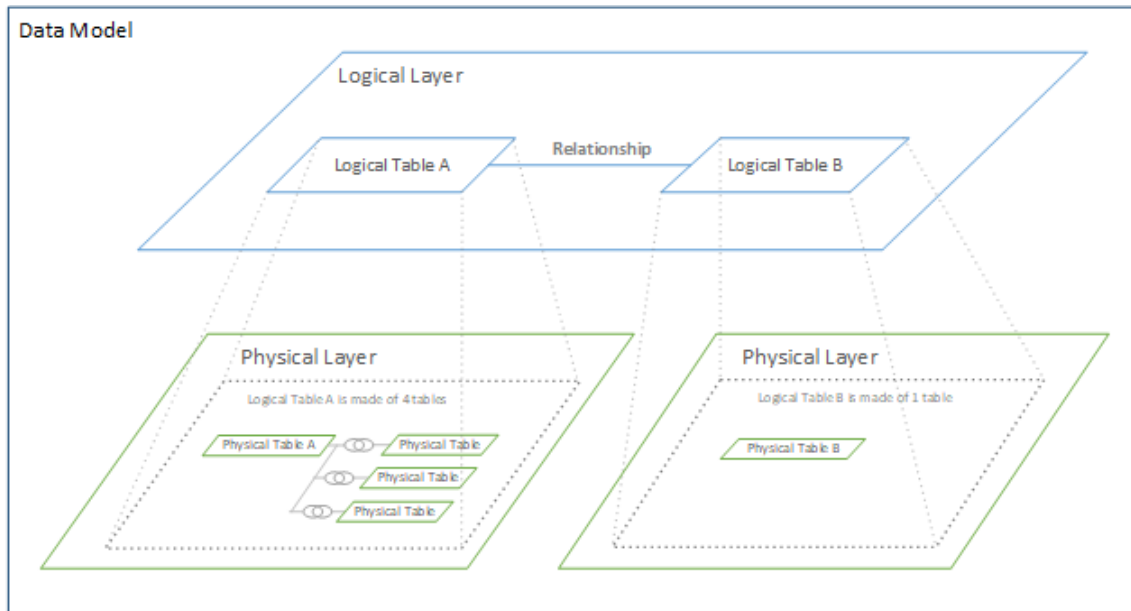
You can still specify joins between tables in the physical layer of a data source. Double-click a logical table to go to the join canvas.

Every top-level, logical table contains at least one physical table. Open a logical table to view, edit or create joins between its physical tables. Right-click a logical table, and then click **Open**. Or, just double-click the table to open it.



When you create a data source, it has two layers. The top-level layer is the logical layer of the data source. You combine data between tables in the logical layer using relationships.

The next layer is the physical layer of the data source. You combine data between tables at the physical layer using joins. For more information, see [Logical and physical tables in the data model](#).



### Tips on using Performance Options

If you know the shape of your data, you can use the optional settings in Performance Options to establish the cardinality of the tables to each other (one-to-one, one-to-many, many-to-many) and indicate referential integrity (values from one table will always have match in the other table).

Instead of thinking of the settings in Performance Options as “yes” and “no”, think of them as “yes” and “I don’t know”. If you are sure that a table’s values are unique, select **One**. If you are sure that each record in one table matches one or more records in the other table, select **All Records Match**. Otherwise, leave the default settings as they are.

If you aren't sure about the shape of your data, use the default settings. When Tableau can't detect these settings in your data, the default settings are:

- Cardinality: Many-to-Many
- Referential integrity: Some Records Match

If Tableau detects key relationships or referential integrity in your data, those settings will be used and indicated as "detected".

To reapply the default settings, click **Revert to Default**.



## Terms defined

*Cardinality* refers to the uniqueness of data contained in a field (column) or combination of fields. When the tables you want to analyse contain many rows of data, queries can be slow (and performance of the overall data source is affected) so we recommend choosing a method for combining data based on the cardinality of the related columns between tables.

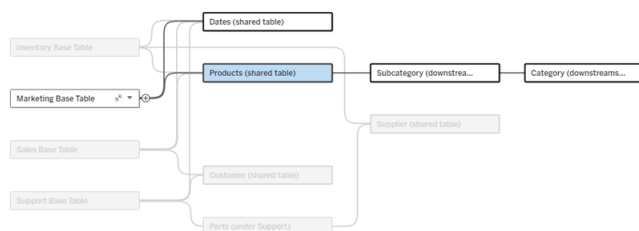
- Low cardinality: When related columns have a lot of repeated data. For example, a table called Products might contain a Category column that contains three values: Furniture, Office Supplies and Technology.
- High cardinality: When related columns have highly unique data. For example, a table called Orders might contain an Order ID column that contains a unique value for every order of product.

*Referential integrity* means that one table will always have a matching row in the other table. For example, a Sales table will always have a matching row in the Product Catalogue table.

## About Multi-fact Relationship Data Models

Multi-fact relationships let you build data sources with more than one *base table*. Using multiple base tables in your data model allows you to perform multi-fact analysis in Tableau.

By establishing *trees* of tables, rooted in a base table, you can model data structures with different conceptual domains and use their shared characteristics to connect them. This type of analysis is often referred to as multi-fact analysis, conformed dimensions or shared dimensions. In Tableau, we call this a multi-fact relationship data model because you use relationships to build it. A multi-fact relationship data model always contains multiple base tables. Base tables are the left-most tables in the data model. For guidance on how to determine which tables to use as base tables, see [When to Use a Multi-fact Relationship Model](#).



A multiple base table data model with one base table's tree highlighted.

## Levels of relatedness

Data models with multiple base tables have a lot of flexibility regarding how pieces of data can relate – or not relate – to each other.

**Note:** Relatedness at any level is only relevant in data models with multiple base tables. Prior to multi-fact relationship data models, either everything was related (a single data source) or nothing was (blending across multiple data sources).

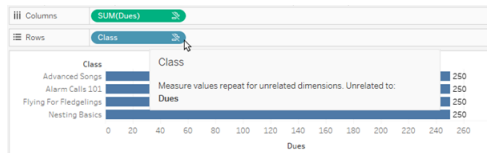
## Relatedness in the data model

Tables are related, unrelated or shared based on the structure of the data model. In a data source, the relatedness of tables is a constant. As a brief overview:

- *Related tables* are in the same tree.
  - Prior to 2024.2, all data sources were single base table data sources consisting of a single tree, and in a single base table data source all tables are related.
- *Unrelated tables* are in different trees. Base tables are always unrelated to each other. Tables that are downstream of exactly one base table are also unrelated to tables in other trees.
- *Shared tables* have multiple incoming relationships and belong to more than one tree.
  - Tables downstream from a table with multiple incoming relationships are also considered shared.

## Relatedness during analysis

Fields can be related, unrelated, ambiguously related or they can act as stitching fields. The relatedness among a group of fields is determined on a sheet-by-sheet basis based on the structure of the data model, what fields are actively in use (that is, on the shelves as pills) and if those fields are dimensions or measures.



To make a visualisation with fields from multiple tables, Tableau has to perform joins behind the scenes to compute the values. The type of join used depends on the **relatedness of the fields**. As a brief overview:

- When *related fields* are used in a viz, dimensions are inner joined and measure values are broken down by the dimensions.
  - It's a little more complicated than that – additional joins might be needed behind the scenes to ensure that **no measure values are dropped**. But in a dimension-only viz, related dimensions are inner joined and that's the main concept here.
  - This is the same behaviour as single-base table models.
- When *unrelated fields* are used in a viz, dimensions are cross joined. Measure values are table scoped (that is, aggregated locally to a single value for their entire table) and repeated.
  - It's also possible for fields to be *ambiguously* related, which means that for the combination of active fields, there is more than one way for the relationships between their tables to be resolved. If Tableau encounters ambiguity, it treats the fields as unrelated.
- When fields are *stitched* based on a shared field, dimensions are outer joined. Measure values are aggregated at the level of whatever dimensions they can be broken down by and might be repeated.
  - *Stitching dimensions* are similar to **linking fields in data blending**. Results are calculated for each pair of related fields. Then the unrelated values are stitched together across the shared values of the dimension shared between them.

All of these concepts and definitions are discussed in more detail later in this topic.

## An aside on dimensions and measures

In Tableau, *measures* are *aggregations* – they're aggregated up to the *granularity* set by the *dimensions* in the view. The value of a measure therefore depends on the context of the

dimensions. For example, "number of cereal boxes" depends on if we mean the total inventory or the number of boxes per brand.

*Dimensions* are usually categorical fields, such as country or brand. In Tableau, dimensions set the granularity, or the *level of detail*, of the view. We typically want to group our data into marks by some combination of categories. What dimensions we use to build the view determines how many marks we have.

When a measure is used without dimensions, it's said to be *table scoped*. This means its value is the fully aggregated value for the entire table. As soon as we use a dimension such as brand in the viz, the measure is broken down more granularly. The total number of cereal boxes is now per brand.

*Aggregation* refers to how the data is combined. Tableau's default aggregation is SUM. You can change the aggregation to other options, including: average, median, count distinct, minimum and so on. *Granularity* refers to how detailed or broken down the measure is – which is controlled by the dimensions. Unless the granularity of the measure is row level (aka disaggregated), its value must be aggregated.

## Example

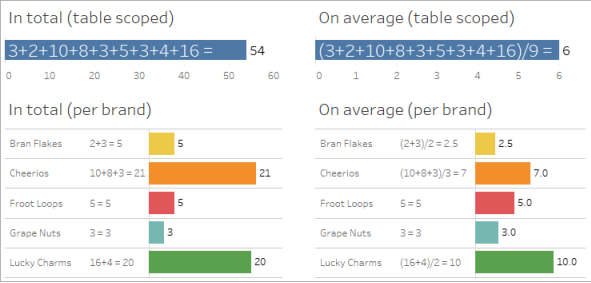
Raw data

	Mini	Normal	ValuePak
Bran Flakes		3	2
Cheerios	10	8	3
Froot Loops		5	
Grape Nuts		3	
Lucky Charms	4		16

What's the value of "number of boxes of cereal"?

Well, it depends on the aggregation type and the granularity as set by the dimensions.


- Aggregations:
  - Sum (or total)
  - Average
- Granularity:
  - Table scoped/fully aggregated (the blue bars in the example)
  - Broken down by the **Brand** dimension (the coloured bars in the example)

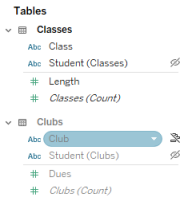



### Field-level relatedness indicators

There are several visual clues that can help you understand the degree of relatedness for fields you're using in an analysis.

#### Relatedness indicators on a worksheet

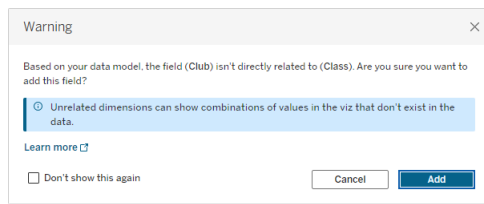
- **Unrelated icon:** Tableau uses an unrelated icon  to indicate not everything in the view is related. If you see an unrelated icon on a pill in the view or in the Data pane, you can hover over the icon [to get more information](#).
- **Light-grey field names:** Field names are displayed in light grey text in the Data pane when they're not related to *any* fields in use on shelves. You can still use these fields for analysis in that viz, but unrelated fields are [evaluated differently](#) in analysis from fields that are related. On hover, these fields also display an unrelated icon.



**Note:** In previous versions of Tableau, light-grey field names indicated that the fields were hidden and **Show hidden fields** was selected. Hidden fields, when shown, are now indicated with a clickable eye icon .

## Relatedness warning dialog

When unrelated fields are used together in a viz, Tableau shows a warning dialog to let you know that the fields aren't related. This message appears each time you add an unrelated field to remind you to validate using unrelated fields in your analysis. The warning message doesn't prevent you from proceeding but it can help avoid potential performance issues. For example, using unrelated fields with high cardinality can result in cross joins that impact performance in the workbook.



Click **Add** to continue adding the field to the viz. If you don't want to see the message again, select the option **Don't show this again**. You can always make these warning messages appear again by turning them back on: open the **Help** menu > **Settings and Performance** > **Reset Ignored Messages**.

If multiple fields are being added or are already present in the view, the **Details** area appears in the dialog. Expand it to see more information about the relatedness of all the fields in use and identify where the unrelatedness issue is coming from.

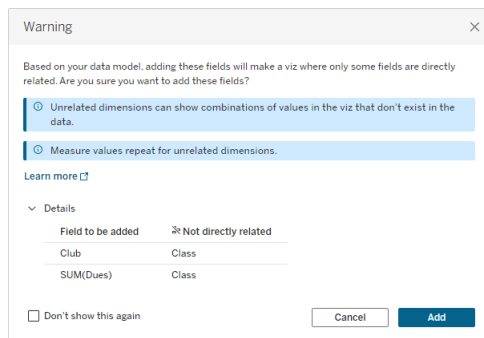
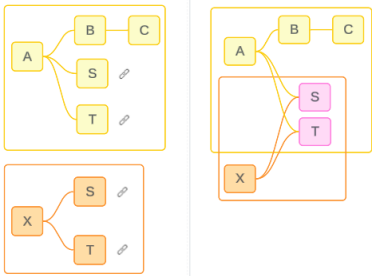


Table-level relatedness in the data model

In a data model with multiple base tables, each base table defines a set of tables that are related and form a conceptual *tree*. These trees must be connected by at least one shared table to ensure the overall data source is a single entity.

What might previously have been two data sources that could be blended using linking fields can now be a single data source with two trees, connected by the shared tables that contain those common fields.



**Tip:** How tables are related in the data model impacts how their fields can be related in the analysis. It can be useful to refer back to the Data Source tab during analysis to see how a table fits into the overall data model.

Let's walk through which tables are related, unrelated or shared using this example data source. There are two trees, one established by base Table A and one by base Table B.

Unrelated tables

Base tables are fundamentally unrelated. Similarly, any tables that exist solely in a single tree are unrelated to tables in other trees.

Table A and Table X are unrelated

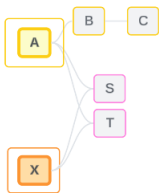
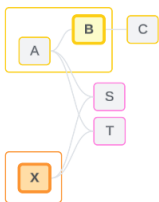


Table B and Table X are unrelated



## Related tables

Tables in the same tree are considered related.

Table A and Table S are related

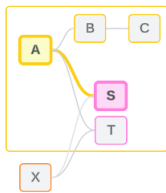
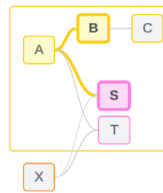


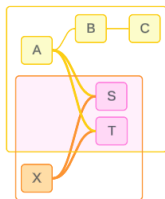
Table B and Table S are related (through Table A)



## Shared tables

Shared tables have multiple incoming relationships. These tables belong to multiple trees and are shared across them.

Table S and Table T are shared.



## Field-level relatedness in the analysis

Relatedness between fields is determined on a sheet-by-sheet basis based on the structure of the data model, what fields are actively in use (that is, what fields are in the viz as pills on shelves) and if those fields are dimensions or measures. How field relatedness impact the results of a viz is covered in [the next section](#).

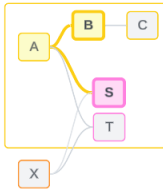
Let's walk through some scenarios using the same example data source. Each field's name indicates which table it is from, such as FieldB from Table B. Fields can be dimensions or measures unless otherwise noted.



## Related fields

At a high level, fields are related when Tableau can clearly determine how to evaluate them together based on a relationship path within a single tree.

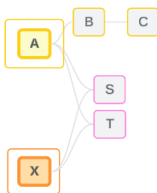
For example, FieldB (from Table B) and FieldS (from Table S) are related.



## Unrelated fields

At a high level, fields are unrelated in any case when they're not related. This could be because the fields are from unrelated tables, such as using fields from two base tables. In this case, fields from different base tables are fundamentally unrelated.

For example, FieldA and FieldX are unrelated.



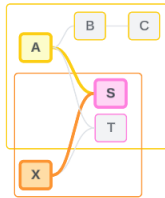
Or fields can be treated as unrelated for a point in time – such as in ambiguously related cases. For the most part, you can rely on **relatedness indicators** to alert you when fields are unrelated in the context of a viz.

## Stitching fields

Stitching is how Tableau evaluates fields from unrelated tables in a multi-fact data model during analysis. In a viz, using a dimension from a shared table stitches together otherwise unrelated fields and allows them to be evaluated simultaneously in the same viz. Think of this as juxtaposing results from two trees together based on a dimension they share.

For example, if a viz is built with FieldA and FieldX, these two fields are unrelated. Adding DimensionS introduces a stitching field.

- FieldA and DimensionS are evaluated together.
- FieldX and DimensionS are evaluated together.
- Those intermediate results are brought together based on the values of DimensionS.
- FieldA and FieldX are now stitched.



**Tip:** A best practice is to use a stitching field in the viz before bringing out an unrelated field. For example, drag out DimensionS first, or FieldA then DimensionS then FieldX, instead of FieldA then FieldX then DimensionS. Adding the stitching field first ensures that Tableau is always aware of how to evaluate the relationships and avoids potential performance issues from evaluating unrelated dimensions together.

Stitching requires a dimension from a shared table to be active in the viz. Fields placed on the Filters shelf or on the Tooltip property of the Marks card aren't considered active for the purposes of stitching.

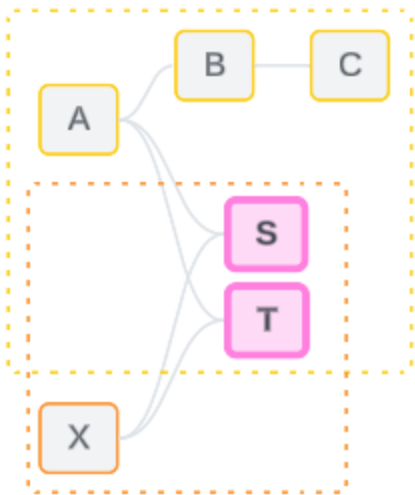
### Ambiguously related fields

Fields can also be ambiguously related. This happens when there's more than one possible relationship between two shared tables (or tables downstream from a shared table) and can be thought of as not-yet-related in the context of the viz.

Consider FieldS and FieldT. Their tables are related to each other both through the tree defined by base Table A and through the tree defined by base Table X.

In a viz with just FieldS and FieldT, there's ambiguity about which tree should be used to relate them. Without additional information, Tableau can't evaluate whether to relate these fields through Base Table A's tree or Base Table B's tree.

FieldS and FieldT are ambiguously related: there are multiple potential relationships.



Ambiguously related fields are evaluated as unrelated fields because Tableau can't clearly determine their relationship path. Unlike truly unrelated fields, ambiguously related fields can be resolved and the fields can be directly related.

Resolve ambiguity

Resolving ambiguity is done by adding a field to establish which tree to use.

Example:

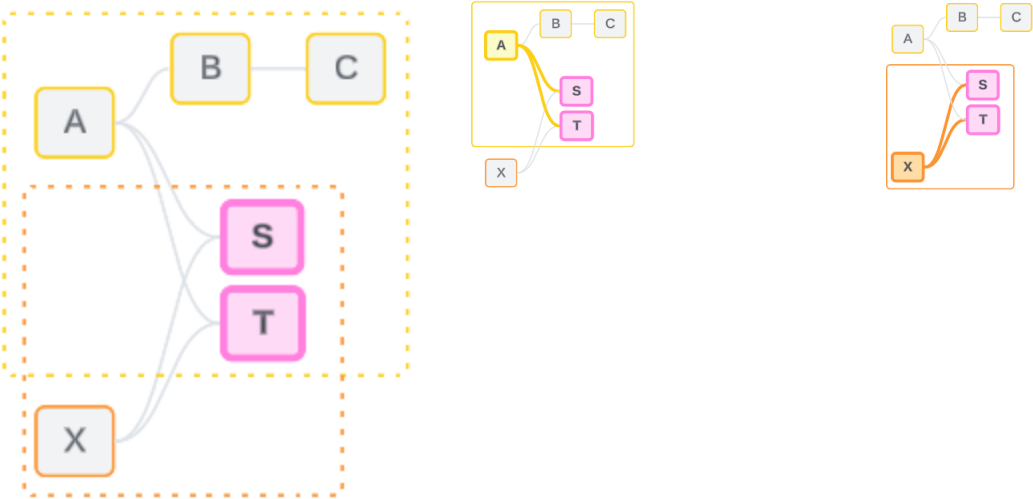
- In a viz of FieldS and FieldT, adding a field from Table A, B or C to the viz makes Base Table A's tree active and resolves the ambiguity between FieldS and FieldT.
- Alternatively, using a field from Table X resolves the ambiguity between FieldS and FieldT to base Table X's tree.

**Ambiguously related**

**Ambiguity resolved to a single tree**

Related through base  
Table A

Related through base Table X

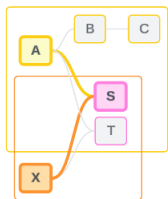


Resolving ambiguity is similar to using a FIXED Level of Detail (LOD) expression. In a FIXED LOD expression, you tell Tableau what level of detail to aggregate to by defining the dimension declaration. Ambiguity is resolved by changing the structure of the viz to make only one tree active, thus telling Tableau what relationship paths it can consider to perform the analysis.

Stitching vs resolving ambiguity

Both stitching and resolving ambiguity are ways of dealing with unrelatedness, but they have different outcomes:

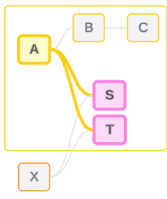
Stitching



Unrelated FieldA and FieldX stitched by DimensionS

Juxtaposes unrelated fields based on

Resolving ambiguity



FieldS and FieldT evaluated through the tree defined by base Table A

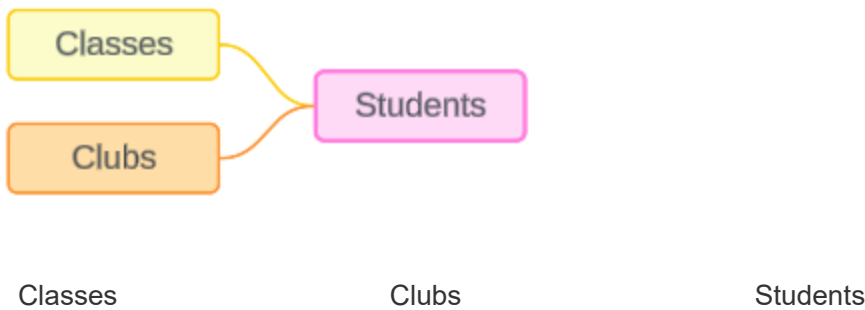
Narrows down which relationship path to use

shared attributes	when there are multiple options
Uses multiple base table logic to calculate results	Uses single base table logic to calculate results
Analysis involves unrelated tables	Analysis involves shared tables

How joins are used for each level of relatedness

After the field-level relatedness has been determined, Tableau has to evaluate the results to create the actual visualisation. The queries used to calculate the values shown in a viz rely on joins. Whether fields are related, unrelated or stitched has a different impact on what joins are performed. Remember, ambiguously related fields are treated as unrelated in this context.

To explain relatedness and joins, this section covers tables and their fields, plus the values in those fields. Consider the following data model with two base tables, Classes and Clubs, and a shared table, Students.



Classes 7 rows 3 fields		Clubs 7 rows 3 fields		Students 5 rows 3 fields		
Abc Classes	Abc Class	Abc Clubs	Abc Clubs	Abc Students	Abc Students	# Students
Class	Stud	Club	Student ...	Bus Rider	Student	Age
Nesting Basics	Robi	Photography	Finch	yes	Finch	3
Advanced Songs	Spar	Travel	Cardinal	yes	Cardinal	4
Flying For Fledgelings	Robi	Juggling	Sparrow	no	Sparrow	6
Nesting Basics	Spar	Art	Finch	yes	Robin	3
Advanced Songs	Fincl	Art	Cardinal	no	Jay	8
Nesting Basics	Fincl	Art	Sparrow		10	
Alarm Calls 101		First Aid	Robin		0	

Fields:

- **Class**, a dimension with values of Nesting Basics, Advanced Songs, Flying for Fledglings and Alarm Calls 101
- **Length**, a measure
- **Student**, a dimension used to relate to the Student table

Fields:

- **Club**, a dimension with values of Photography, Travel, Juggling, Art and First Aid
- **Dues**, a measure
- **Student**, a dimension used to relate to the Student table

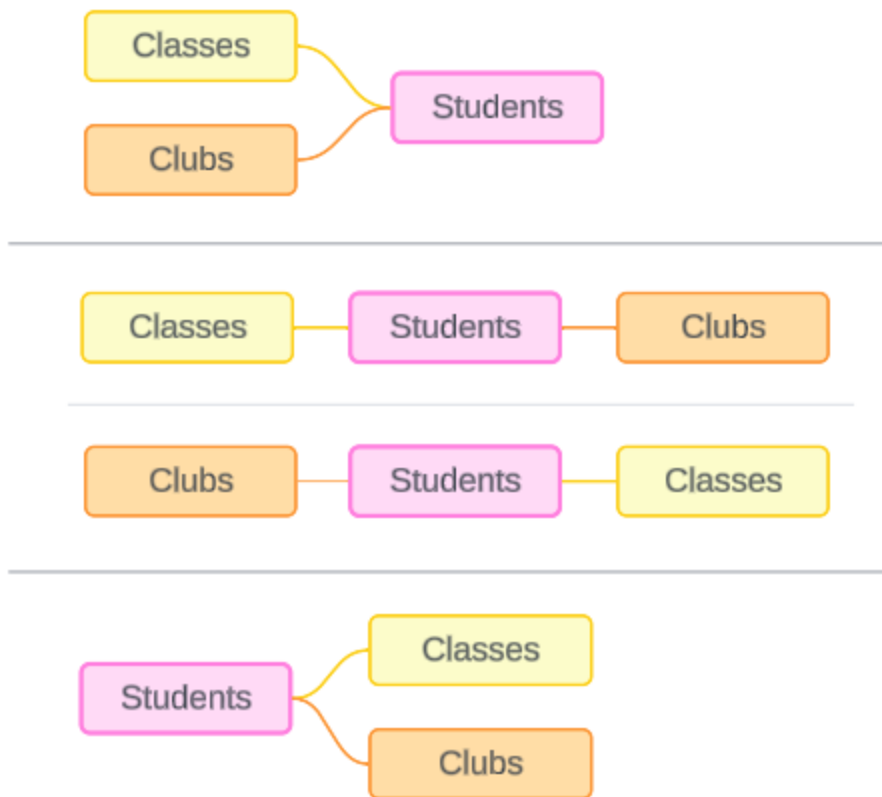
Fields:

- **Bus Rider**, a dimension with values of yes or no
- **Student**, a dimension with values of Finch, Cardinal, Sparrow, Robin and Jay. Used to relate to the other two tables
- **Age**, a measure

This very simple model illustrates how the high-level join logic is calculated for multi-fact relationship data models. For more information about the basics of joins used in single base table data models built on relationships, see [How Analysis Works for Multi-table Data Sources that Use Relationships](#).

## Should this example be a data model with multiple base tables?

For this three-table data model, it might be tempting to set it up as a single base table model, as Classes-Students-Clubs or Clubs-Students-Classes, or with Students as a base table. As a rule, multi-fact relationship data models are intended for specific kinds of data schemas or analysis scenarios. If your data model **has characteristics that are best suited to a multi-fact relationship data model**, set it up that way to keep your base tables conceptually unrelated. However, if your data doesn't require this type of structure, a single base table model can be simpler to use.



Models that could be built for these three tables: (1) Classes and Clubs as base tables with Students as a shared table, (2) linearly, starting with either Classes or Clubs, and (3) Students as a single base table with Classes and Clubs as downstream tables.

In this particular instance, there's nothing about these tables, the data or the model that truly requires multiple base tables. We're using this model as an example to keep it simple so the focus can be on the join logic. Or you could imagine that there's another related table, Rooms, that we're simply ignoring to avoid over complicating the discussion.



As a best practice, however, only use a multi-fact relationship model when your data requires it.

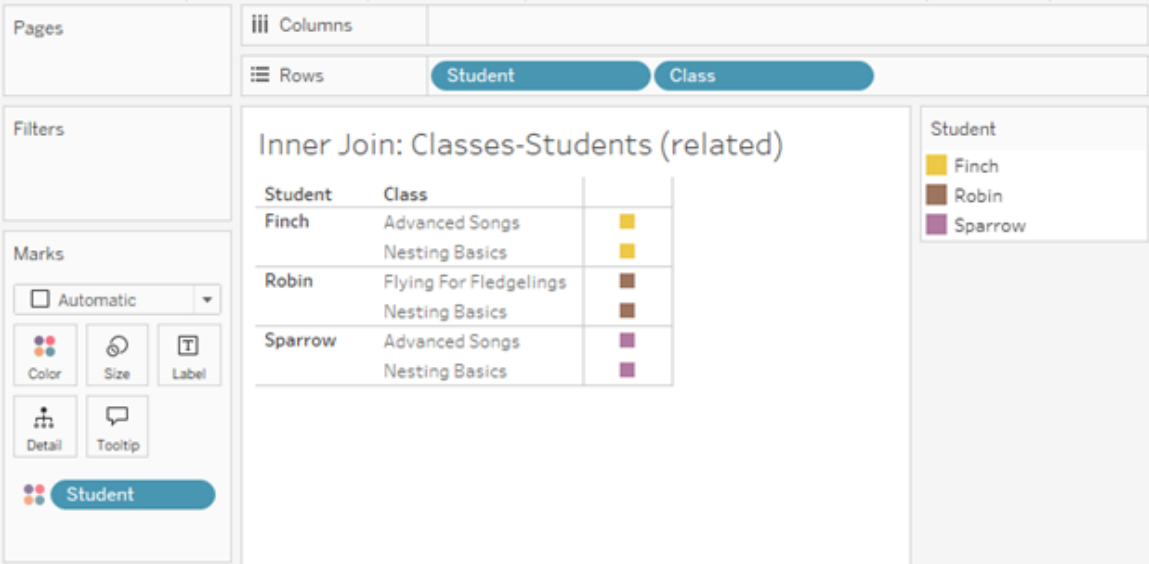
Related dimensions use inner joins

Related dimensions are inner joined. Inner joins drop any dimension values that aren't shared across both tables.

- Tableau uses additional logic to ensure measure values aren't lost. This section uses only dimensions to demonstrate the basics of how Tableau applies inner joins to related dimensions.

The following example shows how related dimensions only return rows that are present in the data. No students are in the Alarm Calls 101 class, so it's not present in the results. Cardinal and Jay aren't in any classes, so they're not present in the results.





Unrelated dimensions use cross joins

Unrelated dimensions – on their own, without a stitching dimension – are cross joined.

In a cross join, every value from one dimension is combined with every value from the other dimension, even if a resulting combination doesn't actually exist in the data. In this example, the cross join adds a row for each possible combination of Class and Club.

**Cross Join: Classes-Clubs (unrelated)**

Class	Club	
Advanced Songs	Art	Abc
	First Aid	Abc
	Juggling	Abc
	Photography	Abc
	Travel	Abc
Alarm Calls 101	Art	Abc
	First Aid	Abc
	Juggling	Abc
	Photography	Abc
	Travel	Abc
Flying For Fledgelings	Art	Abc
	First Aid	Abc
	Juggling	Abc
	Photography	Abc
	Travel	Abc
Nesting Basics	Art	Abc
	First Aid	Abc
	Juggling	Abc
	Photography	Abc
	Travel	Abc

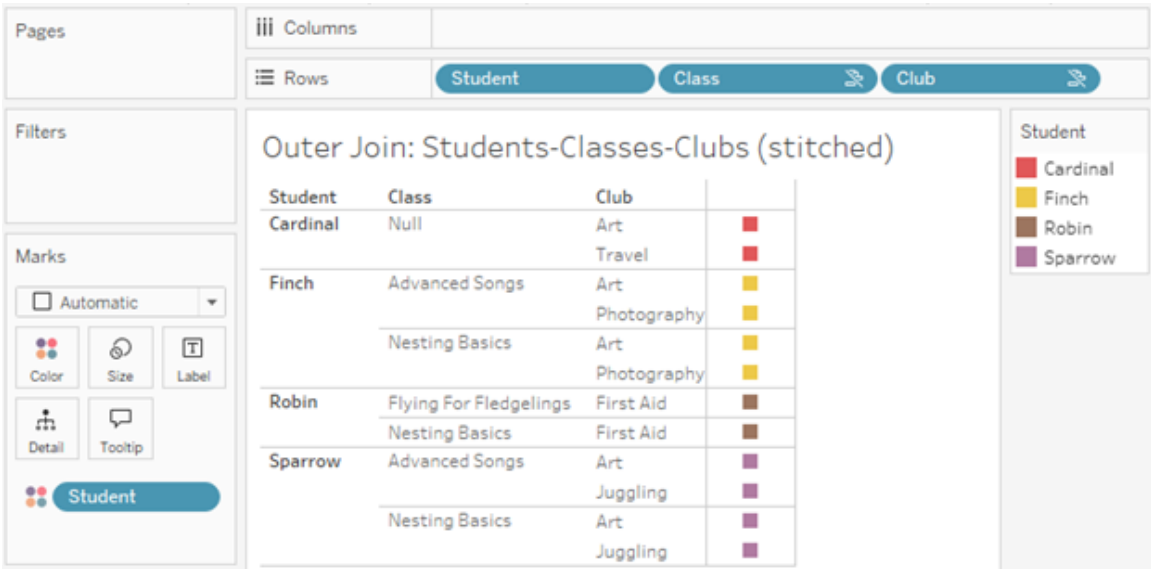
It's important to recognise when a cross join is occurring in your analysis. Although there's a row for Advanced Songs + First Aid in the results table for the cross join, no students are actually in this combination of activities (we'll see proof of this in the stitching example in the next section).

Why is it important to recognise that not all cross join results are based on the data? Imagine you were trying to build a schedule for classes and clubs so there were no conflicts for any students. There aren't any students in Advanced Songs and First Aid, so you could ignore this result and schedule that class and club simultaneously. The cross join doesn't represent combinations of values that actually exist in the data.

Stitched dimensions use outer joins

Unrelated dimensions – in the presence of a stitching dimension – are outer joined.

In this example, both the Classes table and Clubs table are related to the shared Students table but not to each other, so the fields Class and Club are unrelated. Adding the Student dimension lets Tableau know which values from Class and which values from Club should be juxtaposed in the analysis. We call this outer join behaviour *stitching*.



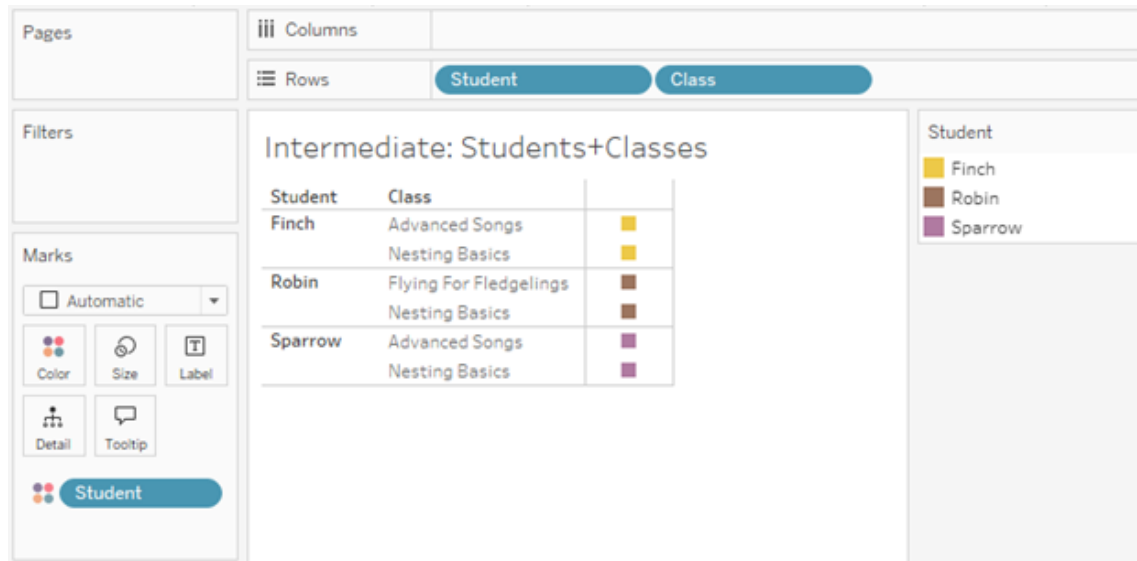
Stitching is similar to data blending in that there are intermediate results that are brought back together for the overall results. Unlike blending, however, stitching is an outer join, not a left join, and doesn't drop values from either side. There's no concept of primary or secondary data sources when it's all one data source, so both of the unrelated fields are given equal precedence.

Intermediate results are outer joined

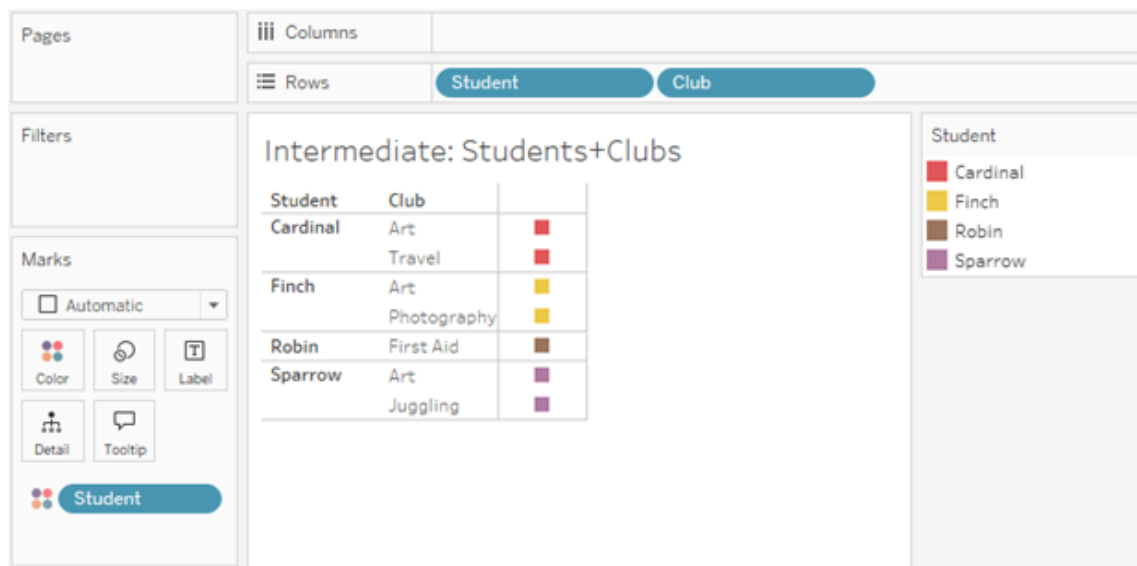
What goes into the outer join for stitched fields? An immediate inner join is computed for each of the unrelated fields and the stitching field in turn. Then those intermediate results are outer joined based on the values of the stitching dimension.

Example

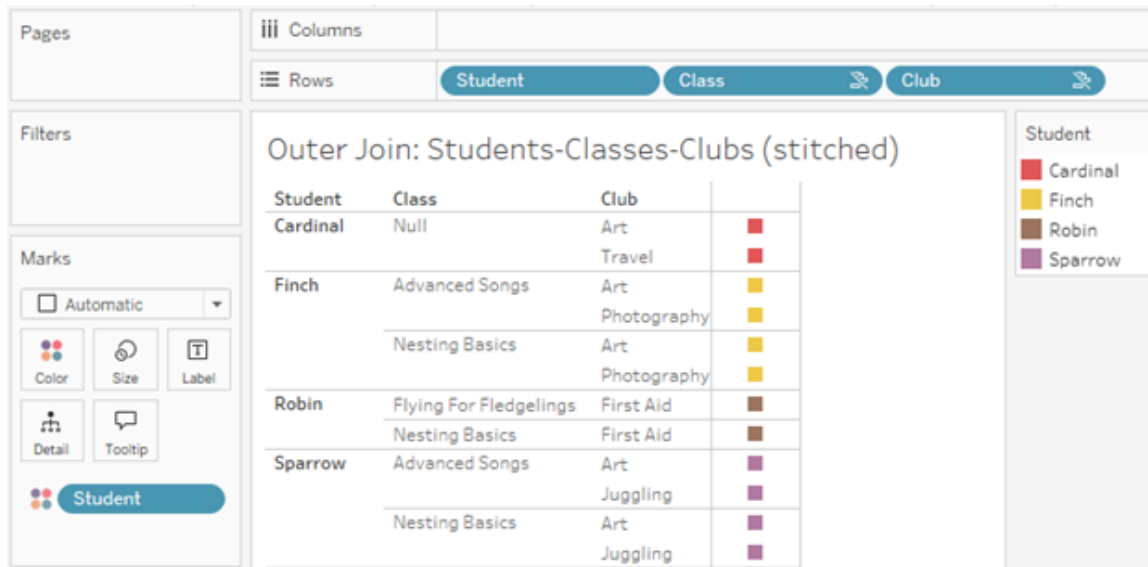
An inner join for Student and Class...



...and an inner join for Student and Club...



...are then outer joined on Student.



### Additional joins to retain measures

In addition to the join logic for dimensions, measures can introduce additional joins. When relationships were first introduced in Tableau, one of the **core principles was that measure values aren't lost**. This is also maintained in multi-fact relationship data models.

The essential details are:

- Measure values are broken down only by related dimensions.
- Measure values repeat for unrelated dimensions.
- Dimension values that would be dropped in dimension-only vizs may be returned if there are relevant measure values associated with them.

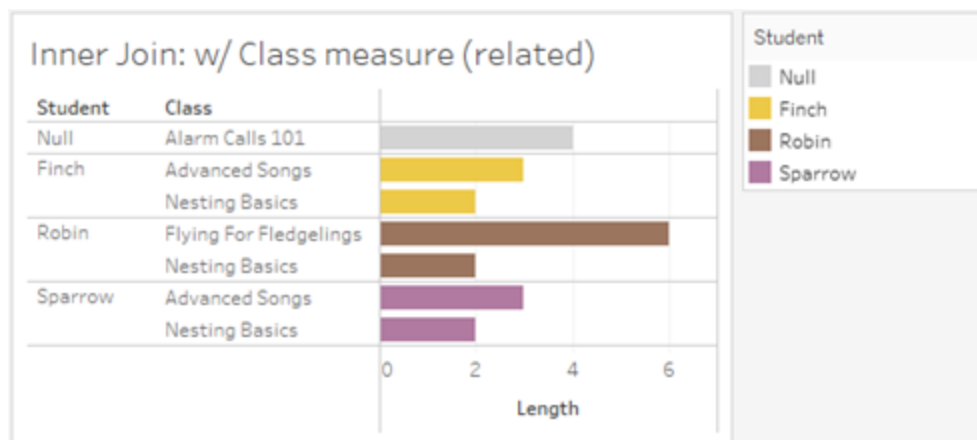
**Note:** Remember that measures are aggregations – they're computed at the level of detail (the granularity) set by the combination of dimensions in the viz. This is referred to as a measure being *broken down* by a dimension. When a measure is used without any dimensions, it is said to be *table scoped*. This means the measure's value is the fully aggregated value. As soon as we use a dimension in the viz, the measure is broken down more granularly based on the dimension values. The value of a measure in an analysis therefore depends on the context of the dimensions.

## Related measures

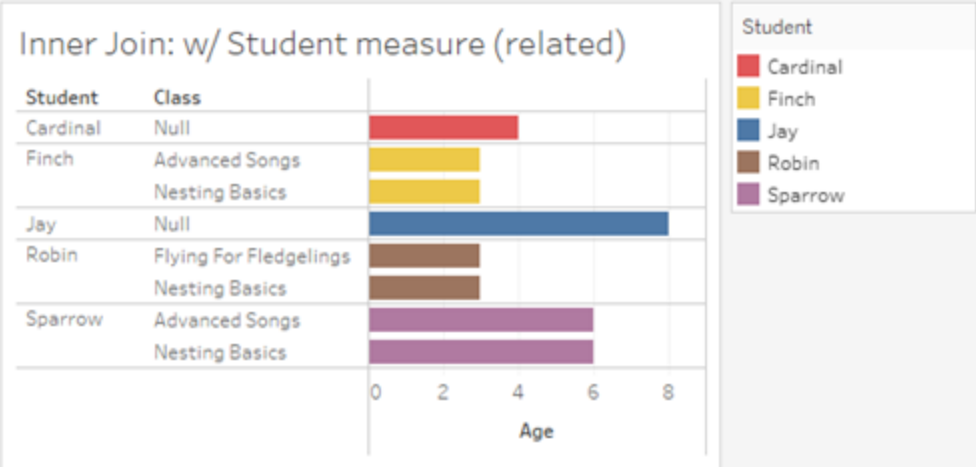
Consider the subset of dimension values that are returned for an inner join on the related dimensions **Student** and **Class**. There are three student values, Finch, Robin and Sparrow; and three class values, Advanced Songs, Nesting Basics and Flying for Fledglings.

Student	Class	
Finch	Advanced Songs	■
	Nesting Basics	■
Robin	Flying For Fledgelings	■
	Nesting Basics	■
Sparrow	Advanced Songs	■
	Nesting Basics	■

If we add the **Length** measure from the Class table, we see that all four classes are shown and there's a null for Student. Every class **Length** is displayed, at the level of **Class**.



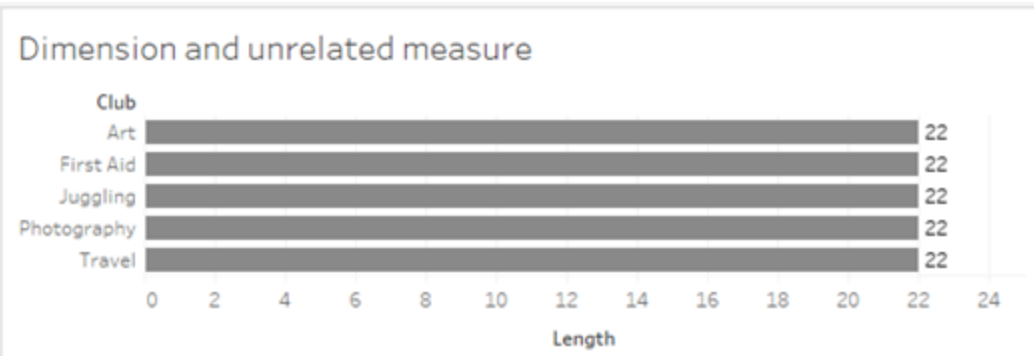
If we instead add the **Age** measure from the Student table, we see that all five students are shown and there are two nulls for Class. The results preserve every student, even if they're not in a class. Every student **Age** is displayed, at the level of **Student**.



### Unrelated measures

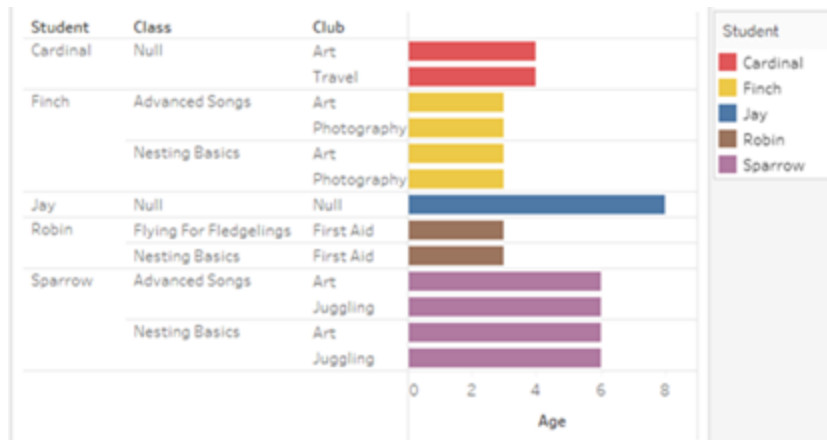
Measure values are repeated for unrelated dimension values.

If we look at the **Length** measure from the Classes table and the unrelated **Club** dimension, the measure is table scoped and repeated across all the dimension values of **Club**.



In the presence of a stitching dimension, measures can be both broken down and repeated.

Here, the measure **Age** is from the Students table and is broken down to the level of student. Each time a student is repeated based on the dimensions for **Class** and **Club**, the **Age** value is repeated.



## Troubleshooting

Considerations when working with multi-fact relationship data models

### Row-level calculations

Row-level calculations can only refer to fields that share the same upstream base table. That is, row-level calculations can't be performed across trees.

### Combined Fields

All fields in a combined field must share an upstream table. That is, you can't create a combined field using fields that are in different trees.

### Sets

Sets can only be created with a definition that involves fields that share the same upstream base table. However, in a viz, the option to Add to Set may be available from a mark when that mark is defined by fields unrelated to the fields used to define the set. If you choose Add to Set, Tableau will add only the related fields to the set definition. This is different from the behaviour for Add to Set in single base table data sources, when Add to Set adds everything that defines the mark.

### Validate INCLUDE level of detail expressions



INCLUDE LOD expressions can't be evaluated across unrelated fields. Because relatedness between fields is evaluated on a sheet-by-sheet basis, it's possible to have a valid LOD expression in the Data pane or calculation editor that becomes invalid in the context of a specific viz (in the presence of an unrelated dimension). When this happens, the LOD pill will turn red. You can update the LOD expression to remove unrelated field conflicts, change the structure of the viz or remove the LOD expression from the viz.

## Updating Published Data Sources

As a best practice, create a copy of an existing published data source if you plan to modify it to become a multi-fact relationship data model when not all of its connected workbooks need the new data model. Don't update the existing version of the data source unless all its workbooks need the new tables. Publish the modified data source as a new data source and create new workbooks from it. This will prevent the existing workbooks from being converted to use VDS instead of data server when they don't need the functionality, preventing the potential for a performance hit.

Known issues in 2024.2

## Extracts

**Warning:** Data sources with multi-fact relationships should be live connections, not extracts.

*Local data source (in a workbook):* Attempting to extract a multi-fact relationship data source will give a "No such table" error.

*Published data source:* Extracting a published multi-fact relationship data source appears to succeed, but field values can be swapped.

There is a planned fix for this behaviour.

## Relatedness indicators with multiple Marks cards

When a viz is built with multiple measures on the Rows shelf or on the Columns shelf, each measure gets its own Marks card. The logic used to determine relatedness indicators (the unrelated icon, the text in tooltips and the relatedness warning dialog) may not give expected

results depending on which Marks card is open. The viz itself, however, is correctly computed based on the relatedness of each pair of fields. There is a planned fix for this behaviour.

### **EXCLUDE Level of Detail expressions**

Only INCLUDE LODs should be validated in the presence of unrelated fields. However, EXCLUDE LODs may also be incorrectly marked as not valid in the same conditions. There is a planned fix for this behaviour.

### **Nested user calculations**

Nested user calculations are not available in published data sources with a multi-fact relationship data model. There is a planned fix for this behaviour.

### **BatchQueryProcessor**

BatchQueryProcessor must be enabled to support multi-fact relationship data models. This is expected behaviour with no currently planned fix.

### **Tableau Pulse**

Pulse may not work with multi-fact relationship data models. You may be prevented from creating a metric definition, or any metrics that are created may be blank. This is not expected behaviour but there is currently no planned fix yet.

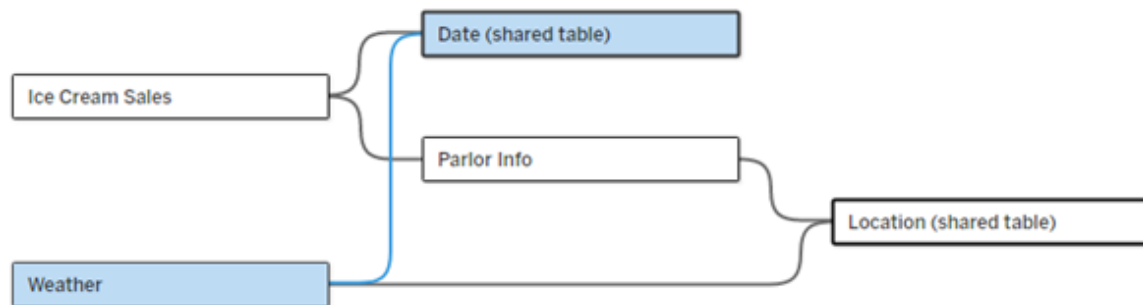
### **When to Use a Multi-fact Relationship Model**

A multi-fact relationship model is a data model that lets you add unrelated tables in a single data source and then uses related fields during visual analysis to essentially stitch the tables together based on the context. Unlike blending, the data exists within a single data source – the concepts of primary and secondary data sources don't apply and no data is dropped from left joins. Unlike a single table data model, multiple base tables maintain their own context regarding tables shared between them. A multi-fact relationship data model gives you more options for performing multi-fact analysis in Tableau.

Imagine you want to analyse how weather and ice cream sales trend together. Weather and ice cream sales both happen at specific times and specific places, but there's no direct

connection between ice cream sales and weather. These are unrelated pieces of data that both relate to the shared concepts of date and location.

This question lends itself to creating a multi-fact relationship model. Ice Cream Sales and Weather can each be added as a base table and related on Date and Location, which are shared tables.



A multiple base table data model, with two unrelated tables (Ice Cream Sales and Weather) and two shared tables (Date and Location). There is an intermediate table, Parlor Info, between Ice Cream Sales and Location.

## Why did we build the capability to model unrelated tables?

Analysis often involves bringing together tables of data that don't even have a direct relationship to each other but that both relate to the same, common information (such as date or location). A multi-fact relationship model supports loose semantic coupling by introducing the concept of degrees of relatedness and the ability to build a data model with multiple, unrelated base tables.

- Semantic coupling is a term used to describe how tightly combined data is. A *join* or a *union* is a tight semantic coupling; they bring multiple tables together into a new physical table that then acts as a single table. A *relationship* is a looser coupling between tables that ties tables together logically, maintaining their distinct status as separate tables. Even further along the semantic coupling spectrum is *data blending*, where results from separate data sources are visually combined based on elements shared between both

of them. A *multi-fact relationship model* is closer to the blending end of the spectrum, but within a single data source instead of across data sources.

A multi-fact relationship model – a data model with multiple base tables – permits unrelated tables in the model as long as shared tables exist in the model, too. During analysis, fields from a shared table "stitch" together otherwise unrelated tables of data based on the shared dimensions they have in common (such as happening in the same place or at the same time). All the benefits of relationships are maintained, including the retention of each table's grain or native level of detail.

Similar to a single base table data model, Tableau determines the best join type to use behind the scenes based on the structure of the viz. But in a multi-fact relationship model, the join options are expanded to include outer and cross joins to handle different levels of relatedness. For more information, see [About Multi-fact Relationship Data Models](#).

## Where did the name come from?

Multi-fact relationships get their name from multi-fact analysis. In a data warehouse model, data is stored in a central fact table surrounded by dimension tables. In this context, *fact* refers to measurements or metrics, which are numeric fields of data that capture facts about the data – Tableau's measures. Dimension tables contain attributes about these facts.

Schemas based on fact tables are often structured as a star or snowflake, depending on how the dimension tables are organised. When analysis needs to be performed across fact tables, this is called multi-fact analysis. Analysis is done in the context of the common dimension tables, known as shared dimensions or conformed dimensions. In Tableau you build these data models using relationships, so we've named this suite of capabilities multi-fact relationships.

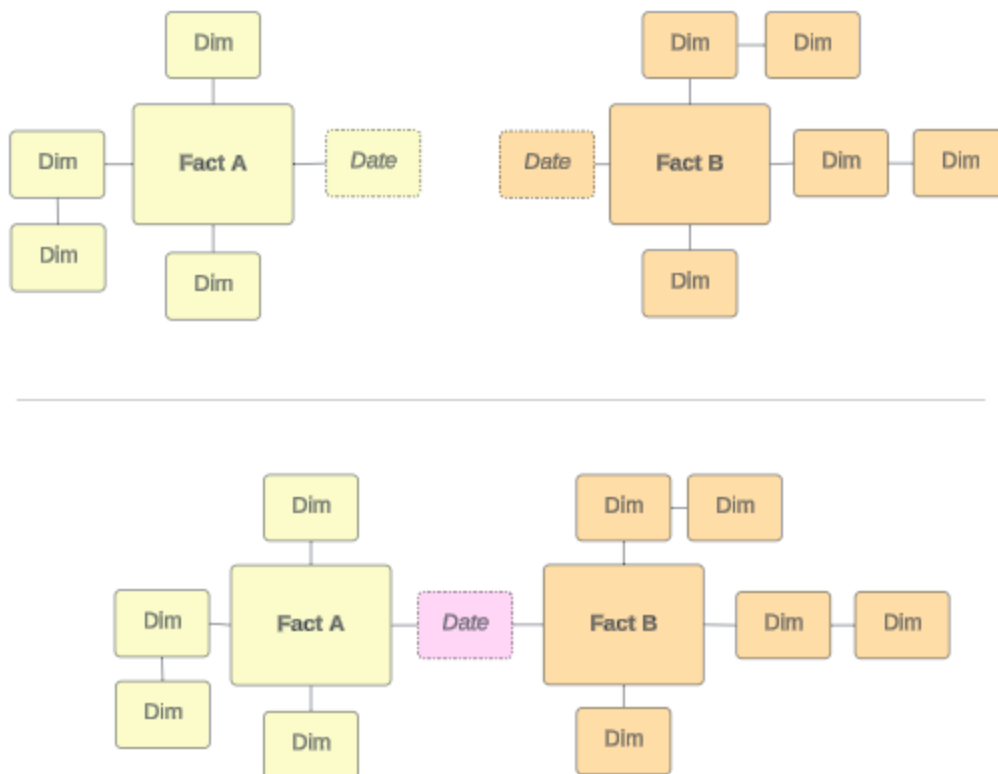
### When to use multi-fact relationship data models

If your data consists of tables that are all related to each other, you can stick with single base table data sources built with relationships. A multi-fact relationship model is called for when your data spans different concepts, either in the form of multiple fact tables or different unrelated contexts.

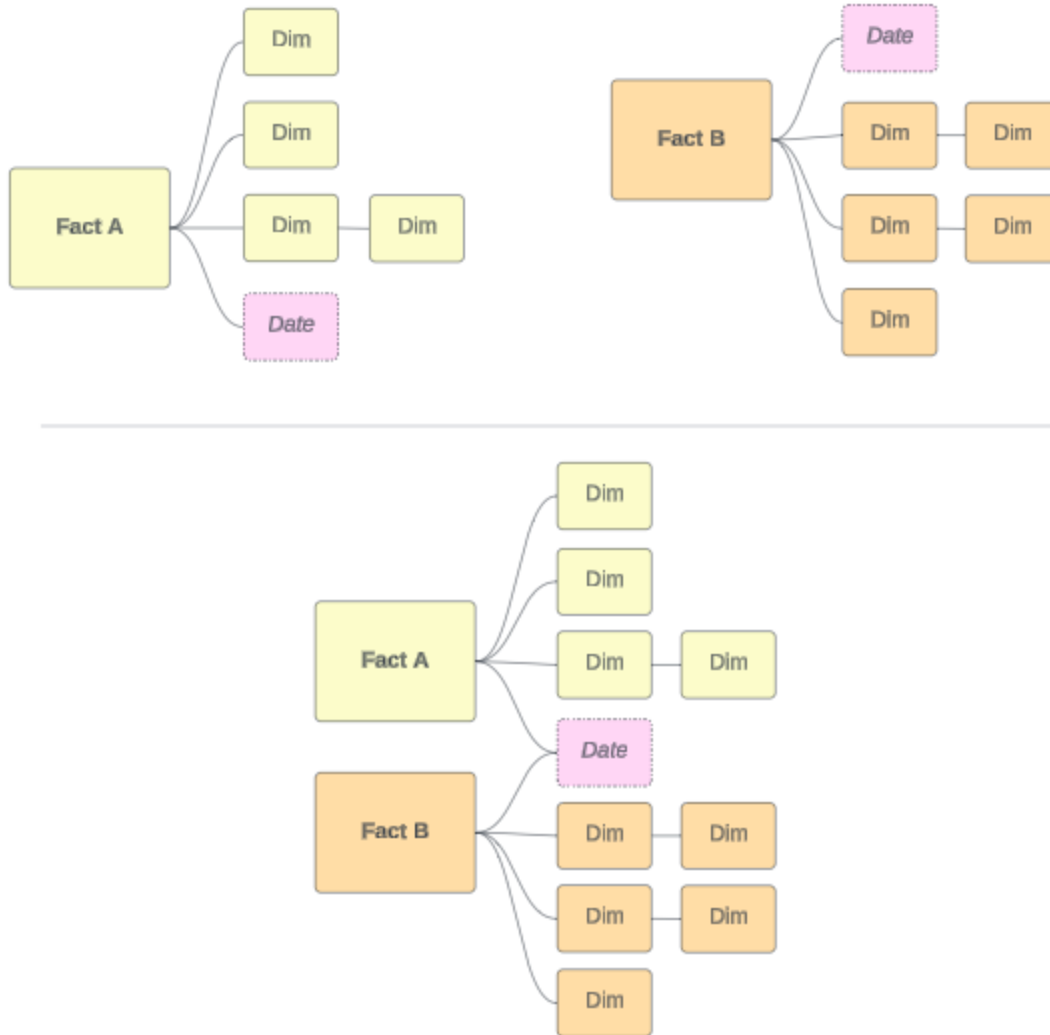
Whenever possible, build your data sources with a single base table. In a single base table data model, every table is related and there is no need to consider degrees of relatedness. Only use multi-fact relationships when that data model structure is called for.

## Multi-fact analysis

Multi-fact analysis is a core use case for multi-fact relationships in Tableau. In this example, Fact A and Fact B share a table Date.



To model this in Tableau, the fact tables become base tables and multiple incoming relationships are established for their shared dimension table.



## Other scenarios

Multi-fact relationship data models aren't just for multi-fact analysis, however. Tableau doesn't require a strict definition of fact or dimension tables. Any table can be a base table (although it should suit the [characteristics of base tables](#)). Some scenarios that indicate that a multiple base table data source might be helpful include:

- **Moving through stages**, such as base tables for applications, transcripts and alumni events for a shared student table.

- **Different contexts for the same events**, such as base tables for the events of medical appointments and billing invoices, with shared tables to set the context to doctors or patients.
- **Different domains that may correlate**, such as scenarios that would previously be best handled with data blending, like ice cream sales and weather correlated through the shared tables of date and location.

Identify the base tables

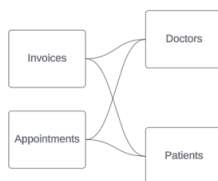
In a multi-fact relationship model, directionality matters. That is to say, which tables are the base tables along the left side of the model and which tables are shared downstream impacts how the relationships are evaluated to return the analytical results.

Consider a conceptual bowtie of invoices, appointments, doctors and patients:

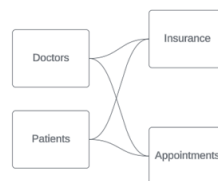


The correct way to build the data model in Tableau is with Invoices and Appointments as the base tables, and with Doctors and Patients as the shared tables (not with Doctors and Patients as the base tables).

**Correct:** Invoices and Appointments as the base tables



**Incorrect:** Doctors and Patients as the base tables



Conceptually, a patient (or doctor) is the entity that stitches together the event of an appointment and the event of an invoice.

If your data model is backwards (such as with Doctors and Patients as the base tables instead of Appointments and Invoices), the **outer join stitching behaviour** won't be as useful. Your analysis might show a lot of table scoped measures and ambiguity. If you find yourself with ambiguously related fields that you weren't expecting, re-evaluate the tables you are using as base tables and see if your data model needs to be reversed.

## Characteristics of base tables and shared tables

If you're performing multi-fact analysis, the fact tables become the base tables and any shared dimension tables are shared tables. Tableau doesn't require a strict adherence to fact and dimension table characteristics. However, there are certain attributes that can help you identify which tables should be base tables and which should be shared tables.

Base table	Shared table
Fact tables in a data warehouse schema	Shared or conformed dimension tables in a data warehouse schema
Specific to the context or analysis (flight information, energy usage)	Consistent concept across various contexts (date, location)
Measure heavy	Primarily dimensions
More frequently updated/transactional (medical appointments, prescriptions, vitals)	More stable/durable (doctor, patient)
Has foreign key fields	Has primary key fields
Event based (class schedule, grade on an assignment)	Entity based (student, classroom)



Note that if there are intermediate tables between a base table and a shared table, you can **swap which one is the base table** without fundamentally altering the data model. (Such as Parlour Info and Ice Cream Sales in the first example.) What matters is which tables are upstream of the shared tables and which are shared.

## Try an additional base table instead

There are various scenarios that may indicate you should build a multi-fact relationship model with multiple base tables rather than a single base table data source:

- If you're trying to build a data source with a cycle, the downstream table should be another base table instead.
- If you have a series of tables that are related on the same sets of relationship clauses (such as date and location), those dimensions should be pulled out and made into shared tables instead.
  - This is especially useful because multiple relationship clauses must all be true (logically, an AND) for the tables to be related for those records.
  - If, instead, you want to analyse records where one may be true at a time (a contextual OR), this flexibility is provided by setting up a data model with shared dimension tables instead.
- If you're using a blend but want to have an equivalent blend without primary and secondary data sources, build a data model that combines the data sources from the blend with their linking fields in a shared table or tables.

### Understand Tooltips for Multi-fact Relationship Data Models


**Note:** For single table data sources or single-base table data sources, all the tables are related. Everything on this page refers to multiple base table data sources.

#### Field-level relatedness

Data models with multiple base tables have a lot of flexibility in how the tables can relate – or not relate – to each other. The relatedness of the *tables* is a constant based on the data model. However, the relatedness of *fields* in a viz depends on what fields are active in that viz (that is, what fields are in use on worksheet shelves as pills). At the level of a single viz, Tableau

evaluates active fields in pairs to determine **how they relate to each other**. Because the way fields interact depends on their status as a dimension or a measure as well as their relatedness, there are different messages for different types of field pairs:

- Unrelated dimension-dimension pairs
- Unrelated dimension-measure pairs
- Unrelated filter pairs

An unrelated icon  on a field means it's unrelated to at least one other field in the viz. This icon can appear in a pill on a shelf or in the Data pane. Hovering over the icon opens a tooltip with more information.

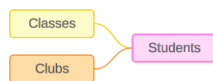
When a field is added to the viz, its relatedness is evaluated against the fields currently active in the viz. If an unrelated field is added, Tableau displays a dialog box with information about relatedness and the structure of the visualisation. Note that the dialog won't be shown if **Don't show this again** was selected.

The icon tooltip and the relatedness warning dialog give you information about how the fields that are active in the viz are related to each other at that moment and what impact that will have on how Tableau computes results.

In Tableau, aggregated dimensions – such as ATTR (dimension) or MIN(dimension) – act like measures. The tooltip message and inline alert message for the warning dialog reflect this.

## Know your data model

Whenever you're working with a data model that contains multi-fact relationships, it's useful to refer to the model regularly on the Data Source page. The examples in this topic are based on a data model with two base tables, Classes and Clubs, and a shared table, Students.



**Classes**

**Clubs**

**Students**

Classes 7 rows, 3 fields		
Alt Classes Class	Alt Classes Student (Classes)	Alt Classes Length
Nesting Basics	Robin	2
Advanced Songs	Sparrow	3
Flying For Fledglings	Robin	6
Nesting Basics	Sparrow	2
Advanced Songs	Finch	3
Nesting Basics	Finch	2
Alarm Calls 101	Null	4

Clubs 7 rows, 3 fields		
Alt Clubs Club	Alt Clubs Student (Clubs)	Alt Clubs Dues
Photography	Finch	50
Travel	Cardinal	90
Juggling	Sparrow	80
Art	Finch	10
Art	Cardinal	10
Art	Sparrow	10
First Aid	Robin	0

Students 5 rows, 3 fields		
Alt Students Bus Rider	Alt Students Student	Alt Students Age
yes	Finch	3
yes	Cardinal	4
no	Sparrow	6
yes	Robin	3
no	Jay	8

Fields:

- **Class**, a dimension with values of Nesting Basics, Advanced Songs, Flying for Fledglings and Alarm Calls 101
- **Length**, a measure
- **Student**, a dimension used to relate to the Student table

Fields:

- **Club**, a dimension with values of Photography, Travel, Juggling, Art and First Aid
- **Dues**, a measure
- **Student**, a dimension used to relate to the Student table

Fields:

- **Bus Rider**, a dimension with values of yes or no
- **Student**, a dimension with values of Finch, Cardinal, Sparrow, Robin and Jay. Used to relate to the other two tables
- **Age**, a measure

Unrelated dimension-dimension pair

One flavour of tooltip message is for an unrelated dimension-dimension pair.

**Possible tooltip messages:**

The message for an unrelated icon for a dimension-dimension pair, either on a shelf or in the Data pane (or in the warning dialog), is:

Unrelated dimensions can show combinations of values in the viz that don't exist in the data. Unrelated to: (list of fields).

In the Data pane, fields can also be de-emphasised with light grey text if they don't relate to any fields in the viz. In this instance, the tooltip for an unrelated dimension-dimension pair is:

Not related to any dimensions in the viz. If used, this field can show combinations of values in the viz that don't exist in the data.

Unrelated dimensions can be cross joined or outer joined, which can result in combinations of dimension values across the headers that do not reflect actual combinations of data in the underlying tables.

- Unrelated dimensions, without the presence of a stitching dimension, are cross joined.
- Unrelated dimensions, in the presence of a stitching dimension, are each independently inner joined with the stitching dimension, then those intermediate results are outer joined together.

#### Unrelated: Cross join

The screenshot shows a Tableau view with 'Class' and 'Club' on the Rows shelf. The view displays a grid of 20 rows and 3 columns, representing a cross join of the 'Class' dimension (with values: Advanced Songs, Alarm Calls 101, Flying For Fledglings, Nesting Basics) and the 'Club' dimension (with values: Art, First Aid, Juggling, Photography, Travel).

Class	Club		
Advanced Songs	Art	Abc	
	First Aid	Abc	
	Juggling	Abc	
	Photography	Abc	
	Travel	Abc	
Alarm Calls 101	Art	Abc	
	First Aid	Abc	
	Juggling	Abc	
	Photography	Abc	
	Travel	Abc	
Flying For Fledglings	Art	Abc	
	First Aid	Abc	
	Juggling	Abc	
	Photography	Abc	
	Travel	Abc	
Nesting Basics	Art	Abc	
	First Aid	Abc	
	Juggling	Abc	
	Photography	Abc	
	Travel	Abc	

A viz showing a cross join of Class and Club with rows for every combination of Advanced Songs/Alarm Calls 101/Flying for Fledglings/Nesting Basics with Art/First Aid/Juggling/Photography.

#### Stitched: Outer join of intermediate inner joins

The screenshot shows a Tableau view with 'Student', 'Class', and 'Club' on the Rows shelf. The view displays a grid of 12 rows and 4 columns, representing an outer join of the 'Student' dimension (with values: Cardinal, Finch, Robin, Sparrow) and the 'Class' dimension (with values: Advanced Songs, Nesting Basics, Flying For Fledglings, Nesting Basics) and the 'Club' dimension (with values: Art, First Aid, Juggling, Photography, Travel).

Student	Class	Club	
Cardinal	Null	Art	Abc
	Null	Travel	Abc
Finch	Advanced Songs	Art	Abc
	Nesting Basics	Photography	Abc
Robin	Flying For Fledglings	Art	Abc
	Nesting Basics	First Aid	Abc
Sparrow	Advanced Songs	Art	Abc
	Nesting Basics	Juggling	Abc

A viz showing the results of an outer join of the Student-Class inner join and the Student-Club inner join. Not all combinations of classes and clubs are represented, and there are rows for students and clubs without a class.

#### Unrelated dimension-measure pair

Another flavour of tooltip message is for an unrelated dimension-measure pair.

#### Possible tooltip messages:

The message for an unrelated icon for a dimension-measure pair, either on a shelf or in the Data pane (or in the warning dialog), is:

## Tableau Server on Windows Help

Measure values repeat for unrelated dimensions. Unrelated to: (list of fields).

In the Data pane, fields can also be de-emphasised with light grey text if they don't relate to any fields in the viz.

- The tooltip for a dimension in the Data pane that is unrelated to all measures in use is:

Not related to any measures in the viz. If used, measure values will repeat for this field.

- The tooltip for a measure in the Data pane that is unrelated to all dimensions in use is:

Not related to any dimensions in the viz. If used, this field will show repeated values.

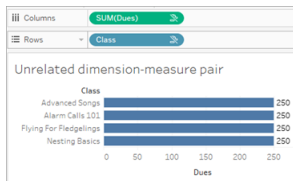
When a measure isn't related to a dimension, it can't be broken down by that dimension's values (that is, it can't be individually aggregated at the level of those dimension values). Instead, the measure will be aggregated at a different level from that of the dimension headers in the view.

The result in a viz is a repeated value for the measure across the unrelated dimension's values. This behaviour is similar to when an LOD expression is used to set the level of aggregation for a measure at a different level of detail from the native granularity of the viz. An unrelated dimension is essentially EXCLUDED from the computation of the measure's aggregated value.

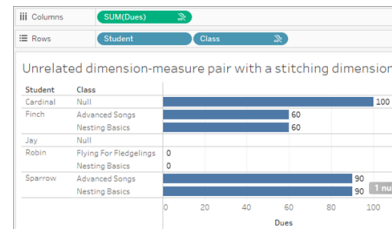
- An unrelated measure, without the presence of a stitching dimension, is table scoped to its overall value and repeated for the unrelated dimension's values.
- An unrelated measure, in the presence of a stitching dimension, is broken down by the stitching dimension's values but repeated for the unrelated dimension's values.

Unrelated: table scoped and repeated

Stitched: both broken down and repeated



A viz showing the measure **Dues** (from the **Clubs** base table) with a single value repeated across every value of the unrelated dimension **Class** (from the **Classes** base table).



A viz showing the value for **Dues** broken down by each **Student** (Cardinal's dues are 100, Finch's dues are 60), but those values still repeat each time a student is repeated across multiple classes (Finch's dues are repeated for both of Finch's classes).

## Filters

Relatedness is also evaluated for fields on the filter shelf compared to fields otherwise active in the viz.

### Possible tooltip messages:

An icon and tooltip appears when a filter is unrelated to at least one field in the viz. Both the filter field and field in the viz have a tooltip.

- The tooltip for the pill on the filter shelf is:

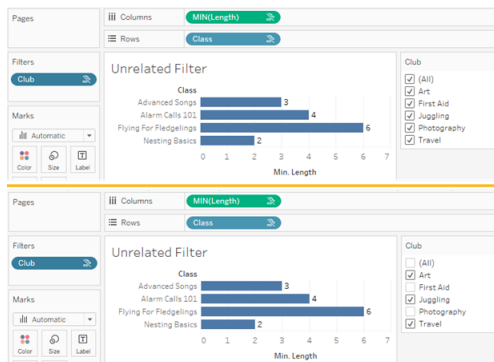
This filter ignores unrelated fields: <fields>

- The tooltip for the pill actively in the viz is:

This field is ignored by unrelated filters: <fields>

The behaviour of filters also depends on their relatedness to other fields in the viz. A filter doesn't impact the values of fields it isn't related to. Unless the filter is set to no values (excluding everything or including nothing), the viz will remain unchanged for any fields that aren't related to the filter. However, deselecting every option in the filter will return a blank viz.

## Tableau Server on Windows Help



Two screenshots of viz with an unrelated filter, showing that deselecting options in the interactive filter control doesn't impact the viz

Related fields are filtered as expected. In a more complex viz with a combination of related and unrelated fields (such as in a stitching context), the filter will only impact values that are related to the filter field.

### Build a Multi-fact Relationship Data Model

Analysis often involves bringing together tables of data that don't have a direct relationship to each other yet both relate to the same, common information such as date or location. This type of analysis is sometimes referred to as multi-fact analysis with shared dimensions.

To perform this kind of analysis in Tableau, you need to create a data source that uses multiple base tables connected by shared tables.

- **Base tables** are the left-most tables in the data model on the Data Source tab. For guidance on how to determine which tables to use as base tables, see [When to Use a Multi-fact Relationship Model](#).
- **Shared tables** are downstream tables with multiple incoming relationships. These tables contain fields that can be used to stitch together unrelated fields during analysis in a viz. Date and Location are examples of commonly shared tables.

### Build the model

Building a multi-fact relationship data model is essentially the same as creating any other data source that uses relationships, but with two additional pieces: additional base tables and multiple incoming relationships to shared tables.

1. **Connect to your data.** You can use **multiple data connections** if your tables aren't all in the same database.
2. Drag a table onto the canvas to create the first base table.
3. Drag another table from the left pane to the **New Base Table** drop area.

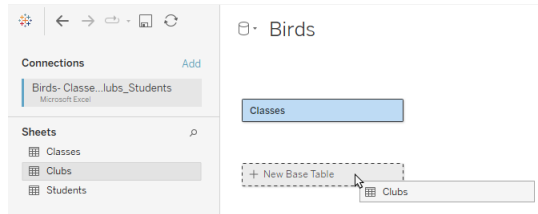
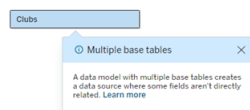
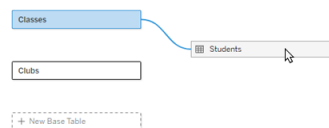


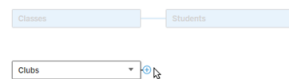
Tableau shows a warning that you're building a data model with multiple base tables. We recommend that you only set up a multiple base table model if your data needs it. Otherwise, use a single base table model to avoid the complexities that come with a multiple base table model.



4. Drag another field to the canvas and relate it to one of the base tables. **Configure each relationship if necessary.**

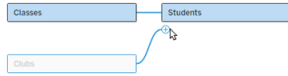


5. Hover over the not-yet-related base table to display a plus sign (affectionately known as a "meatball").



6. Drag the plus sign icon to the shared table to create a new incoming relationship (also known as a "noodle").





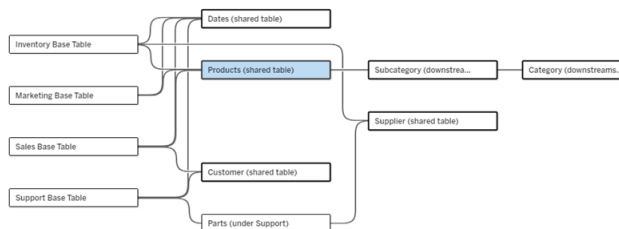
7. *Optional:* Continue adding downstream tables and base tables. Click and drag the plus sign icon to build shared tables as needed.

**Note:** Rather than starting with the base tables, you can also build a single base table model first and add additional base tables later.

### Explore the model

A data model with multiple base tables is built with relationships, but not all tables are related to each other to the same degree. Each base table defines a *tree*, which contains every table related to that base table, either directly related or downstream from a related table. Shared tables exist in multiple trees. For more information about degrees of relatedness, see [About Multi-fact Relationship Data Models](#).

When you view a model with multiple base tables, there are various options for exploring and managing the data model. These options are especially useful when a data model is complex.

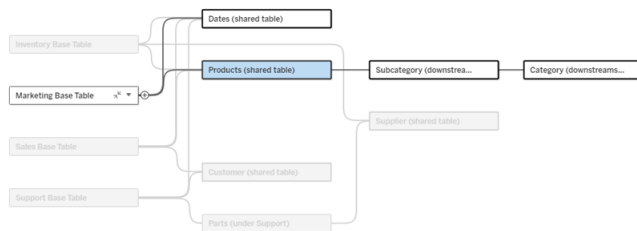


An example of a complex data model with four base tables, multiple shared tables and downstream tables that are both shared and unshared between the base tables.

2024.2 introduced some new layout details for the data model. In a multi-fact relationship data model, relationships bundle together to help track how many incoming relationships a table has, and shared tables (and tables downstream from shared tables) have a bolder outline than tables that aren't shared.

## Identify a relationship tree

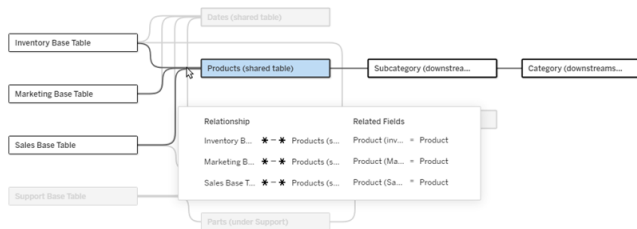
Hover over a table to highlight the tables it's related to. Tableau emphasises the tree for that table and de-emphasises unrelated tables.



The Marketing base table tree consists of two shared tables, Dates and Products, and the Subcategory and Category tables downstream from Products.

## View relationship details

Hover over a relationship or bundle of relationships to see the details in a tooltip.



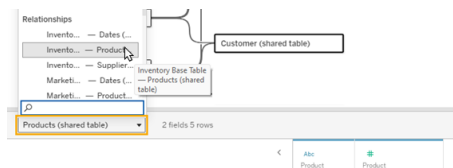
The incoming relationships to the Products table include three individual relationships to the Inventory, Marketing and Sales base tables.

## Select a relationship

When a relationship is selected, it is highlighted in blue in the data model canvas and its details appear in the Table Details pane below the data model canvas. The Table Details pane is where you can **inspect or modify the relationship clause**.

There are multiple ways to select a relationship:

- Click a relationship line (noodle) in the canvas. Every relationship has a clickable zone that selects just that noodle.
- Right-click or control-click a table in the canvas to open its menu. Select the **Select Relationship** option and choose which table's relationship you want.
- Click a bundle of relationships in the canvas to bring up a persistent tooltip (hovering over a bundle brings up the tooltip; you have to click to make it persist). Then select a row in the tooltip details to highlight that relationship in the model.
- Open the menu in the toolbar of the Table Details pane and select the desired relationship. You can also use this menu to select a specific table to see its preview in the pane.



## Swap with base table

Intermediate tables in a relationship between a base table and shared tables give you the option to swap the downstream table with the base table. This is purely a visual change to aid with conceptual understanding and doesn't change the structure of the data model.

Right-click or control-click a downstream table and select **Swap with base table (table name)**. The swap option is also only present on the downstream table and not the base table.

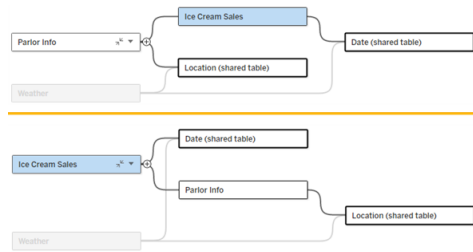
The swap option is not available for tables that would alter the data model if swapped, such as shared tables or tables downstream from shared tables.

### Example

In this example, the **Parlour Info** and the **Ice Cream Sales** tables can be swapped without changing the data model's fundamental structure. No other tables can be swapped.



- Ice Cream Sales is related to both Parlour Info and the shared Date table.
- Parlour Info is related to both Ice Cream Sales and the shared Location table.
- Weather is related to both the shared tables of Date and Location.

These two models are conceptually equivalent:



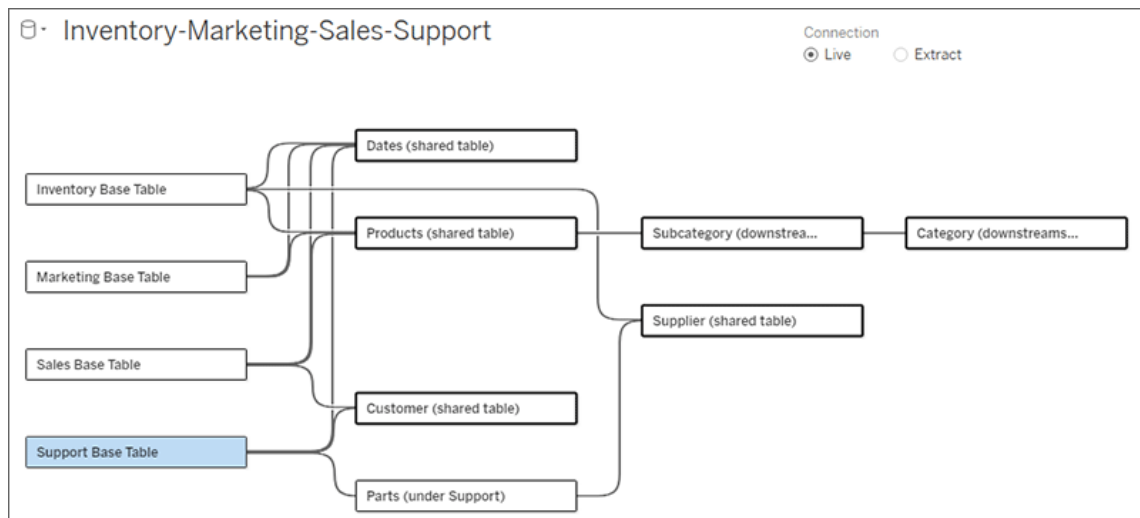
## Collapse a base table

You can also collapse a relationship path, or tree, to just its base table to temporarily simplify the view of the data model.

Click the Collapse  or Expand  buttons on a base table to collapse or expand its entire tree. Alternatively, right-click or ctrl-click on a downstream table and select **Collapse this path** or **Collapse other paths**. This option is not available on shared tables or tables downstream of shared tables.

Collapsing a tree to its base table is purely visual and won't trigger the Unrelated Tables alert. A collapsed path is indicated by a base table with a stacked table and an Expand button. Collapsing affects all tables and relationships that are relevant only to that tree, so tables that are shared with an uncollapsed path are not hidden.

Use the Expand  button to re-open the base table and everything in the tree.



## Troubleshooting

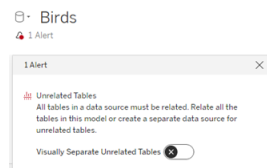
## Create a single data source

All tables must be related to the entire data source in some way. If there are any tables that aren't related to the overall data model, an alert appears. The alert remains until no tables or trees are fully separate from the rest of the data model. When the alert is active, the data source can't be published and you can't use the data source in an analysis.

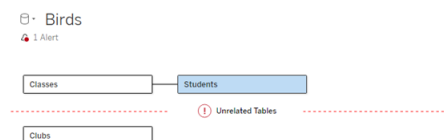
You can open the alert and set **Visually Separate Unrelated Tables** to identify which tables triggered the alert. This option is useful when you have a complex model and need to identify which table or tables aren't yet related to the rest of the data model.

### Example

In the steps under **Build a model**, an alert displays in Step 4 before a relationship is added to connect the second base table.

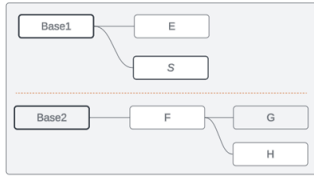


Setting **Visually Separate Unrelated Tables** to On moves the table **Clubs** underneath the **Unrelated Tables** line. Relating **Clubs** to **Students** resolves the alert.

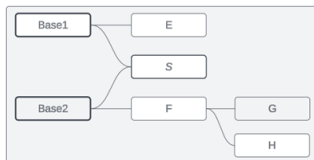


### Resolve a cycle

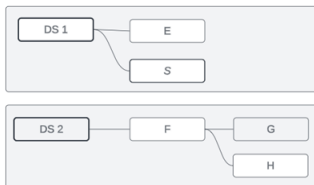
Even if some tables aren't directly related to each other, the entire data model must be a cohesive whole. In this example, each base table defines a tree but there is no shared table connecting them. This isn't a valid model for analysis.



The two groups of related tables need to be combined via a shared table...



...or the data model needs to be created as two separate data sources.

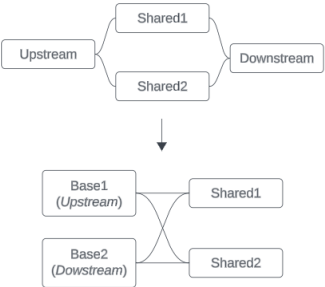


## Data model restrictions

Some relationship paths between tables are not supported in a multi-base table model. If you're unable to drop the meatball when you attempt to create a second incoming relationship on a table, make sure the structure you're trying to create is supported in Tableau. Examples of unsupported models include:

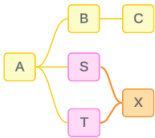
### Cycles

Cycles – where there's more than one relationship path from an upstream table to the same downstream table – are not supported. This unsupported structure is sometimes called a bowtie. To model this kind of relationship between tables in Tableau, use multiple base tables instead of a bowtie by converting the downstream table to another base table.

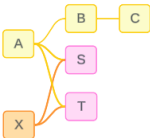


The data model must be a *directed acyclical graph*. This means every incoming relationship to a table must be traceable upstream to a different base table.

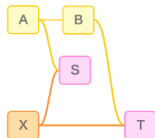
**Not supported.** Table X has two incoming relationships that are both from tables downstream from Base Table A



**Supported.** Tables S and T both have multiple incoming relationships, but each one is from a different base table.

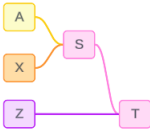


**Supported.** Although it may visually look like there's a cycle, the incoming relationships for both Table S and Table T can be traced back to different base tables.



## Nested shared tables





Nested shared tables are not supported. Any tables downstream from a shared table (a table with multiple incoming relationships) can only have one incoming relationship.



Not supported. Table T is downstream from a shared table and can't receive an additional incoming relationship.

## Add Web Images Dynamically to Worksheets

At Tableau, we know that images are a powerful tool when analysing data. Imagine that you're looking at a viz of monthly shoe sales. The data is telling you that you sold more high heels than wedges, but you can't picture the difference in the two types of shoe. That's where Image Role comes in. You can dynamically add web images to your worksheets and use them in your headers to add visual detail.

Shoe Sales		
Product Name	Product Image URL	
Flats		12,118
High Heels		15,865
Running Shoes		14,200
Wedges		8,665

### Prepare your data source

Image Role can be assigned to discrete dimension fields that contain URLs that point to web images. To prepare your data, be sure that your image fields meet the requirements set by Tableau to be assigned an image role:

- Make sure your URLs navigate to .png, .jpeg, .jpg, .svg, .webp, .jfif, .ico, or .gif image files.
- Verify that each URL begins with http or https. If a transport protocol isn't included, Tableau assumes https.
- Optimise the number of images used in your data set. Usually, you can load up to 500 images per field.
- Ensure that each image file is smaller than 200 kb.

**Note:** If you're using Tableau 23.1 or earlier, your URLs must navigate to image files with .jpg, .jpeg or .png file extensions.

In Tableau 23.2 and later, .gif files are supported, but .gif *animations* will only show on Tableau Cloud and Tableau Server with a client-side render. In Tableau Desktop and



Tableau Server with a server-side render, the .gif file will show as a static image.

Depending on the complexity of your viz, Tableau may default to a server-side render, which limits the number of images to 100 per field. To learn more about complexity settings and server-side rendering, see [Configure Client-Side Rendering](#).

Example data set:

Product Name	Product Image URL	Product Sales
Flats	<a href="https://img.example.com/flats.png">https://img.example.com/flats.png</a>	12,118
High Heels	<a href="https://img.example.com/highheels.png">https://img.example.com/highheels.png</a>	15,865
Running Shoes	<a href="https://img.example.com/runningshoes.png">https://img.example.com/runningshoes.png</a>	14,200
Wedges	<a href="https://img.example.com/wedges.png">https://img.example.com/wedges.png</a>	8,665

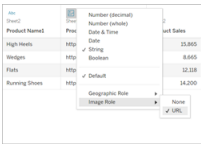
### Assign an image role to your URLs

After you've connected to your data source, you can assign an Image Role to your URLs from either the Data Source page or on the Data pane in a worksheet.

From the Data Source page:

1. Locate the column that has image URLs.
2. Right-click (control-click on Mac) the icon on the top left of the column and select **Image Role > URL**.

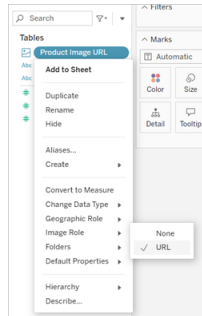
The icon changes to an image icon, and your images are ready to use.



From a worksheet:

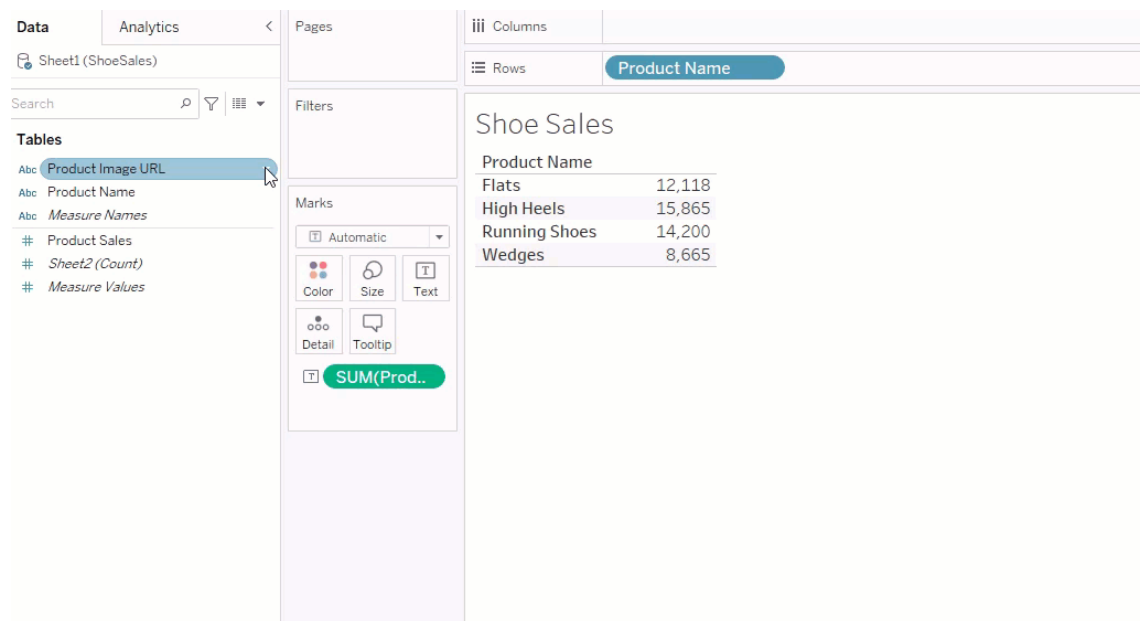
1. Open a new worksheet.
2. Locate a discrete dimension field that has image URLs.
3. Right-click (control-click on Mac) the dimension field and select **Image Role > URL**.

The icon changes to an image icon, and your images are ready to use.



## Add images to your visualisations

From your worksheet, drag the Image Role field onto the Rows or Columns shelf. You can now see images along with their associated data on your viz.



## Share your visualisations

You can export your workbooks with images and share them. Be sure that the images used in your vizzes are available to be viewed by everyone you share your vizzes with. For example, if you're using images that are hosted on an internal server behind a firewall, be sure that everyone you share the viz with has sufficient permissions to access the images. In this example, users who view the viz while connected to the same server shouldn't have any issues seeing the images. But users who export the viz to a PDF on a Tableau Cloud server may not be able to see the images.

If you export your workbook and your viewer attempts to open it in Tableau 2022.3 or earlier, your viewer won't be able to see the images.

**Note:** It's a best practice to always align an Image Role field with a text description to make the content accessible for screen readers and other accessibility software.

## Troubleshoot image connections

Sometimes images won't be displayed if you exceed the number of images allowed per field, have large image files on a complex viz or are viewing the viz on a mobile device. This section helps you troubleshoot those errors.

None of the images are being displayed in my viz

### There are too many images in the viz

Depending on the complexity of your viz, you can typically load 500 images per field. If you have a complex viz, it may default to server-side rendering. With server-side rendering, you can load 100 images per field.

If you get an error message that there are too many images in the viz, filter out images and try again.

### Tableau couldn't access the images

If you receive broken image icons instead of your images, first confirm that you have sufficient permissions to view the images (or if, for example, they're behind a firewall). Tableau must be able to access the images, and the images can't require a separate authentication to view them.

If you're sure that you have permission to view the images and they're within the size requirements, check that web images are enabled on your settings page.

In Tableau Desktop:

1. From your workbook, click **Help** in the toolbar.
2. Select **Settings and Performance > Set Dashboard Web View Security**.
3. Make sure that **Enable Web Page Objects and Web Images** is ticked.

In Tableau Cloud:

1. From the home page, click **Settings**.
2. Under general, scroll down and locate **Web Page Objects and Web Images**.
3. Make sure that **Enable Web Page Objects and Web Images** is ticked.

Some of the images aren't displaying in my viz

## The image file is too large

Each image file must be smaller than 200 kb to render. Check your image file size and try again.

## You're using an earlier version of Tableau

If you're using Tableau 23.1 or earlier, only .png, .jpeg, and .jpg image files are supported. Upgrade your version of Tableau or use a supported file type for the version of Tableau you're using.

## The image URL must begin with http or https

Each image URL must begin with either http or https. Tableau doesn't currently support FTP/SMTP calls. Verify your URL format and try again.

## The image file must be a URL

An Image Role can be assigned to only URLs that navigate to .png, .jpeg, or .jpg, .svg, .webp, .jif, .ico, .bmp or .gif image files. Verify your URL format and try again.

## The image file type isn't supported

An Image Role can be assigned to only URLs that navigate to .png, .jpeg, or .jpg, .svg, .webp, .jif, .ico, .bmp or .gif image files. Verify your URL format and try again.

If you're using Tableau 23.1 or earlier, only .png, .jpeg and .jpg image files are supported. Upgrade your version of Tableau or use a supported file type for the version of Tableau you're using.

In Tableau 23.2 and later, .gif files are supported, but .gif *animations* will only show on Tableau Cloud and Tableau Server with a client-side render. In Tableau Desktop and Tableau Server with a server-side render, the .gif file will show as a static image.

## The image file contains bad characters

An Image Role can't be assigned to URLs that have the following characters:

```
< > & \ ^ ' 
```

or the following character sequences:

```
.. \\ \r \n \t 
```

Verify that your URL doesn't contain any of these characters or character sequences and try again.

The images aren't being displayed outside of my worksheet

## The images aren't displaying in Viz in Tooltip

Viz in Tooltip is processed with server-side rendering, which allows you to load up to 100 images per field. Verify that you have fewer than 100 images per field and try again.

For more about server and client-side rendering, see [Configure Client-Side Rendering](#).

For more about using Viz in Tooltip, see [Create Views in Tooltips \(Viz in Tooltip\)](#).

## The images aren't being displayed in View Thumbnail

View Thumbnail is processed with server-side rendering, which allows you to load up to 100 images per field. Verify that you have fewer than 100 images per field and try again.

For more about server and client-side rendering, see [Configure Client-Side Rendering](#).

## The images aren't being displayed when I export my workbook

All exports and export-related features are processed with server-side rendering, which allows you to load up to 100 images per field. Verify that you have fewer than 100 images per field and try again.

## The images aren't being displayed on a mobile device

Mobile devices have a lower complexity threshold than computers, so the processing is completed through server-side rendering, which allows you to load up to 100 images per field. Verify that you have fewer than 100 images per field and try again.

You can change the complexity settings on your mobile device. For more info on complexity thresholds, see [Configure the complexity threshold for computers and mobile devices](#).

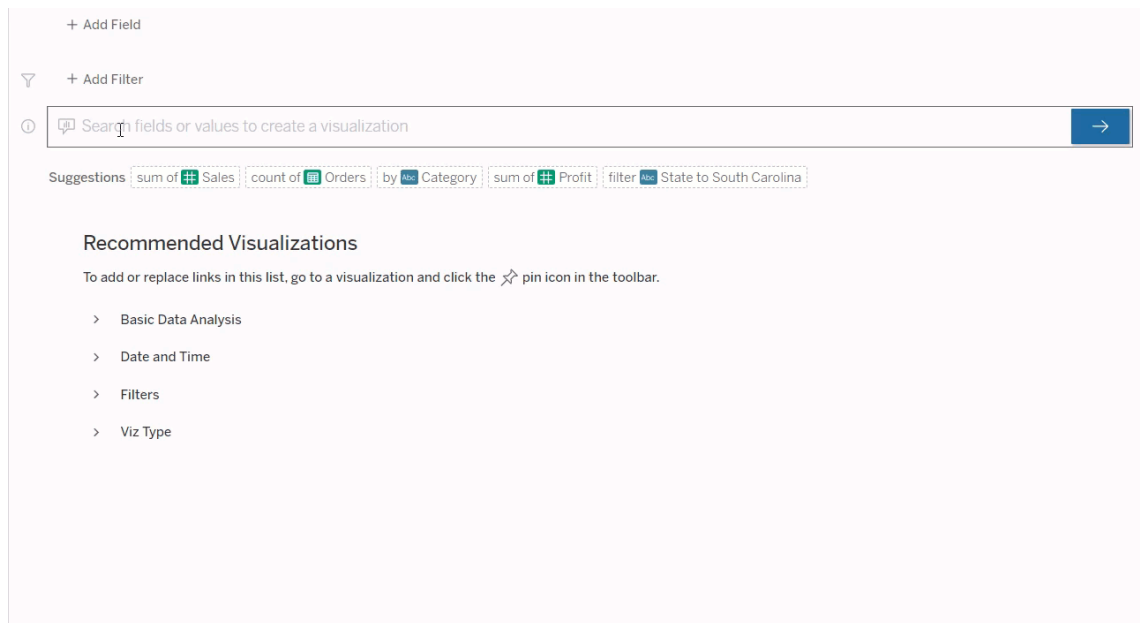
## Automatically Build Views with Ask Data

### Important changes for Ask Data and Metrics

Tableau's Ask Data and Metrics features were retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. With advances in natural language technologies, we're developing an improved interface that will make it easier to ask questions of your data and stay on top of changes. For more information, see [How Tableau AI and Tableau Pulse are reimagining the data experience](#).

Ask Data lets you type a question in common language and instantly get a response right in Tableau. Answers come in the form of automatic data visualisations, with no need to manually drag and drop fields or understand the nuances of your data's structure.

Ask Data lets you ask sophisticated questions naturally, with support for key analytical concepts such as time series and spatial analysis, and has an understanding of conversational phrases such as "last year" and "most popular."



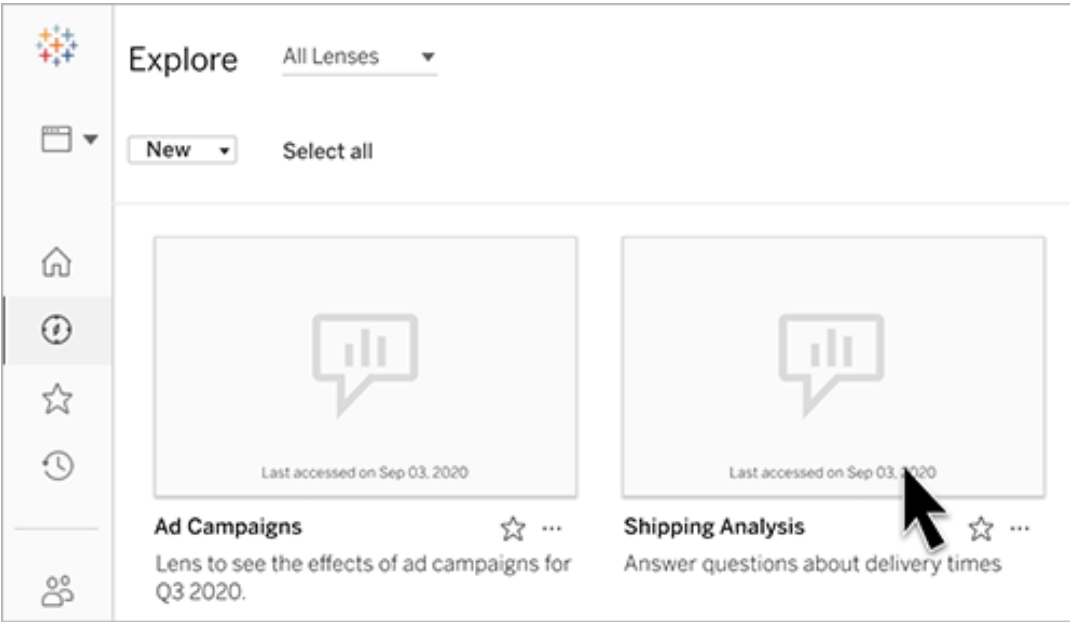
## Navigating to Ask Data lenses

Before you can query a data source with Ask Data, **a Tableau author must first create a lens** that specifies the subset of data fields the lens uses.

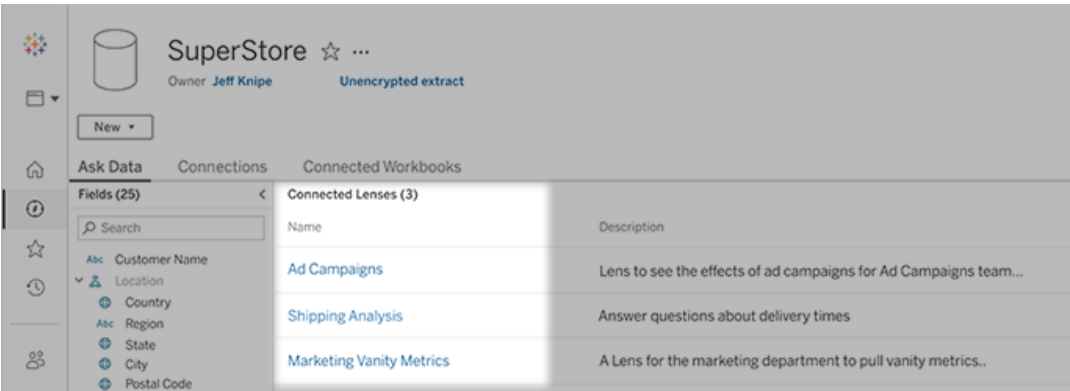
In Tableau, here are all the places where you can access an Ask Data lens:



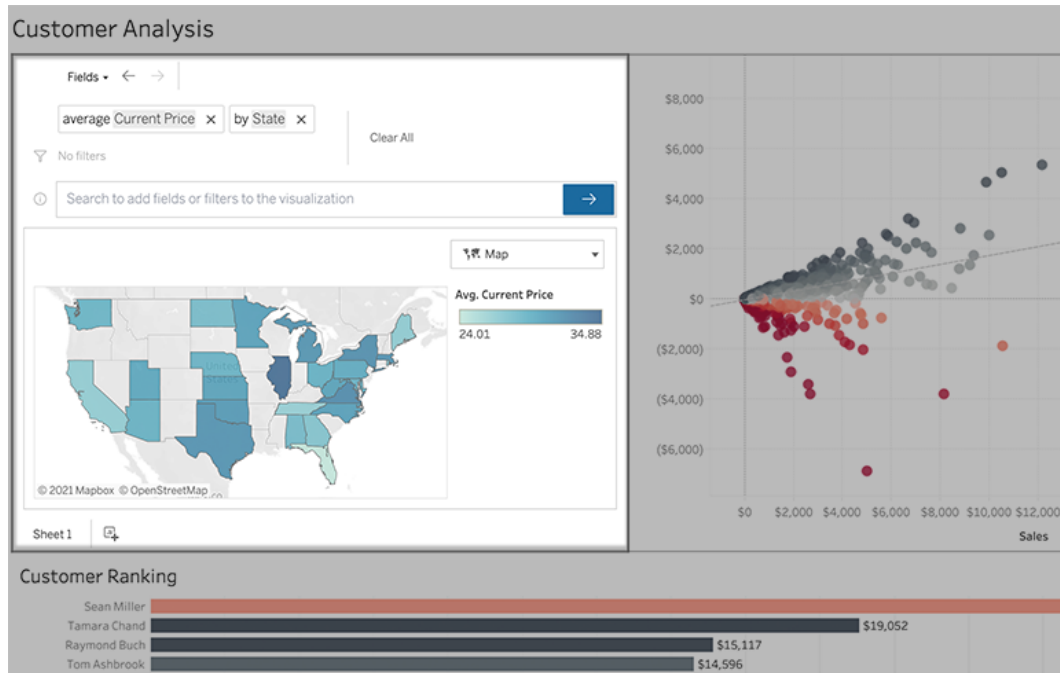
- On the All Lenses page at the top level of your Tableau Cloud or Tableau Server site.



- On the Ask Data tab for a data source for which lenses have been created.



- In an Ask Data object on a dashboard.



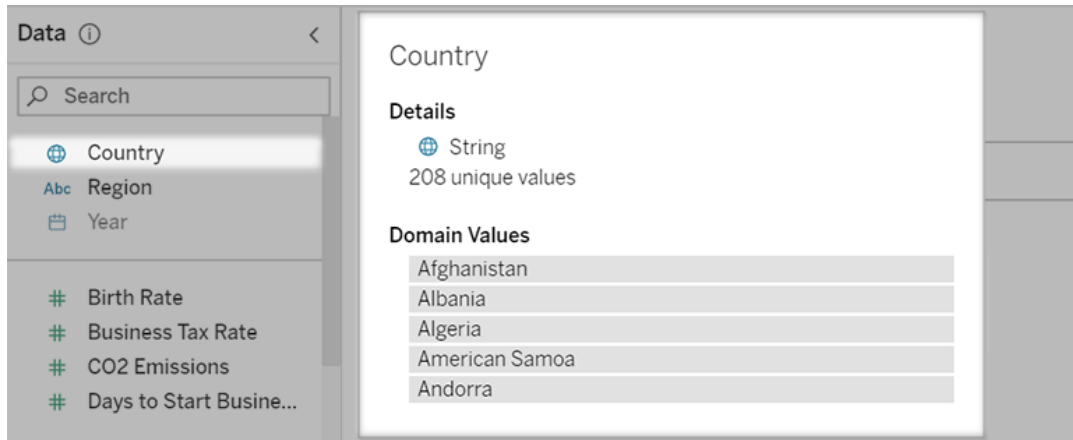
## Ask Data from a lens page or dashboard object

Navigate to a lens and learn more about its data

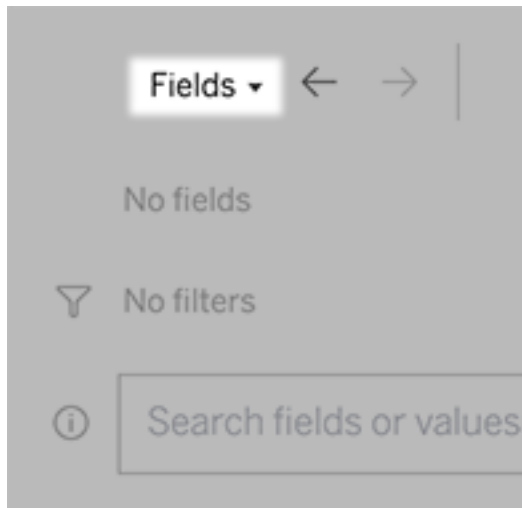
1. Navigate to a lens via the All Lenses page for your Tableau site, the Ask Data tab for a data source, or an Ask Data object on a dashboard.
2. (Optional) Under **Recommended Visualisations**, click an entry to quickly see visualisations the lens author has created for your organisation.

If the recommendations don't address your current data analysis needs, [build a query](#) to create your own question.

3. In the Data pane on the left, briefly hover over each field to learn more about the data it contains.

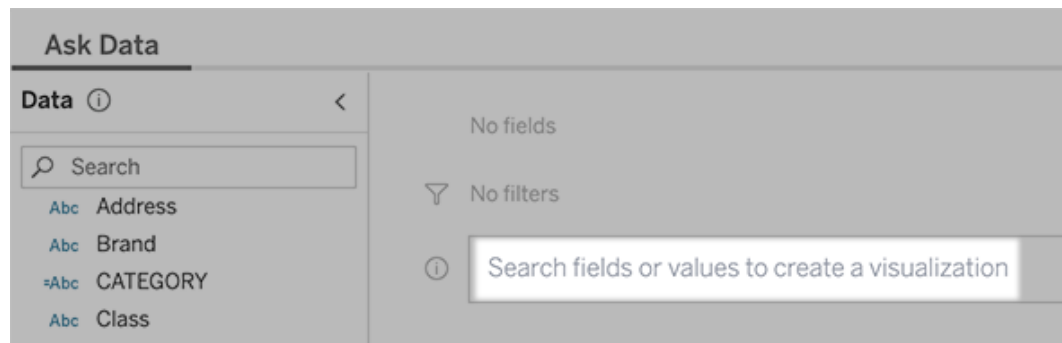


In a narrower dashboard object, the Data pane may be hidden, but you can see the same information by clicking the **Fields** drop-down menu.

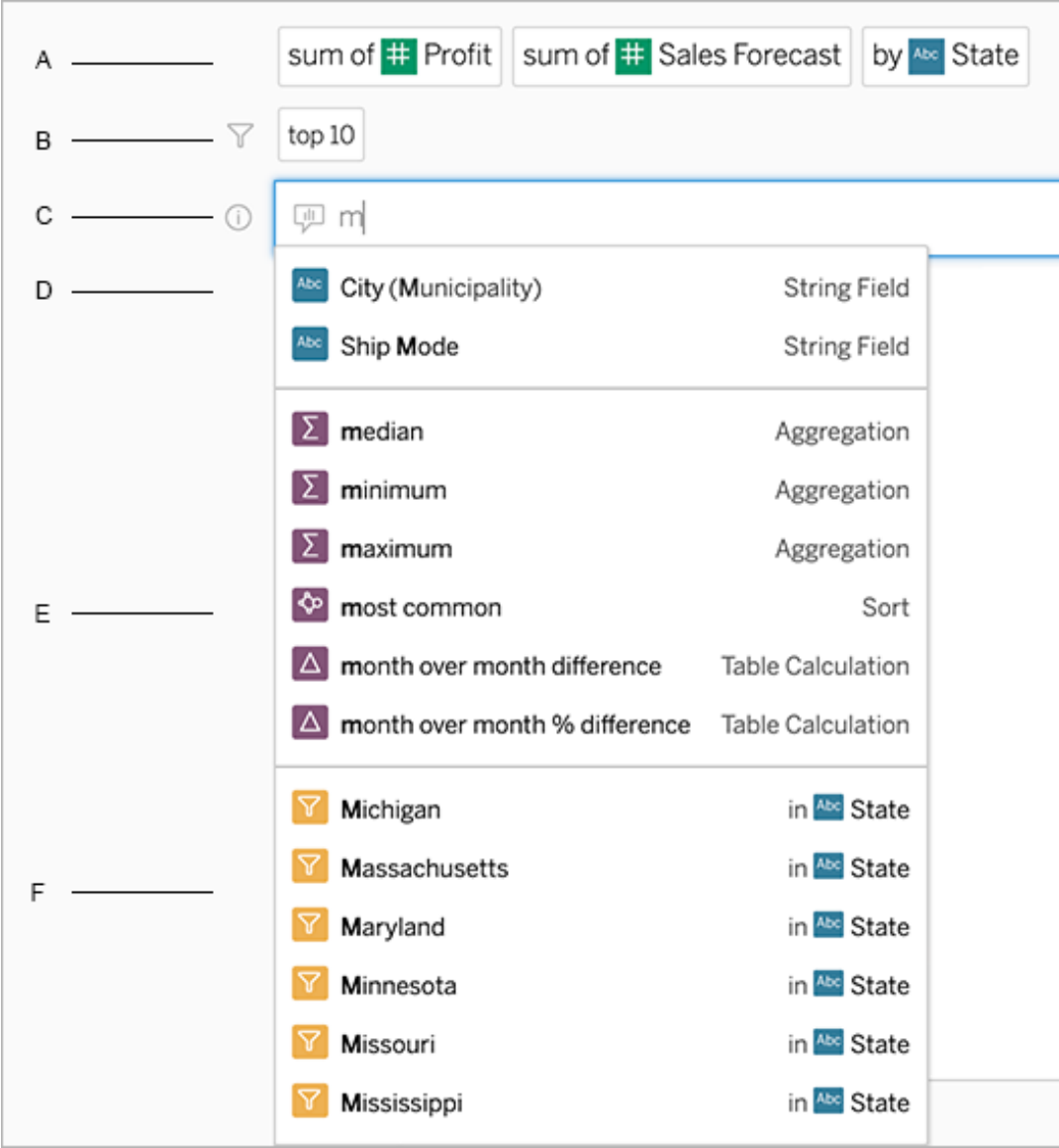


Build queries by entering text

1. Type in the box reading **Search fields or values to create a visualisation.**



2. As you type, Ask Data searches data fields, functions and string values and displays results in a drop-down list. Click items in the list to add them to your current entry, shown above the search box. To automatically create a viz using the current entry, press **Enter** at any time.



Modifying a query by searching for fields and analytical functions

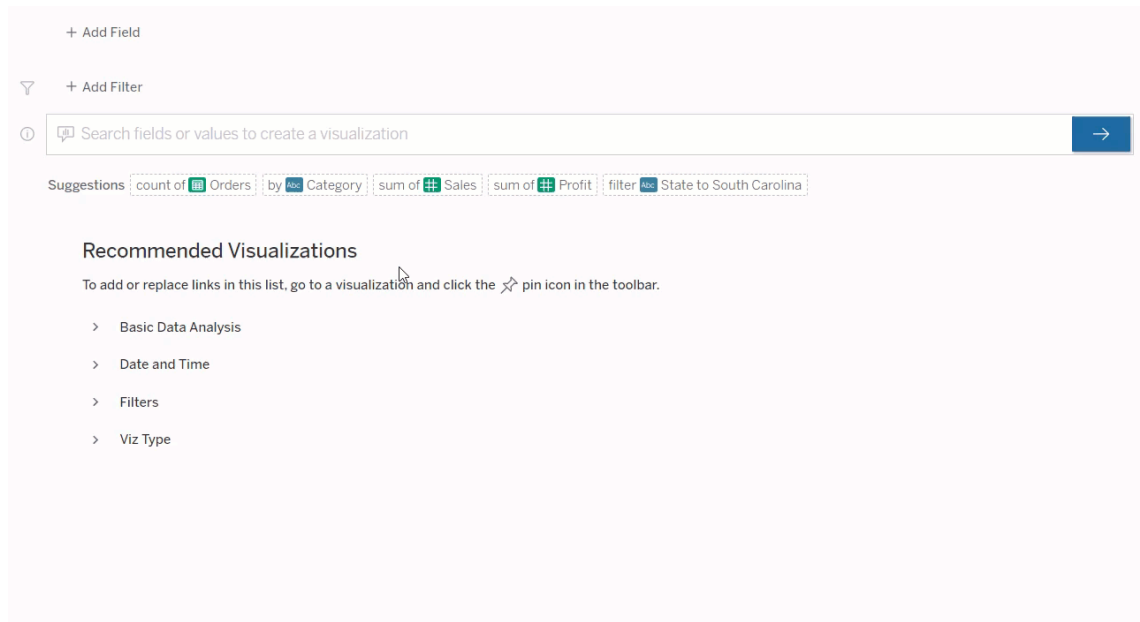
A. Current entry B. Current filters C. Search box D. Returned fields E. Returned analytical functions F. Returned field values

Build queries by adding suggested phrases

Tableau will suggest phrases based on the most common queries asked in your lens and by others in your organisation. When you open your lens, you'll notice suggestions that will help

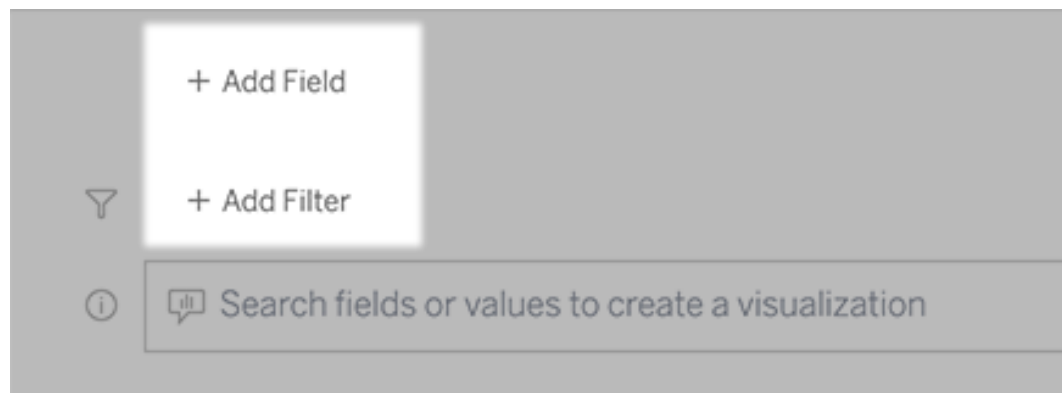
you get quick answers to common questions.

You can add these suggestions to your query by clicking them. As you add phrases to your query, the suggestions dynamically update with more relevant phrases. The view automatically builds with each selection.

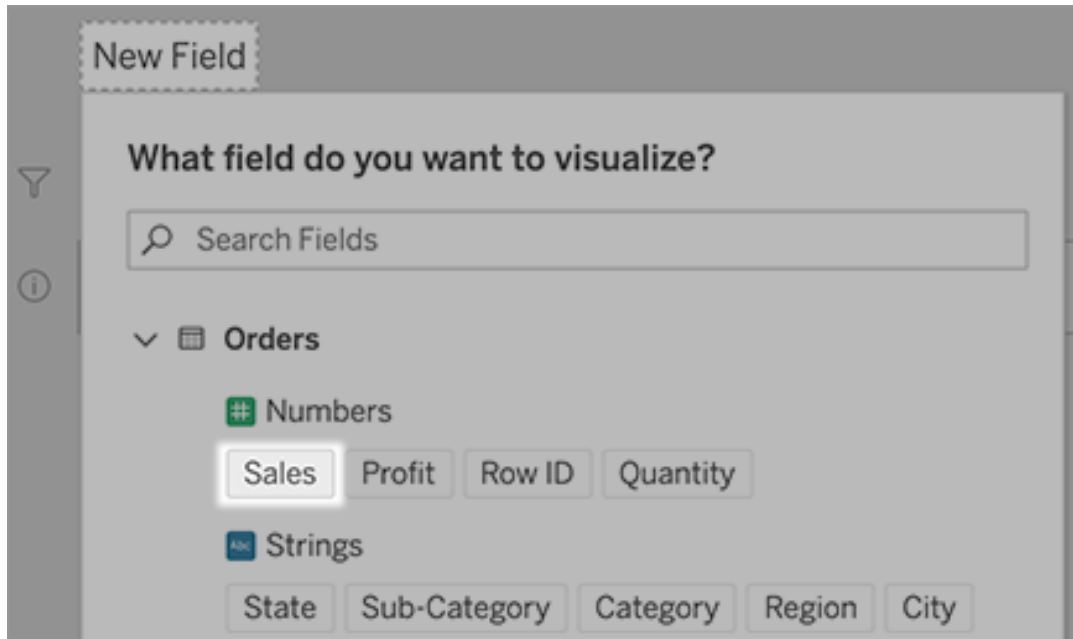


Build queries by adding fields and filters

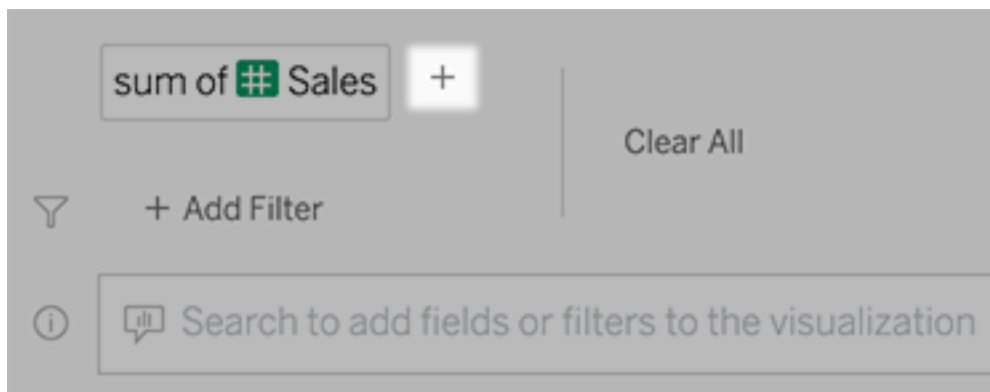
1. Click **Add Field** or **Add Filter**.



2. Click the desired field. (To narrow down a long list, first type in the **Search Fields** box.)

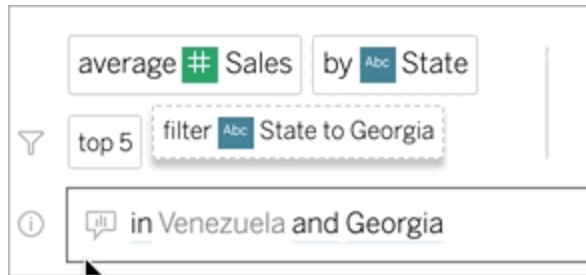


3. Set any sub-options, such as aggregation type for a numeric field or grouping for string and date fields.
4. To add more fields or filters, click the plus sign.



See how elements of your query are applied

To see how elements of your query are applied, hover over them in the text box or the interpretation above it. Words that aren't used are greyed out, helping you rephrase your query in a way that's clearer to Ask Data.



## Rephrase your question

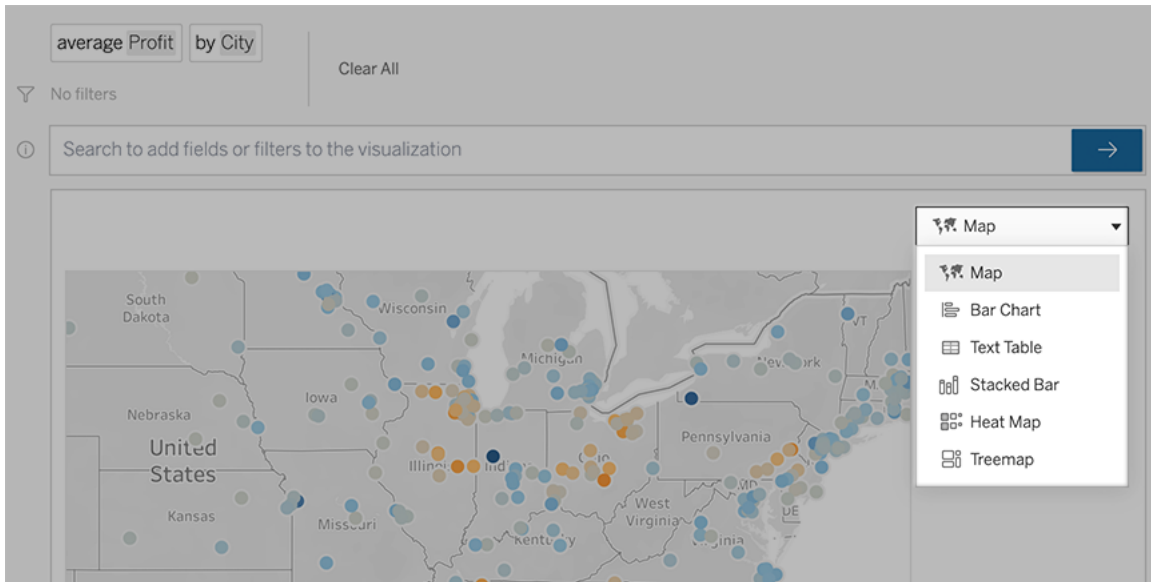
You can rephrase questions by clicking options, data fields and filters in the user interface.

### Change the viz type

If the default viz doesn't fully reveal your data, click the menu at upper right, and choose from these supported viz types:

- Bar Chart
- Gantt Bar
- Heat Map
- Histogram
- Line Chart
- Map
- Pie Chart
- Scatter
- Stacked Bar Chart
- Text Table
- Treemap






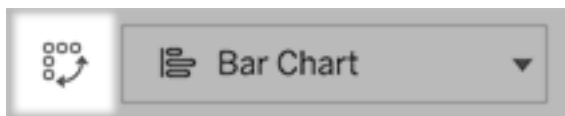
**Note:** To automatically create certain viz types, Ask Data sometimes adds fields such as "Number of Records" to your entries.

Change fields, filters and displayed data

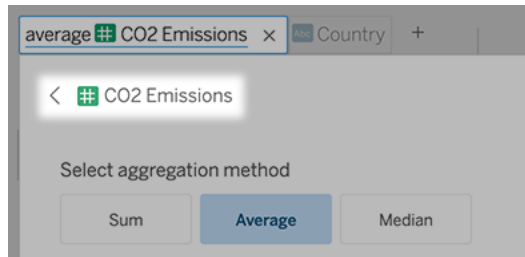
Ask Data gives you several ways to fine-tune how field values are displayed.

- To switch the fields used for the vertical and horizontal axes, click the Swap Axes button

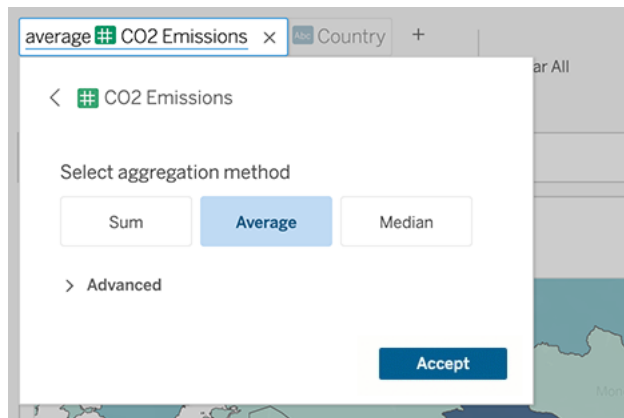
 to the left of the viz selection menu:



- To change a field, first click on it in your query entry, and then click the field name below.  
(To change fields used in difference calculations, see [Compare differences over time](#).)

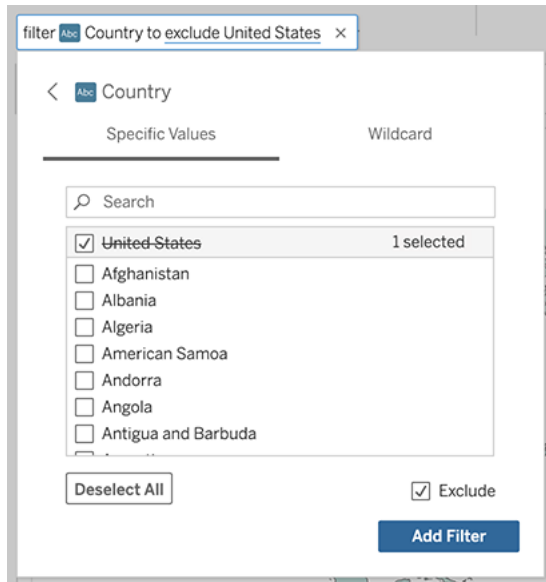


- To change a field's aggregation or grouping type (for example, from average to sum), click on the field name in the text box, and then choose a different aggregation or grouping.

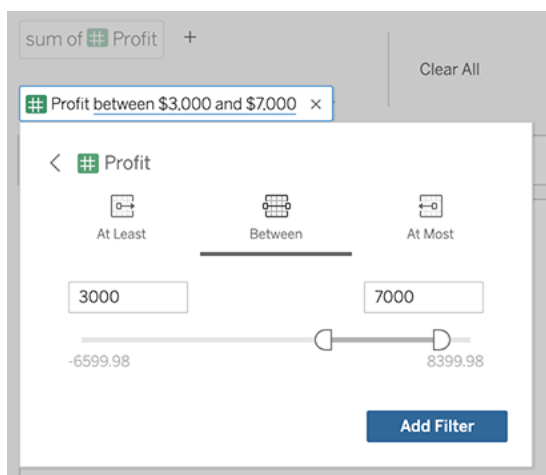


- For categorical filters, click values (for example, "exclude United States" in the example below) to change specific values or enter wildcard parameters.

## Tableau Server on Windows Help



- To adjust a numeric range, click words such as "high" or "cheap".



- To delete a field or filter, hover over it and click the **X**.

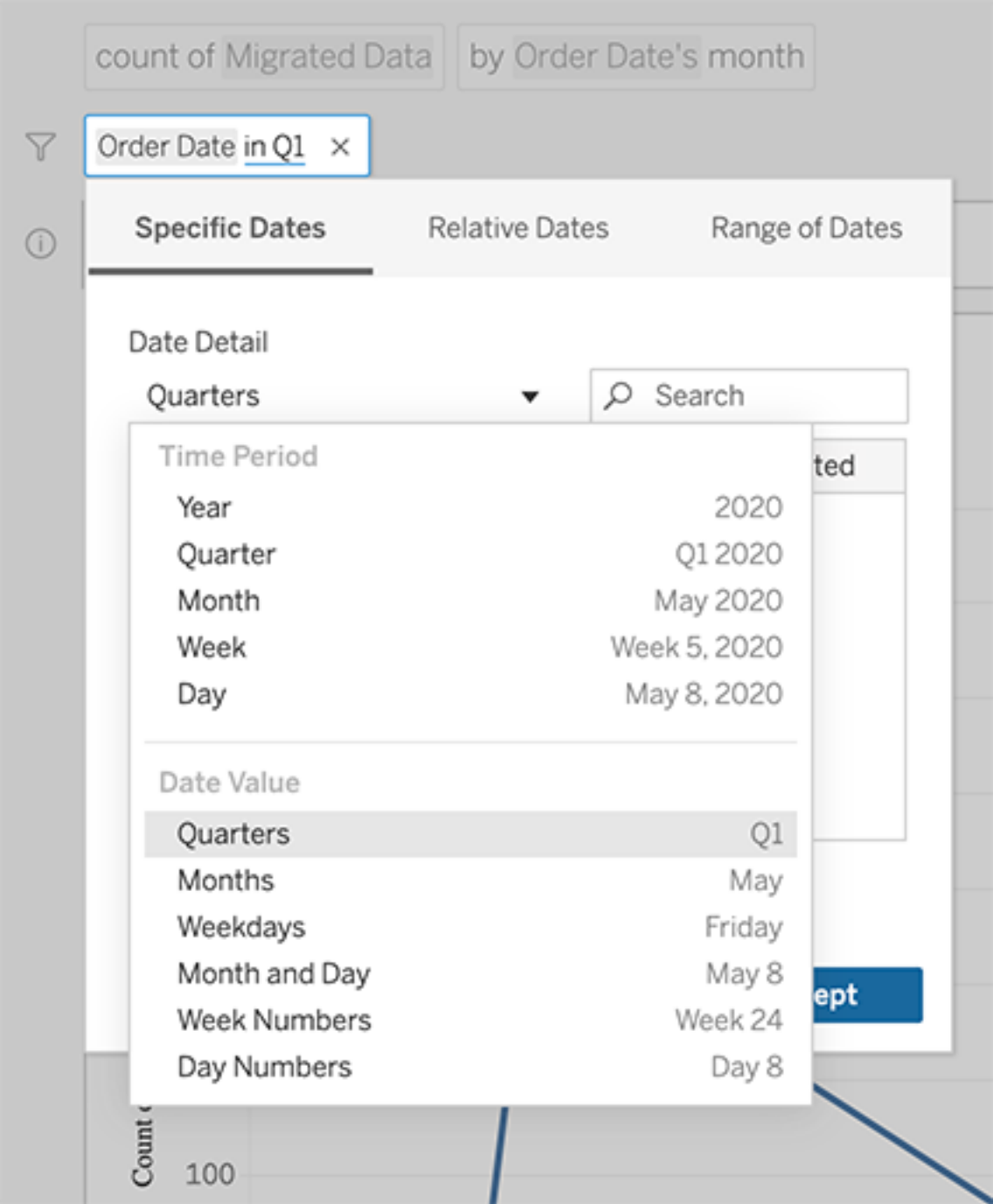
### Adjust date filters

To adjust a date filter, click words such as "last" or "previous". Then click one of the following:

- **Specific Dates** to enter a specific time period or date value
- **Relative Dates** to show a date range relative to the present day
- **Range of Dates** to enter specific start and end points

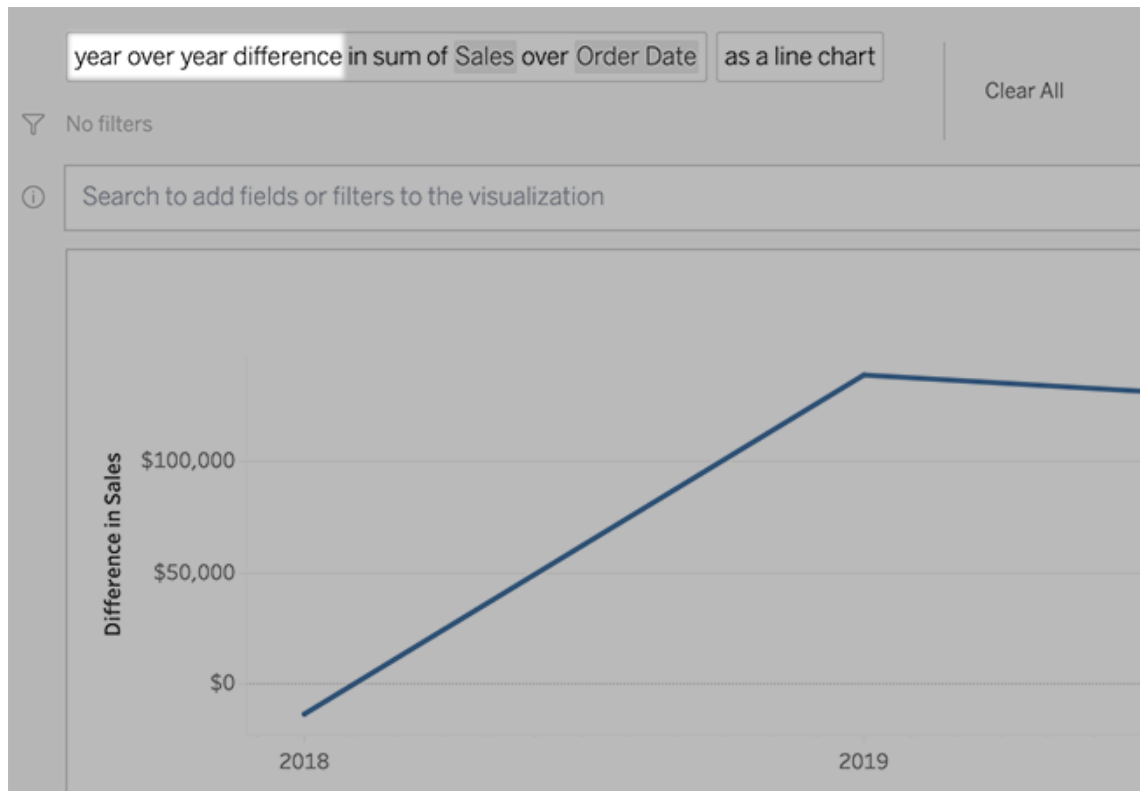
**Specific Dates** offers some unique options in the **Date Detail** menu:

- **Time Period** options show a single continuous date range
- **Date Value** options show ranges that can repeat in multiple time periods. For example, to see combined sales performance for Q1 across multiple years, under Date Value, you would choose Quarters.

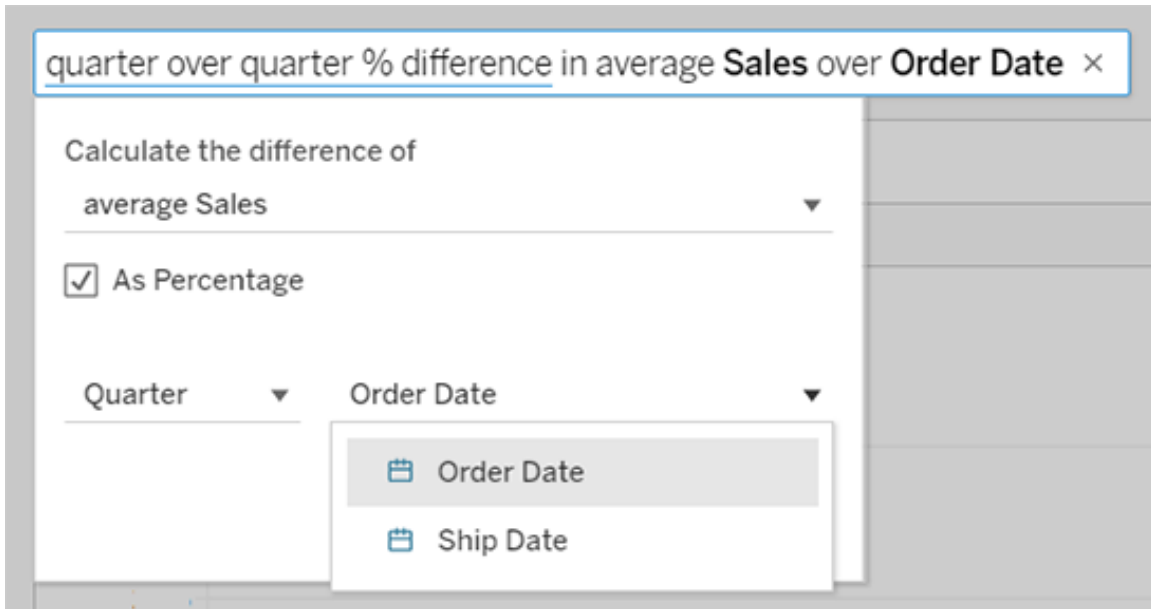


## Compare differences over time

Ask Data lets you compare time periods with phrases such as "year over year" or "quarter over quarter". The results appear as difference or percentage difference table calculations in workbooks you save from Ask Data.



In the text box, click a difference calculation to choose other fields, aggregation methods and time periods.

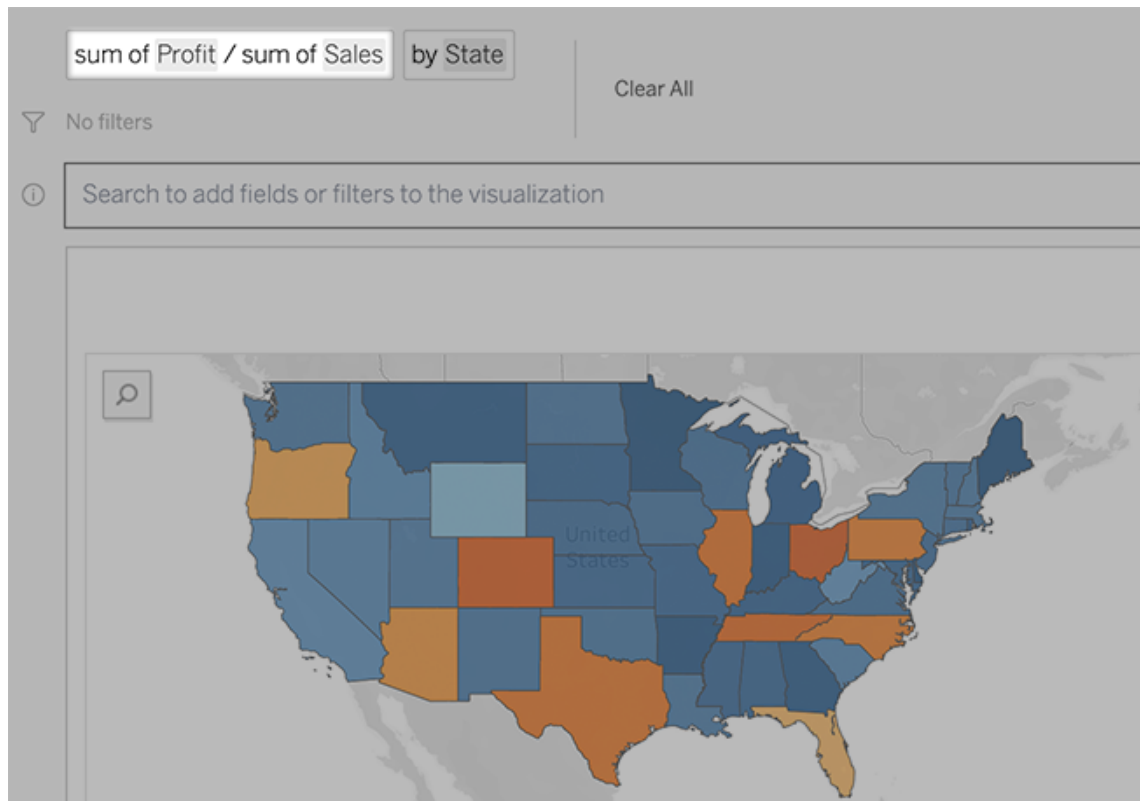


## Apply simple calculations

Ask Data supports simple calculations between two measures, which you can apply using these symbols:

- + sums the measures
- produces the difference between them
- \* multiplies
- / divides

In workbooks you save from Ask Data, these calculations don't become calculated fields but instead ad hoc calculations on the Columns, Rows or Marks shelves.

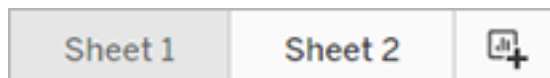


## Add sheets with other vizzes

To quickly create multiple different vizzes from a lens, add sheets in Ask Data.

At the bottom of the web page, do any of the following:

- Click the **Add Sheet** icon to the right of named sheets.



- Right-click a sheet name, and choose either **Duplicate** or **Delete**.

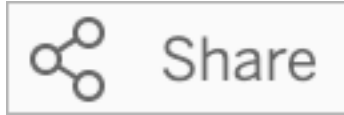
(To rename sheets from Ask Data, you need to save them in a new workbook.)

## Share Ask Data vizzes via email, Slack, or a link

You can quickly share Ask Data vizzes with anyone who has access to a lens.



1. In the upper right corner of the browser, click on the Share icon.

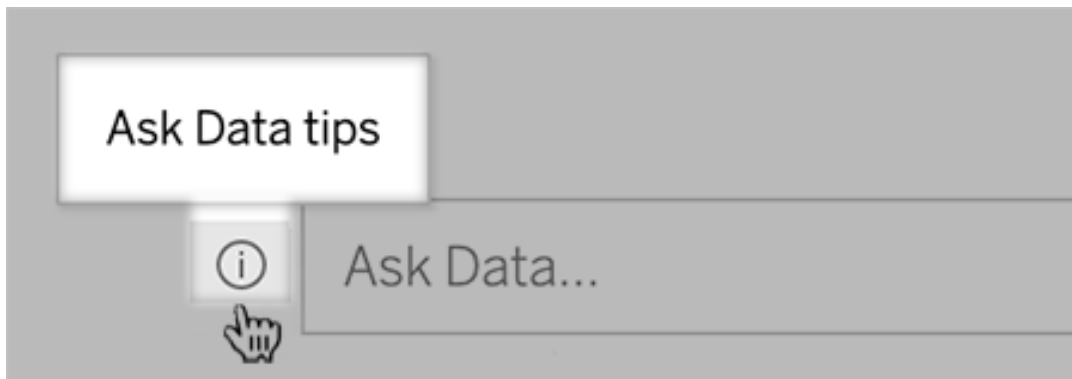


2. Do either of the following:
  - To share the viz via email or Slack, enter specific usernames in the text box. (Email and Slack integration must previously be configured by your Tableau administrator.)
  - To copy a URL, you can paste into custom emails and other messages, click **Copy Link**.

## Send feedback to the lens owner

If you have questions about the structure of a lens or how best to use it with Ask Data, you can send feedback directly to the author. (This option is enabled by default, but lens authors may disable it.)

1. To the left of the query box for Ask Data, click the **Ask Data tips** icon.



2. At the bottom of the tips dialog, click **Contact the Lens Author**.

## Tips for successful queries

As you structure questions for Ask Data, apply these tips to get better results.

- **Use keywords** – For example, instead of "I want to see all the countries that these airports are in", try "by airport and country".
- **Use exact wording for field names and values** – For example, if your lens includes Airport Code, Airport Name, and Airport Region fields, specify those by name.
- **See a ranked list** – Ask Data maps terms such as "best" and "worst" to Top 1 and Bottom 1, respectively. If you want to see broader rankings, use "high" and "low" instead. For example, enter "houses with low sale prices".
- **Query table calculations** – In query expressions for table calculation fields, note that you can't filter, limit or include "year over year difference".
- **Surround unusually long values with quotation marks** – To analyse long field values that contain line returns, tabs or more than ten words, surround them with quotation marks. To improve performance, Ask Data doesn't index fields of that length, or anything beyond the first 200,000 unique field values.

## Create Lenses that Focus Ask Data for Specific Audiences

### Important changes for Ask Data and Metrics

Tableau's Ask Data and Metrics features were retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. With advances in natural language technologies, we're developing an improved interface that will make it easier to ask questions of your data and stay on top of changes. For more information, see [How Tableau AI and Tableau Pulse are reimagining the data experience](#).

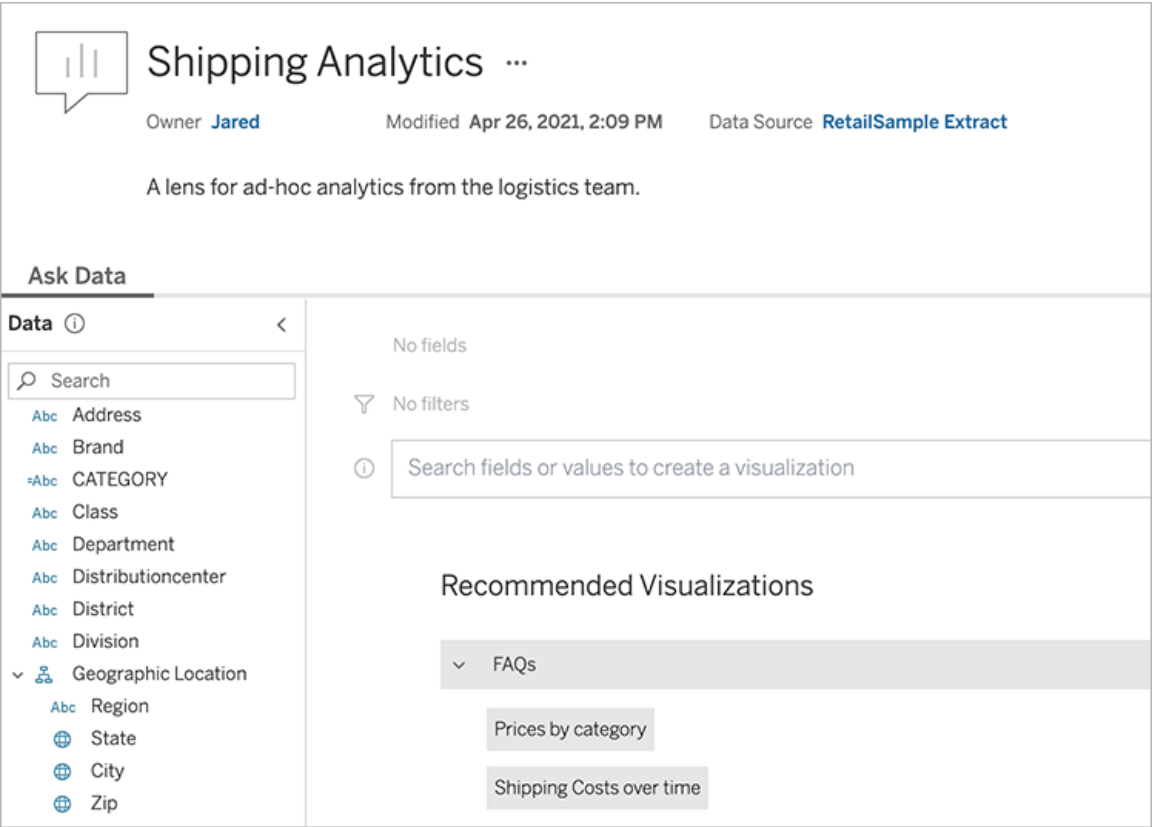
Most people don't need information from an entire data source but instead want data visualisations relevant to their job function, like sales, marketing or support. To optimise Ask Data for different audiences like these, Tableau authors create separate Ask Data *lenses*, which query a selected subset of fields. For the selected fields, authors can specify synonyms for field names and values, reflecting terms the lens audience uses in common language (for example, "SF" for "San Francisco"). Lens authors then customise the recommended visu-

alisations that appear below the Ask Data query box, which provide answers to users with a single click.

**Note:** Ask Data lenses can be created only for data sources published separately from a Tableau site. Lenses can't be created for data sources embedded in workbooks or those with a virtual connection.

Create or configure a lens page on your Tableau site

On your Tableau site, each lens has a separate page where users can query Ask Data and authors can configure lens fields, synonyms and suggested questions.

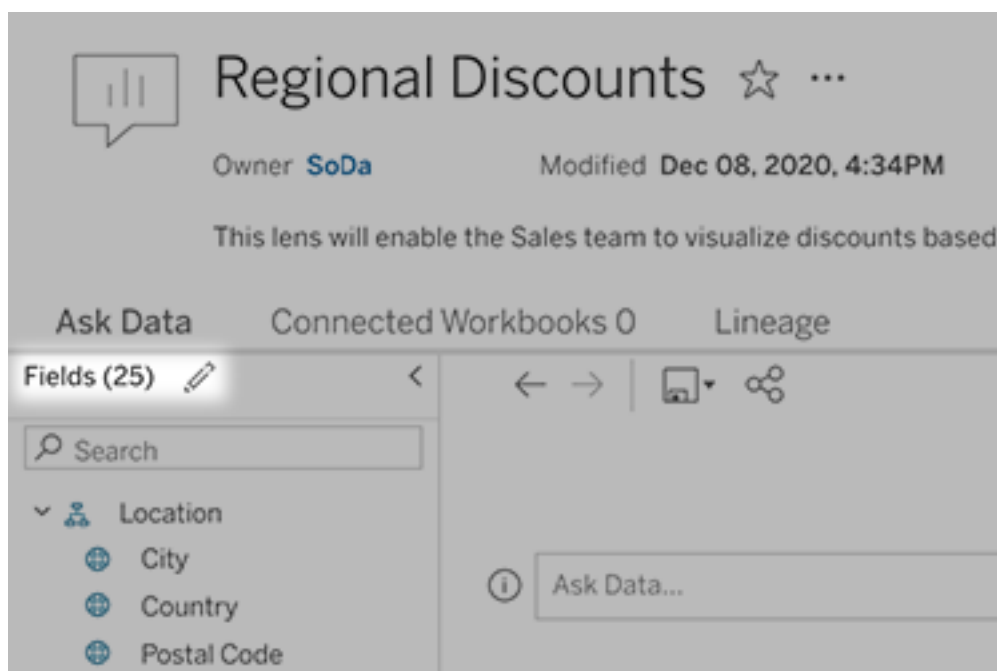


A lens page on a Tableau site

1. To create a lens page on your Tableau site, go to a data source page, and choose **New** > **Ask Data Lens**.

To configure an existing lens, go to the lens page on your site. (From an Ask Data object in a dashboard, you can click the pop-up menu in the upper corner and choose **Go to Lens Page**.)

2. If you're creating a new lens, enter a name, description and project location, and then click **Publish Lens**.
3. At the top of the Fields pane at left, click the pencil icon. Then select the relevant fields for lens users, and click **Save**.

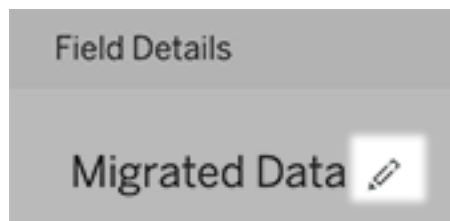


4. On the left, hover over individual tables or fields, and click on the pencil icon:



Then do any of the following:

- Provide a more representative name by clicking on the pencil icon to the right.



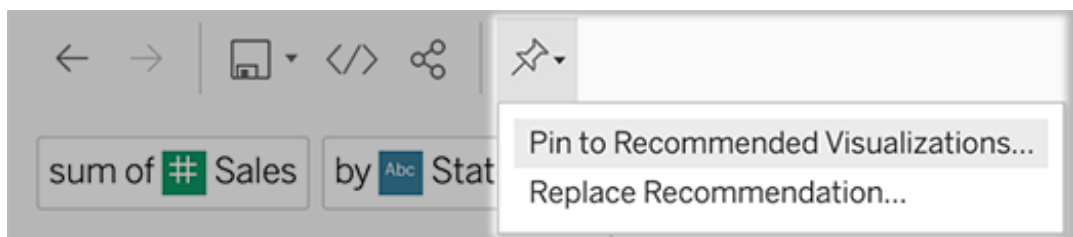
- Add common synonyms for field names and values that lens users may enter in their queries.
- Edit descriptions that appear when users hover over fields.

Change the list of recommended visualisations

To address common queries from lens users, you can customise the recommended visualisations that appear below the query box.



Add or replace a recommended visualisation

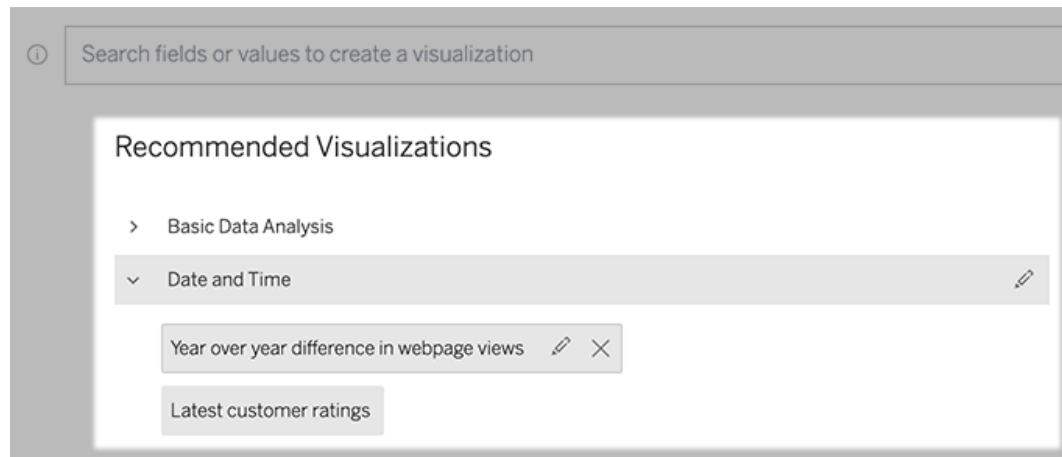
1. Enter a query into the text box, and press Enter or Return.
2. After the visualisation appears, from the pin icon in the toolbar, choose either **Pin to Recommended Visualisations** or **Replace Recommendation**.



3. For a new recommendation, enter a name and choose the section in which you want it to appear. For a replacement recommendation, choose the existing one you want to overwrite.

Edit section titles and recommendation names, or delete recommendations

- To edit a section title, click the pencil icon  to the right of the title.
  - To change the name of a recommendation, hover over it and click the pencil icon .
- To delete a recommendation, click the X.

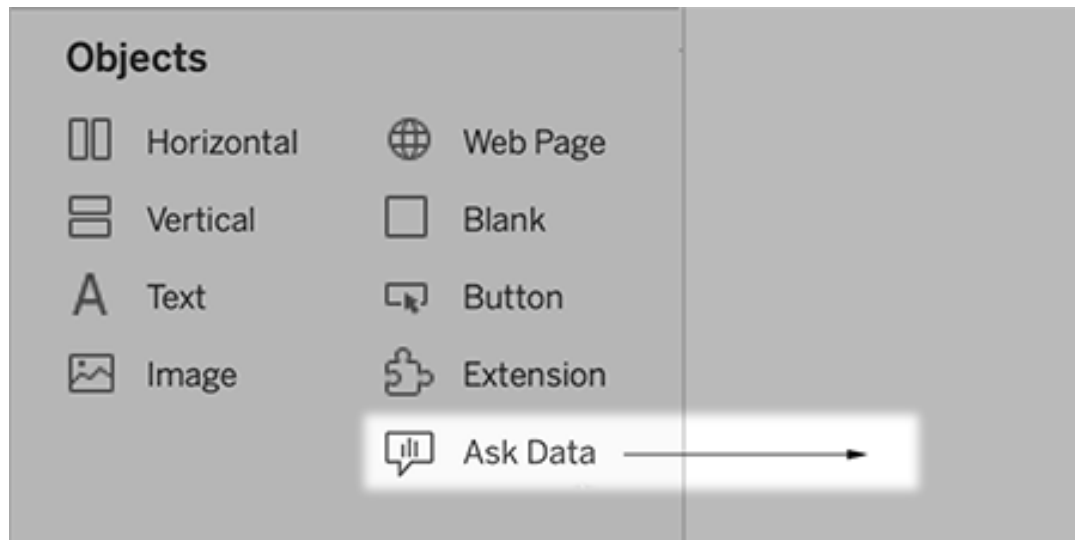


Add an Ask Data lens to a dashboard

On a dashboard, you can add an Ask Data object that lets users query a published data source via a lens on your Tableau site.

1. While editing a dashboard in Tableau Cloud or Tableau Server, drag the Ask Data object to the canvas.

**Note:** In Tableau Desktop, you can also drag an Ask Data object to the canvas for placement purposes. But to select a lens, you will need publish to Tableau Cloud or Tableau Server and edit the object there.

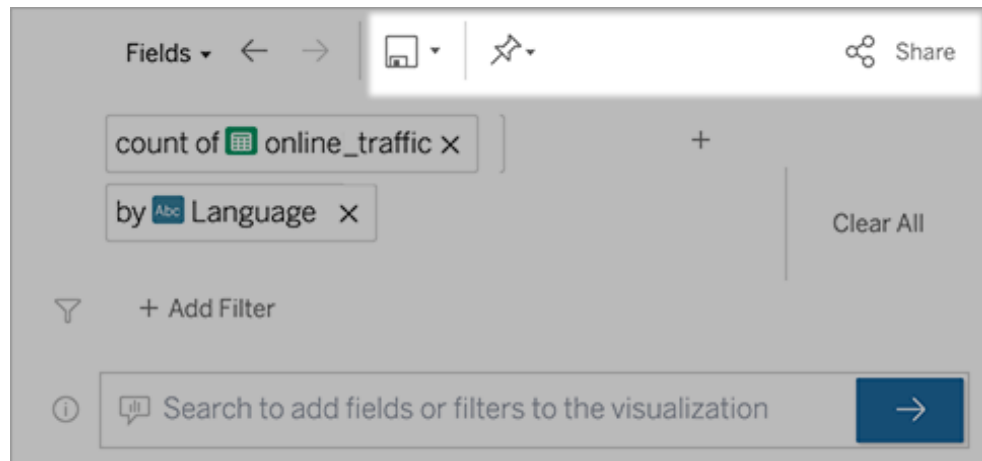


- 2.
3. Select a published data source previously connected to the workbook.
4. To use an existing lens, select it and click **Use Lens**.

Or, to create a new lens, do one of the following:

- If there are no lenses for the data source, click **Go to Data Source Page**.
  - If lenses already exist, click the data source name at the bottom of the dialog.
5. (New lenses only) Complete the steps in Create or configure a lens page on your Tableau site.
  6. Under **Toolbar Options for Lens Users**, select the buttons you want available to users.
    - **Add Visualisation to Pins** lets users [add to the Recommended Visualisations list](#), which appears just below the query box.
    - **Publish as Workbook** lets users [save visualisations as workbook sheets](#) to their Tableau site.
    - **Share Visualisation** lets users [share via email, Slack or a link](#).

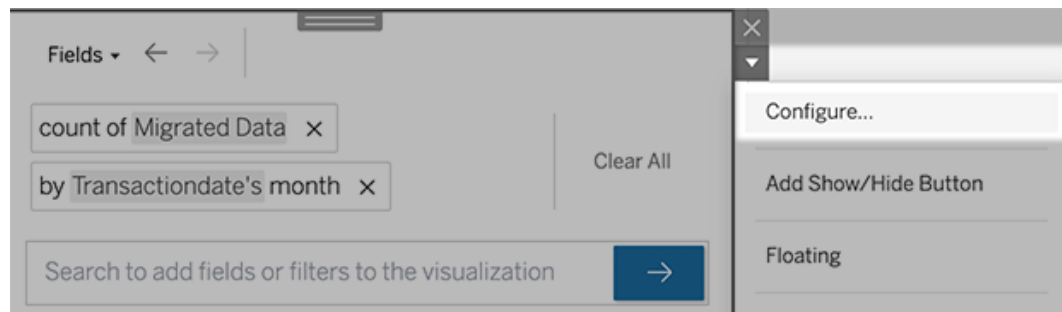
In the lens, the publish (save icon), pin and share options appear in the upper right corner:



7. (New lenses only) After you finish creating the lens, return to the Lens object in your dashboard and click **Refresh**. Then select the new lens, and click **Use Lens**.

Apply a different lens to an Ask Data dashboard object

1. From the pop-up menu at the top of the object, choose **Configure**.



2. Go to Add an Ask Data lens to a dashboard, and repeat steps 2 onward.

Change a lens name, description or project location

1. Navigate to the lens page on Tableau Cloud or Tableau Server.
2. To the right of the lens name at the top of the page, click the three dots (...), and choose **Edit Workbook**.
3. Click **Edit Lens Details**.



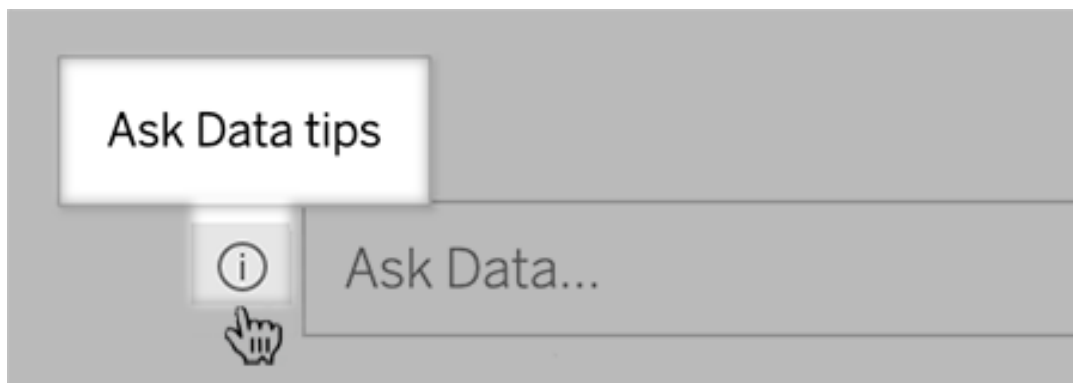
## Tableau Server on Windows Help

See how people use Ask Data with a lens

For data source owners and lens authors, Ask Data provides a dashboard that reveals the most popular queries and fields, the number of visualisation results that users clicked and other helpful information. Filters let you narrow data down to specific users and time ranges. These stats help you further optimise a lens to increase the success of your users.

**Note:** If you use Tableau Server, you can access this data in the Tableau Server Repository to create custom dashboards.

1. In Tableau Server or Tableau Cloud, navigate to a lens page.
2. To the left of the Ask Data text box, click on the "Ask Data tips" icon.



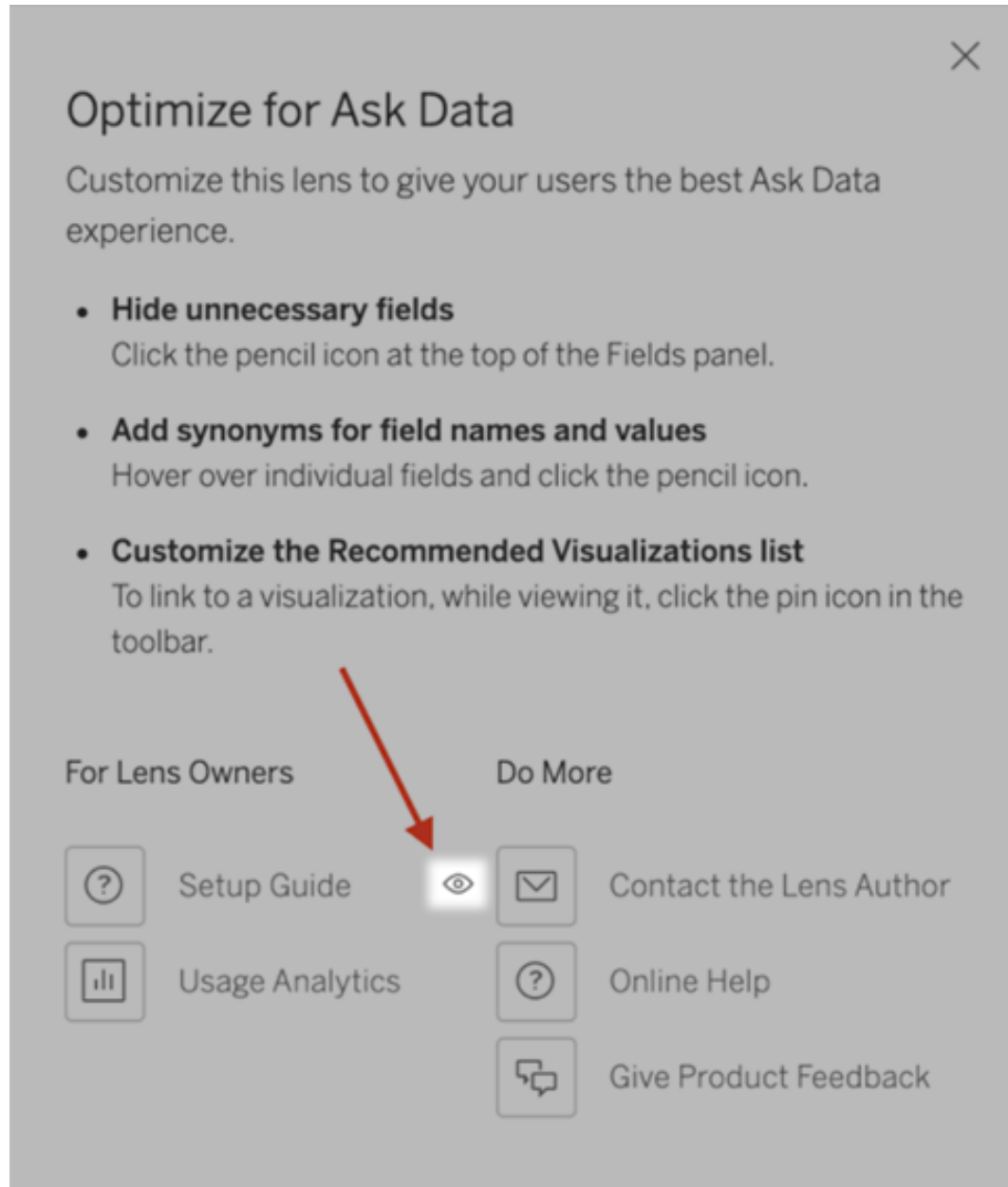
3. In the lower-left corner of the tips dialog, click **Usage Analytics**.

Let users email you questions about a lens

As a lens owner, you can allow users to email you with questions about data structure, expected results and more. This option is on by default, but you can turn it off using the steps below.

1. In Tableau Server or Tableau Cloud, navigate to a lens page.
2. To the left of the Ask Data text box, click on the "i" shown above in See how people use Ask Data with a lens.
3. At the bottom of the tips dialog, click on the eye icon next to "Contact the Lens Author" to

enable or disable feedback.



### Permissions for publishing and viewing lenses

For Ask Data objects in dashboards, no change to permissions should be required: by default, existing workbook authors can create lenses, and existing dashboard audiences can view

them. But for reference, here's a detailed outline of required lens permissions for both dashboards and direct access via a data source page.

To create and publish a lens, a user needs:

- The Creator or Explorer user role
- Lens Creation permission for the data source (inherited by default from the Connect permission)
- Write permission for the parent project to which the lens is published

To access and interact with a published lens, a user needs:

- The Viewer role or above
- Connect permission for the data source
- View permission for the lens

**Note:** By default, lens permissions like View reflect a project's permissions for workbooks. If Tableau administrators want to change default lens permissions, they can do so either individually for each project, or in bulk using the permissions API.

## Disable or Enable Ask Data for a Site

### Important changes for Ask Data and Metrics

Tableau's Ask Data and Metrics features were retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. With advances in natural language technologies, we're developing an improved interface that will make it easier to ask questions of your data and stay on top of changes. For more information, see [How Tableau AI and Tableau Pulse are reimagining the data experience](#).

Ask Data is enabled for sites by default, but Tableau administrators may disable it.

1. Go to the **General** site settings.
2. (Tableau Server only) In the **Web Authoring** section, select **Let users edit workbooks in their browser**.
3. In the **Availability of Ask Data** section, choose from these options:

- **Enabled** enables creation of Ask Data lenses for all published data sources.
- **Disabled** hides Ask Data throughout the site, while preserving information about previously created lenses so they can be restored if Ask Data is re-enabled.

**Note:** Beginning with version 2019.4.5, Tableau Server administrators can configure whether or not Ask Data is enabled by default.

## Optimise Data for Ask Data

### Important changes for Ask Data and Metrics

Tableau's Ask Data and Metrics features were retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. With advances in natural language technologies, we're developing an improved interface that will make it easier to ask questions of your data and stay on top of changes. For more information, see [How Tableau AI and Tableau Pulse are reimagining the data experience](#).

If you manage and publish data sources, here are some tips to help make users of Ask Data more successful. By spending a little extra time on this process, you'll open up data analysis to a wider range of people at your organisation, helping them independently answer questions and gain deeper insights.

#### Optimise data in Ask Data

In the Data pane on the left of the Ask Data interface, data source owners can add synonyms for fields and exclude irrelevant values.

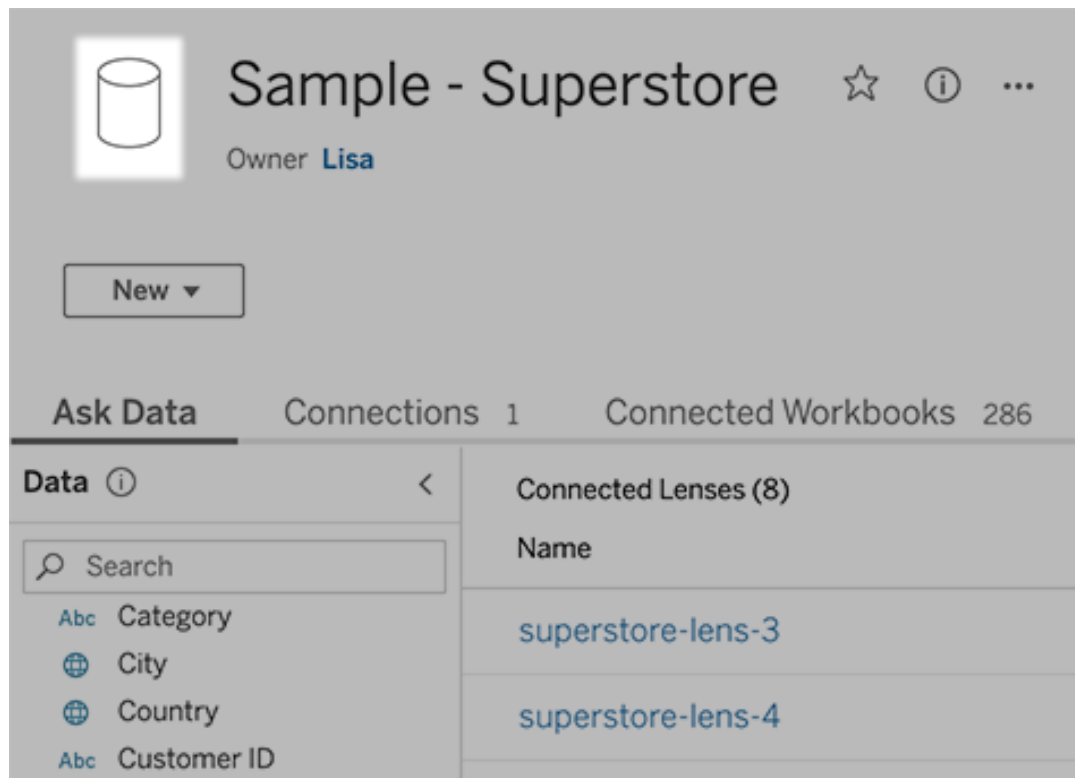
#### Changing settings at the data source or lens level

When changing settings in the Data pane for Ask Data, pay close attention to whether you're at the data source or lens level. (For more information, see [Create Lenses that Focus Ask Data for Specific Audiences](#).)

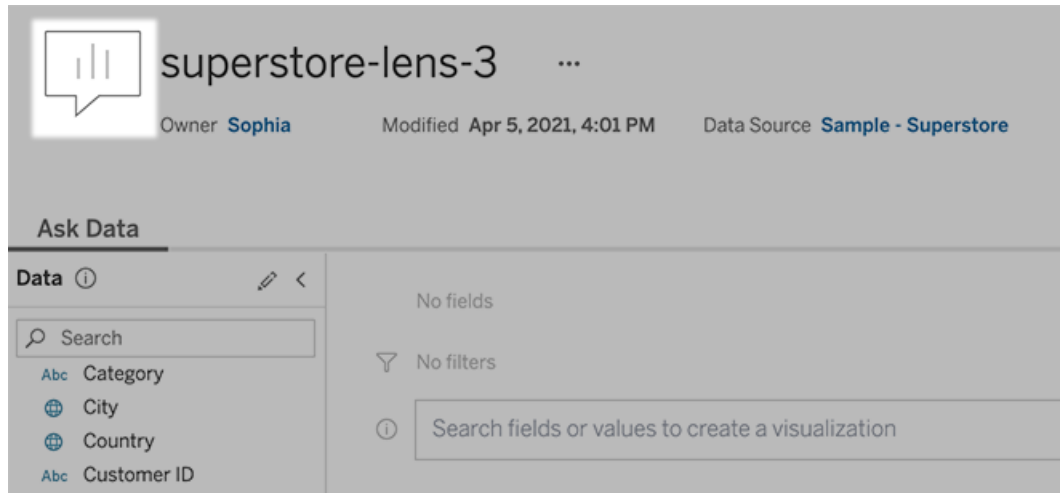
## Tableau Server on Windows Help

- At the data source level, you'll see the cylindrical data source icon in the upper left corner. Here, changes you make in the Data pane will apply by default to all subsequently created lenses.

**Note:** For extracts, two cylinders will appear.



- For an individual lens, you'll see the quotation icon in the upper left corner. Here, changes you make in the Data pane will apply to this lens alone.



### Add synonyms for field names and values

People may not use the same terminology found in your data source, so data source owners and Tableau administrators can **add synonyms for specific data field names and values**. Synonyms you enter are available throughout your organisation, making data analysis quicker and easier for everyone.

### Exclude values of specific fields from search results

To improve the usability of search results in Ask Data, you can exclude the values of specific fields from indexing. Though Ask Data doesn't add non-indexed values to search results, the values still appear in visualisation results when relevant. For example, if you don't index values from a "Product" field because they add unnecessary detail to search results, Ask Data can still display values such as "iPhone 12" in resulting data visualisations. And users can manually add non-indexed values to queries by surrounding them with quotation marks (for example, "Sales for Product containing "iPhone 12"").

**Note:** This field-level setting is ignored if **the value indexing setting for the data source** is set to Disabled. Field names and related synonyms are always indexed.

## Tableau Server on Windows Help

1. Go to the Ask Data tab for a data source or individual lens.
2. Hover over a data source field at left, and click the **Edit Field Details** icon (the pencil).



3. Deselect **Index field values**.

Either click the text box that appears to reindex the data source now, or let it reindex based on its regular indexing schedule.

### Optimise data sources

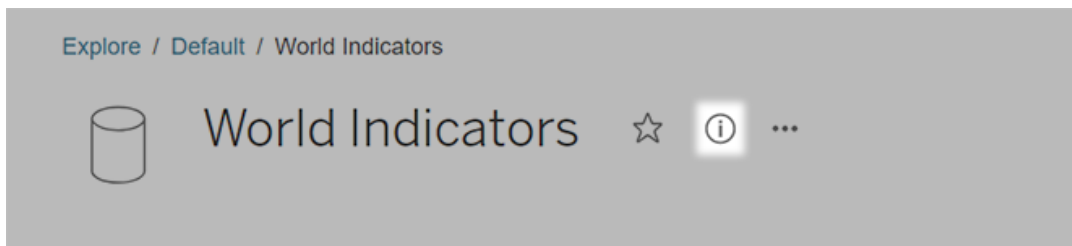
To create the best experience for Ask Data users, optimise the original data source.

**Note:** Ask Data doesn't support multidimensional cube data sources, or non-relational data sources like Google Analytics, or data sources with a virtual connection.

### Optimise indexing for Ask Data

Data source owners can change how often field values are indexed for Ask Data, optimising system performance.

1. At the top of a data source page, click the Details icon:

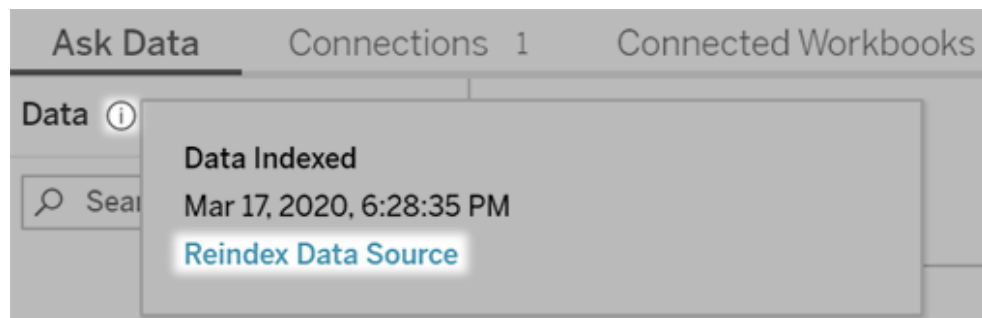


2. In the Ask Data section, click **Edit**.

## 3. Choose an indexing option for field values:

- **Automatic** checks for changes every 24 hours and analyses the data source if it is live, has had an extract refreshed, or has been republished. Choose this option for a data source frequently used with Ask Data, so it will be ready before users query it.
- **Manual** analyses the data source only when Tableau creators manually trigger indexing on the data source page. Choose this option if the data source changes frequently but users query it with Ask Data only occasionally.

To trigger manual indexing, go to the data source page, click the circled “i” in the Data pane at left, and then click **Reindex Data Source**.



- **Disabled** analyses only field names, not values.

4. Click **Save**

Use data extracts for faster performance

For improved performance and support for large data sets, use Ask Data with published extracts rather than live data sources. For more information, see [Create an extract](#).

Ensure that users can access the data source

To use Ask Data, users must have permission to connect to the individual data source. If a data source has row-level permissions, those permissions also apply to Ask Data, which won't recognise secure values or make related statistical recommendations.



Be aware of unsupported data source features

Ask Data supports all Tableau data source features except the following. If your data source contains these, Ask Data users won't be able to query related fields.

- Sets
- Combined fields
- Parameters

Anticipate user questions

Anticipate the kinds of questions your users will ask, and then optimise your data source for those questions using these techniques:

- Clean and shape data in **Tableau Prep** or a similar tool.
- **Join data** to include all fields users may have questions about in one table, improving performance.
- Add **calculated fields** that answer common user questions.
- Create **bins with appropriate sizes** for quantitative variables that users are likely to want to see as a histogram or another binned form.

Simplify the data

To make data easier to understand by both users and Ask Data, simplify the data source as much as possible during the data prep process.

1. Remove any unnecessary fields to improve performance.
2. Give each field a unique and meaningful name.
  - For example, if there are five field names that start with "Sales ...", better distinguish them so Ask Data can properly interpret the term "sales".
  - Rename "Number of records" to something more meaningful. For example, use "Number of earthquakes" in a data source where each record is an earthquake.
  - Avoid field names that are numbers, dates or boolean ("true" or "false") values.
  - Avoid names which resemble analytical expressions such as "Sales in 2015" or "Average Products Sold".
3. Create meaningful **aliases for field values**, reflecting terms people would use in conversation.

## Set appropriate field defaults

To help Ask Data analyse data correctly, ensure that default field settings reflect the content of each field.

- **Set data types** for text, time, date, geographic and other values.
- **Assign the proper data role:** dimension or measure, continuous or discrete.
- For each measure, **assign appropriate default settings** in Tableau Desktop, such as colour, sort order, number format (percentage, currency, etc.) and aggregation function. For example, SUM may be appropriate for “Sales”, but AVERAGE might be a better default for “Test Score”.

**Tip:** It's particularly helpful to set a default comment for each field, because these comments appear as informative descriptions when users hover over fields in Ask Data.

## Create hierarchies for geographic and categorical fields

For time data, Tableau automatically creates hierarchies, which let users quickly drill up and down in vizzes (for example, from day to week to month). For geographic and categorical data, however, we recommend that you **create custom hierarchies** to help Ask Data produce visualisations that reflect the relationships between fields. Be aware that Ask Data won't show the hierarchies in the data pane.

Ask Data doesn't index hierarchy names, only names of fields within hierarchies. For example, if a geographic hierarchy named “Location” contains “Country” and “City” fields, users should enter “Country” and “City” in their questions for Ask Data.

## Create a Tableau Data Story (English Only)

If you've ever written an executive summary of your Tableau dashboard, then you know it can be time-consuming. It takes time to choose which insights to share, and you have to rewrite your summaries each time the data is updated. Tableau Data Stories automatically generates narrative insights within your dashboard, saving time and surfacing relevant insights. As you

explore the vizzes in your dashboard, the stories written by Data Stories adjust, allowing you to dive deeper into data and identify key insights faster.

From where you're already working in Tableau, you can quickly add the **Data Story** object to your dashboard. And you can customise the terms and metrics used in your story so Data Stories speaks the language used by your business.

Today, you can write and view a Tableau Data Story anywhere you use Tableau. After you create your story, you can also view your Data Story in Tableau Mobile. However, Data Stories aren't included if you export your dashboard, for example to a PDF.

### Understand how Data Stories handles data

To write Data Stories, Tableau uses a service hosted in your Tableau Cloud or Tableau Server environment. When you Add a Tableau Data Story to a Dashboard or view a Data Story from a dashboard, Tableau sends associated worksheet data to the environment that you're logged in to (i.e. your Tableau Cloud site or your Tableau Server instance), using the security standards outlined in [Security in the Cloud](#) and [Security in Tableau Server](#). Data Stories can be written and viewed from anywhere you use Tableau.

### Learn about how Data Stories are written

Tableau Data Stories is powered by rules-based templated natural language generation (NLG). Data Stories performs automated analytics to determine relevant and accurate facts about the underlying data – from basic calculations to more advanced statistics. To write a story, Data Stories uses a library of predefined language templates to synthesise these facts into natural language insights. Data Stories processes these templates at run-time, using the most up-to-date summary data from the Tableau worksheet it is connected to. You can leverage the [custom language feature](#) to generate your own language templates, add functions and define business rules, helping you build a more relevant and contextual Data Story.

**Note:** Data Stories doesn't use generative AI, large language models (LLMs), or machine learning to write insights and stories.

## Manage Data Stories for your site

Tableau administrators can choose whether Tableau Data Stories are available for their site. Data Stories are turned on by default.

1. Sign in to your Tableau site.
2. From the left pane, choose **Settings**.
3. From the **General** tab, scroll to the **Availability of Data Stories** section.
4. Choose whether you want to **Turn on** or **Turn off** Data Stories.

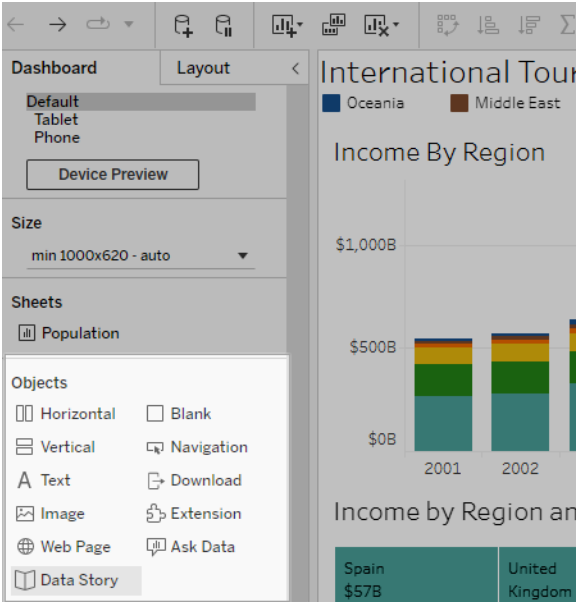
**Note:** If Data Stories are turned off, turning the feature back on restores Data Stories that were already in dashboards.

## Add a Tableau Data Story to a Dashboard

After you [Create a Dashboard](#), you can add the **Data Story** object to your dashboard to display insights about your viz that are written in natural language. Today, Tableau Data Stories are written in English only and are available in Tableau Cloud, Tableau Server (version 2023.1 and later), and Tableau Desktop. There is no data size limit when creating **Data Stories**. However, story generation times out after 45 seconds if it's trying to analyse a lot of data. We recommend using **Data Stories** with visualisations that have 1,000 or fewer data points.

**Note:** Tableau Data Stories opens in a pop-up window, so make sure you allow pop-ups. If you're using full screen mode, Data Stories can open in a new tab.


1. Drag the **Data Story** object into your Tableau dashboard. If you haven't already, add a sheet to your dashboard to use Tableau Data Stories.





2. In the Data Story dialog box, configure your story by first choosing the worksheet to write about. When you click **Next**, Tableau sends all associated workbook data to the

Tableau Cloud or Tableau Server instance that you are logged in to.

Configure

  
Views


  
Fields

  
Story

Choose a worksheet to write about.

☐ Tourism Over Time

☒ Tourism by Country/Region

 To write stories, Tableau processes summary data in the Tableau Cloud or Tableau Server instance you are logged in to. By clicking Next, you acknowledge that Tableau sends data in accordance with the foregoing.

[Learn More](#)

Next

3. Choose the dimensions and measures to include in your story.

Configure

Views

Fields

Story

Drag and drop fields to include in your narrative.

Dimensions

Country/Region<sup>1</sup>

Region<sup>2</sup>

Measures

AVG(GDP)<sup>1</sup>

AVG(Tourism Inbound)<sup>2</sup>

AVG(Tourism Outbound)<sup>3</sup>

Ignored

Back

Next

Tableau Software

987

4. Choose the type of story that best describes your data:

**Configure**

Views Fields **Story**

Choose the option that best describes your data. You can see a preview in the container.

☒ **Discrete (best fit)** For qualitative values such as names or dates.

☐ **Continuous** For quantitative values over time.

☐ **Percent of Whole** For proportions of a whole.

☐ **Scatter Plot** For relationships between numerical variables.

**Back** **Done**

**Discrete** is best for qualitative values such as names or dates, such as in bar or column charts.

**Continuous** is best for quantitative values over time, such as a plotted-in-a-line chart.

**Percent of Whole** is best for proportions of a whole, such as a pie chart.

**Scatter Plot** is best for relationships between numerical values, such as a scatter plot chart.

5. Click **Done**.

To filter your Data Story by clicking different sections on your visualisation, open the menu on your visualisation and click **Use as filter**.



After your story is generated, click **Settings** at the top of your **Data Story** object for a guided experience that helps you personalise and contextualise your story. For more information, see [Configure Settings for a Tableau Data Story](#).

**Note:** If you experience a discrepancy in your Tableau Data Story (for example, if the numbers in your story are different from your visualisation), it may be caused by way your visualisation is set up. Try creating a new visualisation on a different sheet, and then add a new Data Story with the Use a hidden sheet technique to uncover the underlying issue.

## Choose the Right Story Type for Your Tableau Data Story

When you Add a Tableau Data Story to a Dashboard, it's important to choose the right type of story for your data. Do you want your story about trends over time? Or do you want your story about two values that you're comparing? To help you tell the right story, this topic describes the different types of stories, including an example of each story type.

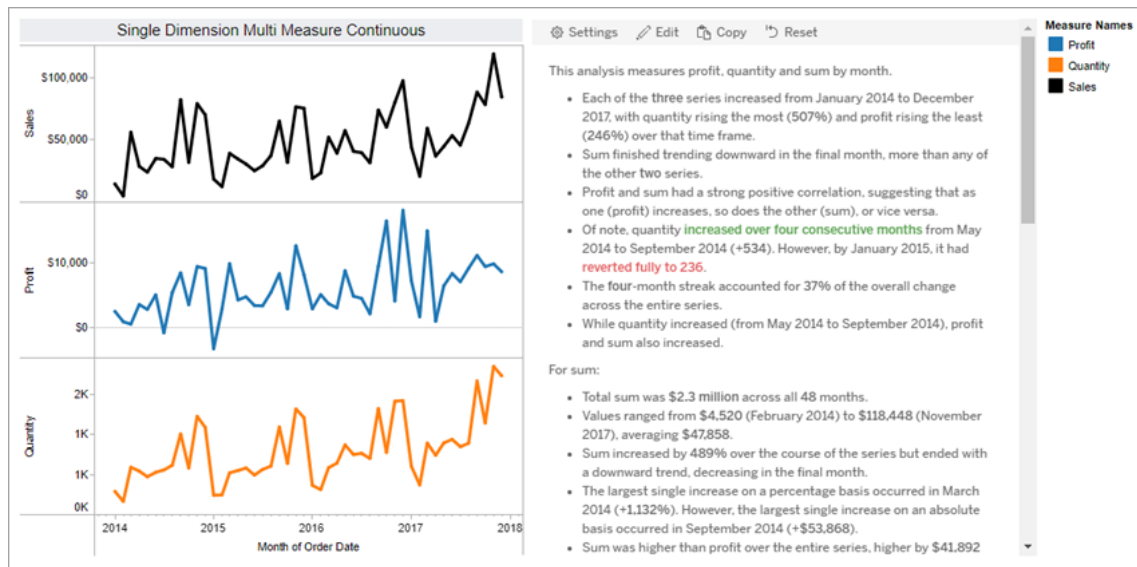
### Continuous

Continuous stories are best for analysing trends or progress over time.

When you create a continuous story, it includes content for performance, segments, volatility and trend lines. The story also includes contribution analysis and correlation for stories that use more than one dimension. To use a continuous story, your worksheet must have:

- 1 dimension that has between 1–10 measures
- 2 dimensions and up to 3 measures

The following example is a continuous story for a line chart that has a single dimension and multiple measures:



## Discrete

Discrete stories are best for comparing values and understanding the distribution of data in each value. When you create a discrete story, the story includes content about the distribution and groupings or clusters across the data. And the story includes contribution analysis for worksheets that use multiple dimensions.

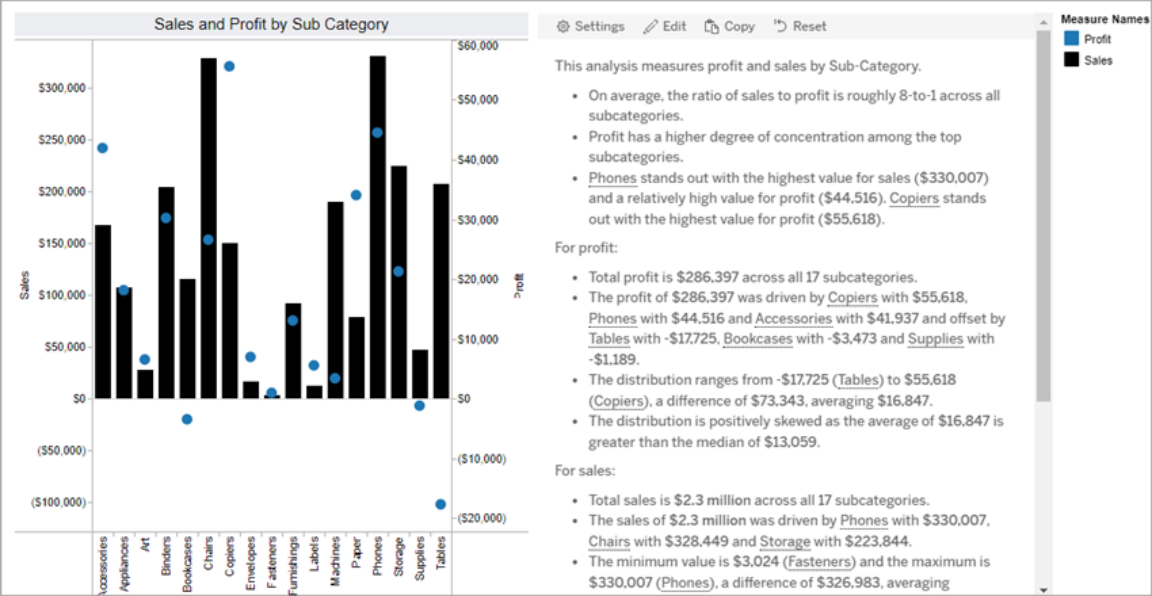
Consider using a discrete story when you want to:

- Understand drivers of your key performance indicators (KPIs) in sales reports.
- Identify and understand outliers quickly during data discovery.
- Identify trends that aren't easily observable in the visual when performing an audit.
- Uncover complex utilisation insights instantly for geographic analysis.
- Identify and call out key relationships, for example, between sales and profit.

To use a discrete story, your worksheet must have:

- 1 dimension that has between 1–10 measures
- 2 dimensions and up to 3 measures

The following example is a discrete story for a bar chart that has a single dimension and two measures:

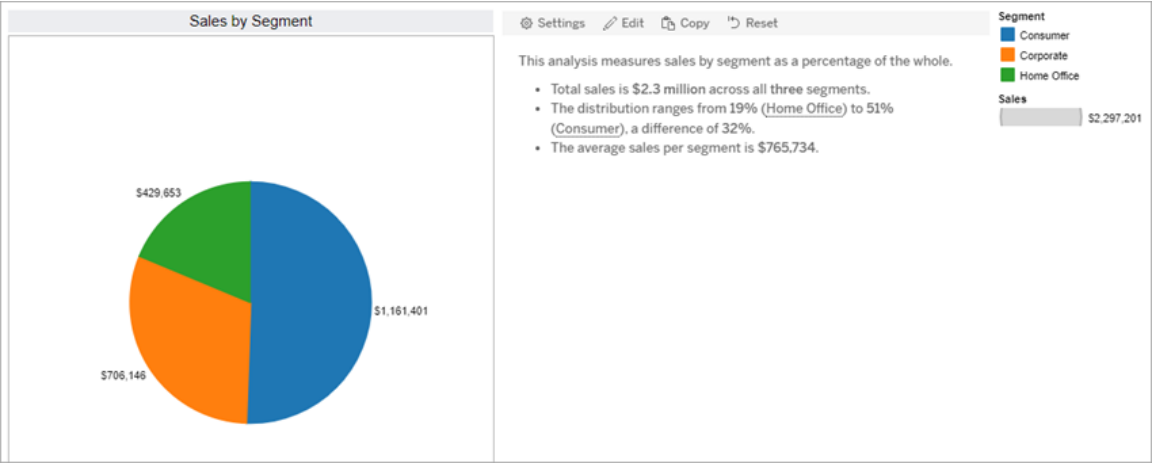


Percentage of whole

Percent-of-whole stories are best for pie charts. To use a percent-of-whole story, your worksheet must have:

- 1 dimension
- 1 measure

The following example is a percent-of-whole story that uses a pie chart with a single dimension and a single measure:



## Scatter plot

Scatter plot stories are best for understanding the relationship between two measures. When you create a scatter plot story, the story includes content about the relationship (regression) between two measures. And the story includes content about groups (clusters) within the data, when they exist.

Consider using a scatter plot story when you want to:

- Call out relationships between two measures to identify impact (regression analysis).
- Identify and understand outliers that are above or below defined thresholds.
- Analyse how your data is distributed.

To use a scatter plot story, your worksheet must have:

- 1 dimension
- 2 or 3 measures

**Note:** When you create your scatter plot story, the first measure you select is treated as the independent variable and the second measure is the dependent variable.

The following example is a scatter plot story that uses a scatter plot that has a single dimension and two measures:



## Configure Settings for a Tableau Data Story

After you Add a Tableau Data Story to a Dashboard, you can configure and edit your Tableau Data Story, so it's tailored to your needs – use language specific to your data, specify which analytics are written about and customise how your Tableau Data Story is displayed.

### Configure Tableau Data Story Settings: Analytics

Within your Tableau Data Story, you can choose which analytics to write about and when those analytics are written about. Different types of analytics are available depending on your story type and how many dimensions and measures your story has. However, analytics aren't currently supported for scatter plot story types. For more information, see [Choose the Right Story Type for Your Tableau Data Story](#).

#### Configure analytics for your story

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your **Data Story** object.
3. In the Data Story dialog box, click the **Analytics** tab.
4. Click the switches to turn on different types of analytics.

5. For **Segments** and **Trend line**, expand **Settings** to set thresholds for performing those analytics.
6. Click **Save**.

Understand different types of analytics

## Correlation

Use **Correlation** to identify true statistical correlations between two series. If you have more than two series, then all combinations are analysed for correlations. For example, you might turn on **Correlation** to identify when two products are often purchased together.

## Clustering

Use **Clustering** to identify distinct groups of data points (clusters) using a single statistical analysis. For example, you might turn on **Clustering** to identify when a product is very popular in a specific geographic region.

## Distribution

Use **Distribution** to rank data points relative to each other using non-statistical observations, such as mean, median, skew, etc. For example, you might turn on **Distribution** to identify which product has the highest profit ratio.

## Segments

Use **Segments** to highlight noteworthy changes to data points within a series. First, set the minimum percentage of change that you want to be written about in a segment. Changes that fall below your defined threshold aren't written about. For example, if you set your segment threshold for changes that are greater than 60%, then your story doesn't write about a trough in a time series that features a 30% decrease.

After you've set your threshold, choose whether to **Apply formatting**, and set the minimum percentage of change that you want formatted.

## Trend line

Use **Trend line** to calculate a linear best fit line and identify data that falls within a defined percentage of confidence. Data that has high variability has a lower confidence level than data that's more consistent, and that confidence level affects whether trend lines are written about. You can use trend lines for stories that have one dimension and one measure, or you can use trend lines in a drilldown. For more information about drilldowns, see [Configure Tableau Data Story Settings: Narrative](#).

Set the minimum percentage of confidence for your trend line. If you set your threshold at 95%, but a trend line could be drawn at 90% confidence, then your story doesn't write about trend lines. After you've set your threshold, choose whether to **Apply formatting**. Then set the minimum percentage of change that you want formatted.

Tableau Data Stories about trend lines communicate the absolute change over a period. The story written about your trend line varies depending on the level of verbosity you set for your story. If your story uses high verbosity, then your story writes about the R-squared value, which is a statistical concept that quantifies how well your data fits the trend line. For more information about verbosity settings, see [Configure Tableau Data Story Settings: Narrative](#).

Within the **Trend line** settings, you can also choose how many periods into the future for which you want your story to write predictions. When you use predictions, your story uses the slope and intercept of the trend line to calculate predicted values for future periods. The confidence of the prediction adds upper and lower bounds to the confidence threshold you set for trend lines. You can use predictions when your story has at least 30 data points that are linear.

## Volatility

Use **Volatility** to analyse standard deviations over time. For example, use **Volatility** when you want your story to write about values that fall outside the average range for your data.

Break down how analytics are used to generate stories

At this point, you might be wondering how the analytics for different story types work. Let's take a look at an example for each story type and break down each sentence in the story.

## Understand analytics for discrete stories

Because continuous stories measure trends over time, Data Stories writes about performance, progression, averages, totals, streaks, volatility, segments and predictions.

The following example of a continuous story is about sales per month:

This analysis measures Sales by month.

- Average Sales was **\$47,858** across all **48** months.
- The minimum value was **\$4,520** (February 2014) and the maximum was **\$118,448** (November 2017).
- Sales increased by **489%** over the course of the series but ended with a downward trend, decreasing in the final month.
- The largest single increase on a percentage basis occurred in March 2014 (**+1,132%**). However, the largest single increase on an absolute basis occurred in September 2014 (**+\$53,868**).
- Sales experienced cyclical, repeating each cycle about every **12** months. There was also a pattern of smaller cycles that repeated about every **three** months.
- Sales had a **significant positive peak between October 2014 (\$31,453) and February 2015 (\$11,951), rising to \$78,629 in November 2014.**
- The **overall linear trend of the series rose at \$902 per month** for an absolute change of **\$42,394** over the course of the series.

Example story	Story breakdown
<ul style="list-style-type: none"> <li>• Average Sales was <b>\$47,858</b> across all <b>48</b> months.</li> <li>• The minimum value was <b>\$4,520</b> (February 2014) and the maximum was <b>\$118,448</b> (November 2017).</li> </ul>	The first two sentences use average and range functions to write about the average, maximum and minimum values across the period you're analysing.
<ul style="list-style-type: none"> <li>• Sales increased by <b>489%</b> over the course of the series but ended with a downward trend, decreasing in the final month.</li> </ul>	The third sentence is about overall performance of the measure over the period. For example, a sentence can be about whether sales increased, decreased or trended differently during a specific period.
<ul style="list-style-type: none"> <li>• The largest single increase on a percentage basis occurred in March 2014 (<b>+1,132%</b>). However, the largest single increase on an absolute basis occurred in September 2014</li> </ul>	The fourth sentence uses progression analysis. This sentence writes about the largest increase and decrease based on the measure during the period using both a percentage basis and an absolute basis.



<p>(+\$53,868).</p>	
<ul style="list-style-type: none"> <li>• Of the <b>three</b> series, the strongest relationship was between Corporate and Home Office, which had a moderate positive correlation, suggesting that as one (Corporate) increases, the other (Home Office) generally does too, or vice versa.</li> </ul>	<p>This sentence is a <b>Correlation</b> insight. This type of analytic insight writes about notable correlations between different series in your data.</p>
<ul style="list-style-type: none"> <li>• Sales experienced cyclicity, repeating each cycle about every <b>12</b> months. There was also a pattern of smaller cycles that repeated about every <b>three</b> months.</li> <li>• Sales had a <b>significant positive peak between October 2014 (\$31,453) and February 2015 (\$11,951), rising to \$78,629 in November 2014.</b></li> </ul>	<p>This sentence is a <b>Segment</b> insight. This type of analytic insight writes about noteworthy increases and decreases over time.</p>
<ul style="list-style-type: none"> <li>• The <b>overall linear trend of the series rose at \$902 per month</b> for an absolute change of <b>\$42,394</b> over the course of the series. If this trend continued for the next one month, Sales is <b>predicted to be about \$69,958.</b></li> </ul>	<p>This sentence is a <b>Trend line</b> insight. This type of insight writes about how well trends fit your data with a certain percentage of confidence, and trend lines allow you to make predictions based on historic trends.</p>

## Understand analytics for discrete stories

Because discrete stories allow you to compare values and understand the distribution of the data, the story writes about distribution, averages, totals and groupings or clusters across the data.

The following example of a discrete story is about sales by product:

This analysis measures Sales by product.

- Total Sales is **\$2.3 million** across all **17** products.
- The Sales of **\$2.3 million** was driven by Phones with **\$330,007**, Chairs with **\$328,449** and Storage with **\$223,844**.
- The distribution ranges from **\$3,024** (Fasteners) to **\$330,007** (Phones), a difference of **\$326,983**, averaging **\$135,129**.
- The distribution is positively skewed as the average of **\$135,129** is greater than the median of **\$114,880**.
- Sales is somewhat concentrated with **eight** of the **17** products (**47%**) representing **78%** of the total.
- The top **two** products represent over a quarter (**29%**) of overall Sales.
- Phones (**\$330,007**) is more than **two** times bigger than the average across the **17** products.

Example story	Story breakdown
<ul style="list-style-type: none"> <li>• Total Sales is <b>\$2.3</b> million across all <b>17</b> products.</li> </ul>	The first sentence calculates the total value of your measure.
<ul style="list-style-type: none"> <li>• The Sales of <b>\$2.3</b> million was driven by <u>Phones</u> with <b>\$330,007</b>, <u>Chairs</u> with <b>\$328,449</b> and <u>Storage</u> with <b>\$223,844</b>.</li> </ul>	The second sentence writes about the dimension drivers. In this example, the dimension drivers are the products that contributed the most to total sales.
<ul style="list-style-type: none"> <li>• The distribution is positively skewed as the average of <b>\$135,129</b> is greater than the median of <b>\$114,880</b>.</li> <li>• Sales is relatively concentrated with <b>78%</b> of the total represented by <b>eight</b> of the <b>17</b> products (<b>47%</b>).</li> </ul>	The third and fourth sentences analyse the distribution of the data. This analyses the averages, medians, concentration of data (if any exist), and how the data is skewed. This helps identify how balanced these grouped variables are compared to one another.
<ul style="list-style-type: none"> <li>• The top <b>two</b> products combine for over a quarter (<b>29%</b>) of overall Sales.</li> </ul>	This sentence uses <b>Clustering</b> to write about measures that can be grouped. This helps identify whether there are distinct groups that stand out in the data.
<ul style="list-style-type: none"> <li>• <u>Phones</u> (<b>\$330,007</b>) is more than two times bigger than the average across the <b>17</b> products.</li> </ul>	The final sentence writes about notable outliers.

# Understand analytics for scatter plot stories

Scatter plot story types are best used to understand the relationship between two measures, and for that reason, scatter plot stories require 2–3 measures. The scatter plot analysis writes about the relationship (regression) between two measures, and it writes about groups (clusters) within the data, if they exist.

The following example of a scatter plot story is about profit and sales across a dimension:

This analysis measures profit, quantity and sales across 793 customer.

- As quantity increased and profit increased, sales increased based on the data provided. Specifically, when quantity increased by 1, sales increased \$49.55, and when profit increased by \$1.00, sales increased \$1.20.
- Few customers deviated from this general relationship, indicating a good fit.
- When organized into groups of similar profit, quantity and sales values, one distinct group stands out. There were 651 customers that had values of profit between -\$6,626 and \$1,488, quantity between 2 and 122 and sales between \$4.83 and \$5,690.
- Tamara Chand, Raymond Buch and Sanjit Chand, among others were outliers with high profit and sales values. Sean Miller stood out with a low profit and high sales value.
- The minimum value for profit is -\$6,626 (Cindy Stewart) and the maximum value is \$8,981 (Tamara Chand), a difference of \$15,608. The average profit per customer is \$361 and the median is \$228.
- The minimum value for quantity is 2 (Anthony O'Donnell) and the maximum value is 150 (Jonathan Doherty), a difference of 148. The average quantity per customer is 47.76 and the median is 44.
- The distribution of sales ranges from \$4.83 (Thais Sissman) to \$25,043 (Sean Miller), a difference of \$25,038. The average sales per customer is \$2,897 and the median is \$2,256.

Example story	Story breakdown
<ul style="list-style-type: none"><li>As quantity increased and profit increased, sales increased based on the data provided. Specifically, when quantity increased by 1, sales increased by \$49.55, and when profit increased by \$1.00, sales increased by \$1.20.</li><li>Few customers deviated from this gen-</li></ul>	The first two sentences are powered by regression analytics. Regression shows how one measure affects another. Notice that in the first sentence, the story has identified a relationship between profit and sales.

<p>eral relationship, indicating a good fit.</p>	
<ul style="list-style-type: none"> <li>When organised into groups of similar profit, quantity and sales values, one distinct group stands out. There were <b>651</b> customers that had values of profit between <b>-\$6,626</b> and <b>\$1,488</b>, quantity between <b>2</b> and <b>122</b> and sales between <b>\$4.83</b> and <b>\$5,690</b>.</li> </ul>	<p>The third sentence is derived from clustering. Clustering analytics tries to identify key groups or clusters across all the variables in the data.</p>
<ul style="list-style-type: none"> <li><u>Tamara Chand</u>, <u>Raymond Buch</u> and <u>Sanjit Chand</u>, among others, were outliers with high profit and sales values. Sean Miller stood out with a low profit and high sales value.</li> </ul>	<p>The fourth sentence is written about outliers – values that fall significantly above or below the average.</p>
<ul style="list-style-type: none"> <li>The minimum value for profit is - <b>\$6,626</b> (<u>Cindy Stewart</u>) and the maximum value is <b>\$8,981</b> (<u>Tamara Chand</u>), a difference of <b>\$15,608</b>. The average profit per customer is <b>\$361</b> and the median is <b>\$228</b>.</li> <li>The minimum value for quantity is <b>2</b> (<u>Anthony O'Donnell</u>) and the maximum value is <b>150</b> (<u>Jonathan Doherty</u>), a difference of <b>148</b>. The average quantity per customer is <b>47.76</b> and the median is <b>44</b>.</li> <li>The distribution of sales ranges from <b>\$4.83</b> (<u>Thais Sissman</u>) to <b>\$25,043</b> (<u>Sean Miller</u>), a difference of <b>\$25,038</b>. The average sales per customer is <b>\$2,897</b> and the median is <b>\$2,256</b>.</li> </ul>	<p>The remaining sentences for scatter plot stories use range and average analysis to write insights.</p>

# Understand analytics for percentage of whole stories

Percentage of whole story types is best for understanding what part of a whole a dimension or measure represents.

The following example of a percentage of whole story is about sales by segment:

This analysis measures sales by segment as a percentage of the whole.

- Total sales is \$2.3 million across all three segments.
- The minimum value is 19% (Home Office) and the maximum is 51% (Consumer), a difference of 32%.
- The average sales per segment is \$765,734.

Example story	Story breakdown
<ul style="list-style-type: none"><li>• Total SUM (Sales) is 2.3 million across all three entities.</li></ul>	The first sentence calculates the total value of your measure.
<ul style="list-style-type: none"><li>• The SUM (Sales) of 2.3 million was driven by Consumer with 1.2 million, Corporate with 706,146 and Home Office with 429,653.</li></ul>	The second sentence writes about drivers. In this example, the drivers are segments that contributed the most to total sales.
<ul style="list-style-type: none"><li>• The minimum value is 429,653 (Home Office) and the maximum is 1.2 million (Consumer), a difference of 731,748, averaging 765,734.</li></ul>	The final sentence analyses the distribution of the data.

## Configure Tableau Data Story Settings: Characteristics

Within your Tableau Data Story, you can configure the characteristics settings to give context to your data, so you get more insightful stories. For example, in your story, you can specify that in the context of sales, a higher number is good. But in the context of customer complaints, a higher number is bad.

## Use dimension and measure characteristics

Your story and number formatting adjust based on what the measure is. By default, your story writers all measure values as numbers, and your story won't perform any additional calculations or apply any special rendering rules.

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click the **Characteristics** tab.
4. Configure your formatting, such as number type, decimal places and negative values.
5. Click **Save**.

Learn more about measure characteristics

## Formatting

If values are formatted as **Percentages**, then the story writes about percentage point differences, rather than percentage changes as a story would for number values. When you format a number as a **Percentage** in the **Characteristics** tab, the **Data Story** multiplies the value of the number by 100 to create the percentage that appears in your story.

If values are formatted as **Currency**, then you can specify your preferred currency. You can also specify how you want large values (numbers greater than one million) formatted, for example \$1.3 million instead of \$1,300,000.00.

For both **Numbers** and **Currency**, you can specify how you want large values and negative values to be written about. If you choose to have negative values written about in brackets, you might see nested brackets in your story when the negative value is written about in a parenthetical phrase.

When you choose **Number** formatting, you can also specify whether you want numbers less than or equal to 10 to be spelled out (rather than using a numeral) in your story.

For decimal places, **Dynamic** is the default option. This means that the story rounds to different decimal places depending on how large or small the number is. If the percentage value is less than 10, then the number has two decimal places. If the percentage value is greater

than 10, then the number rounds to the nearest whole number. You can also specify how many decimal places you want used, which is used consistently throughout your story.

## Content

You can assign meaning to larger values. For example, larger values for sales are good, but larger values for losses are bad.

In addition, you can choose how to aggregate values by sum or average. It's a best practice to choose the same aggregation method that you're using in the viz. For ratio measures, choose **Average** and then define the ratio by selecting the component measures of that ratio measure. Measures that are components of a ratio must be summable.

The screenshot shows the 'Content' settings panel in Tableau. On the left is a sidebar with tabs: Narrative, Characteristics, Analytics, Drivers, Relationships, and Display. The 'Content' tab is selected. The main area contains the following settings:

- Content**
- Assign meaning to larger values.
  - ☒ Good
  - ☐ Neutral
  - ☐ Bad
- Choose how to aggregate SUM(Quantity).<sup>ⓘ</sup>
  - ☐ Sum
  - ☒ Average
- SUM(Quantity) is a ratio.
  - ☒ Ratio
- SUM(Quantity) is a ratio of: <sup>ⓘ</sup>
  - SUM(Profit) / SUM(Sales)

For cumulative measures (available for continuous stories only), choose **Sum** and then specify that the measure is already cumulative. Continuous stories write about the total of the measure across the series.

## Sorting

To sort dimension values, click the arrow up/down icon to sort based on the oldest or newest time values in your dimension.

**Note:** Sorting dimension values is available only for continuous stories.

### Configure Tableau Data Story Settings: Display

You can configure how the text in your Tableau Data Story is displayed, such as font colour and size. You can also choose whether your story uses bulleted lists or paragraphs.

Configure the display for your story

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click on the **Display** tab.
4. Choose whether you want your story structure to be **Bullets** or **Paragraphs**.
5. Choose your **Font Size**.
6. Pick colours to represent good and bad changes (available for continuous stories).
7. Choose whether to use **Dynamic Ordering**.
8. Choose whether to use a **Condensed View**.
9. Click **Save**.

Understand when to use story display settings

To use colour, your story must be continuous. When using colour, you can choose colours from the palette to represent good changes and bad changes. For your story to know whether a change is good or bad, you must assign meaning to larger values in the **Characteristics** tab. For more information, see [Configure Tableau Data Story Settings: Characteristics](#). After you configure your display, the styles and colours are applied in your story based on thresholds for trend line or segment analytics.

If you turn on **Dynamic Ordering**, the insights for measures in a story are dynamically ordered from the best to the worst average value. If you already have an order you want to maintain, turn off **Dynamic Ordering**.

If you turn on **Condensed View**, additional space is removed from your story. This is helpful if you don't have much extra space in your dashboard or when you have multiple Data Story objects in a dashboard.



## Configure Tableau Data Story Settings: Drivers

Hypothetically, let's say your month-over-month sales increased significantly. What drove that increase in sales? And what might have detracted from (offset) those increased sales? Setting up drivers in your Data Story can answer those questions.

In Data Stories, drivers contribute towards a total value. Offsetters detract from a total value. You'll find insights about drivers and offsetters in discrete and continuous stories. And these insights make it easy to understand exactly what's going on in the data and why.

### Set dimension drivers

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click the **Drivers** tab.
4. From the **Dimension Drivers** section, select the type of driver that has the greatest impact on your analysis:  
For **Count**, set the maximum number of contributors and offsetters.  
For **Individual %**, set thresholds for writing about individual contributors and offsetters.  
For **Cumulative %**, set thresholds for writing about contributors and offsetters based on their collective value.
5. Click **Save**.

### Understand dimension driver types

- **Count** specifies the number of entities (contributors and offsetters) called out in your story. For example, use **Count** to see the top three contributors and offsetters in your data.
- **Individual %** sets a threshold, and values higher than that threshold are included in your story. For example, use **Individual %** to specify that you want to write about only entities that represent more than 5% of the total value.
- **Cumulative %** sets a percentage threshold of the total value that included entities collectively account for. For example, use **Cumulative %** to specify that you want to write about the entities that contributed to at least 90% of that total value. In this example, entities are written about in order of magnitude until the cumulative value of those entities account for 90% of the total value.

## Use secondary contributors

To use secondary contributors, you must have a second dimension that isn't time. When you use secondary contributors, each driver that is written about also has details about and drivers for its secondary contributor. For example, if you are analysing store sales, a secondary contributor would be a class within a department. Secondary contributors allow for deeper analysis. But secondary contributors can also contain a lot of information to fit into a single sentence in your story.

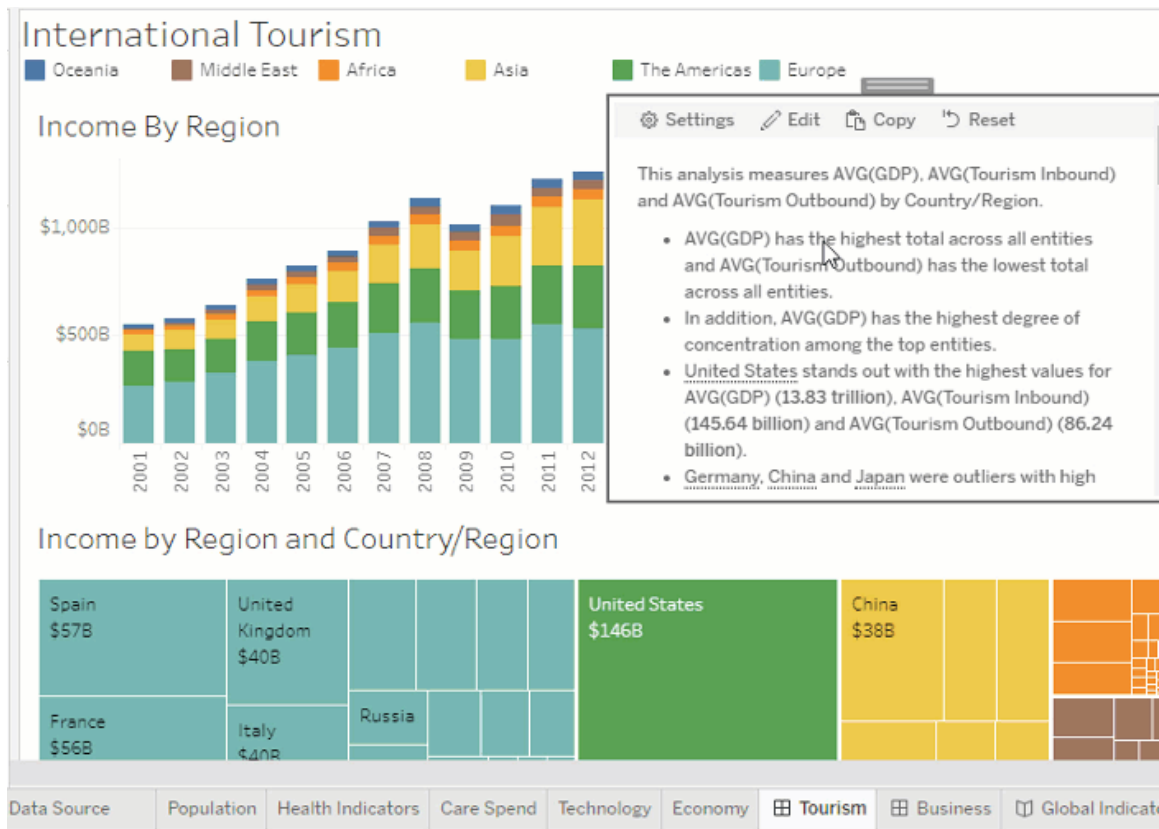
## Set metric drivers

For measures that are composed of other subcategory measures, driver analysis can explain the impact that each measure had on the top-level value. For example, material costs and operating costs contribute to total cost.

To use metric drivers, you must have multiple measures for metric analysis. Then, you can specify the relationships between each measure.

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click the **Drivers** tab.
4. From the **Metric Drivers** section, first choose the measure that is a subcategory of another measure.
5. Then, choose the measure that is the primary category.
6. Click **Save**.

**Tip:** The verbosity setting also applies to drivers. By changing your story's verbosity setting, you can adjust the way insights are written. If you use high verbosity, then you'll see more information in brackets. If you use low verbosity, then you'll get a more concisely written insight about your drivers. For more information, see [Configure Tableau Data Story Settings: Narrative](#).



## Configure Tableau Data Story Settings: Narrative

You can customise the narrative settings of your Tableau Data Story. Specifically, you can specify the verbosity and level of analytical detail in your story, and you can add terms that are unique to your data. These settings help you write a story that uses the right language and speaks to the right level of detail for your dashboard.

### Set verbosity

Verbosity specifies the length and analytical detail written in your story. If you choose high, your story has longer insights, with more analytic analysis. If you choose low, your story is more concise, with fewer details.

If you allow viewers to change verbosity, viewers of published dashboards can change the level of verbosity in the Data Story object. This is helpful when your dashboard is used by a broader audience with viewers who want varying levels of detail from your story.

## Set drilldowns

A drilldown includes two dimensions, and drilldowns describe figures associated with each dimension of your dashboard.

Let's say you have a dashboard that has monthly sales by product category. Your story is configured to write about both the **Time** and **Category** dimensions. In this case, this story includes an insight for each Category that describes its performance in and across the **Time** dimension.

By setting the maximum number of drilldowns, you can control how many insights are included in your story. Drilldown insights are also ranked based on the meaning assigned to the measure characteristics. As the number of drilldowns is reduced, the lowest performing measures (measures that are assigned a Bad meaning) are eliminated.

## Add dimension terms

By adding terms, you can define the way each of your measures and dimensions are labelled and referenced in your story.

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click on the **Narrative** tab.
4. Expand the dimension to see how it will be written about in both singular and plural form.
5. Click **Add Term** to add another variation for your story to use to describe your dimension.
6. Click **Save**.

Your story uses (at random) the terms you've added when writing about a dimension.

## Manage measure labels

Similarly to dimensions, you can manage labels used for measures in your story.

1. From the **Narrative** tab, expand the measure to see its label.
2. Enter the new label that you want used for your measure.

3. Click **Save**.

Configure Tableau Data Story Settings: Relationships

The **Relationships** setting allows you to assign relationships between measures in a Tableau Data Story that has multiple measures. To configure Relationships, your story must have one dimension and multiple measures. For more information, see [Create Custom Measure Relationships in Your Tableau Data Story](#).

There are two types of relationships:

- Actual vs. Benchmark
- Current/Most Recent vs. Previous Period

Use **Actual vs. Benchmark** when you want to know if you're performing above or below your performance benchmarks, for example, when performing quota reporting. This type of relationship is also helpful for identifying data points that require additional analysis because they're significantly above or below your benchmark. To use **Actual vs. Benchmark**, the measures you're comparing must have the same value type.

Use **Current/Most Recent vs. Previous Period** when you want to see if your key performance indicators (KPIs) are increasing, decreasing or remaining consistent over time. To use **Current/Most Recent vs. Previous Period**, you must use a discrete story type. For more information, see [Choose the Right Story Type for Your Tableau Data Story](#).

Additionally, you can use **Actual vs. Benchmark** and **Current/Most Recent vs. Previous Period** relationships simultaneously. Measures in your viz that aren't part of the configured relationships are written about in separate paragraphs.

Create Actual vs. Benchmark relationship for continuous or discrete stories

Use the **Actual vs. Benchmark** relationship when one measure is a benchmark for other measures. For example, you could compare actual sales to a sales target so your story writes insights about whether you outperformed or underperformed your goal. When you use this type of relationship, the story removes unnecessary content and focuses on what's most important – comparing a metric to its associated benchmark.

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click the **Relationships** tab.
4. Tick the box for **Actual vs. Benchmark**.
5. First, select the measure that is the benchmark.
6. Then, select the measure that you want to compare against the benchmark.
7. Click **Save**.

#### Create Current/Most Recent vs. Previous Period relationship

Use the **Current/Most Recent vs. Previous Period** relationship to compare the performance of two measures over a period. For example, you could compare two products to see which product generated the most revenue over the last year.

1. Add a Tableau Data Story to a Dashboard.
2. From your dashboard, click on the **Settings** icon in the top-left corner of your Data Story object.
3. In the Data Story dialog box, click the **Relationships** tab.
4. Tick the box for **Current/Most Recent vs. Previous Period**.
5. First select the measure for the previous period.
6. Then, select the measure for the current period.
7. Enter the label for the period that you're measuring, for example, year.
8. Choose the number of periods to measure.
9. Click **Save**.

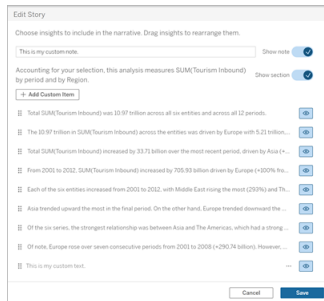
## Customise Your Tableau Data Story

You can use custom language, tailored to your audience, to supplement your Tableau Data Stories with insights specific to your business. Identify the analytics and data from the Data Story that matters most to your audience, and use your own language to create the most impactful story. As with the overall Tableau Data Story, data and variables used in custom content are dynamic, adjusting along with the dashboard.

#### Add your own insights

1. In your **Data Story**, click **Edit** to open the Edit dialog box.
2. Find the section you want to write about and click **Add Custom Item**.

## Tableau Server on Windows Help



3. Enter your custom text in the field that appears.
4. Click **Save**.

### Add headers and footers

You can insert custom text at the top and bottom of your **Data Story**. With headers and footers, you can add your own qualitative analysis to stories, include additional explanations of data trends or append legal and privacy disclaimers.

1. In your **Data Story**, click **Edit** to open the Edit dialog box.
2. Click the **Show note** switch.
3. Enter your custom note.



4. Click **Save**.

Your note now appears at the top or bottom of your **Data Story**.

### Add functions

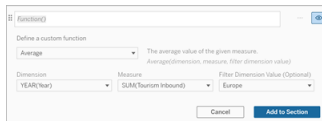
Using a function in your Data Story is a great way to customise your story and find the insights that are most important to you and your business.

For example, if you want to know the average sum of tourism revenue over a period, select **Average** as your function and then designate the measure as **SUM (Tourism Inbound)**. This returns the average sum of inbound tourism.

1. In your **Data Story**, click **Edit** to open the Edit dialog box.
2. Click the menu on the right-hand side of the box and select **Add Function**.



3. Select a Data Story Function and fill in the required fields.



4. Click **Add to Section**.
5. Click **Save**.



The custom content now appears in your Data Story.

## Add conditions

For each custom sentence you write, you can add a condition that determines whether the sentence renders in your **Data Story**. If the condition is met, the custom sentence appears in your story. If the condition isn't met, the custom sentence doesn't appear.

You can apply multiple conditions to each custom sentence, and the conditions can be combined using the **Any** or **All** buttons within the Add a condition dialog box.

Conditional statements are most often used with numerical comparisons, but the function also supports string matching using the equal (=) or not equal (!=) symbols.

1. In your Data Story, click **Edit** to open the Edit dialog box.
2. Enter your custom sentence.



3. Click the menu on the right-hand side of the box and select **Add Condition**.
4. Define the custom function to be used to inform the conditional logic. In this example, the sentence "We have met our quota" appears if the Sum of Tourism Inbound is greater than 5 trillion.

5. Click **Add to Section**.
6. Click **Save**.

The custom sentence now appears in your Data Story only if the conditions are met.

### Duplicate custom content

You can easily duplicate custom content added to your Data Story, making it easier to build different variations of a sentence. We recommend copying a fully built custom sentence when applying thresholds, building in language variation and creating different logical variations.

1. In your Data Story, click **Edit** to open the Edit dialog box.
2. Create a custom sentence, complete with functions and conditions, if desired.
3. In the completed sentence box, Click the menu in the right-hand side of the box and select **Duplicate**.

4. Click into your duplicated sentence, update as desired and click **Add to Section**.
5. Click **Save**.

When you copy a sentence, all functions and conditional statements also copy over. The copied bullet appears directly below the original bullet in the same section.

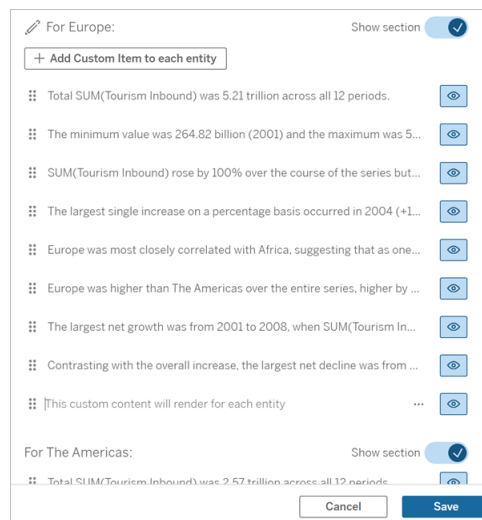
**Note:** Copied bullets can only be added to the section that the original bullet is in.

## Add custom content in drilldown sections

For stories that have two dimensions, each section after the first section is called a drilldown section. Drilldown sections focus on an individual primary dimension entity (i.e. The Americas in the following example).

Because the drilldown sections have the same content structure, custom content added in the first section (i.e. Europe) is applied to each additional section (i.e. The Americas). You can only create or edit content in the first drilldown section.

1. In your Data Story, click **Edit** to open the Edit dialog box.
2. In the first drilldown section, click **Add Custom Item** to each entity.
3. Enter your custom content.
4. Click **Save**.



Custom content in drilldown sections already has a context variable called Current Category value (dynamic). This creates a dimension value option called Current Category value (dynamic), which always represents the section that the drilldown section is about.

**Tip:** To create content that only appears in a single specific drilldown section, you can use conditional logic to ensure it only writes where appropriate.

## Customise Your Tableau Data Story: Context Variables

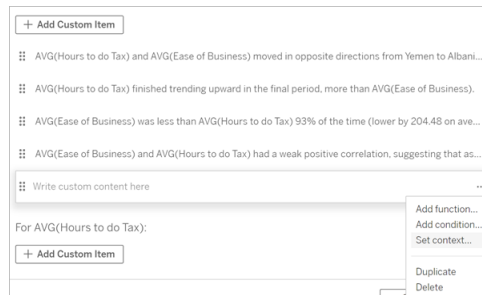
Context variables are functions that can be referenced by other functions. In other words, you can use context variables to nest functions within other functions.

After you define your context variable, it appears as a function that you can use when adding new functions to your Tableau Data Story.

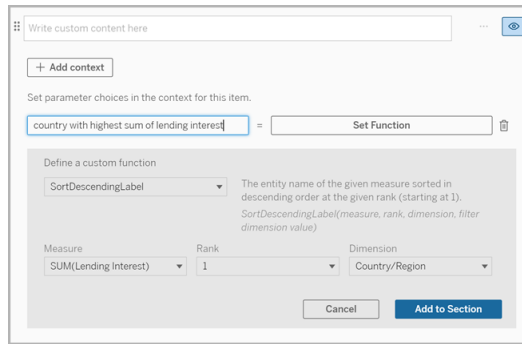
**Note:** You can have multiple context variables set for each custom sentence, but you must define each context variable separately for each piece of custom content.

### Set a context variable

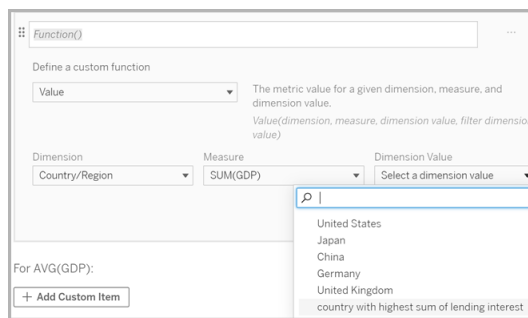
1. In your **Data Story**, click **Edit** to open the Edit dialog box.
2. Click **Add Custom Item**.
3. Click the menu in the right-hand side of your custom content box and select **Set context**.



4. Click **Add context**.
5. Name the context variable and click **Set Function**.
6. Define your custom function and choose a dimension.



7. Click **Add to Section**.
8. Click back into the sentence where you set your context variable.
9. Follow the steps to Add functions.



Now your context variable is listed as an option in the **Dimension Value** drop-down list when adding your function.

When to use a context variable: reference two or more measures

Let's say that you want to refer to two or more measures in one analytical sentence in your **Data Story**. Without a context variable, we can write a sentence for only one measure at a time. But if we use a context variable, we can reference more than one measure in one sentence.

To reference two or more measures with a context variable, your **Data Story** must have:

- 1 dimension
- 2 or more measures

1. In your **Data Story**, click **Edit** to open the Edit dialog box.
2. Click **Add Custom Item**.
3. Click the menu in the right-hand side of your custom content box and select **Set context**.
4. Click **Add context**.
5. Name the context variable and click **Set Function**.
6. Define your custom function and choose a dimension.
7. Click **Add to Section**.

Set parameter choices in the context for this item.

Country with the highest GDP = Set Function

Define a custom function

SortDescendingLabel

The entity name of the given measure sorted in descending order at the given rank (starting at 1).  
SortDescendingLabel(measure, rank, dimension, filter dimension value)

Measure: SUM(GDP) Rank: 1 Dimension: Country/Region

Cancel Add to Section

8. Click back into the sentence where you set your context variable.
9. Add your first function and fill in the required fields. In this example, we selected **DimensionValueLabel**, then chose Country/Region from **Dimension** and then country with the highest GDP (our context variable) from **Dimension Value**.

Function()

Define a custom function

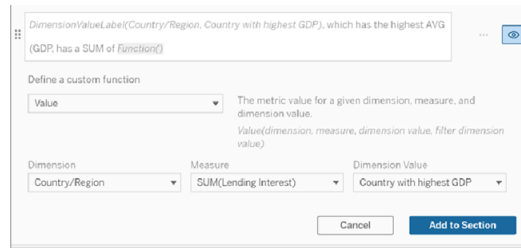
DimensionValueLabel

The label for a dimension value. Most useful in combination with "Current (dynamic)."  
DimensionValueLabel(dimension, dimension value)

Dimension: Country/Region Dimension Value: Country with the highest GDP

Cancel Add to Section

10. Click **Add to Section**.
11. Add your second function and fill in the required fields. In this example, we selected **Value**, then chose Country/Region from **Dimension**, SUM(Lending Interest) from **Measure** and country with the highest GDP (our context variable) from **Dimension Value**.



12. Click **Add to Section**.

13. Click **Save**.

Your **Data Story** writes a sentence that gives us insight into a secondary measure (Lending Interest) for the country that we're interested in (the country with the highest GDP).



When to use a context variable: period-over-period analysis

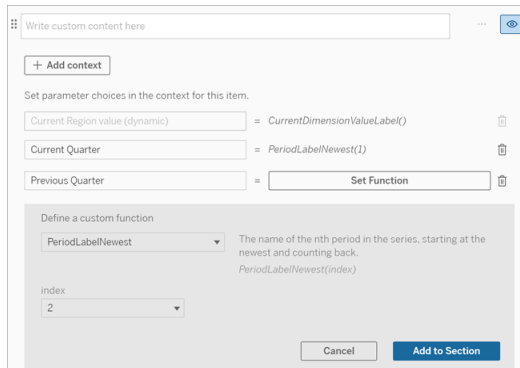
A context variable is helpful when you want to analyse performance over two different periods in your **Data Story**. You can create a custom sentence that writes about a measure displayed in your drilldown section and compares the measure against different periods, such as year on year or month on month.

To set up a period-over-period analysis, your Data Story must have:

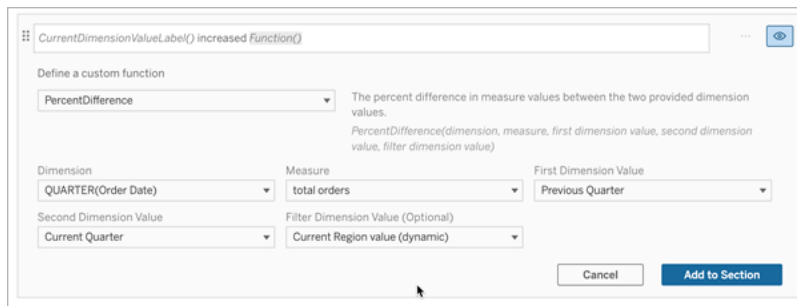
- 2 dimensions: 1 time period dimension (primary) and 1 non-time period dimension (secondary)
- 1–3 measures

1. Create your **Data Story**.
2. In the Fields dialog box, make sure your time period dimension is ordered first and click **Next**.

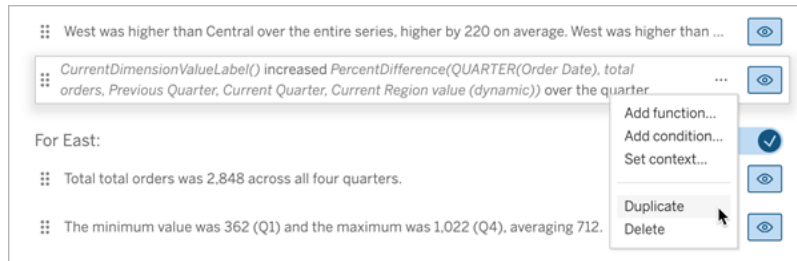
3. In the Story dialog box, select **Continuous** and click **Done**.
4. Open the Edit dialog box and select **Add Custom Item** in the first drilldown area.
5. Create two context variables that represent your time periods. For example, "Current Quarter" and "Previous Quarter."



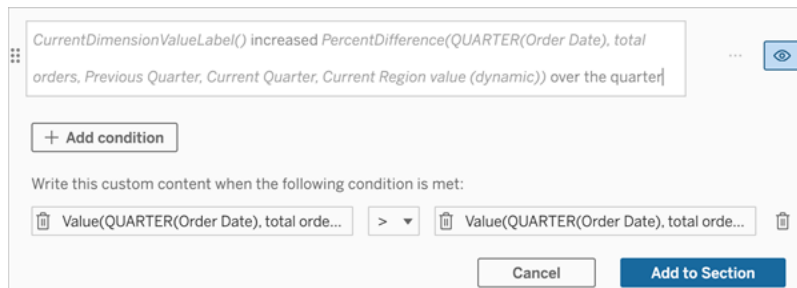
6. Create an *increased* sentence by adding custom language and functions. The content of this sentence results in "[CurrentDimensionValueLabel] increased [X%] over the quarter."
7. Type in the function followed by the word "increased" in the custom text box.
8. Add the function that returns the percentage change of your measurement during your time period.



9. Click **Add to Section**.
10. Duplicate custom content and create a *decreased* version by replacing the word "increased" with "decreased." The functions stay the same.



11. Add conditions for each sentence so that only one is written, depending on the data.



12. For the *increased* sentence, set conditions in line with the following example:

Left Argument = Value function

Dimension = Quarter (OrderDate). Select your time period dimension

Measure = SUM (Total Orders). Select the measure you used for the calculation

Dimension Value = Current Quarter. One of the context variables

Filter Dimension Value = Current Region value (dynamic). This is the preset context variable

Middle Argument = > (greater than)

Right Argument = Value function

Dimension = Quarter (OrderDate). Select your time period dimension

Measure = Total (Total Orders). Select the measure you used for the calculation



Dimension Value = Previous Quarter. One of the context variables

Filter Dimension Value = Current Region value (dynamic). This is the preset context variable

CurrentDimensionValueLabel() increased PercentDifference(QUARTER(Order Date), total orders, Previous Quarter, Current Quarter, Current Region value (dynamic)) over the quarter

+ Add condition

Write this custom content when the following condition is met:

Value(QUARTER(Order Date), total orde... > Value(QUARTER(Order Date), total orde...

Cancel Add to Section

13. For the *decreased* sentence, set the same conditions, but replace the > (greater than) sign with the < (less than) sign. The right and left arguments remain the same.
14. Click **Save**, and your **Data Story** writes a sentence that includes the insights from analysing the two time periods.

## Customise Your Tableau Data Story: Functions

If you'd like to customise your Tableau Data Story with a function, it helps to know what functions you can use, what each function does and what dimensions and measures you'll need for each function.

Learn how to Add functions to your Data Story.

Click a letter to see functions that begin with that letter. If no functions start with that letter, the functions that start with the next letter in the alphabet are shown. You can also press Ctrl+F (Command-F on a Mac) to open a search box that you can use to search the page for a specific function.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

## Average

Description: The average value of the given measure.

Syntax: Average(dimension, measure, filterDimensionValue)

## Count

Description: The number of dimension values within a given dimension.

Syntax: Count (dimension)

## Difference

Description: The difference in measure values between the two provided dimension values.

Syntax: Difference (dimension, measure, firstDimensionValue, secondDimensionValue, filterDimensionValue)

## DifferenceFromMean

Description: The difference between the mean and the measure value for the given dimension value.

Syntax: DifferenceFromMean (dimension, measure, firstDimensionValue, filterDimensionValue)

## Direction

Description: Language describing the direction (e.g. increase or decrease) between measure values for the two provided dimension values.

Syntax: Direction (dimension, measure, firstDimensionValue, secondDimensionValue, filterDimensionValue, phrase)

## Ending Label

Description: The name of the last period in the series.

Syntax: Label (measure)

## EndingValue

Description: The value at the last period in the series for the given measure.

Syntax: EndingValue (measure, filterDimensionValue)

## Label

Description: The label for the given measure.

Syntax: Label (measure)

## LargestNegativeChangeDifference

Description: The value of the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangeDifference (measure, filterDimensionValue)

## LargestNegativeChangeEndingLabel

Description: The name of the ending period for the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangeEndingLabel (measure, filterDimensionValue)

## LargestNegativeChangeEndingValue

Description: The ending value of the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangeEndingValue (measure, filterDimensionValue)

## LargestNegativeChangePercentDifference

Description: The percentage change of the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangePercentDifference (measure, filterDimensionValue)

## LargestNegativeChangeStartingLabel

Description: The name of the starting period for the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangeStartingLabel (measure, filterDimensionValue)

## LargestNegativeChangeStartingValue

Description: The starting value of the largest negative period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestNegativeChangeStartingValue (measure, filterDimensionValue)

## LargestNegativePercentChangeDifference

Description: The value of the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangeDifference (measure, filterDimensionValue)

## LargestNegativePercentChangeEndingLabel

Description: The name of the ending period for the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangeEndingLabel (measure, filterDimensionValue)

## LargestNegativePercentChangeEndingValue

Description: The ending value of the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangeEndingValue (measure, filterDimensionValue)

## LargestNegativePercentChangePercentDifference

Description: The percent change of the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangePercentDifference (measure, filterDimensionValue)

## LargestNegativePercentChangeStartingLabel

Description: The name of the starting period for the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangeStartingLabel(measure, filterDimensionValue)

## LargestNegativePercentChangeStartingValue

Description: The starting value of the largest negative period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestNegativePercentChangeStartingValue (measure, filterDimensionValue)

## LargestPositiveChangeDifference

Description: The value of the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangeDifference (measure, filterDimensionValue)

## LargestPositiveChangeEndingLabel

Description: The name of the ending period for the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangeEndingLabel (measure, filterDimensionValue)

## LargestPositiveChangeEndingValue

Description: The ending value of the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangeEndingValue (measure, filterDimensionValue)

## LargestPositiveChangePercentDifference

Description: The percentage change of the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangePercentDifference (measure, filterDimensionValue)

## LargestPositiveChangeStartingLabel

Description: The name of the starting period for the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangeStartingLabel (measure, filterDimensionValue)

## LargestPositiveChangeStartingValue

Description: The starting value of the largest positive period-over-period difference, on an absolute basis, in the given series.

Syntax: LargestPositiveChangeStartingValue (measure, filterDimensionValue)

## LargestPositivePercentChangeDifference

Description: The value of the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangeDifference (measure, filterDimensionValue)

## LargestPositivePercentChangeEndingLabel

Description: The name of the ending period for the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangeEndingLabel (measure, filterDimensionValue)

## LargestPositivePercentChangeEndingValue

Description: The ending value of the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangeEndingValue (measure, filterDimensionValue)

## LargestPositivePercentChangePercentDifference

Description: The percent change of the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangePercentDifference (measure, filterDimensionValue)

## LargestPositivePercentChangeStartingLabel

Description: The name of the starting period for the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangeStartingLabel (measure, filterDimensionValue)

## LargestPositivePercentChangeStartingValue

Description: The starting value of the largest positive period-over-period difference, on a percentage basis, in the given series.

Syntax: LargestPositivePercentChangeStartingValue (measure, filterDimensionValue)



## LongestStreakDifference

Description: The difference over the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakDifference (measure, filterDimensionValue)

## LongestStreakDirection

Description: The direction (positive or negative) of the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakDirection (measure, filterDimensionValue)

## LongestStreakEndingLabel

Description: The name of the ending period for the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakEndingLabel (measure, filterDimensionValue)

## LongestStreakEndingValue

Description: The ending value of the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakEndingValue (measure, filterDimensionValue)

## LongestStreakLength

Description: The largest number of periods of consecutive increase or decrease for the given series.

Syntax: LongestStreakLength (measure, filterDimensionValue)

## LongestStreakPercentDifference

Description: The percent difference over the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakPercentDifference (measure, filterDimensionValue)

## LongestStreakStartingLabel

Description: The name of the starting period for the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakStartingLabel (measure, filterDimensionValue)

## LongestStreakStartingValue

Description: The starting value of the longest streak of consecutive increases or decreases for the given series.

Syntax: LongestStreakStartingValue (measure, filterDimensionValue)

## MaxLabel

Description: The name of the entity with the maximum value for the given measure.

Syntax: MaxLabel (dimension, measure, filterDimensionValue)

## MaxValue

Description: The maximum value for the given measure.

Syntax: MaxValue (measure)

## Median

Description: The median value for the given measure.

Syntax: Median (dimension, measure, filterDimensionValue)

## MinLabel

Description: The name of the entity with the minimum value for the given measure. Syntax:

MinLabel (dimension, measure, filterDimensionValue)

## MinValue

Description: The minimum value for the given measure.

Syntax: MinValue (dimension, measure, filterDimensionValue)

## PercentDifference

Description: The percentage difference in measure values between the two provided dimension values.

Syntax: PercentDifference (dimension, measure, firstDimensionValue, secondDimensionValue, filterDimensionValue)

## PercentOfWhole

Description: The percentage in measure values for a given dimension value over the total measure values for that dimension.

Syntax: PercentOfWhole (dimension, measure, DimensionValue, filterDimensionValue)

## PeriodLabel

Description: The name of the nth period in the series, starting at 1.

Syntax: PeriodLabel (index)

## PeriodLabelNewest

Description: The name of the nth period in the series, starting at the newest and counting back.

Syntax: PeriodLabelNewest (index)

## PeriodValue

Description: The value of the given measure at the nth period in the series, starting at 1.

Syntax: PeriodValue (measure, index, filterDimensionValue)

## PeriodValueNewest

Description: The value of the given measure at the nth period in the series, starting at the newest and counting back.

Syntax: PeriodValueNewest (measure, index)

## Range

Description: The difference between the maximum and minimum values for the given measure.

Syntax: Range (dimension, measure, filterDimensionValue)

## SortAscendingLabel

Description: The entity name of the given measure sorted in descending order at the given rank (starting at 1).

Syntax: SortAscendingLabel (measure, rank, dimension, filterDimensionValue)

## SortAscendingValue

Description: The value of the given measure sorted in ascending order at the given rank (starting at 1).

Syntax: SortAscendingValue (measure, rank, dimension, filterDimensionValue)

## SortDescendingLabel

Description: The entity name of the given measure sorted in descending order at the given rank (starting at 1).

Syntax: SortDescendingLabel (measure, rank, dimension, filterDimensionValue)

## SortDescendingValue

Description: The value of the given measure sorted in descending order at the given rank (starting at 1).

Syntax: SortDescendingValue (measure, rank, dimension, filterDimensionValue)

## StartingLabel

Description: The name of the first period in the series.

Syntax: StartingLabel()

## StartingValue

Description: The value at the first period in the series for the given measure.

Syntax: StartingValue (measure, filterDimensionValue)

## StartToFinishDifference

Description: The difference between the values for the first and last periods in the given series.

Syntax: StartToFinishDifference (measure, filterDimensionValue)

## StartToFinishPercentDifference

Description: The percentage difference between the values for the first and last periods in the given series.

Syntax: StartToFinishPercentDifference (measure, filterDimensionValue)

## StdDev

Description: The standard deviation value for the given measure.

Syntax: StdDev (dimension, measure, filterDimensionValue)

## Sum

Description: The sum of measure values for the two provided dimension values.

Syntax: Sum (dimension, measure, firstDimensionValue, secondDimensionValue, filterDimensionValue)

## Total

Description: The sum total value for the given measure.

Syntax: Total (dimension, measure, filterDimensionValue)

## Value

Description: The metric value for a given dimension, measure and dimension value.

Syntax: Value (dimension, measure, dimension value, filterDimensionValue)

## Z-Score

Description: The z-score for the given measure.

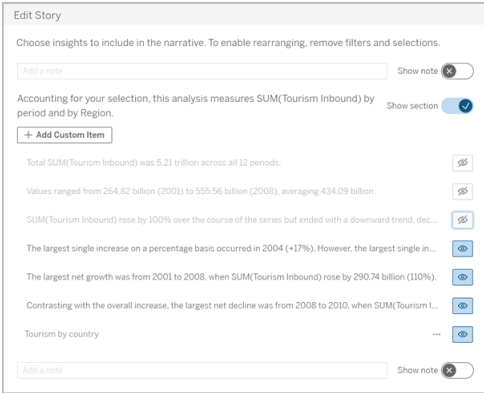
Syntax: Z-Score (dimension, measure, firstDimensionValue, filterDimensionValue)

### Customise Your Tableau Data Story: Hide and Reorder Content

Customise your Tableau Data Story with the content that is most important to you and your audience by hiding or reordering content within your story.

#### Hide content and sections

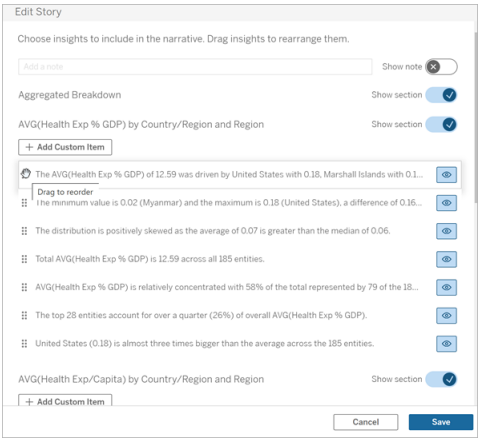
1. Create your **Data Story** and click **Edit** to open the Edit dialog box.
2. Set sections to show or hide by clicking the **Show section** switch to the on or off position.
3. Hover over the blue box to the right of each individual sentence, and click on the box to show or hide from view.
4. Click **Save**.



Now, only the sentences and sections that are set to **Show** appear in your Data Story.

Reorder content within a section

1. Create your **Data Story** and click **Edit** to open the Edit dialog box.
2. Hover over the left-side menu of the content you want to reorder. Your cursor turns into a hand icon.
3. Click the item with your cursor and drag it anywhere within the same section.
4. Click **Save**.



Now, the sentences appear in your **Data Story** in the order that you set them to.



**Note:** Currently, content can only be moved within the same section. Moving entire sections isn't yet supported.

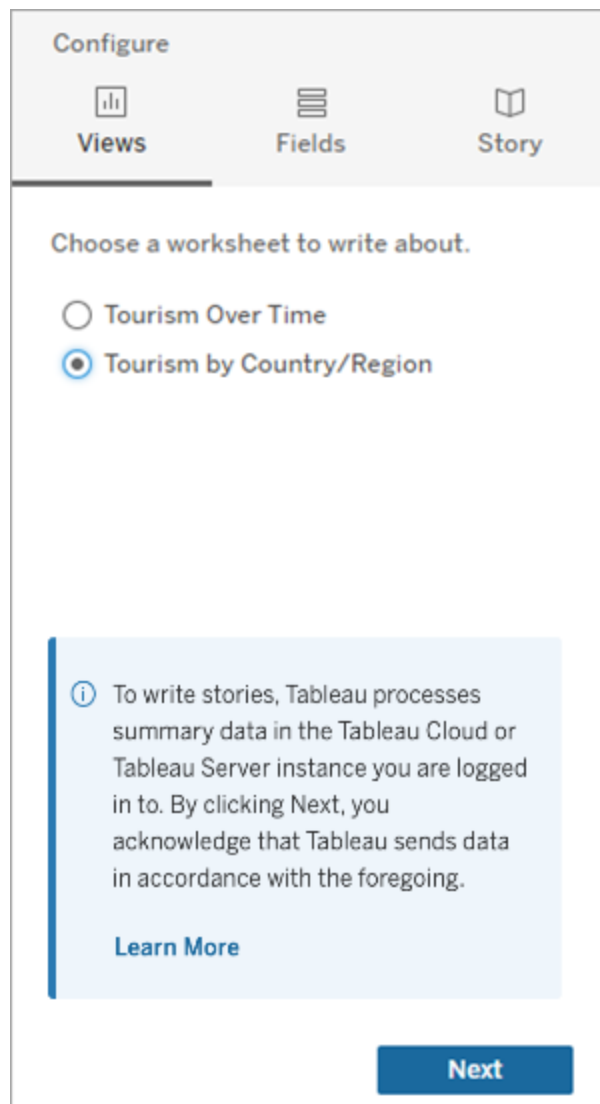
## Add More Data to Your Tableau Data Story

Data Stories currently supports stories with two dimensions and one measure, or one dimension and up to 10 measures. If you'd like to write about data that you don't need to show on your dashboard, then use a hidden sheet to simplify your dashboard. If you'd like to add more than two dimensions to your story, then concatenate dimensions or create multiple data stories and stack them.

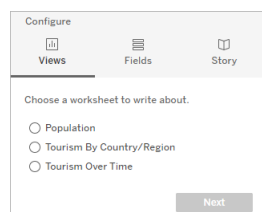
### Use a hidden sheet

If you have data that you want to include in a Tableau Data Story and don't need to show all the data that drove the insight, you can use a hidden sheet to bring additional measures and dimensions into your story without cluttering the dashboard.

1. Drag the **Data Story** object to your dashboard to see which worksheets you can write about in the Data Story dialog box. In this example, there are two worksheets available to write about.

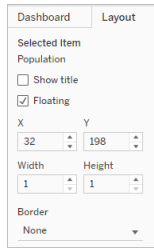


2. Bring in another data source, such as "Population", by navigating to the left-hand menu, selecting **Floating** and dragging that sheet onto your dashboard.



The Data Story dialog box updates with the new available data source.

3. Click into **Layout** and adjust the size to 1 x 1 to hide the sheet but keep the underlying data in your story.



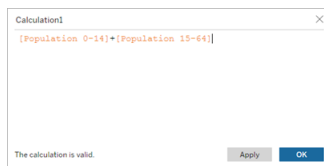
You can now configure your stories using this hidden sheet.

**Note:** You may need to deselect additional legend elements to keep the sheet hidden.

### Concatenate dimensions

If your data contains three dimensions and one measure and is a **Discrete Story**, you can concatenate (link together) two of those dimensions by creating a calculated field.

1. From the worksheet you want to use in your story, click **Analysis** and select **Create Calculated Field**.
2. Name the calculated field and use the following formula to create your calculation, using the + sign to join the dimensions.  
[Dimension 1] + [Dimension 2]



**Tip:** Drag your dimensions into the **Calculated Field** box and place them in the formula.

3. Click **OK**.
4. Drag your new calculated field into the **Detail** pane to make it accessible in your data story.

## Stack multiple data stories

Write about more measures and dimensions by creating multiple **Data Stories** and stacking them vertically or horizontally on your dashboard.

For example, if you wanted to create a story about actual revenue vs. benchmark revenue, you could create two different stories – one with the actual revenue and the first benchmark, and another with the actual revenue and the second benchmark – and compare them.

## Add a Pop-up Tableau Data Story to Your Dashboard

You can place a Tableau Data Story in a pop-up window that allows your users to open a story, read it and then close it when they're done. This is a great way to save space being used by already-established dashboards or to reduce the amount of clutter and information on a dashboard.

1. Add a Tableau Data Story to a Dashboard.
2. Set the container to **Floating** by clicking on the menu and selecting **Floating**.

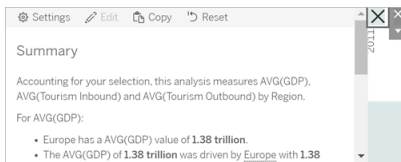
**Tip:** Another way to set the container to **Floating** is by holding the shift key while dragging the container onto your dashboard.

3. Navigate to the **Layout** tab in the left-hand column and set the background colour to white.

The screenshot shows the 'Layout' tab in the Tableau properties pane. It includes the following settings:

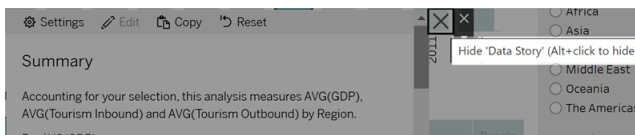
- Selected Item:** Data Story
- ☐ Show title
- ☐ Floating
- X:** 7
- Y:** 173
- Width:** 906
- Height:** 116
- Border:** None
- Background:** 100% (with a color selection circle)

- Click on the menu that is associated with your floating container to show its settings, and select **Add Show/Hide Button**. This creates an "X" icon that allows you to show or hide your story.



**Note:** If your story is selected, your button is partially obscured by the sidebar options that are part of the Data Story object. Click anywhere outside of the story to reveal the button.

- Hover over the "X" icon to show instructions for opening or closing the story. In this example, you're being prompted to press the Alt key at the same time as you click on the "X" icon.



- Collapse the story by clicking the "X" icon at the same time as pressing the key indicated in your prompt.

The story collapses, but the menu remains on the dashboard so that the user can expand the story when needed. You can move your collapsible, floating story around your dashboard as desired.

## Create Custom Measure Relationships in Your Tableau Data Story

You can create a relationship story in your Tableau Data Story to see how data compares to another set of data. To build a relationship story, you must have at least two measures and one dimension. Data that you'd like to compare is often grouped into one column of data named something such as "Year" or "Month", with values such as "2022" or "March".

You can **Create a Simple Calculated Field** to separate "2022" from "2021" (or March from February) so that you can compare the two time periods in a relationship story.

1. Start in the sheet that you want to use in your **Data Story**.
2. Click **Analysis** and select **Create a Calculated Field**.
3. Create a calculated field such as "Current Period".



**Tip:** Follow the structure of the calculated field shown here, but substitute your own dimension or measure names (orange text).

4. Create a calculated field such as "Previous Period".



5. Drag the new measures onto the **Detail** mark.
6. From your dashboard, click on the story and add the two new measures into your **Data Story**.

Configure

Views Fields Story

Drag and drop fields to include in your story.

Dimensions

YEAR(Year) <sup>1</sup>

Measures

SUM(Current Period) <sup>1</sup>

SUM(Previous Period) <sup>2</sup>

Ignored

Back Next

7. From your dashboard, click the **Settings** icon in the top-left corner of your Data Story object.
8. In the Data Story dialog box, click the **Relationships** tab.
9. Set up a relationship story with the two custom measures.

10. Click **Save**.

Your story now writes sentences that compare the custom measures.

## Refresh Parameters in a Tableau Data Story

If you've added a parameter to your dashboard and are using Data Stories, you'll notice that clicking the parameter refreshes your visualisation, but not the story. This happens because the parameter doesn't refresh the underlying data like a filter does.

To refresh your Tableau Data Story with the parameter data, add a "refresh" button to your dashboard that updates your story to align with your parameter.

1. Create a new sheet in your workbook.
2. Create a **Calculated Field** in the new sheet with the following info:

Name: Refresh

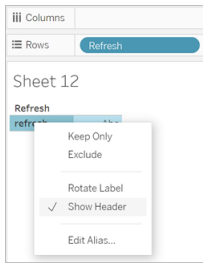
Contents: "refresh"



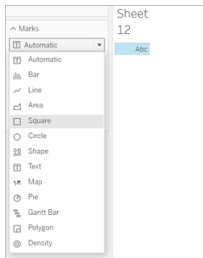
3. Click **OK**, and then drag the new calculated field (Refresh) onto your new sheet.
4. Right-click in the field and click **Show Header** to hide the header.



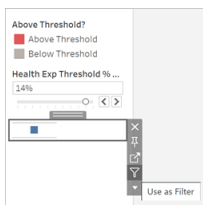
## Tableau Server on Windows Help



5. Choose a shape for your button.



6. Return to your dashboard and drag the sheet containing the refresh button onto your dashboard next to the parameter.
7. Hover over the button, select **More Options** and click **Title** to hide the title.
8. Hover over the button and click **Use as Filter**.

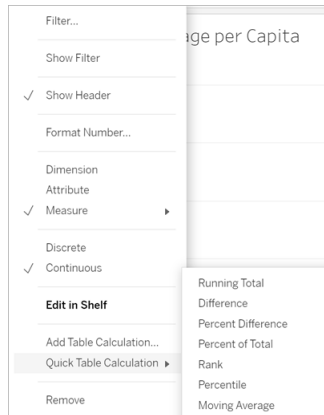


9. Adjust your parameter and then click on the new refresh button. The button updates your story to align with the parameter.

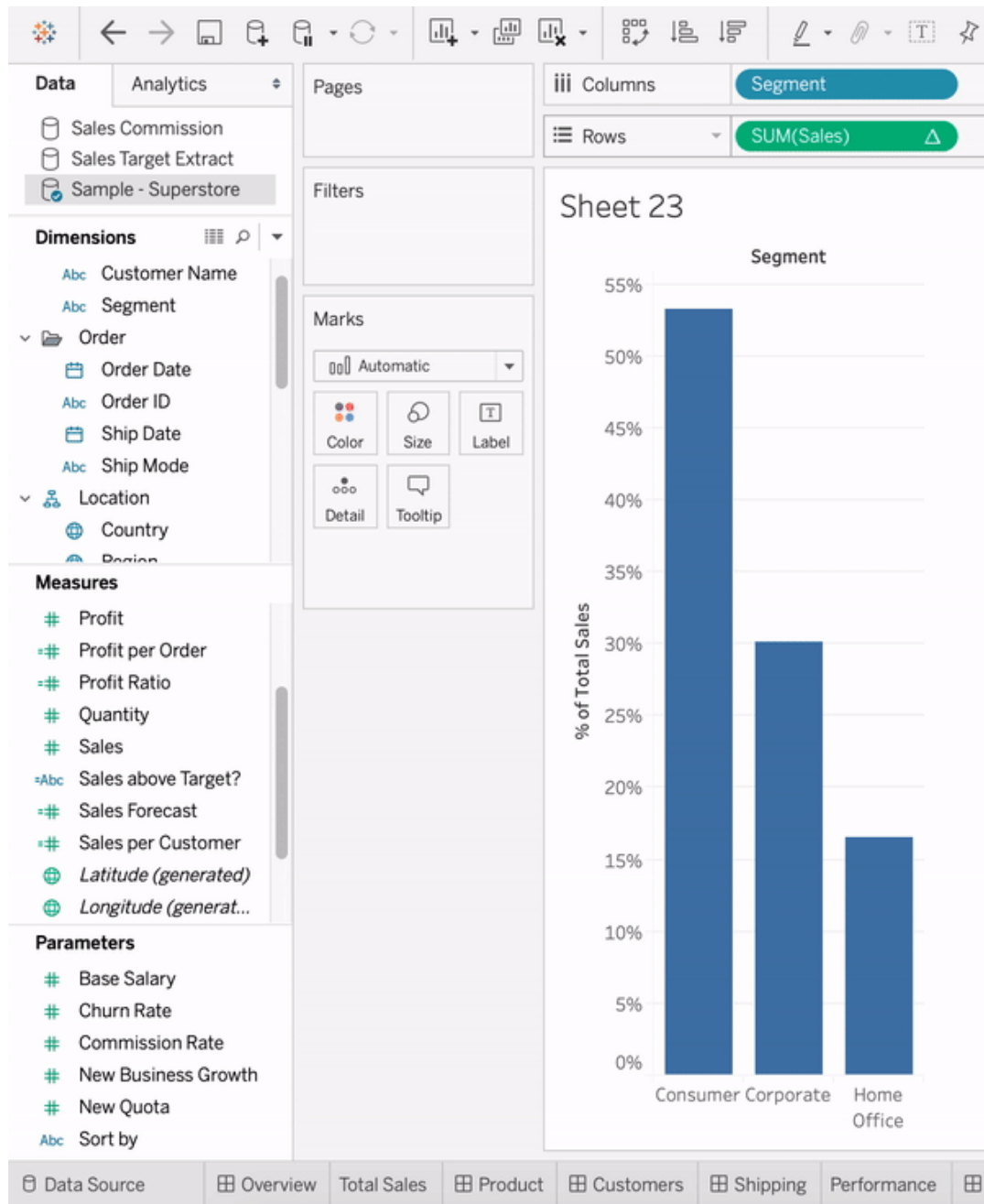
## Use a Table Calculation in a Tableau Data Story

You can use a **Table Calculation** as a measure in a Tableau Data Story in addition to the measure that you used to create the table calculation.

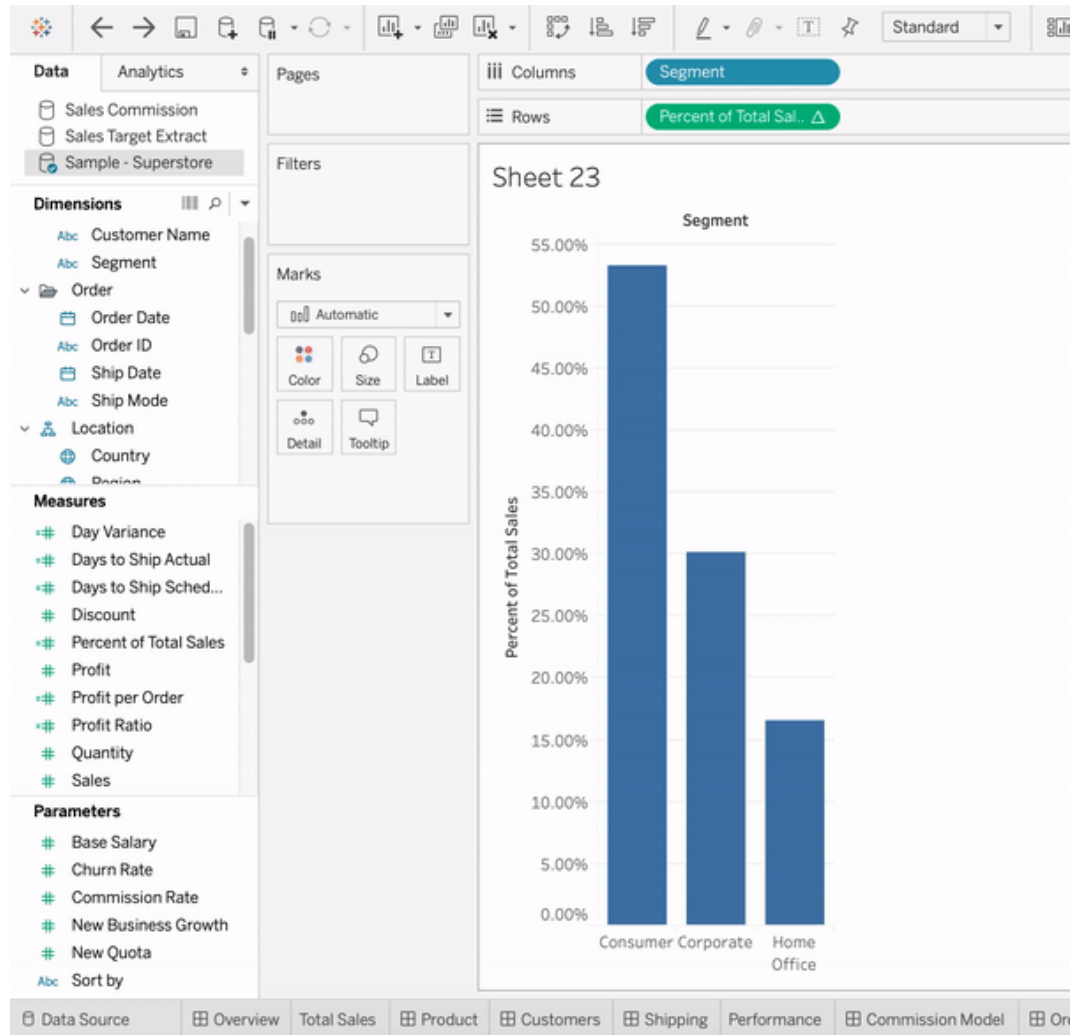
1. From the **Marks** card, click on the right side of your field to open a menu, and click **Quick Table Calculation**.



2. After you create your table calculation, drag it to **Measures** in the **Data** pane and rename it.



3. Drag your original measure (e.g. Sales) back to the **Rows** shelf, and then drag your new calculation (e.g. Sum of Sales) into the **Tooltip**. Your visualisation may remain the same, but you now have access to the new measure.



4. Go to your dashboard and drag the **Data Story** object onto the dashboard. Both measures appear when creating your story.

## Discover Insights Faster with Explain Data

Explain Data in the Data Guide helps you to inspect, uncover and dig deeper into the marks in a viz as you explore your data. You can use Explain Data to analyse dashboards, sheets or selected marks for possible outliers and correlations in the underlying data. Explain Data builds statistical models and proposes possible explanations for individual marks in a viz, including potentially related data from the data source that isn't used in the current view.

For information on running Explain Data and exploring explanations, see [Get Started with Explain Data](#).

**Note:** This topic describes how Explain Data works in Tableau 2021.2 and later versions. If you have a previous version of Tableau, read this topic in [version 2021.1 of Explain Data help](#).

As you build different views, use Explain Data as a jumping-off point to help you explore your data more deeply and ask better questions. For more information, see [How Explain Data helps to augment your analysis](#). For information on what characteristics make a data source more interesting for use with Explain Data, see [Requirements and Considerations for Using Explain Data](#).

### Access to Explain Data

Explain Data is enabled by default at the site level. Server administrators (Tableau Server) and site administrators (Tableau Cloud) can control whether Explain Data is available for a site. For more information, see [Disable or Enable Explain Data for a Site](#).

Authors who can edit workbooks and have the Run Explain Data permission capability for a workbook can run Explain Data in editing mode. All users with the Run Explain Data capability can run Explain Data in viewing mode in Tableau Cloud and Tableau Server.

When allowed by site administrators, explanations can be shared in viewing mode via email or Slack with other Tableau Cloud and Tableau Server users. For more information, see [Configure Tableau to allow users to share explanations via email and Slack](#).

Authors can use Explain Data Settings to control which explanation types are displayed in the Data Guide pane.

For information on controlling access to Explain Data, explanation types and fields, see [Control Access to Explain Data](#).

## How Explain Data helps to augment your analysis

Explain Data is a tool that uncovers and describes relationships in your data. It can't tell you what is causing the relationships or how to interpret the data. **You are the expert on your data.** Your domain knowledge and intuition are key in helping you decide what characteristics might be interesting to explore further using different views. For related information, see [How Explain Data Works and Requirements and Considerations for Using Explain Data](#).

For more information on how Explain Data works and how to use Explain Data to augment your analysis, see these Tableau Conference presentations:

- [From Analyst to Statistician: Explain Data in Practice \(1 hour\)](#)
- [Leveraging Explain Data \(45 minutes\)](#)

## Get Started with Explain Data

Use Explain Data in your flow of analysis as you are exploring the marks in a viz. Explain Data runs automatically when the Data Guide pane is open and updates based on the current selection (dashboard, sheet or mark).

### Use Explain Data

- Run Explain Data on a dashboard, sheet or mark
- Drill into explanations
- View analysed fields
- Terms and concepts in explanations
- [Explanation Types](#)

### Author Workbooks and Control Access

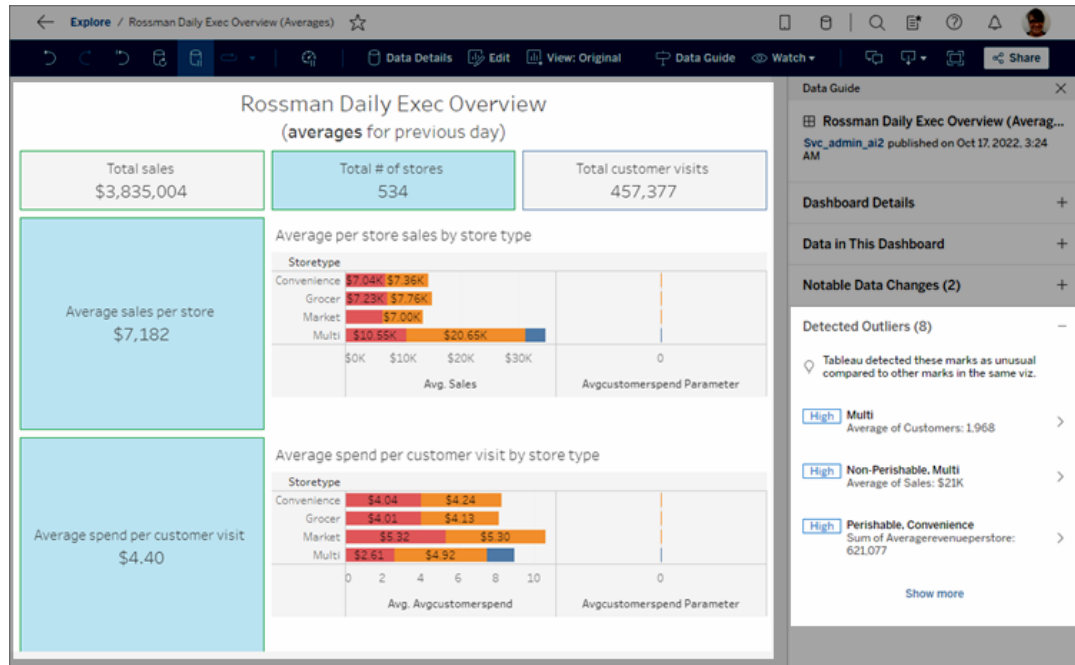
- [Requirements and Considerations for Using Explain Data](#)
- [Change Explain Data Settings \(Authors-only\)](#)
- Control Access to Explain Data
- Disable or Enable Explain Data for a Site
- How Explain Data Works

Run Explain Data on a dashboard, sheet or mark

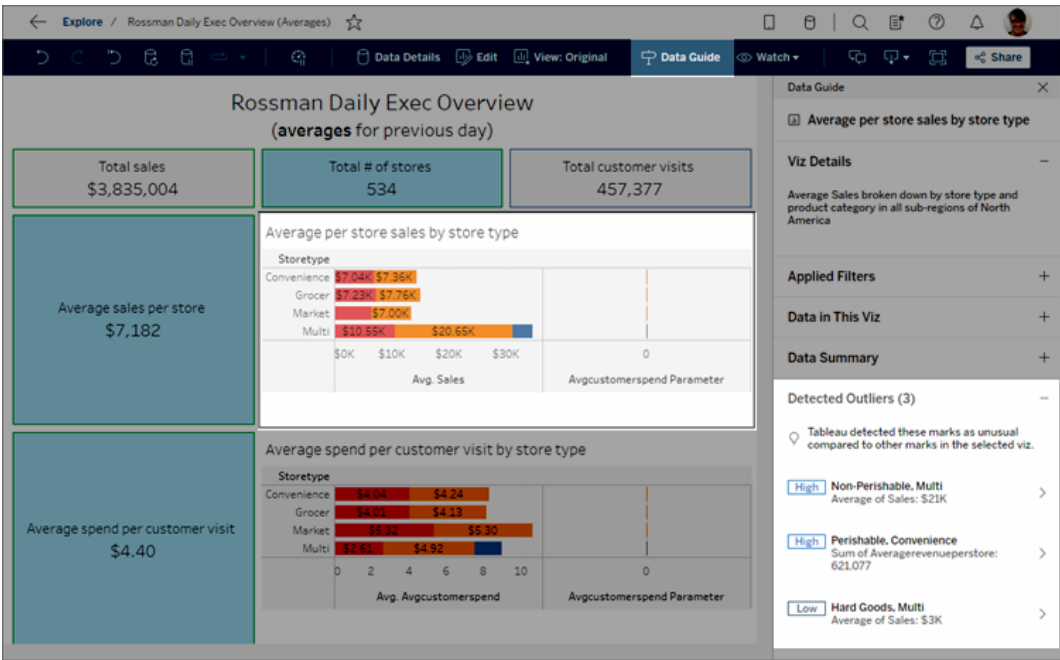
These are the basic steps to run Explain Data in Tableau Desktop, Tableau Cloud and Tableau Server:

## Tableau Server on Windows Help

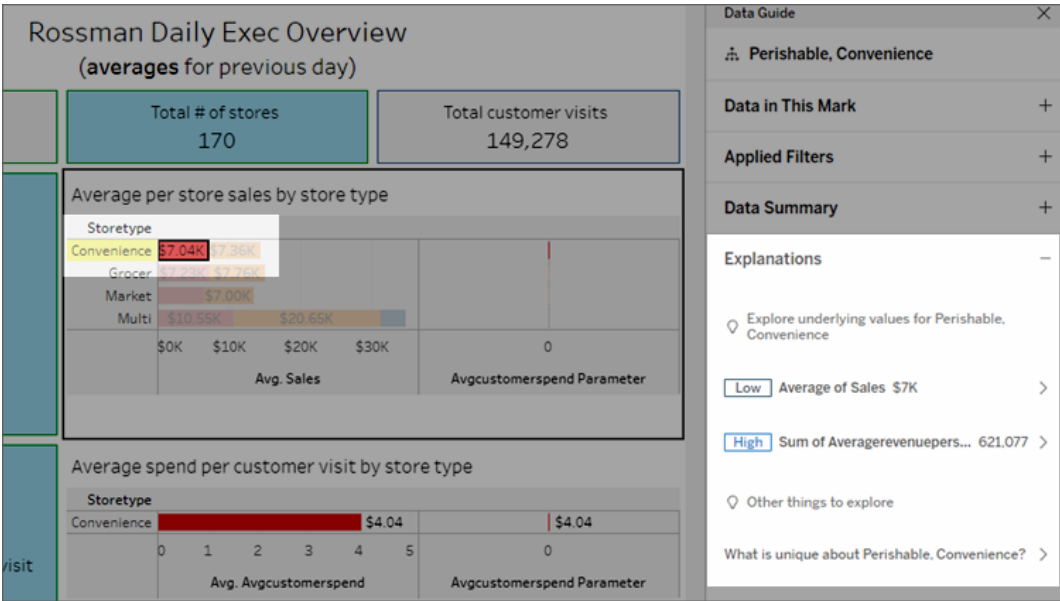
1. Open a dashboard or sheet in a workbook.
2. In the view toolbar, select **Data Guide** to open the Data Guide pane.
3. If you open a dashboard, Explain Data will analyse it for outliers.



If you select a sheet in the dashboard, Explain Data analyses the marks in that sheet for outliers.



If you select a mark in the dashboard, Explain Data specifically analyses that mark for explanations.

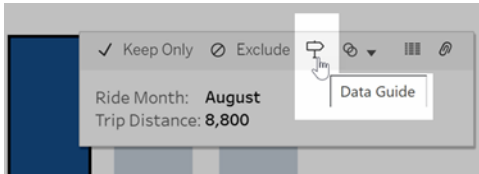


The marks that are being explained are highlighted in the viz as you select

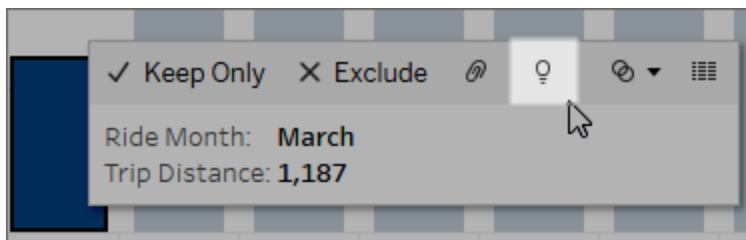


corresponding explanations.

Optionally, you can select a mark in a viz, hover the cursor over the mark. In the tooltip menu, select **Data Guide**.



In Tableau Public, select the lightbulb in the tooltip menu to run Explain Data.



Possible explanations for the value of the analysed mark are displayed in the Data Guide pane. Select different explanation names to expand the details and start exploring.

Explain Data permissions required for seeing explanations

If you see Detected Outliers with a note to contact the owner of the viz, it is because you need permission to see these types of explanations. Select the owner name to go to their Tableau content page with their email address. Contact the owner to ask them to give you Explain Data permissions for the workbook or view.

If you are the owner of the workbook, for more information on setting permissions, see [Control who can use Explain Data and what they can see](#).


## Tips for using Explain Data


- Multiple marks can't be selected for comparison with each other.
- The view must contain marks that are aggregated using SUM, AVG, COUNT, COUNTD or AGG (a calculated field).
- When Explain Data cannot analyse the type of mark selected, a message is displayed to indicate why. For more information, see [Situations where Explain Data is not available](#).
- The data you analyse must be drawn from a single, primary data source. Explain Data does not work with blended or cube data sources.
- For information on what characteristics make a data source more interesting for use with Explain Data, see Requirements and Considerations for Using Explain Data.

## Drill into explanations



1. In the Data Guide pane, select an explanation name to see more details.

Select an explanation to expand or contract its details.

2. Scroll to see more explanation details.
3. Hover over charts in the explanations to see details on different data points. Select the **Open**  icon to see a larger version of the visualisation.

Creators or Explorers who open the view for editing can select the **Open**  icon to open the visualization as a new worksheet and explore the data further.

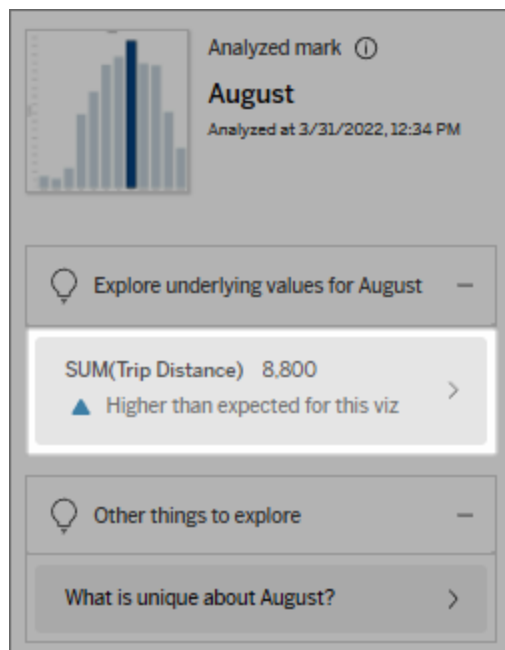
**Note:** Creators and Explorers who have editing permissions can also control Explain Data Settings. For more information, see Control Access to Explain Data.

4. Hover over a Help icon  to see tooltip help for an explanation. Select the Help icon  to keep the tooltip open. Select a **Learn More** link to open the related help topic.

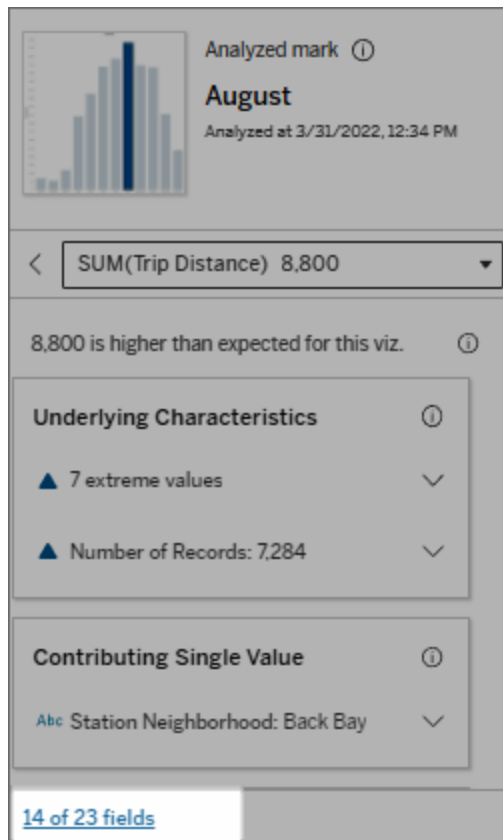
## View analysed fields

1. Run Explain Data on a dashboard, sheet or mark.

2. In the Data Guide pane, under **Explore underlying values for**, select a target measure name.



3. Select the *number-of-fields* link at the bottom of the pane.



Authors have the option to open Explain Data Settings to control which fields are included in the analysis. For more information, see [Change fields used for statistical analysis](#).

### Terms and concepts in explanations

The following terms and concepts appear frequently in explanations. You may find it helpful to become acquainted with their meaning in the context of using Explain Data.

## What is a mark?

A mark is a selectable data point that summarises some underlying record values in your data. A mark can be made of a single record or multiple records aggregated together. Marks

in Tableau can be displayed in many different ways such as lines, shapes, bars and cell text.

Tableau gets the records that make up the mark based on the intersection of the fields in the view.

The **analysed mark** refers to a mark in a dashboard or sheet that was analysed by Explain Data.

For more information on marks, see [Marks](#).

## What does expected mean?

The expected value for a mark is the median value in the expected range of values in the underlying data in your viz. The expected range is the range of values between the 15th and 85th percentile that the statistical model predicts for the analysed mark. Tableau determines the expected range each time it runs a statistical analysis on a selected mark.

If an expected value summary says the mark is *lower than expected* or *higher than expected*, it means the aggregated mark value is outside the range of values that a statistical model is predicting for the mark. If an expected value summary says the mark is *slightly lower* or *slightly higher* than expected or *within the range of natural variation*, it means the aggregated mark value is within the range of predicted mark values, but is lower or higher than the median.

For more information, see [What is an expected range?](#)

## What are dimensions and measures?

Each column name in a database is a field. For example, Product Name and Sales are both fields. In Tableau, fields like Product Name that categorise data are called dimensions; fields with quantifiable data like Sales are called measures. Tableau aggregates measures by default when you drag them into a view.

Some explanations describe how the underlying record values and the aggregations of those values may be contributing to the value of the analysed mark. Other explanations may mention the distribution of values across a dimension for the analysed mark.

When you run Explain Data on mark, the analysis considers dimensions and measures in the data source that aren't represented in the view. These fields are referred to as unvisualised dimensions and unvisualised measures.

For more information on dimensions and measures, see [Dimensions and Measures](#).

## What is an aggregate or aggregation?

An aggregate is a value that is a summary or total. Tableau automatically applies aggregations such as SUM or AVG whenever you drag a measure onto Rows, Columns, a Marks card option or the view. For example, measures are displayed as SUM(Sales) or AVG(Sales) to indicate how the measure is being aggregated.

To use Explain Data, your visualisation must use a measure that is aggregated with SUM, AVG, COUNT, COUNTD or AGG.

For more information about aggregation, see [Data Aggregation in Tableau](#).

## What is a record value?

A record is a row in a database table. A row contains values that correspond to each field. In this example, Category, Product Name and Sales are fields (or columns). Furniture, Floor Lamp and \$96 are the values.

Category	Product Name	Sales
Furniture	Floor Lamp	\$96.00

## What is a distribution?

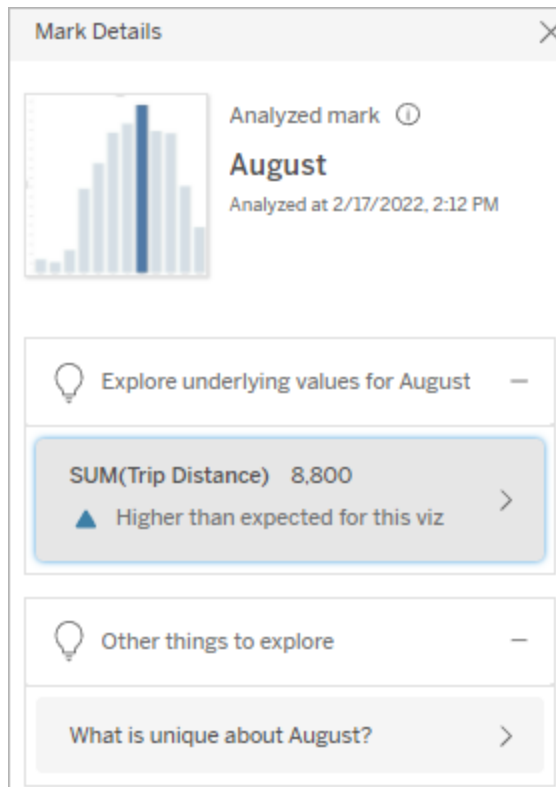
A distribution is a list of all the possible values (or intervals) of the data. It also indicates how often each value occurs (frequency of occurrence).

## Explanation Types in Explain Data

Each time you select a new mark in a viz or dashboard and run Explain Data, Tableau runs a new statistical analysis considering that mark and the underlying data in the workbook. Possible explanations are displayed in expandable sections for the Data Guide pane. For information about how Explain Data analyses and evaluates explanations, see [How Explain Data Works](#).

### Explore underlying values

This section lists explanations for each measure that can be explained (referred to as *target measures*). Each explanation listed here describes a relationship with the values of the target measure that are tested on the analysed mark. Use your real-world, practical understanding of the data to determine if the relationships found by Explain Data are meaningful and worth exploring.



In this example, Trip Distance is the target measure

### Underlying Characteristics

These explanations describe how underlying records of the marks in the view may be contributing to the aggregated value of the measure being explained. Mark attributes can include **Extreme Values**, **Null Values**, **Number of Records** or the **Average Value** of the mark.

**Note:** For definitions of common terms used in explanations, see Terms and concepts in explanations.

### Extreme Values

This explanation type indicates if one or more records have values that are significantly higher or lower than most records. If the explanation is supported by a model, it indicates the



extreme value is affecting the target measure of the analysed mark.


When a mark has extreme values, it doesn't automatically mean it has outliers or that you should exclude those records from the view. That choice is up to you depending on your analysis. The explanation is simply pointing out an extreme value in the mark. For example, it could reveal a mistyped value in a record where a banana cost 10 pounds instead of 10 pence. Or, it could reveal that a particular sales person had a great quarter.

**Note:** This explanation must be enabled by the author to be visible in viewing mode for a published workbook. For more information, see [Control Access to Explain Data](#).

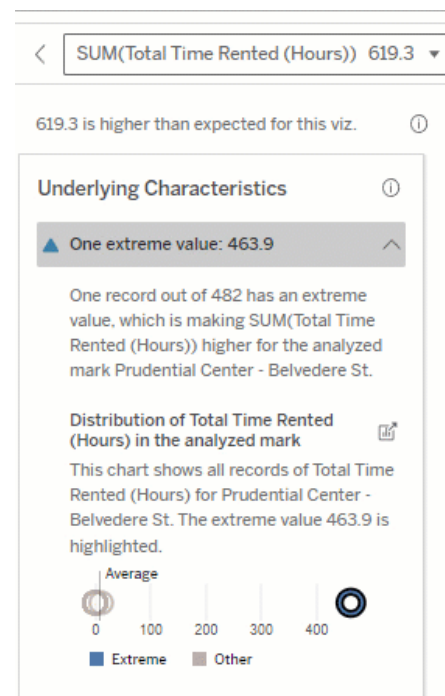
### This explanation shows:

- The number of underlying records in the analysed mark.
- The extreme value or values contributing to the value of the target measure.
- The distribution of values in the mark.
- The record details that correspond to each distribution value.

### Exploration options:

- Hover over a circle in the chart to see its corresponding value.
- Select the left or right arrow below the details list to scroll through record details.
- If available, select **View Full Data**, and then select the **Full Data** tab to see all records in a table.
- Select the **Open**  icon to see a larger version of the visualisation.

### Next steps for analysis:



In this example, a single extreme value of 463 hours rented is contributing to the higher-than-expected sum of Total Time Rented of 613 hours.

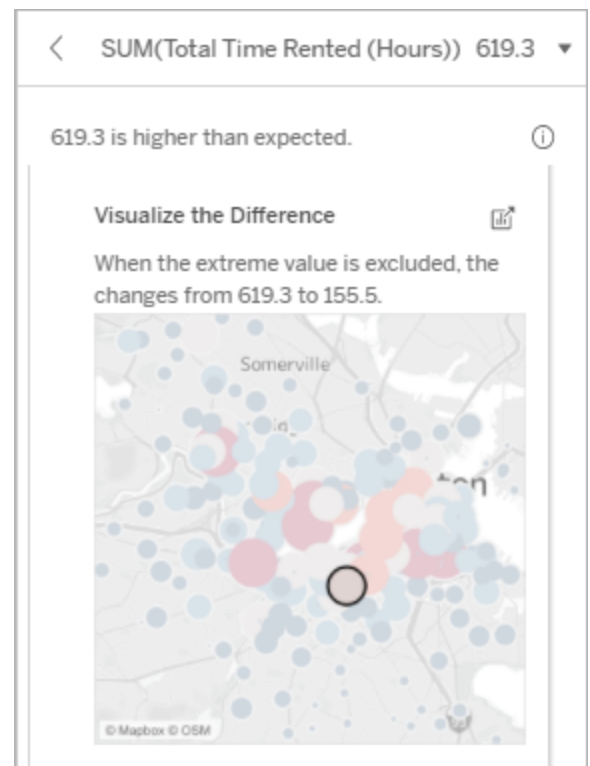
- If the number of records is low, examine these values compared to the extreme value.
- If the extreme value is significantly higher or lower than the other record values, exclude it and consider how it changes the value of the analysed mark.
- When considering the data with and without the extreme value, use this as an opportunity to apply your practical knowledge about the data.

A likely reason for this high value could be that someone forgot to dock the bike when they returned it. In this case, the author might want to exclude this value for future analysis.


### Visualise the Difference

#### This section shows:

- How the analysed mark value changes when the extreme value is excluded.



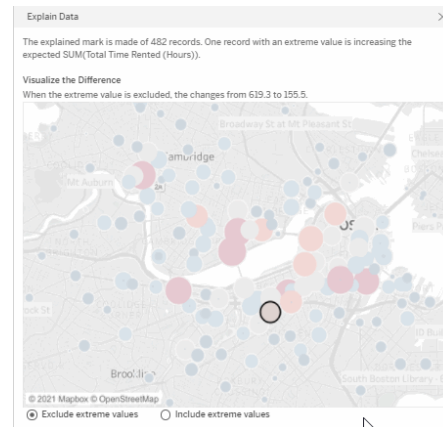
#### Exploration options:

- Select the **Open**  icon to see a larger version of the visualisation.

- Explore the difference with and without the extreme value (or values).
- Authors can open the view as a new sheet and apply a filter to exclude the extreme value.

### Next steps for analysis:

- If the extreme value is significantly higher or lower than the other record values, exclude it and see how it changes the value of the analysed mark.
- When considering the data with and without the extreme value, use this as an opportunity to apply your practical knowledge about the data.



In this example, when the extreme value of 483 is excluded, the analysed mark is no longer high compared to other marks in the view. Other marks now stand out. The author might want to explore the other marks to consider why these other locations have higher hours for bike rentals.

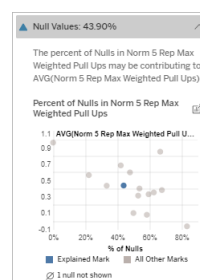
## Null Values


The Null Values explanation type calls out situations where there is a higher-than-expected amount of missing data in a mark. It indicates the fraction of target measure values that are null and how the null values might be contributing to the aggregate value of that measure.

### This explanation shows:

- The percentage of values that are null in the target measure for the analysed mark (blue circle).

### Exploration options:



- Hover over each circle in the scatter plot to see its details.
- Scroll to see more of the chart.
- Select the **Open**  icon to see a larger version of the visualisation.

In this example, the percentage of null values in the target measure is shown as a blue circle.

**Next steps for analysis:**

- Optionally exclude null values in the mark for further analysis.

## Number of Records


This explanation type describes when the count of the underlying records is correlated to the sum. The analysis found a relationship between the number of records that are being aggregated in a mark and the mark's actual value.

While this might seem obvious, this explanation type helps you explore whether the mark's value is being affected by the magnitude of the values in its records or simply because of the number of records in the analysed mark.

**This explanation shows:**

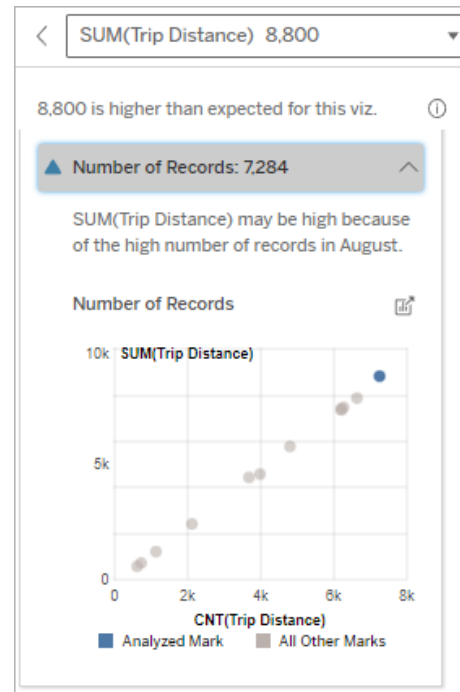
- The number of records in the target measure for the analysed mark (dark blue bar).
- The number of records in the target measure for other marks in the source visualisation (light blue bar).

**Exploration options:**

- Hover over each bar to see its details.
- Scroll to see more of the chart.
- Select the **Open**  icon to see a larger version of the visualisation.

**Next steps for analysis:**

- Compare whether the individual values of records are low or high, or the number of records in the analysed mark is low or high.
- Authors, if you are surprised by a high number of records, you might need to normalise the data.



In this example, the number of records for Trip Distance is listed for each value of Ride Month, which is a dimension in the original visualisation. August has the highest total trip distance value.

You might explore whether August has the highest value for trip distance because more rides occurred in August, or if it has the highest trip distance because some rides were longer.

## Average Value of Mark


This explanation type describes when the average of a measure is correlated to the sum.

Compare whether the average value is low or high, or the number of records is low or high.

### This explanation shows:

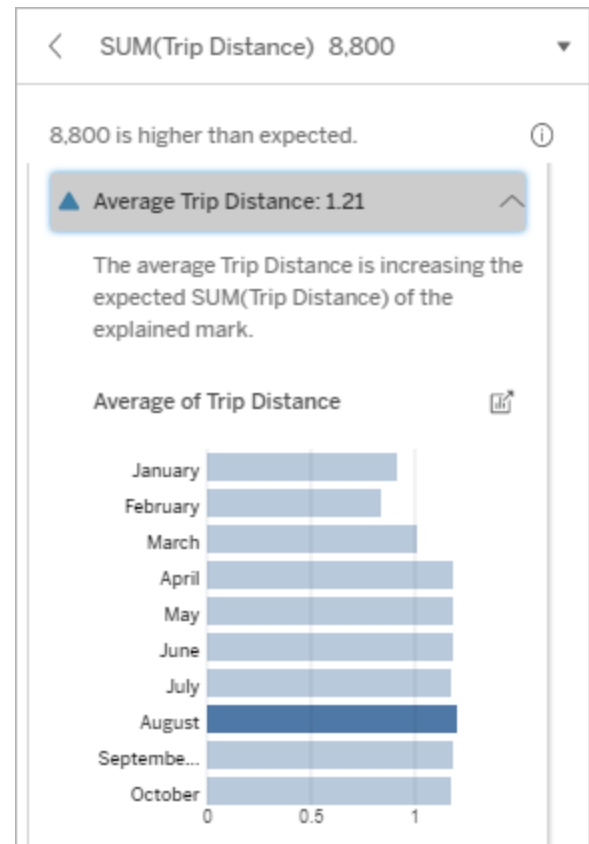
- The average of the target measure for each value of a dimension used in the source visualisation.

### Exploration options:

- Hover over each bar to see its details.
- Scroll to see more of the chart.
- Select the **Open**  icon to see a larger version of the visualisation.

### Next steps for analysis:

- Compare whether the average value is low or high, or the number of records is low or high. For example, are profits high because you sold a lot of items or because you sold expensive items?
- Try to figure out why the analysed mark has a significantly higher or lower average value.



In this example, the average trip distance for August is not significantly higher or lower than most months. This suggests that trip distance is higher for August because there were more rides in August, rather than from people taking longer rides.

### Contributing Single Value

Use this explanation to understand the composition of the record values that make up the analysed mark.

This explanation type identifies when a single value in an unvisualised dimension may be contributing to the aggregate value of the analysed mark. An unvisualised dimension is a dimension that exists in the data source but isn't currently being used in the view.


This explanation indicates when every underlying record of a dimension has the same value, or when a dimension value stands out because either many or few of the records have the same single value for the analysed mark.

**Note:** For definitions of common terms used in explanations, see [Terms and concepts in explanations](#).

**This explanation shows:**

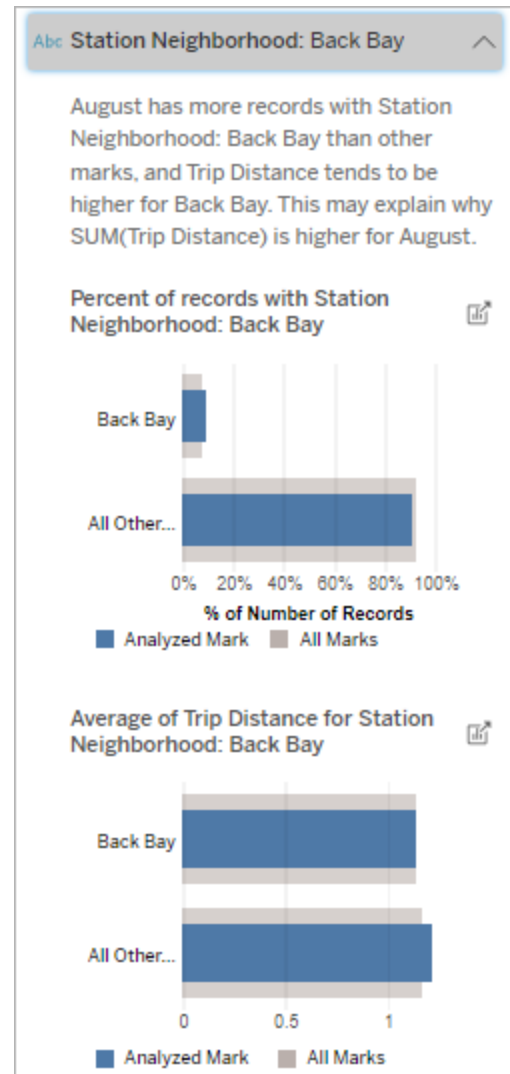
- The percentage of the number of records for a single value of a dimension for the analysed mark (blue bar) versus all marks (grey bar) in the source visualisation.
- The percentage of the number of records for all other values of a dimension for the analysed mark (blue bar) versus all marks (grey bar) in the source visualisation.
- The average of the target measure for the single value of a dimension in the analysed mark (blue bar) versus all marks (grey bar).
- The average of the target measure for all other values of a dimension for the analysed mark (blue bar) versus all marks (grey bar) in the source visualisation.

**Exploration options:**

- Hover over each bar to see its details.
- Select the **Open**  icon to see a larger version of the visualisation.

**Next steps for analysis:**

- Use this explanation to understand the composition of the record values that make up the analysed mark.
- Authors might want to create a new visualisation to explore any unvisu-



In this example, the statistical analysis has exposed that many of the rides come from the station neighbourhood of Back Bay. Note that Station Neighbourhood is an unvisualised dimension that has some relationship to Trip Distance in the underlying data for the source visualisation.



alised dimension surfaced in this explanation.

### Top Contributors

Use this explanation to see the values that make up the largest fraction of the analysed mark.

For a COUNT aggregation, the top contributors show dimension values with the most records. For SUM, this explanation shows dimension values with the largest partial sum.

### Contributing Dimensions

Use this explanation to understand the composition of the record values that make up the analysed mark.


This explanation type shows that the distribution of an unvisualised dimension may be contributing to the aggregate value of the analysed mark. This type of explanation is used for target measure sums, counts and averages. An unvisualised dimension is a dimension that exists in the data source but isn't currently being used in the view.

**Note:** For definitions of common terms used in explanations, see [Terms and concepts in explanations](#).

**This explanation shows:**

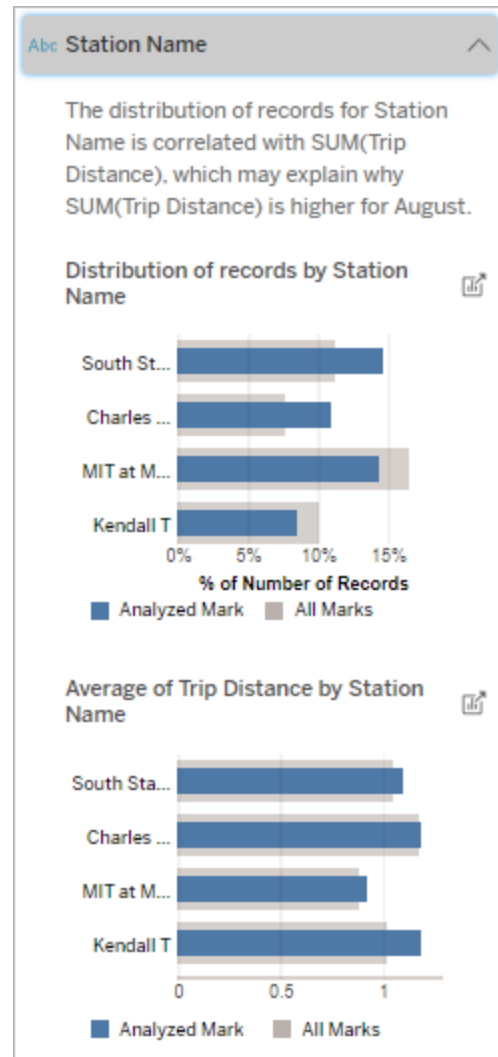
- The percentage of the number of records for all values of a dimension for the analysed mark (blue bar) versus all values of a dimension for all marks (grey bar) in the source visualisation.
- The average of the target measure for all values of a dimension for the analysed mark (blue bar) all values of a dimension for all marks (grey bar).

**Exploration options:**

- Hover over each bar to see its details.
- Scroll to see more of the chart.
- Select the **Open**  icon to see a larger version of the visualisation.

**Next steps for analysis:**

- Use this explanation to understand the composition of the record values that make up the analysed mark.
- Authors might want to create a new visualisation to explore any unvisualised dimensions surfaced in this explanation.



In this example, the statistical analysis has exposed that more rides were taken from South Station and MIT and fewer rides were taken from Charles Circle and Kendall, compared to rides taken for marks overall.

Note that Station Name is an unvisu-

alised dimension that has some relationship to Trip Distance in the underlying data for the source visualisation.

### Contributing Measures

This explanation type shows that the average of an unvisualised measure may be contributing to the aggregate value of the analysed mark. An unvisualised measure is a measure that exists in the data source but isn't currently being used in the view.


This explanation can reveal a linear or quadratic relationship between the unvisualised measure and the target measure.

**Note:** For definitions of common terms used in explanations, see [Terms and concepts in explanations](#).

**This explanation shows:**

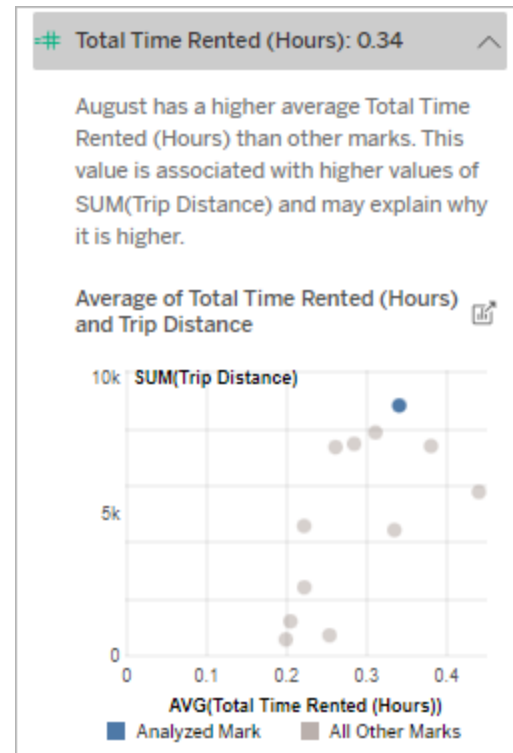
- The relationship between the sum of the target measure and the average of an unvisualised measure for the analysed mark (blue circle) and all marks (grey circles) in the view.
- If the sum of the target measure is high or low because the average value of the unvisualised measure is high or low.

**Exploration options:**

- Hover over each circle to see its details.
- Select the **Open**  icon to see a larger version of the visualisation.

**Next steps for analysis:**

- Authors might want to create a new visualisation to explore any unvisualised measures surfaced in this explanation.



In this example, one possible reason why trip distance is high is because the average total time rented is also high.

**Other things to explore**

This section provides possible reasons why the analysed mark is unique or unusual. These explanations:

- Do not explain why the value of this mark is what it is.
- Are not related in any way to the value of the measures in the source visualisation.
- Do not take any target measures into account.

## Other Dimensions of Interest

Use this explanation to understand the composition of the record values that make up the analysed mark.


The distribution of an unvisualised dimension in the analysed mark is unusual compared to the distribution of values for all other marks in the view. An unvisualised dimension is a dimension that exists in the data source but isn't currently being used in the view.

**Note:** For definitions of common terms used in explanations, see Terms and concepts in explanations.

### This explanation shows:

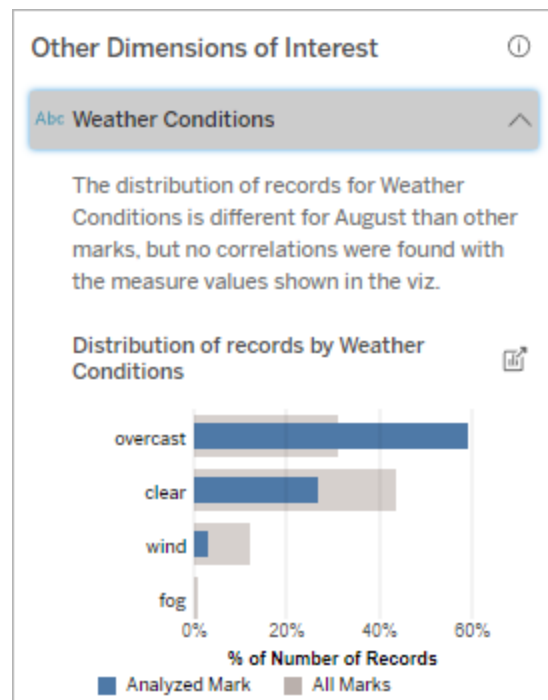
- The percentage of the number of records for all values of a dimension for the analysed mark (blue bar) versus all values of a dimension for all marks (grey bar) in the source visualisation.

### Exploration options:

- Hover over each bar to see its details.
- Scroll to see more of the chart.
- Select the **Open**  icon to see a larger version of the visualisation.

### Next steps for analysis:

- Use this explanation to understand the composition of the record values that make up the analysed mark.
- Authors might want to create a new visualisation to explore any unvisualised dimensions surfaced in this explanation.



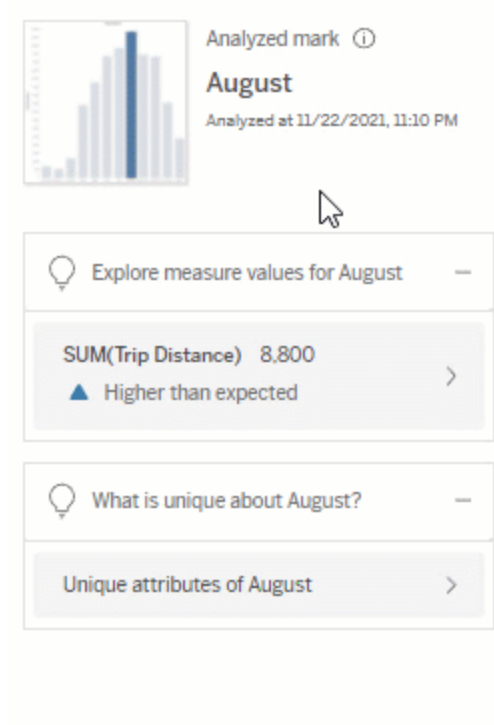
In this example, a high percentage of records are associated with overcast weather. Because the data is about bike rentals in Boston, and the analysed mark is Trip Distance for

August, we can assume that the weather is typically warm and humid. People might have rented bikes more often on overcast days to avoid the heat. It's also possible there were more overcast days in August.

## Analysed Fields in Explain Data

Explain Data runs a statistical analysis on a dashboard or sheet to find marks that are outliers, or specifically on a mark you select. The analysis also considers possibly related data points from the data source that aren't represented in the current view.

Explain Data might not include every column from the data source in the analysis. In many cases, certain types of fields will be automatically excluded from the analysis. For more information, see [Fields excluded by default](#).

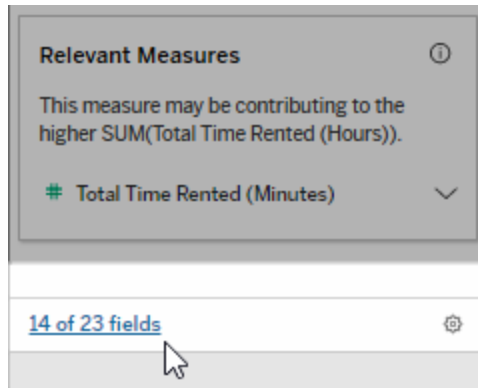


**Note:** Dimensions with more than 500 unique values won't be considered for analysis (unless allowed by the author in Explain Data Settings).

All users can view information on which fields are included or excluded in the current analysis. Creators and Explorers who have editing permissions can edit the fields used by Explain Data for statistical analysis.

View fields analysed by Explain Data

When you expand an explanation for a measure that is contributing to the value of the mark, a link that indicates the number of fields considered in the analysis is displayed at the bottom of the Data Guide pane.



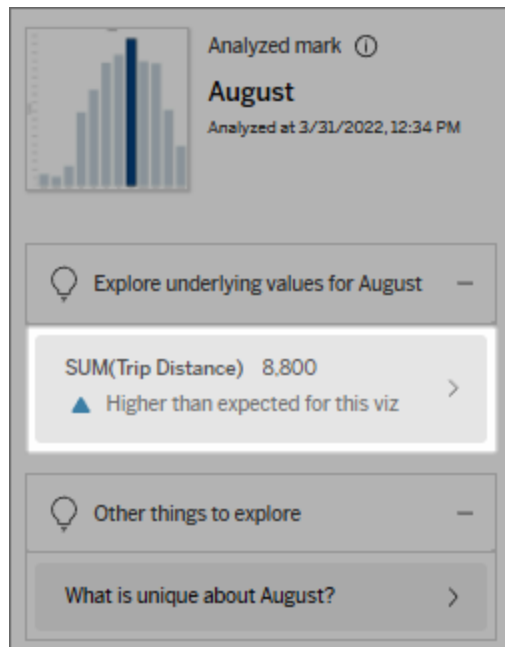
Click the link to see the list of fields included in or excluded from the current statistical analysis.

When a data source contains more than 1000 unvisualised dimensions or measures, you might see an alert asking if you want Explain Data to consider more fields. Click **Explain All** to run an analysis that includes more fields. The analysis may take longer to complete.

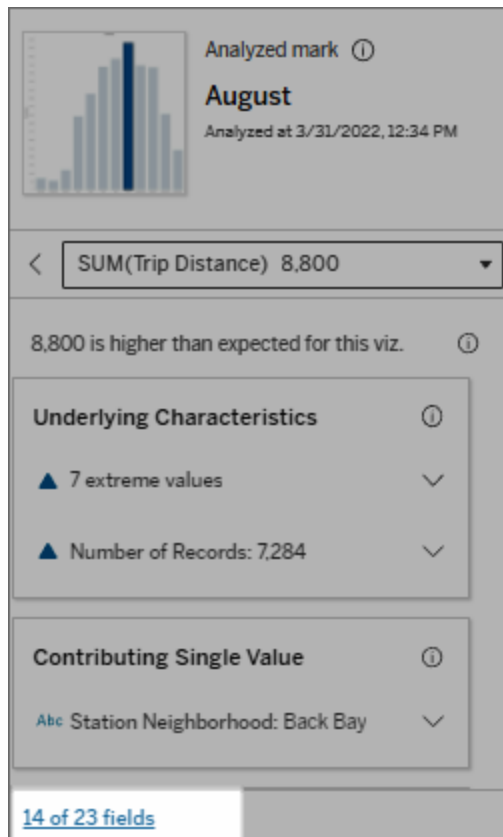
### To view fields used by Explain Data for statistical analysis

1. **Run Explain Data on dashboard, sheet or mark.**
2. In the Data Guide pane, under **Contributing to the value of**, click a measure name.



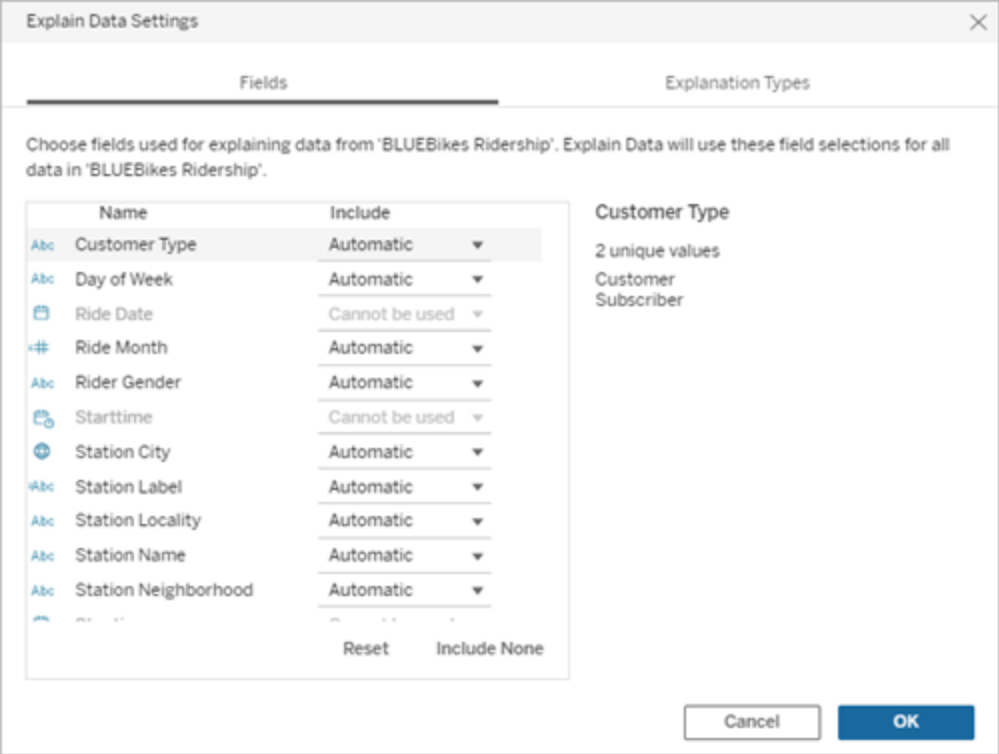


3. Click on the *number-of-fields* link at the bottom of the pane.



Change fields used for statistical analysis

Creators and Explorers who have editing permissions can select fields to be included or excluded from the statistical analysis in the Fields tab of the Explain Data Settings dialog box.

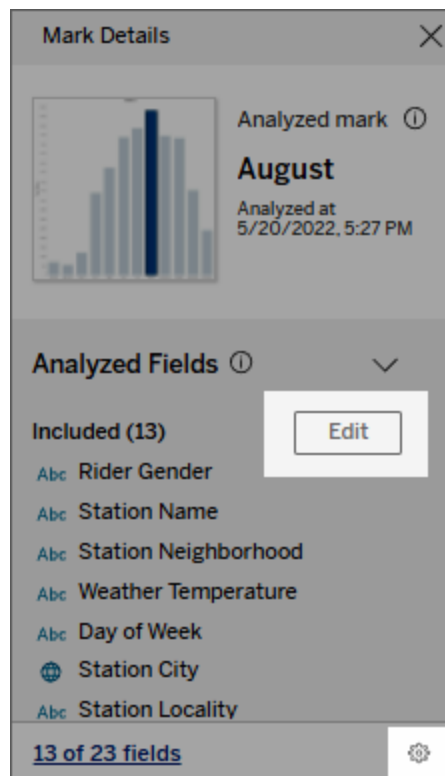


When a data source contains dimensions with a large number of unique values (up to 500), those fields won't be considered for analysis.

## To edit the fields used by Explain Data for statistical analysis

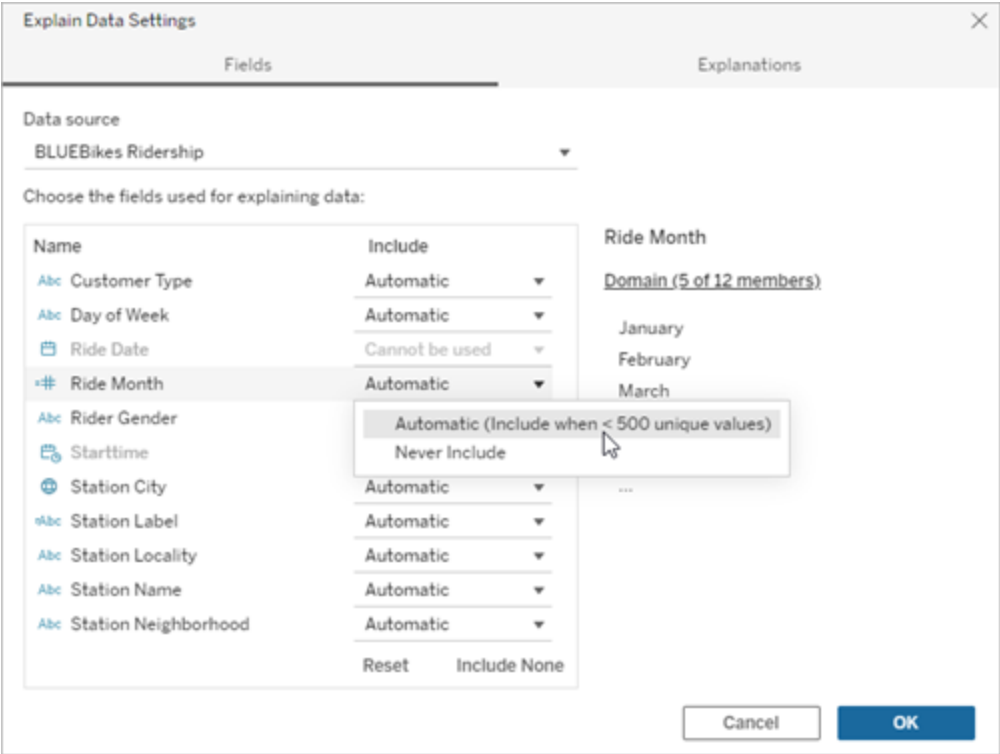
Settings for analysed fields are applied at the data source level.

1. Run Explain Data on a mark when editing a view.
2. In the Data Guide pane, click the settings icon at the bottom of the pane. Or, click the **Edit** button in the Analysed Fields view ([how to open analysed fields](#)).



3. In the Explain Data Settings dialog box, click on the **Fields** tab.
4. Click a drop-down arrow next to a field name, select **Automatic** or **Never Include**, and then click **OK**.

Note that fields must have less than 500 unique values to be included in the analysis.



Fields excluded by default

Fields excluded by default

All unvisualised measures when there are more than 1,000 measures in the data source.

All unvisualised dimensions when there are more than 1,000 dimensions in the data source.

Reasons for exclusion

Computing explanations for more than 1000 unvisualised measures or dimensions can take longer to compute, sometimes several minutes. These fields are excluded by default for initial analysis, but you can choose to include them for further analysis.

In this situation, you might see an alert asking if you want Explain Data to consider more fields. Click the alert link to get more information. Click **Explain All** to run an analysis that includes more fields.

<b>Fields excluded by default</b>	<b>Reasons for exclusion</b>
Fields that use geometry, latitude or longitude	Geometry, latitude or longitude by themselves can never be explanations. It is highly likely that an explanation that calls out the latitude or the longitude as an explanation is due to a spurious correlation and not a probable explanation.
Dimensions with high cardinality (dimensions with > 500 members)	High cardinality dimensions take longer to compute. Dimensions with more than 500 unique values will not be considered for analysis.
Groups, bins or sets	Not currently supported.
Table calculations	Table calculations cannot be analysed when table calculations are at a different level of detail than the view.
Unvisualised measures that can't be averaged	Unvisualised measures that can't be averaged include measures that are calculated fields where the calculation expression includes aggregations (display as AGG() fields when added to the sheet).
Discrete measures and continuous dimensions	Not currently supported.
Hidden fields	Not available.
Calculated fields with errors	No values present to analyse.

## Requirements and Considerations for Using Explain Data

Explain Data is always available to authors in Tableau Desktop.

For Tableau Cloud and Tableau Server: When Explain Data is enabled for a site, Creators and Explorers with the appropriate permissions can run Explain Data when editing a work-

book. All users with the appropriate permissions can run Explain Data in viewing mode in published workbooks. For more information, see [Control Access to Explain Data](#).

#### What makes a viz a good candidate for Explain Data

Explain Data works best on visualisations that require deeper exploration and analysis, rather than infographic-style, descriptive vizzes that communicate summarised data.

- Row-level data is necessary for Explain Data to create models of your data and generate explanations. Vizzes with underlying, row-level data, where relationships might exist in unvisualised fields are good candidates for running Explain Data.
- Vizzes based on pre-aggregated data without access to row-level data are not ideal for the statistical analysis performed by Explain Data.

#### What data works best for Explain Data

When you are using Explain Data in a worksheet, remember that Explain Data works with:

- **Single marks only** – Explain Data analyses single marks. Multiple mark analysis is not supported.
- **Aggregated data** – The view must contain one or more measures that are aggregated using SUM, AVG, COUNT or COUNTD. At least one dimension must also be present in the view.
- **Single data sources only** – The data must be drawn from a single, primary data source. Explain Data does not work with blended or cube data sources.

When preparing a data source for a workbook, keep the following considerations in mind if you plan to use Explain Data during analysis.

- Use a data source with underlying data that is sufficiently wide. An ideal data set has at least 10-20 columns in addition to one (or more) aggregated measures to be explained.
- Give columns (fields) names that are easy to understand.
- Eliminate redundant columns and data prep artifacts. For more information, see [Change fields used for statistical analysis](#).
- Don't discard unvisualised columns in the data source. Explain Data considers fields in the underlying data when it analyses a mark.

- Low cardinality dimensions work better. The explanation of a categorical dimension is easier to interpret if its cardinality is not too high (< 20 categories). Dimensions with more than 500 unique values will not be considered for analysis.
- Don't pre-aggregate data as a general rule. But if the data source is massive, consider pre-aggregating the data to an appropriate level of detail.
- Use extracts over live data sources. Extracts run faster than live data sources. With live data sources, the process of creating explanations can create many queries (roughly one query per each candidate explanation), which can result in explanations taking longer to be generated.

#### Situations where Explain Data is not available

Sometimes Explain Data will not be available for a selected mark, depending on the characteristics of the data source or the view. If Explain Data cannot analyse the selected mark, the Explain Data icon and context menu command will not be available.

Explain Data can't be run in views that use:

- Map coordinate filters
- Blended data sources
- Data sources with parameters
- Data sources that don't support COUNTD or COUNT(DISTINCT ...) syntax, such as Access.
- Filters on aggregate measures
- Disaggregated measures

Explain Data can't be run if you select:

- Multiple marks
- Axis
- Legend
- Grand total
- Trend line or reference line
- A mark in a view that contains a very low number of marks

Explain Data can't be run when the measure to be used for an explanation:

- Isn't aggregated using SUM, AVG, COUNT, COUNTD
- Is a table calculation
- Is used in measure values



Explain Data can't offer explanations for a dimension when it is:

- A calculated field
  - A parameter
  - Used in Measure Names and Measure Values
  - A field with more than 500 unique values.
- Dimensions with more than 500 unique values will not be considered for analysis.

## Control Access to Explain Data

Your access to Explain Data will vary depending on your site role and content permissions. Explain Data is always available to authors in Tableau Desktop. Authors with appropriate permissions can run Explain Data in editing mode in Tableau Cloud and Tableau Server.

Authors can also control whether Explain Data is available in viewing mode in published workbooks and which explanation types are displayed.

Be aware that Explain Data can surface values from dimensions and measures in the data source that aren't represented in the view. As an author, you should run Explain Data and test the resulting explanations to make sure that sensitive data isn't being exposed in your published workbooks.

### Who can access Explain Data

Explain Data is enabled by default at the site level. Server administrators (Tableau Server) and site administrators (Tableau Cloud) can control whether Explain Data is available for a site. For more information, [Disable or Enable Explain Data for a Site](#).

Mode	Who Can Access
<b>Viewing mode</b>	Tableau <b>Viewers</b> , <b>Explorers</b> and <b>Creators</b> who have the Run Explain Data permission capability can run and explore Explain Data explanations in viewing mode.
<b>Editing mode</b>	Tableau <b>Creators</b> can run Explain Data when editing a view in Tableau Desktop, Tableau Cloud or Tableau Server. <b>Explorers</b> who have the Run Explain Data permission cap-

Mode	Who Can Access
	<p>ability and editing permissions can run Explain Data when editing a workbook in Tableau Cloud or Tableau Server.</p> <p>Creators and Explorers who have editing permissions can open new worksheets for further analysis.</p> <p>They can also use Explain Data Settings to control who can use Explain Data and what they can see.</p>

Control who can use Explain Data and what they can see

A combination of settings must be enabled to make Explain Data available in editing mode and viewing mode in Tableau Cloud and Tableau Server.

Editing mode

Requirements for authors to run Explain Data or edit Explain Data settings in editing mode:

- Site setting: **Availability of Explain Data** set to **Enable**. Enabled by default.
- Site role: Creator, Explorer (can publish)
- Permissions: **Run Explain Data** capability set to **Allowed**. Unspecified by default. If you open a workbook (Tableau version 2022.1 or earlier) that used this permission in Tableau version 2022.2 or later, you will need to reset the Run Explain Data capability to Allowed.

**Note:** The **Download Full Data** capability for a Creator or Explorer (can publish) controls whether they see the View Full Data option in Extreme Values explanations. Viewers are always denied the Download Full Data capability. However, all users can see record-level details when the Extreme Values explanation type is enabled in Explain Data settings.

Creators and Explorers with editing permissions and the Run Explain Data permission capability can access **Explain Data Settings**, which provide options for controlling:

- The **explanation types that are displayed** in the Data Guide pane.
- The **fields that are included in, or excluded from** statistical analysis.

These options are set for the entire workbook and can only be set in the Explain Data Settings dialog box.

#### Viewing mode

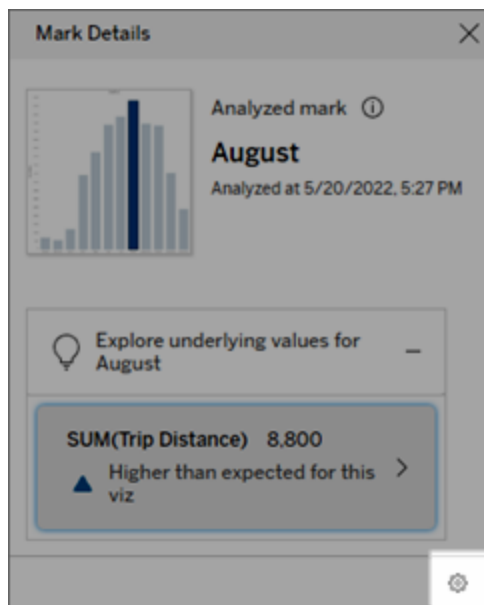
Requirements for all users to run Explain Data in viewing mode:

- Site setting: **Availability of Explain Data** set to **Enable**. Enabled by default.
- Site role: Creator, Explorer or Viewer
- Permissions: **Run Explain Data** capability set to **Allowed**. Unspecified by default. If you open a workbook (Tableau version 2022.1 or earlier) that used this permission in Tableau version 2022.2 or later, you will need to reset the Run Explain Data capability to Allowed.

**Note:** To see explanations of Detected Outliers in the Data Guide, users of a viz must have the Explain Data permission allowed for the workbook or view. The owner of the workbook will need to open the permissions settings for this workbook in Tableau Server or Tableau Cloud and allow the Explain Data permission to that user.

Open the Explain Data Settings dialog box

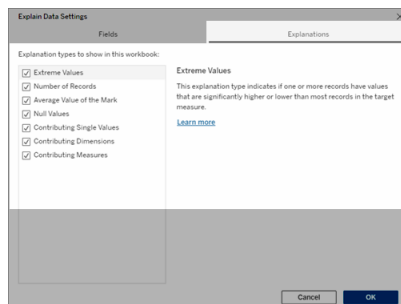
1. From the **Analysis** menu, choose **Explain Data Settings**. Or, in the Data Guide pane, click the settings icon (bottom right).



Include or exclude explanation types displayed by Explain Data

Creators and Explorers who have editing permissions can choose to exclude (or include) explanation types displayed for all workbook users.

1. In the **Explain Data Settings** dialog box, click on the **Explanation Types** tab.



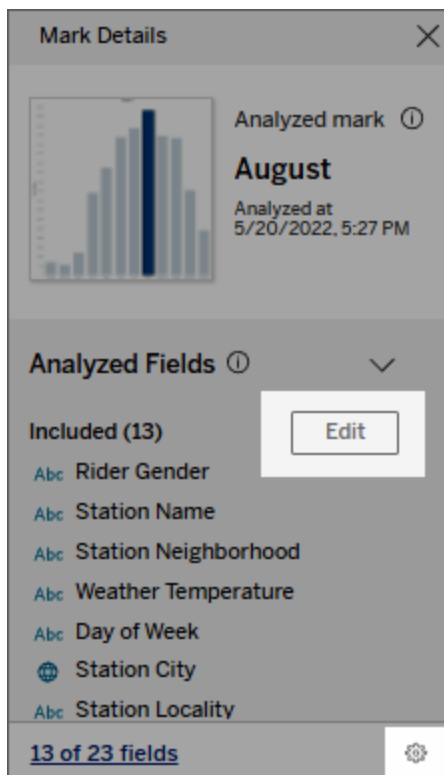
2. In the list of explanation types, select or clear an explanation type.
3. Click **OK**.

Test the setting by saving and closing the published workbook and then opening a view from the workbook in viewing mode. Select a mark that typically has Extreme Value explanations, and then run Explain Data to check the explanation results.

Include or exclude fields used for statistical analysis

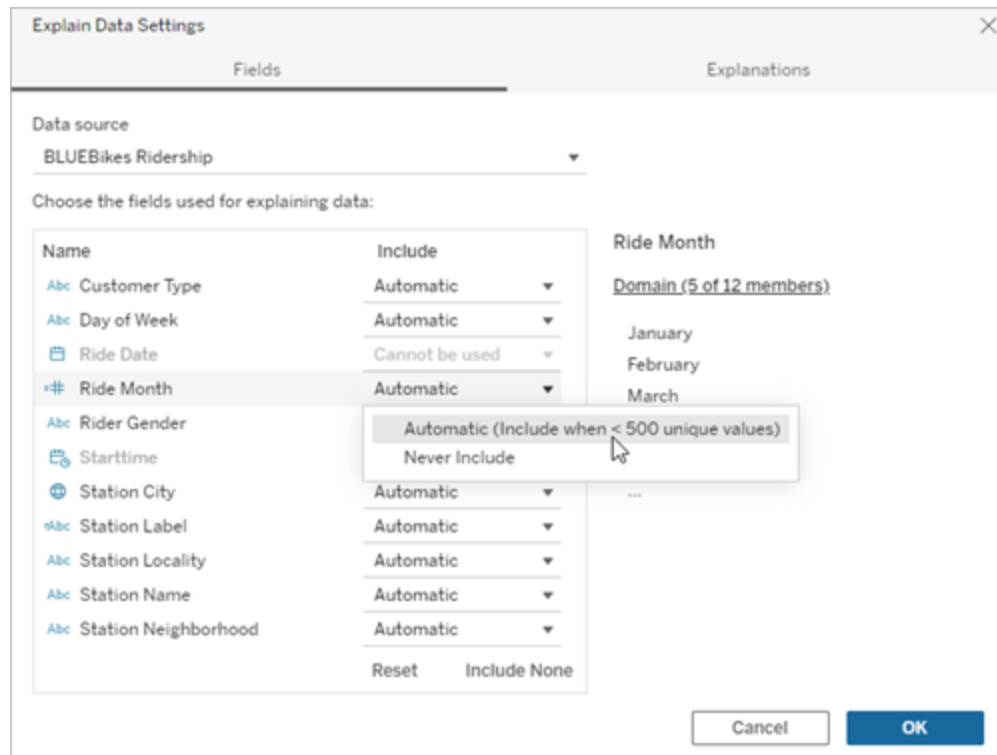
Creators or Explorers who have editing permissions can choose to exclude (or include) fields that are eligible for analysis.

1. In the Data Guide pane (bottom right), choose the settings icon. Or, choose the **Edit** button in the **Analysed Fields view**.



2. In the **Explain Data Settings** dialog box, click on the **Fields** tab.
3. In the list of fields under **Include**, click on the drop-down arrow and select **Automatic** to include an eligible field every time Explain Data runs for that workbook.

Note that fields must have less than 500 unique values to be included in the analysis.



Select **Never Include** to explicitly exclude the field.

Select **Include None** to run a statistical analysis on the data without considering fields.

Select **Reset** to return to the default settings.

#### 4. Click **OK**.

Test the setting by saving the published workbook. Select a mark, and then run Explain Data to check the explanation results.

Configure Tableau to allow users to share explanations via email and Slack

Tableau administrators can control whether explanations can be shared in viewing mode via email or Slack to other Tableau users.

Follow these steps to allow notifications and sharing via email and Slack in Tableau Cloud or Tableau Server:

1. Click **Settings**.
2. On the General tab, scroll down to **Manage Notifications**.
3. For Collaboration, select **Share** for **On Tableau**, **Email** and **Slack**.

To share explanations via Slack, the Tableau app must be set up for your Slack workspace. Sharing explanations with Slack is enabled by default in Tableau Cloud.

In Tableau Server, an administrator will need to set up the Tableau app for Slack. For more information, see [Integrate Tableau with a Slack Workspace](#).

## How Explain Data Works

Use Explain Data as an incremental, jumping-off point for further exploration of your data. The possible explanations that it generates help you to see the different values that make up or relate to an analysed mark in a view. It can tell you about the characteristics of the data points in the data source, and how the data might be related (correlations) using statistical modelling. These explanations give you another tool for inspecting your data and finding interesting clues about what to explore next.

**Note:** Explain Data is a tool that uncovers and describes relationships in your data. It can't tell you what is causing the relationships or how to interpret the data. **You are the expert on your data.** Your domain knowledge and intuition is key in helping you decide what characteristics might be interesting to explore further using different views.

For related information on how Explain Data works, and how to use Explain Data to augment your analysis, see these Tableau Conference presentations:

- [From Analyst to Statistician: Explain Data in Practice \(1 hour\)](#)
- [Leveraging Explain Data \(45 minutes\)](#)

What Explain Data is (and isn't)

Explain Data is:

- A tool and a workflow that leverages your domain expertise.
- A tool that surfaces relationships in your data and recommends where to look next.
- A tool and a workflow that helps expedite data analysis and make data analysis more accessible to a broader range of users.

Explain Data is not:

- A statistical testing tool.
- A tool to prove or disprove hypotheses.
- A tool that is giving you an answer or telling you anything about causality in your data.

When running Explain Data on marks, keep the following points in mind:

- **Consider the shape, size and cardinality of your data.** While Explain Data can be used with smaller data sets, it requires data that is sufficiently wide and contains enough marks (granularity) to be able to create a model.
- **Don't assume causality.** Correlation is not causation. Explanations are based on models of the data, but are not causal explanations.

A correlation means that a relationship exists between some data variables, say A and B. You can't tell just from seeing that relationship in the data that A is causing B, or B is causing A, or if something more complicated is actually going on. The data patterns are exactly the same in each of those cases and an algorithm can't tell the difference between each case. Just because two variables seem to change together doesn't necessarily mean that one causes the other to change. A third factor could be causing them both to change, or it may be a coincidence and there might not be any causal relationship at all.

However, you might have outside knowledge that is not in the data that helps you to identify what's going on. A common type of outside knowledge would be a situation where the data was gathered in an experiment. If you know that B was chosen by flipping a coin, any consistent pattern of difference in A (that isn't just random noise) must be caused by B. For a longer, more in-depth description of these concepts, see the article [Causal inference in economics and marketing](#) by Hal Varian.

How explanations are analysed and evaluated

Explain Data runs a statistical analysis on a dashboard or sheet to find marks that are outliers, or specifically on a mark you select. The analysis also considers possibly related data points



from the data source that aren't represented in the current view.

Explain Data first predicts the value of a mark using only the data that is present in the visualisation. Next, data that is in the data source (but not in the current view) is considered and added to the model. The model determines the range of predicted mark values, which is within one standard deviation of the predicted value.

What is an expected range?

The expected value for a mark is the median value in the expected range of values in the underlying data in your viz. The expected range is the range of values between the 15th and 85th percentile that the statistical model predicts for the analysed mark. Tableau determines the expected range each time it runs a statistical analysis on a selected mark.

Possible explanations are evaluated on their explanatory power using statistical modelling. For each explanation, Tableau compares the expected value with the actual value.

value	Description
<b>Higher than expected/Lower than expected</b>	If an expected value summary says the mark is <i>lower than expected</i> or <i>higher than expected</i> , it means the aggregated mark value is outside the range of values that a statistical model is predicting for the mark. If an expected value summary says the mark is <i>slightly lower</i> or <i>slightly higher</i> than expected, or <i>within the range of natural variation</i> , it means the aggregated mark value is within the range of predicted mark values, but is lower or higher than the median.
<b>Expected Value</b>	If a mark has an expected value, it means its value falls within the expected range of values that a statistical model is predicting for the mark.
<b>Random Variation</b>	When the analysed mark has a low number of records, there may not be enough data available for Explain Data to form a statistically significant explanation. If the mark's value is outside of the expected range, Explain Data can't determine whether this unexpected value is being caused by random variation or by a meaningful difference

value	Description
	in the underlying records.
<b>No Explanation</b>	When the analysed mark value is outside of the expected range and it does not fit a statistical model used for Explain Data, no explanations are generated.

#### Models used for analysis

Explain Data builds models of the data in a view to predict the value of a mark and then determines whether a mark is higher or lower than expected given the model. Next, it considers additional information, like adding additional columns from the data source to the view, or flagging record-level outliers, as potential explanations. For each potential explanation, Explain Data fits a new model and evaluates how unexpected the mark is given the new information. Explanations are scored by trading off complexity (how much information is added from the data source) against the amount of variability that needs to be explained. Better explanations are simpler than the variation they explain.

Explanation type	Evaluation
<b>Extreme values</b>	<p>Extreme values are aggregated marks that are outliers, based on a model of the visualised marks. The selected mark is considered to contain an extreme value if a record value is in the tails of the distribution of the expected values for the data.</p> <p>An extreme value is determined by comparing the aggregate mark with and without the extreme value. If the mark becomes less surprising by removing a value, then it receives a higher score.</p> <p>When a mark has extreme values, it doesn't automatically mean it has outliers, or that you should exclude those records from the view. That choice is up to you depending on your analysis. The explanation is simply pointing out an interesting extreme value in</p>

Explanation type	Evaluation
	<p>the mark. For example, it could reveal a mistyped value in a record where a banana cost 10 pounds instead of 10 pence. Or, it could reveal that a particular sales person had a great quarter.</p>
<b>Number of records</b>	<p>The number of records explanation models the aggregate sum in terms of the aggregate count; average value of records models it in terms of the aggregate average. The better the model explains the sum, the higher the score.</p> <p>This explanation describes whether the sum is interesting because the count is high or low, or because the average is high or low.</p>
<b>Average value of the mark</b>	<p>This type of explanation is used for aggregate marks that are sums. It explains whether the mark is consistent with the other marks because in terms of its aggregate count or average, noting the relation <math>SUM(X) = COUNT(X) * AVG(X)</math>.</p> <p>This explanation describes whether the sum is interesting because the count is high or low, or because the average is high or low.</p>
<b>Contributing Dimensions</b>	<p>This explanation models the target measure of the analysed mark in terms of the breakdown among categories of the unvisualised dimension. The analysis balances the complexity of the model with how well the mark is explained.</p> <p><i>An unvisualised dimension</i> is a dimension that exists in the data source but isn't currently being used in the view. This type of explanation is used for sums, counts and averages.</p> <p>The model for unvisualised dimensions is created by splitting out marks according to the categorical values of the explaining column, and then building a model with the value that includes all of the data points in the source visualisation. For each row, the model</p>

Explanation type	Evaluation
	<p>attempts to recover each of the individual components that made each mark. The analysis indicates whether the model predicts the mark better when components corresponding to the unvisualised dimension are modelled and then added up, versus using a model where the values of the unvisualised dimension are not known.</p> <p>Aggregate dimension explanations explore how well mark values can be explained without any conditioning. Then, the model conditions on values for each column that is a potential explanation. Conditioning on the distribution of an explanatory column should result in a better prediction.</p>
<b>Contributing Measures</b>	<p>This explanation models the mark in terms of this unvisualised measure, aggregated to its mean across the visualised dimensions. An <i>unvisualised measure</i> is a measure that exists in the data source but isn't currently being used in the view.</p> <p>A Contributing Measures explanation can reveal a linear or quadratic relationship between the unvisualised measure and the target measure.</p>

## Disable or Enable Explain Data for a Site

Explain Data is enabled for sites by default, but Tableau administrators may disable it.

1. Go to the **General** site settings.
2. (Tableau Server only) In the **Web Authoring** section, select **Let users edit workbooks in their browser**.
3. In the **Availability of Explain Data** section, select from these options:
  - **Enable** lets Creators and Explorers with the appropriate permissions run Explain Data in editing mode. Lets all users with appropriate permissions run

Explain Data when it is enabled for viewing mode.

- **Disable** prevents all users from running Explain Data or accessing Explain Data settings in workbooks.

4. In Tableau Cloud and Tableau Server 2023.3 or later, to use Explain Data:

- In the **Availability of Data Guide** section, select **Show**. For more information about Data Guide, see [Explore Dashboards with Data Guide](#).

## Use Dashboard Extensions

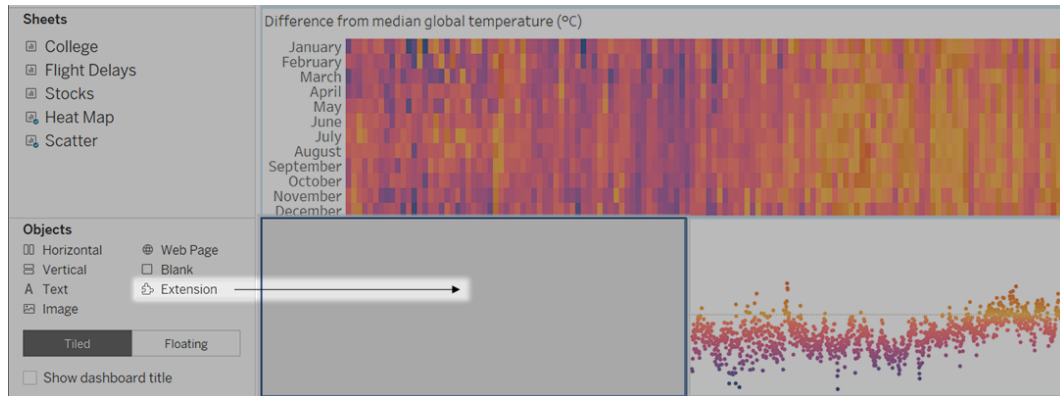
Extensions let you add unique features to dashboards or directly integrate them with applications outside Tableau. Adding extensions is easy; you incorporate them into dashboard layouts just like other dashboard objects.

Extensions expand dashboard functionality with the help of web applications created by third-party developers. If you're a developer and want to create your own extensions, see the [Tableau Extensions API documentation](#) on GitHub.

**Note:** Tableau administrators can turn off dashboard extensions for [Tableau Desktop](#), [Tableau Server](#) and [Tableau Cloud](#).

### Add an extension to a dashboard

1. In a Tableau workbook, open a dashboard sheet.
2. From the **Objects** section, drag **Extension** to the dashboard.



3. In the “Add an Extension” dialog box, do either of the following:
  - Search for and select an extension.
  - Click **Access Local Extensions**, and navigate to a .trex file you previously downloaded.
4. If prompted, allow or deny the dashboard extension access to data in the workbook.  
For more information, see [Data security, Network-enabled and Sandboxed extensions](#).  
If you allow access, follow any on screen instructions for configuring the extension.

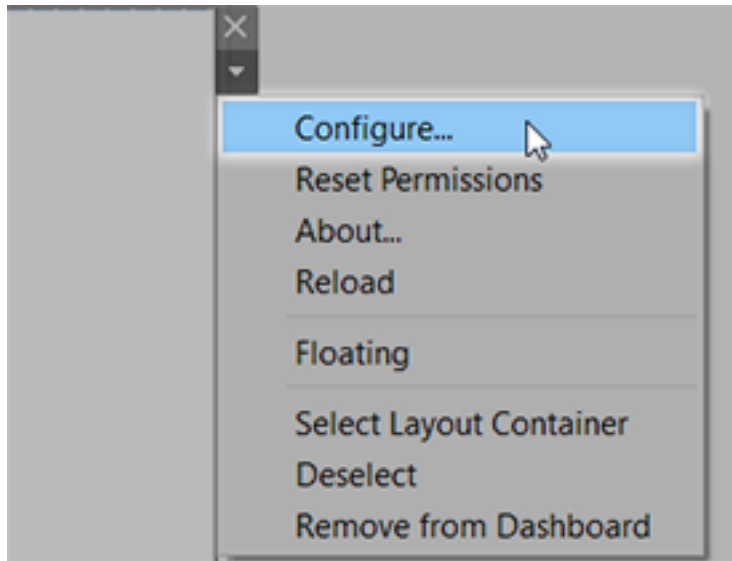
**Note:** If you're using Tableau Server or Tableau Cloud, Extension objects will appear blank in prints, PDFs and images of dashboards (including images in subscription emails).

### Configure a dashboard extension

Some dashboard extensions provide configuration options that let you customise features.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose **Configure**.

2. Follow the on-screen instructions to configure the extension.



Reload a dashboard extension

If a dashboard extension becomes unresponsive, you might need to reload it, which is similar to refreshing a web page in a browser.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose **Reload**.

The dashboard extension is refreshed and set to its original state.

2. If reloading the extension fails to return it to a usable state, try removing it from the dashboard and adding it again.

## Data security, Network-enabled and Sandboxed extensions

Dashboard extensions are web applications that come in two forms:

- *Network-enabled extensions* run on web servers located outside of your local network.
- *Sandboxed extensions* run in a protected environment without access to any other resource or service on the web.

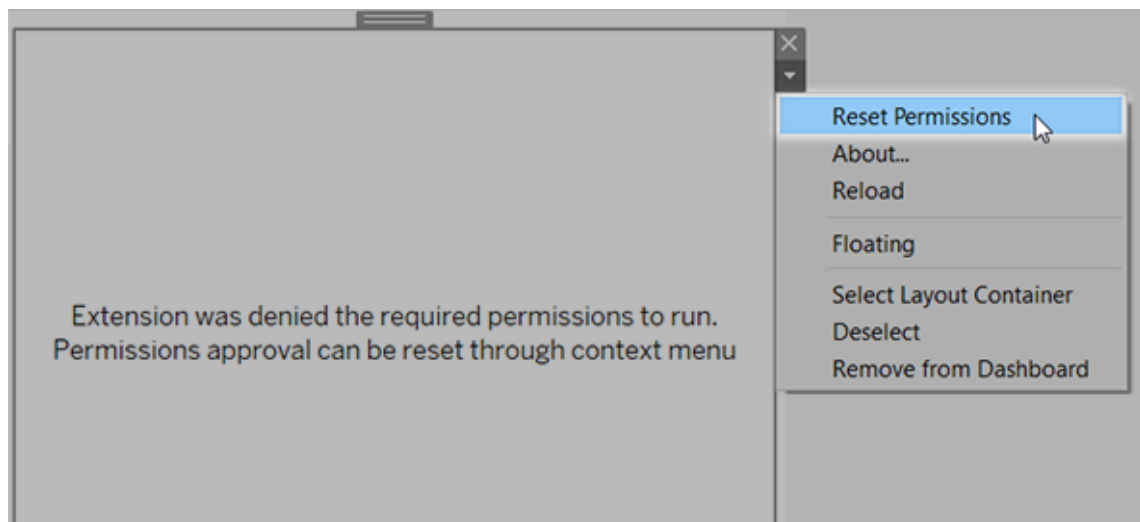
Before adding a Network-enabled extension or viewing a dashboard with one, be certain that you trust the website that hosts it. By default, dashboard extensions use the HTTPS protocol, which guarantees an encrypted channel for sending and receiving data, and ensures some privacy and security.

For more information about data security when using dashboard extensions, see [Extension Security - Best Practices for Deployment](#).

#### Allow or deny data access to a Network-enabled extension

Depending on how an extension is designed, it can access either visible data in a view, or full underlying data, table and field names from data sources, and information about data source connections. When you add an extension, or view a dashboard with one, you're given an opportunity to allow or deny the extension to run and access this data.

If you're viewing a dashboard with an extension that requires full data access, and that access has been denied, a message appears in place of the extension. If you trust the extension and want to use it, you can reset permissions and allow the extension to run.



1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose **Reset Permissions**.



2. Click either **Allow** to let the extension run and access data, or **Deny** to prevent the extension from running.

Ensure that JavaScript is enabled in Tableau Desktop

Dashboard extensions interact with data using the Tableau Extensions API library, a JavaScript library. If you want to use extensions, be sure that JavaScript is enabled in the dashboard security settings:

Choose **Help > Settings and Performance > Set Dashboard Web View Security > Enable JavaScript**.

## Ensure that extensions run on Tableau Cloud or Tableau Server

You can add extensions to workbooks that you publish from Tableau Desktop or directly in the web-authoring mode of Tableau Cloud and Tableau Server. A Tableau administrator must allow extensions to run on a site and add Network-enabled extensions to a safe list. Administrators should only allow extensions that you have tested and trust.

If you want to use a dashboard extension on Tableau Cloud or Tableau Server, direct your administrator to [Manage Dashboard Extensions in Tableau Cloud](#) or [Manage Dashboard Extensions in Tableau Server](#).

Supported web browsers for Sandboxed extensions

Sandboxed extensions run in all browsers supported by [Tableau Server](#) and [Tableau Cloud](#) except Internet Explorer 11.

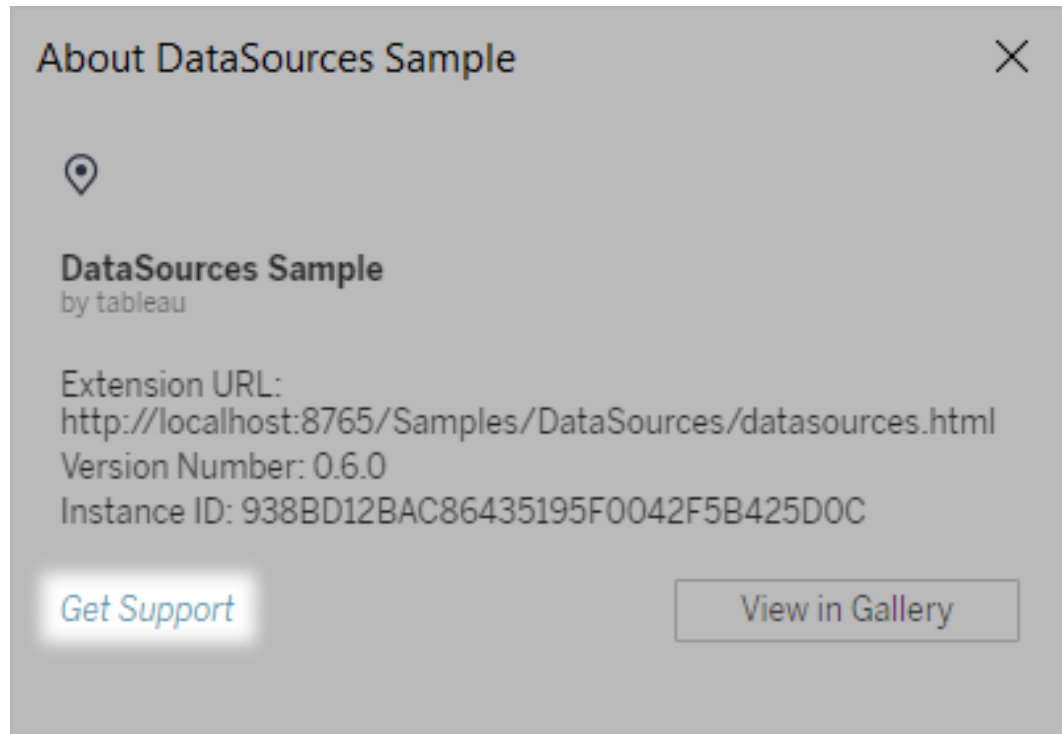
Supported versions of Tableau Server for Sandboxed extensions

You can use Sandboxed extensions in Tableau Server 2019.4 and later.

## Get support for dashboard extensions

To get help for an extension, you'll need to contact the developer or company who created it.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose **About**.
2. Click **Get Support** to go to the support page of the extension developer.



**Note:** Tableau doesn't provide support for extensions or for other programs that interface with the Extensions API. However, you can submit questions and ask for help in the [Tableau developer community](#).

## Format Animations

Animate visualisations to better highlight changing patterns in your data, reveal spikes and outliers and see how data points cluster and separate.

Animations visually transition between filter, sort and zoom settings, different pages and changes to filter, parameter and set actions. As visualisations animate in response to these

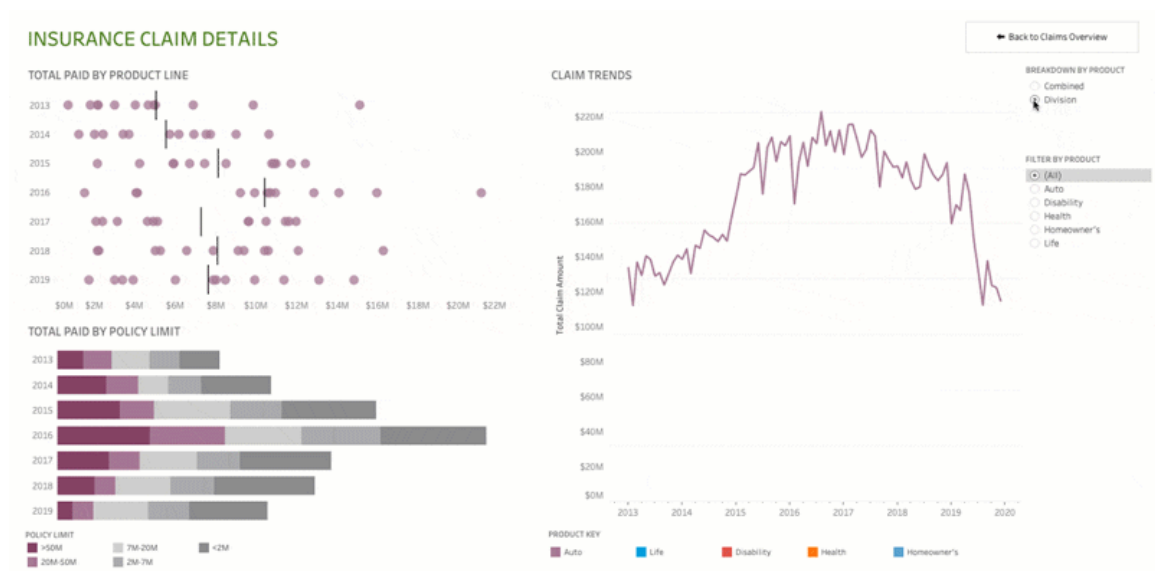
changes, viewers can more clearly see how data differs, helping them make better informed decisions.

## Understanding simultaneous and sequential animations

When you author animations, you can choose between two different styles: simultaneous or sequential. Here are examples of each type.

### Simultaneous animations

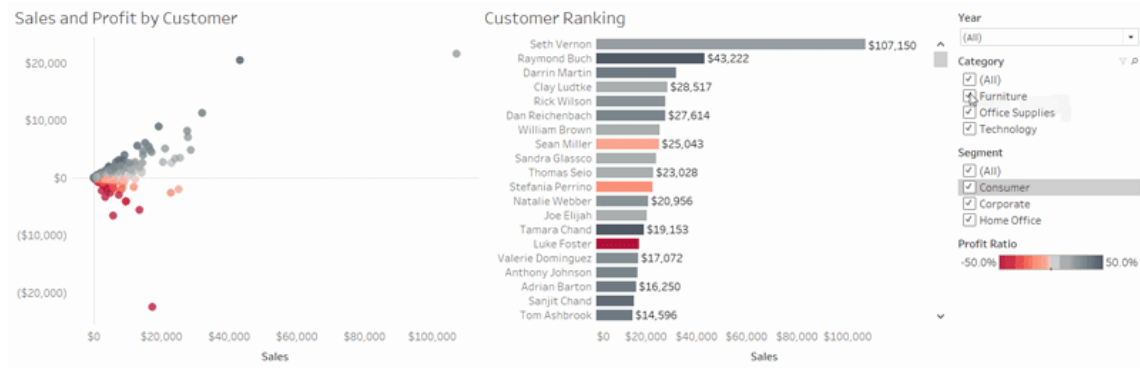
The default simultaneous animations are faster and work well when showing value changes in simpler charts and dashboards.



Click the image above to replay the animation.

### Sequential animations

Sequential animations take more time but make complex changes clearer by presenting them step-by-step.



Click the image above to replay the animation.

## Animate visualisations in a workbook

When you create a new workbook, Tableau enables animations for your viz by default. You can turn animations on or off at the user and workbook level.

1. Choose **Format > Animations**.
2. If you want to animate every sheet, under **Workbook Default**, click **On**. Then do the following:
  - For **Duration**, choose a preset, or specify a custom duration of up to 10 seconds.
  - For **Style**, choose **Simultaneous** to play all animations at once or **Sequential** to fade out marks, move and sort them and then fade them in.
3. To override workbook defaults for a particular sheet, change the settings under **Selected Sheet**.

**Note:** In the Selected Sheet section, “(Default)” indicates a setting that auto-

matically reflects the related Workbook Default setting.

**Animations** ×

**Workbook Default**

On

Off

Duration

1.00 seconds (Slow) ▼

Style

Simultaneous ▼

Reset All Sheets

**Selected Sheet**

Heat Map

Animation

On (Default) ▼

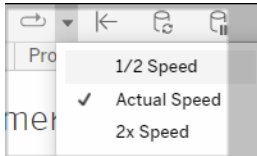
Duration

0.30 seconds (Fast) ▼

Style

Sequential ▼

To replay an animation, click the **Replay** button in the toolbar. From the **Replay** button, you can also choose the speed at which the animation replays: actual speed, 2x speed or 1/2 speed.



## Reset animation settings for a workbook

You can reset animations to return an entire workbook to the default animation settings. Be aware that this turns animations off by default.

1. Choose **Format > Animations**.
2. In the middle of the **Animations** pane, click **Reset All Sheets**.

## Completely disable all animations

When you create a new workbook, animations are enabled by default. If you find animations distracting while viewing vizs, you can completely disable them so they never play. (This isn't a system-wide setting; each user needs to apply it separately.)

- In Tableau Desktop, choose **Help > Settings and Performance**, and deselect **Enable Animations**.
- In Tableau Cloud or Tableau Server, click your profile image or initials in the top-right corner of the browser, and choose **My Account Settings**. Then scroll down to the bottom of the page, deselect **Enable animations**, and click **Save Changes**.

**Note:** When animations are disabled, you can still choose **Format > Animations** in authoring mode and adjust settings – but they will have no effect.

## Format decimals for axes animations

If the number of decimal places for a measure is set to the default, then the number of decimals shown during the axis animation might fluctuate during the axes animation. To avoid this, format the number of decimal places displayed for a measure. For more information, see [Format Numbers and Null Values](#).

## Why animations won't play

### Server rendering

Animations won't play if a viz is server-rendered. To ensure that vizzes render on a client computer or mobile device, use these techniques:

- If you're a viz author, [reduce viz complexity](#).
- If you're a Tableau Server administrator, [increase the complexity threshold for client-side rendering](#).

**Note:** On computers with lower processing power, animations may appear choppy, but users can continue to interact with vizzes without any delays in responsiveness.

### Unsupported browsers and features

Animations are supported by all web browsers except Internet Explorer.

The following Tableau features don't animate:

- Maps, polygons and density marks in web browsers
- Pie and text marks
- Headers
- Forecasts, trends and reference lines



- Page history trails (If a viz includes these, turn off animations to avoid unexpected behaviour.)

## Format Numbers and Null Values

You can specify the format for numeric values that are displayed in your viz, including measures, dimensions, parameters, calculated fields and axis labels.

When specifying a number format, you can select from a set of standard formats, such as number, currency, scientific and percentage. You can also define a custom number format, with the option to include special characters.

When a measure contains null values, the nulls are usually plotted as zero. You can use formatting, however, to handle the null values in a different way, such as hiding them.

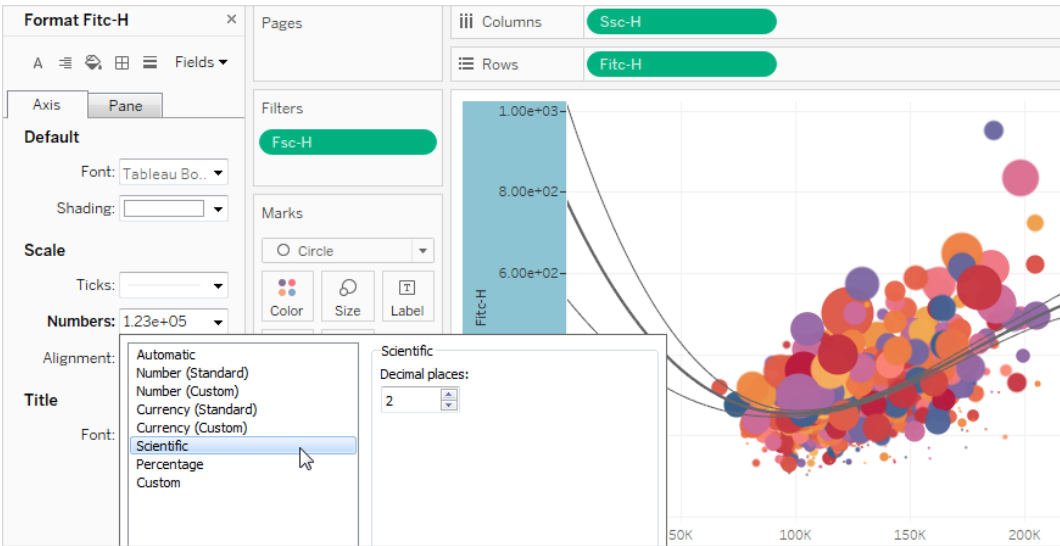
### For Tableau Desktop

Specify a number format

1. Right-click (control-click on Mac) a number in the view and select **Format**.
2. In the **Format** pane, click the **Numbers** drop-down menu.
3. Select a number format.

Some formats require additional settings. For example, if you select **Scientific**, you

must also specify the number of decimal places.



Here are the number formats and associated options available in Tableau.

Number Format	Format Options
<b>Automatic:</b> format is automatically selected based on either the format specified by the data source or the data contained in the field.	None.
<b>Number (Standard):</b> format is based on locale selected.	Locale: number format changes based on the geographical location selected.
<b>Number (Custom):</b> format is customised to your choice.	Decimal Places: the number of decimal places to display.  Negative Values: how negative values are displayed.  Units: the number is displayed using the specified units. For example, if the number is

Number Format	Format Options
	<p>20,000 and the units are thousands, the number will be displayed as 20K.</p> <p>Prefix/Suffix: characters that precede and follow each displayed number.</p> <p>Include thousands separators: whether the number shows separators every thousand (example: 100,000 vs. 100000).</p>
<p><b>Currency (Standard):</b> format and currency symbol is based on locale selected.</p>	<p>Locale: currency format based on the geographical location selected.</p>
<p><b>Currency (Custom):</b> format and currency symbol is customised to your choice.</p>	<p>Decimal Places: the number of decimal places to display.</p> <p>Negative Values: how negative values are displayed.</p> <p>Units: the number is displayed using the specified units. For example, if the number is 20,000 and the units are thousands, the number is displayed as 20K.</p> <p>Prefix/Suffix: characters that precede and follow each displayed number.</p> <p>Include thousands separators: whether the number shows separators every thousand (example: 100,000 vs. 100000).</p>

Number Format	Format Options
<b>Scientific:</b> numbers are displayed in scientific notation.	Decimal: the number of decimal places to display.
<b>Percentage:</b> numbers are displayed as a percentage with the percent symbol. The value of 1 is interpreted as 100% and 0 as 0%	Decimal: the number of decimal places to display.
<b>Custom:</b> format is based entirely on what is specified in the format options.	Custom: Type in the format you want to use, including special characters (optional). See "Define a custom number format" in this topic for details.

#### Define a custom number format

To apply a custom number format in your viz:

1. Right-click (control-click on Mac) a number in the view and select **Format**.
2. In the **Format** pane, click the **Numbers** drop-down menu and select **Custom**.
3. In the **Format** field, define your formatting preferences using the following syntax: `Positive number format;Negative number format;Zero values`.

When defining your number format code, keep in mind that:

- You can specify the formatting for up to three types of numbers in the following order: positive numbers, negative numbers and zeros.
- Each number type must be separated by a semicolon (;).
- If you specify only one number type, the format for that type is used for all numbers.
- If you specify two number types, the format for the first type is applied to positive numbers and zeros, while the format for the second type is applied to negative numbers.
- If you skip types in your number format code, you must include a semicolon (;) for each of the missing types.

## Custom number format examples

Refer to the following table for examples of commonly used custom number format codes that you can use in your viz.

USE CASE	NUMBER CODE SYNTAX	EXAMPLE OUTPUT
Show only positive values	<code>#,##; ;</code>  (note a blank space after the 2nd and 3rd semicolon)	Positive values: 1,234 Negative values: (only the blank space displays) Zero values: (only the blank space displays)
Show only negative values	<code>;-#,##;</code>	Positive values: (nothing is displayed) Negative values: -1,234 Zero values: (nothing is displayed)
Show only zero values	<code>;;0;</code>	Positive values: (nothing is displayed) Negative values: (nothing is displayed) Zero values: 0
Hide zero values	<code>#,###;-#,###;;</code>	Positive values: 1,234 Negative values: -1,234 Zero values: (nothing is displayed)
Show negative values in brackets	<code>#,###;(#,###);;</code>	Positive values: 1,234 Negative values: (1,234) Zero values: (nothing is displayed)
Add a character prefix to a value	<code>\$#,###.##;-\$#,###.##;\$0;</code>	Positive values: \$1,234.56 Negative values: -\$1,234.56 Zero values: \$0

USE CASE	NUMBER CODE SYNTAX	EXAMPLE OUTPUT
Add a character suffix to a value	#%;-#%;0%;	Positive values: 12% Negative values: -34% Zero values: 0%
Add text descriptors	"\$"#,#" Surplus";"\$"-##" Shortage"; "\$"0;	Positive values: \$1,234 Surplus Negative values: \$-1,234 Shortage Zero values: \$0

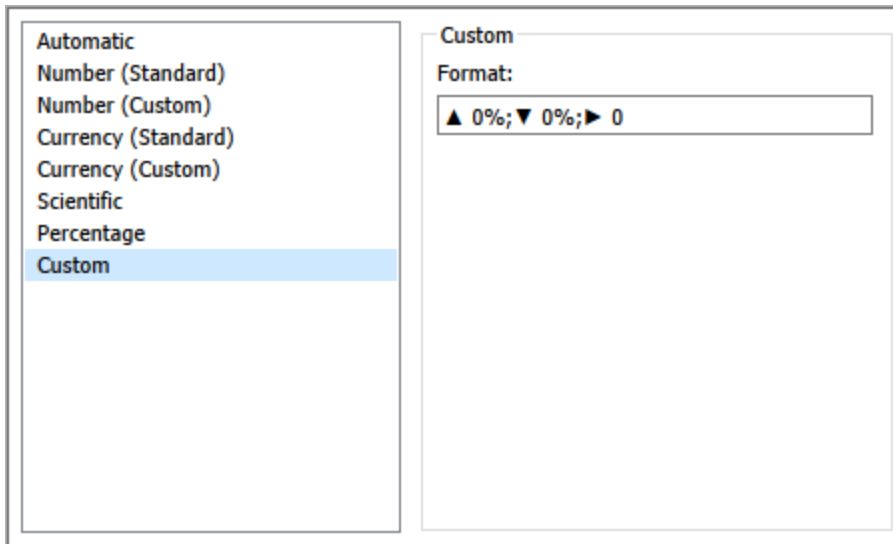
There are several ways to customise your number format to meet your needs. For more code guidance and examples, see [Review guidelines for customising a number format](#) in the Microsoft Knowledge Base.

**Note:** There are slight deviations between the options described by Microsoft and those available in Tableau. For example, custom number formats that align text within columns aren't relevant in Tableau. Additionally, custom number formats to colour code text aren't applicable because you can apply colour to text using the Marks card. (For more information on applying colour, see [Control the Appearance of Marks in the View](#).) Be sure to only use custom number formats that apply in Tableau.

#### Include special characters in a custom number format

One of the benefits of custom number formatting is the ability to include special characters or symbols. Symbols can make it easier to quickly understand comparisons between measures and calculations in your viz.

For example, let's say you want to show a month-over-month comparison of profits for three of your company's top-selling products. Rather than using the standard label to show that the profit for these products changed +5%, -2% and 0% from last month, you can set the custom number format as follows to show these changes as ▲5%, ▼2% and ►0.



Set the default number format for a field

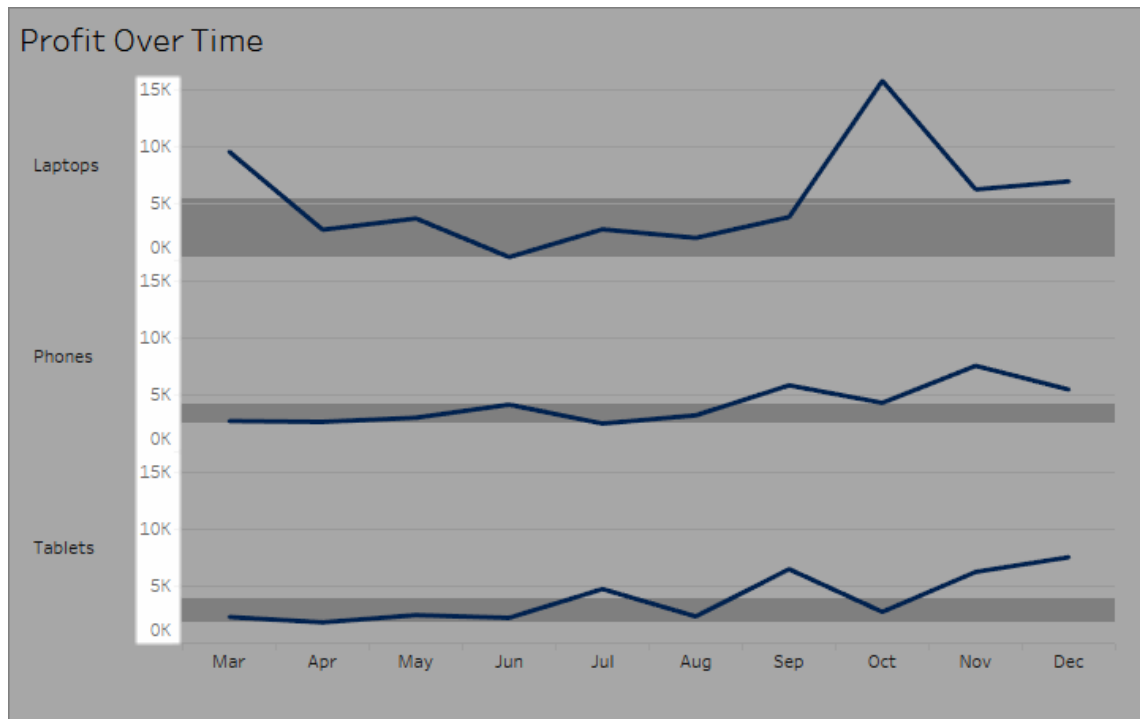
Right-click (control-click on Mac) the field in the **Data** pane and select **Default Properties > Number Format**.

In the subsequent dialog box, specify a number format to be used whenever the field is added to the view. The default number format is saved with the workbook. It's also exported when you export the connection information.

**Note:** Formatting numbers using the **Format** pane overrides any number formatting applied elsewhere.

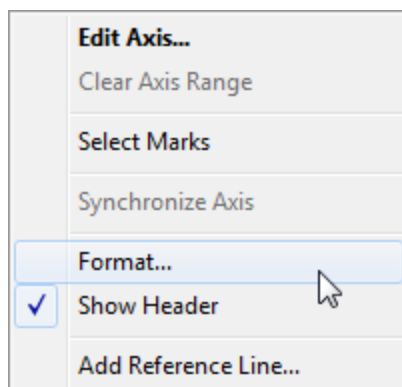
Format a measure as currency

The view in the following image shows profit over time. Notice that the profit figures on the vertical axis aren't formatted as currency.



To format the numbers as currency:

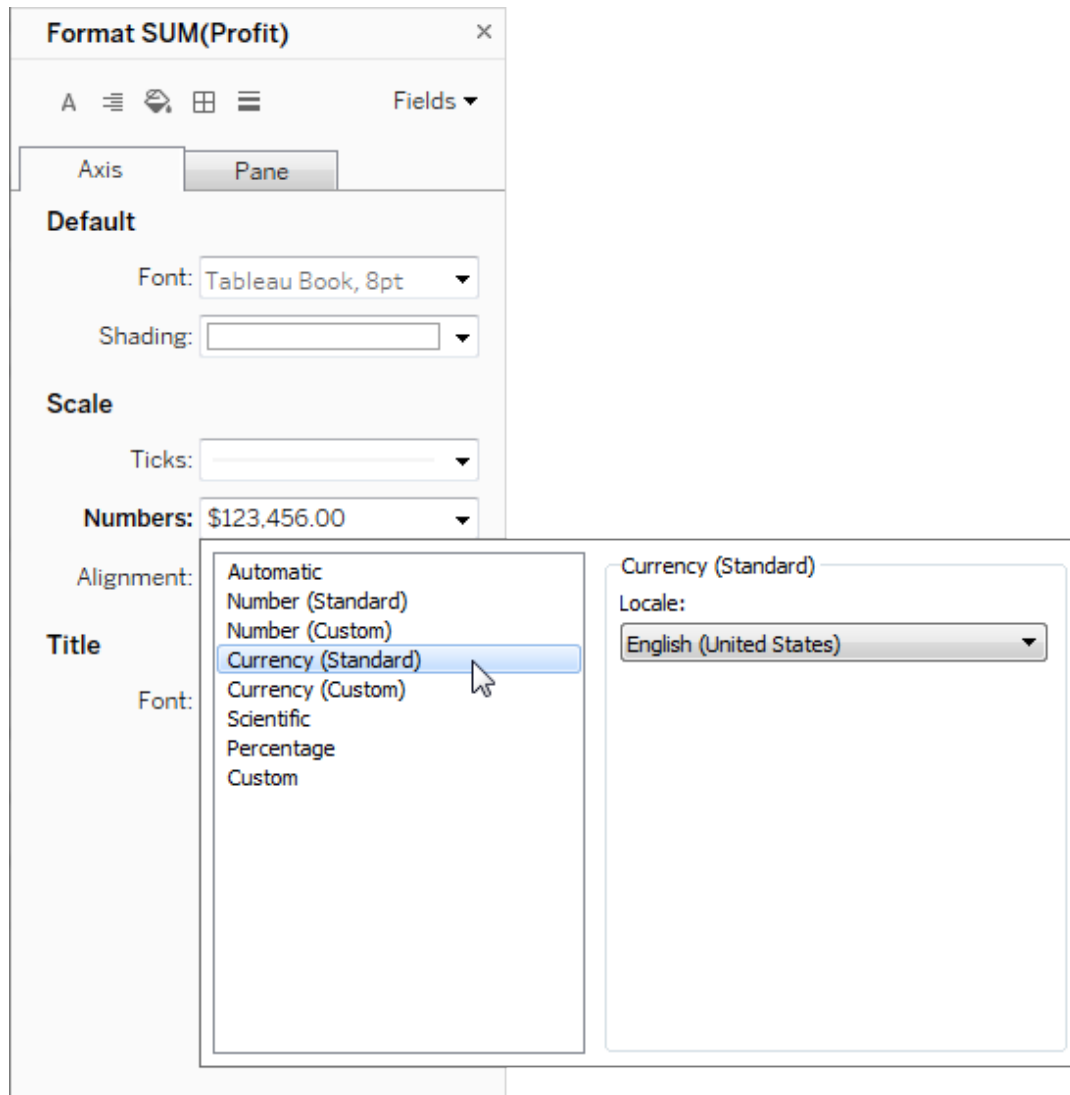
1. Right-click the **Profit** axis and choose **Format**.



2. On the **Axis** tab in the **Format** pane, under **Scale**, select the **Numbers** drop-down list, and then select one of the following:

**Currency (Standard)** to add a dollar sign and two decimal places to the figures.





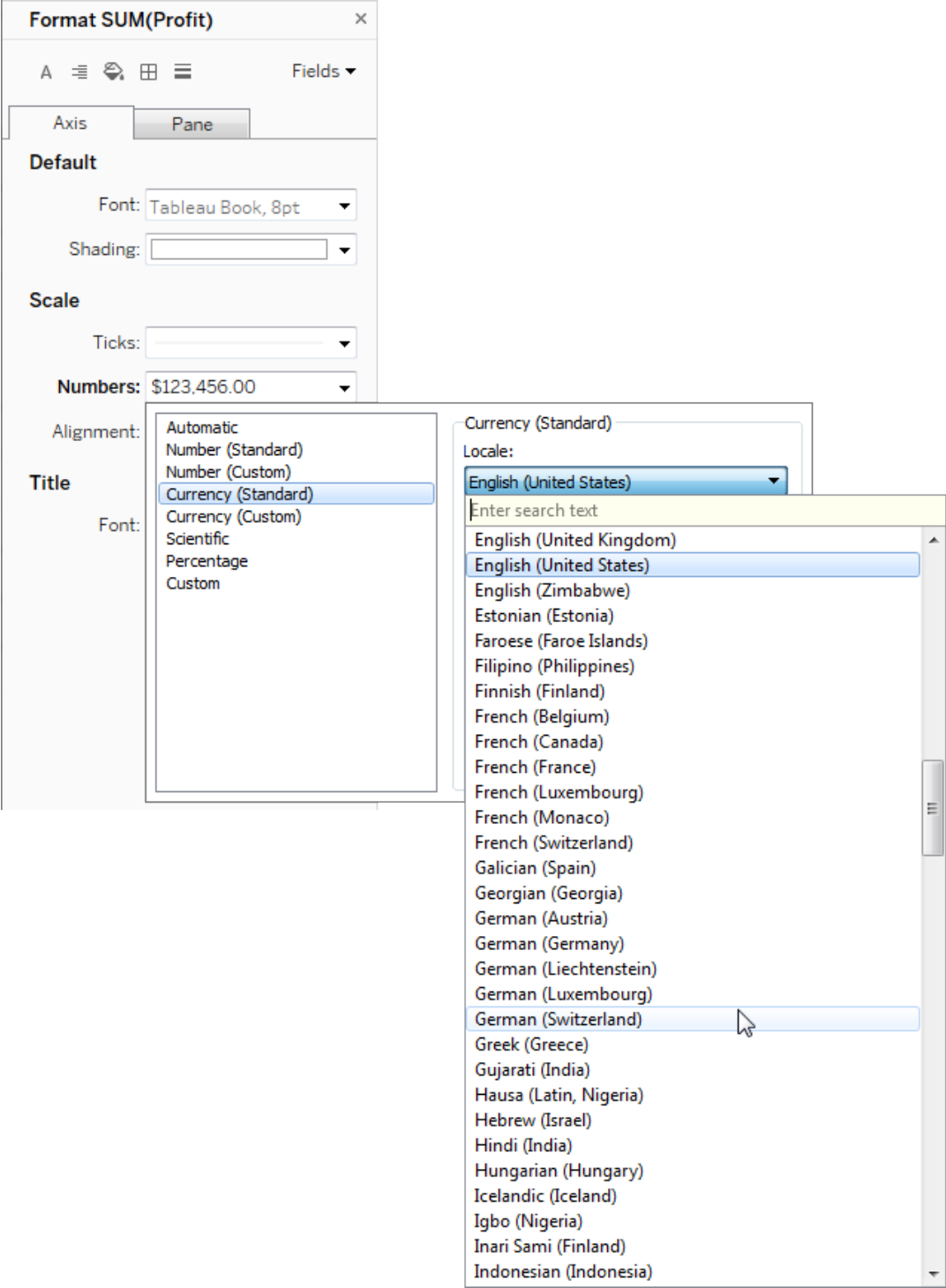
**Currency (Custom)** to specify the number of decimal places, how to show negative values, the units, whether to include a prefix or suffix, and whether to include a separator character.

Use locale to specify number formats

By default, Tableau uses your computer's locale and language settings to format numbers. But you can explicitly set a different locale in the **Format** pane.

The following steps show how to set Swiss German currency, using the same view as in the previous section.

1. Right-click the **Profit** axis and select **Format**.
2. On the **Axis** tab, under **Scale**, select the **Numbers** drop-down list and then select **Currency (Standard)**.
3. In the **Locale** drop-down list, items appear in a **Language (Country)** format. For this example, select **German (Switzerland)**.



The view updates to show the sales figures in Swiss Francs, formatted for the German language.

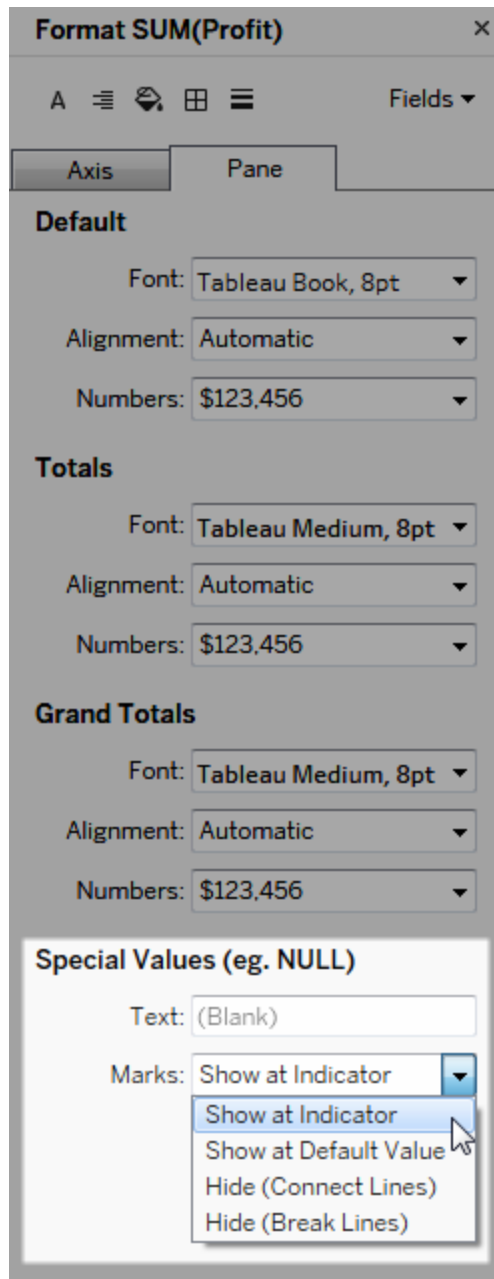
**Tip:** You can change the default currency setting so that every time you drag the **Profit** measure to a view it uses the settings you want. In the **Data** pane, right-click **Profit** (or other monetary measure) and select **Default Properties > Number Format**. Then format the field as shown above.

### Format null values

When a measure contains null values, they're usually plotted in a view as zero. However, sometimes that changes the view and you'd rather just suppress null values altogether. You can format each measure to handle null values in a unique way.

#### To format null values for a specific field:

1. Right-click the field in the view that has the null value (Control-click on a Mac) and choose **Format**.
2. Go to the **Pane** tab.
3. In the **Special Values** area, specify whether to show the null value using an indicator in the lower right corner of the view, plot it at a default value (such as zero for number fields), hide the value but connect the line, or hide and break the line to indicate that a null value exists.



4. If you specify text in the **Text** field, it appears in the view for a null value when mark labels are turned on. See [Show and Hide Mark Labels](#).

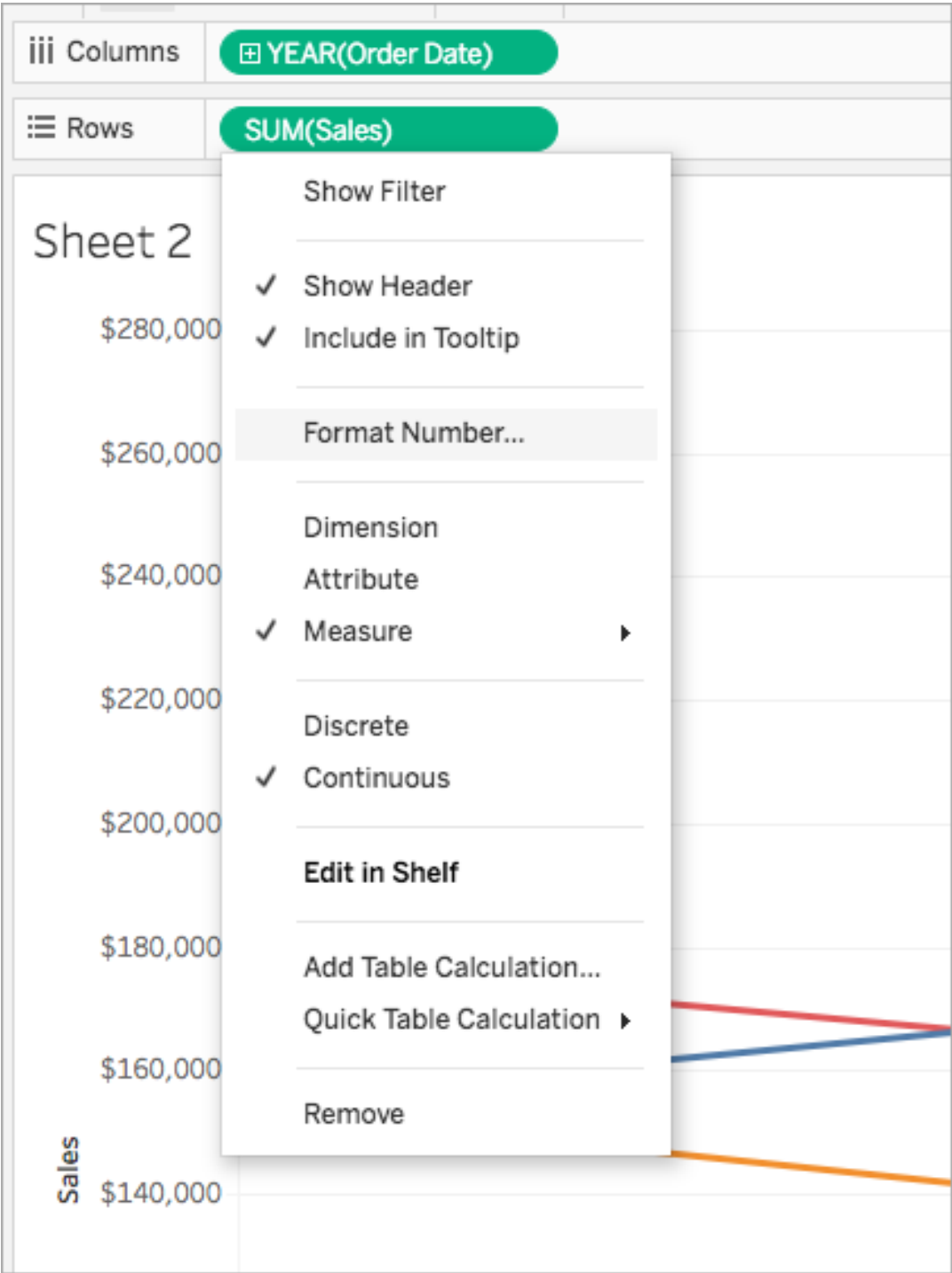
**Note:** The Special Values area isn't available for dimensions or discrete measures.

## For Tableau Server or Tableau Cloud

### Specify a number format

When authoring a view on the web, you can specify the number format for a field used in the view.

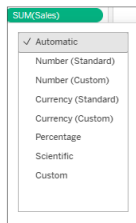
1. In web editing mode, right-click a measure in the view and select **Format Number**.



2. In the dialog box that appears, select a number format.

Some formats provide additional settings. For example, if you select **Currency**, you can also specify the number of decimal places, as well as the units, and whether or not to include separators, such as commas.

In this example, Sales is formatted as a Currency with zero decimal places and thousand (k) units. Sales numbers in the view update with these settings. Labels and tool-tips update as well.



Here are the number formats and associated options available in Tableau.

Number Format	Format Options
<b>Automatic:</b> format is automatically selected based on either the format specified by the data source or the data contained in the field.	None.
<b>Number (Custom):</b> format is customised to your choice.	<p><b>Decimal Places:</b> the number of decimal places to display.</p> <p><b>Units:</b> the number is displayed using the specified units. For example, if the number is 20,000 and the units are thousands, the number is displayed as 20K.</p> <p><b>Include separators:</b> whether the number shows separators every thousand</p>



Number Format	Format Options
	(example: 100,000 vs. 100000).
<b>Currency (Custom):</b> format and currency symbol is customised to your choice.	<p><b>Decimal Places:</b> the number of decimal places to display.</p> <p><b>Units:</b> the number is displayed using the specified units. For example, if the number is 20,000 and the units are thousands, the number is displayed as 20K.</p> <p><b>Include separators:</b> whether the number shows separators every thousand (example: 100,000 vs. 100000).</p>
<b>Percentage (Custom):</b> numbers are displayed as a percentage with the percent symbol. The value of 1 is interpreted as 100% and 0 as 0%	<b>Decimal Places:</b> the number of decimal places to display.
<b>Scientific (Custom):</b> numbers are displayed in scientific notation.	<b>Decimal Places:</b> the number of decimal places to display.

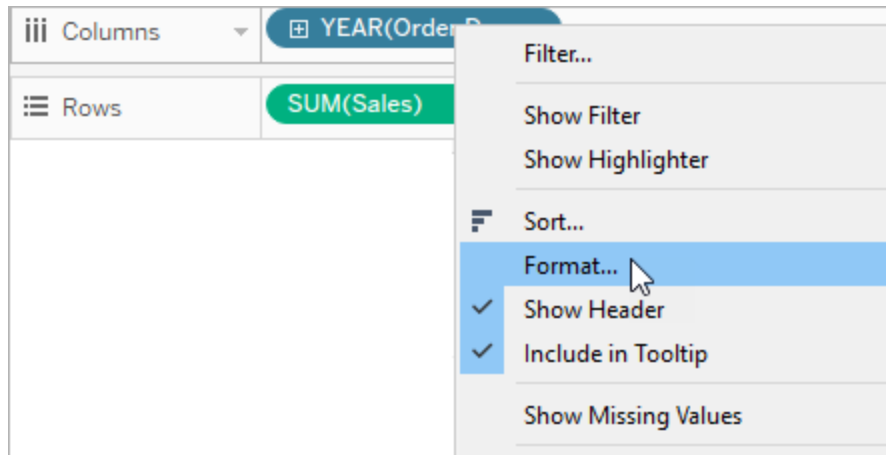
## Custom Date Formats

This article discusses using the custom date format field to format dates in a view. For an overview of how Tableau works with dates, see [Dates and Times](#), or [Changing Date Levels](#). For setting date properties for a **data source**, see [Date Properties for a Data Source](#).

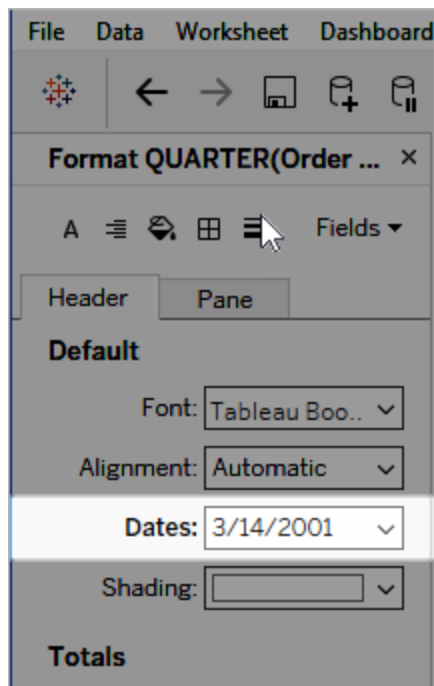
## How to find the custom date format field

Format a date field in a view (Tableau Desktop)

To format a date field in the view in Tableau Desktop, right-click (Control-click on a Mac) the field and choose **Format**.



This opens the **Format** panel to the left of your view. Select the **Dates** field.

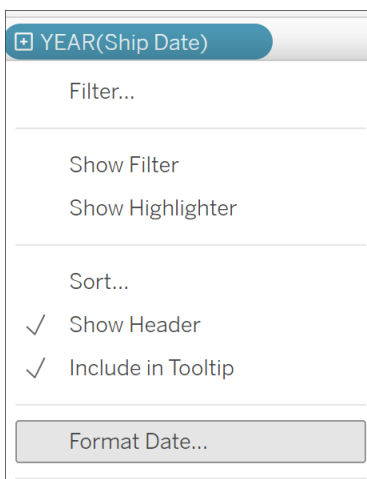


## Tableau Server on Windows Help

When you format dates, Tableau presents a list of available formats. Usually, the last item in the list is **Custom**. You can specify a custom date using format symbols listed in the Supported date format symbols table, either alone or in combination.

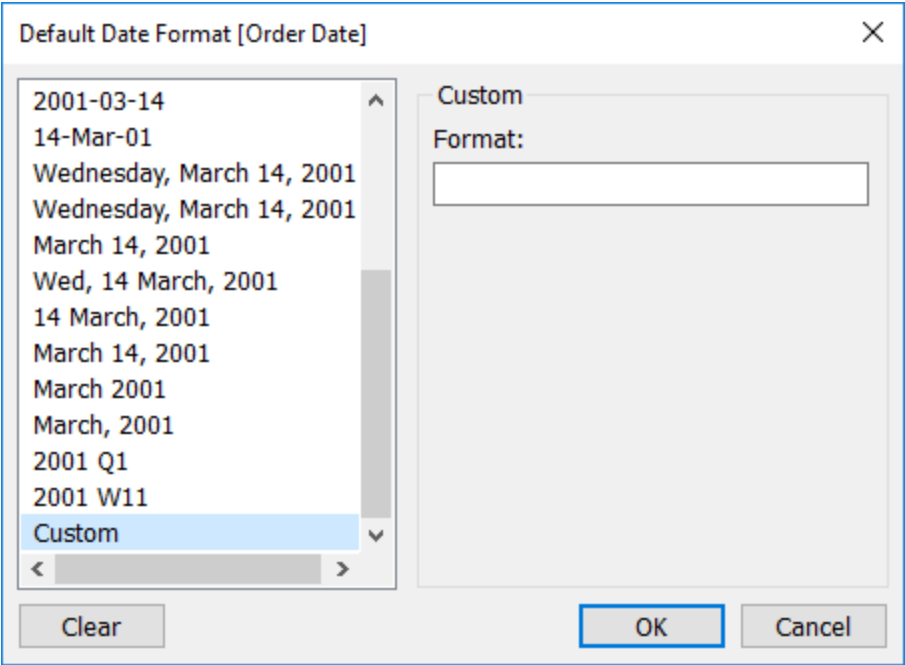
### Format a date field in a view (Tableau Cloud and Tableau Server)

To format a date field in the view in Tableau Cloud and Tableau Server, right-click (Control-click on a Mac) the field and choose **Format Date**.



### Format a date field in the Data pane (Tableau Desktop only)

To format a date field in the **Data** pane, right-click the field and choose **Default Properties > Date Format**.



The date formats in the table are supported when your workbook is connected to a Tableau extract or has a live connection to a data source that also supports the date format. (Refer to your data source's documentation to verify that the date format you want is supported.)

Tableau retrieves date formats from the data source. Tableau Server can also retrieve date formats from the Run As user account on the server that's running Tableau Server.

**Note:** The following date formats might not be the same as those used with the [Type Conversion](#) function. See [Convert Strings to Date Fields](#) for more information.

Supported date format symbols

Use the following symbols to construct a custom date format.

Symbol	Description
(:)	Time separator. In some locales, a different character is used to represent the time separator. The time separator separates hours, minutes and seconds when time values are formatted. The actual character used as the

	time separator in formatted output is determined by your system settings.
(/)	Date separator. In some locales, a different character is used to represent the date separator. The date separator separates the day, month and year when date values are formatted. The actual character used as the date separator in formatted output is determined by your system settings.
c	Display the date as dddddd and display the time as tttttt, in that order. Display only date information if there's no fractional part to the date serial number; display only time information if there's no integer portion.
d	Display the day as a number without a leading zero (1–31).
dd	Display the day as a number with a leading zero (01–31).
ddd	Display the day as an abbreviation (Sun, Sat).
dddd	Display the day as a full name (Sunday, Saturday).
dddddd	Display the date as a complete date (including day, month and year), formatted according to your system's short date format setting. The default short date format is m/d/yy.
dddddd	Display a date serial number as a complete date (including day, month and year) formatted according to the long date setting recognised by your system. The default long date format is mmmm dd, yyyy.
aaaa	The same as dddd, only it's the localised version of the string.
w	Display the day of the week as a number (1 for Sunday through 7 for Saturday).
ww	Display the week of the year as a number (1–54).
M	Display the month as a number without a leading zero (1–12). If m immediately follows h or hh, the minute rather than the month is displayed.
MM	Display the month as a number with a leading zero (01–12). If m immediately follows h or hh, the minute rather than the month is displayed.

MMM	Display the month as an abbreviation (Jan–Dec).
MMMM	Display the month as a full month name (January–December).
MMMMM	Display the month as a single letter abbreviation (J–D)
oooo	The same as MMMM, but localised.
q	Display the quarter of the year as a number (1–4).
y	Display the day of the year as a number (1–366).
yy	Display the year as a 2-digit number (00–99).
yyyy	Display the year as a 4-digit number (100–9999).
h	Display the hour as a number without leading zeros (0–23).
Hh	Display the hour as a number with leading zeros (00–23).
N	Display the minute as a number without leading zeros (0–59).
Nn	Display the minute as a number with leading zeros (00–59).
S	Display the second as a number without leading zeros (0–59).
Ss	Display the second as a number with leading zeros (00–59).
000	Display milliseconds. Use a period character as a separator before specifying milliseconds.
tttt	Display a time as a complete time (including hour, minute and second), formatted using the time separator defined by the time format recognised by your system. A leading zero is displayed if the leading zero option is selected and the time is before 10:00 A.M. or P.M. The default time format is <code>h:mm:ss</code> .
AM/PM	Use the 12-hour clock and display an uppercase AM with any hour before noon; display an uppercase PM with any hour between noon and 11:59 P.M.
am/pm	Use the 12-hour clock and display a lowercase AM with any hour before noon; display a lowercase PM with any hour between noon and 11:59 P.M.

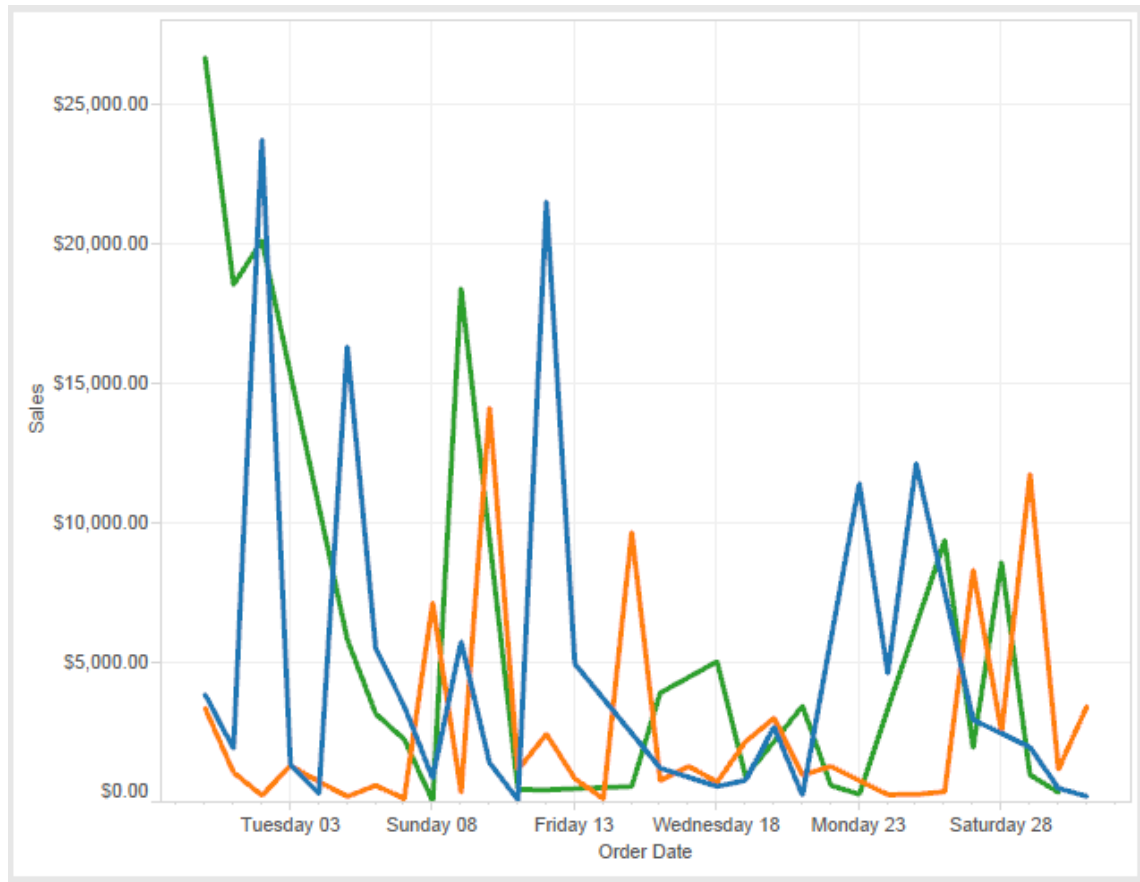
A/P	Use the 12-hour clock and display an uppercase A with any hour before noon; display an uppercase P with any hour between noon and 11:59 P.M.
a/p	Use the 12-hour clock and display a lowercase A with any hour before noon; display a lowercase P with any hour between noon and 11:59 P.M.
AMPM	Use the 12-hour clock and display the AM string literal as defined by your system with any hour before noon; display the PM string literal as defined by your system with any hour between noon and 11:59 P.M. AMPM can be either uppercase or lowercase, but the case of the string displayed matches the string as defined by your system settings. The default format is AM/PM.

## Custom date format examples

Any of the date format symbols in the table above can be used alone or in combination.

Specifying a custom format `yyyy-MM-dd HH:mm:ss.000` would produce dates in the format `2015-05-10 11:22:16.543`. Such a format might be appropriate for scientific data.

Specifying a custom format `DDDD DD` would produce dates that show the Weekday and the Day, as shown below.



Specifying a custom format `yy-mm-dd (dddd)` would produce dates in the format **18-01-04 (Thursday)**.

Specifying a custom format `"Q"1 YYYY` would produce dates that appear as **Q1 2018**.

## Support for Japanese era-based date formats

Tableau supports Japanese emperor-era-based date (Wareki) formats. Here's how to apply an era-based date format to a field in your view:

1. Set your workbook locale to Japanese.
2. Right-click the field in the view for which you want to set a date format.



3. Choose **Format**.
4. In the **Format** pane, from the **Dates** drop-down list, select a format.

If the format that you want isn't listed, you can construct your own date format. To do this, choose **Custom format** in the **Dates** box, then type your format using the Tableau date placeholders. The following era-based year placeholders are available:

Symbol	Description
g	Short era name (such as H for the Heisei era).
gg	Era name (such as 平成).
ggg	Long era name (for Japanese, this is the same as the regular era name).
e	Era-based year, such as 1 for the first year of an era.
ee	Era-based year, such as 01 for the first year of an era. If there's only one digit, then the era-based year will have a zero added to the front.

If your workbook locale isn't Japanese, you can create a custom date format, then insert the language code `!ja_JP!` in front of your format so that it looks like this:

```
!ja_JP! gg ee"年"mm"月"dd"日"
```

The language code forces the date to be treated as if it's a Japanese date.

Era-based dates aren't fully supported by the Tableau Server browser view. In particular, if you publish a workbook that contains an interactive filter, the `e` and `g` placeholders won't be filled in:



To avoid this issue, don't show era-based dates in interactive filters if your workbook will be viewed in a browser.

## Using literal text in a date format

You may want your date format to include some words or phrases, such as **Fiscal Quarter q of yyyy**. However, if you type that text directly into the Tableau format box, it may treat the letters like date parts:

Quarter of Order Date
Fi01/1/2010al 1uarter 1 of 2010
Fi04/1/2010al 2uarter 2 of 2010
Fi07/1/2010al 3uarter 3 of 2010
Fi010/1/2010al 4uarter 4 of 2010

To prevent Tableau from doing this, put double quotes around the letters and words that shouldn't be treated as date parts: "Fiscal Quarter" q "of" yyyy.

If you want a literal quote inside of a quoted section, insert this code: "\"". For example, the format "Fiscal \" Quarter" would be formatted as **Fiscal " Quarter**.

## Format syntax in DATEPARSE function for extract data sources

If you're using the DATEPARSE function in an extract, use the syntax defined by the Unicode Consortium.

The following table lists the field types that can be represented in the format parameter of the DATEPARSE function. Click the field type to get information about the symbols, field patterns, examples and descriptions from the Unicode Consortium website.

Unit of time	Notes
<a href="#">Era</a>	n/a
<a href="#">Year</a>	All symbols are supported in .hyper extracts except for "U".  <b>Notes:</b>

Unit of time	Notes
	<ul style="list-style-type: none"> <li>• Negative values denote a year before Christ (BC). For example, <code>DATEPARSE ('y', '-10')</code> returns the first January of 11BC and <code>DATEPARSE ('y', '-0')</code> returns the first January of 1BC.</li> <li>• When working with the calendar year "y", the pattern "yy" requests the two low-order digits of the year. For numbers &lt; 70, the <code>DATEPARSE</code> function returns the year 2000+x. For numbers &gt;=70, the <code>DATEPARSE</code> function returns the year 1900+x.</li> <li>• When working with "Y" in "ISO week date" based calendars, the year transition occurs on a week boundary and may differ from the calendar year transition. The "Y" designation is used in conjunction with pattern character "w" in ISO year-week calendar. The ISO week date system is effectively a leap week calendar system that is part of the ISO 8601 date and time standard. Similar to "y", negative values for "Y" denote a year before Christ (BC).</li> </ul>
Month	<p>All symbols are supported in .hyper extracts except for "l".</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• The month designations are used in conjunction with "d" for the day number.</li> <li>• In contrast to ICU, .hyper extracts allow values 1–12. Other values cause an error.</li> </ul>
Week	<p>All symbols are supported in .hyper extracts except for</p>

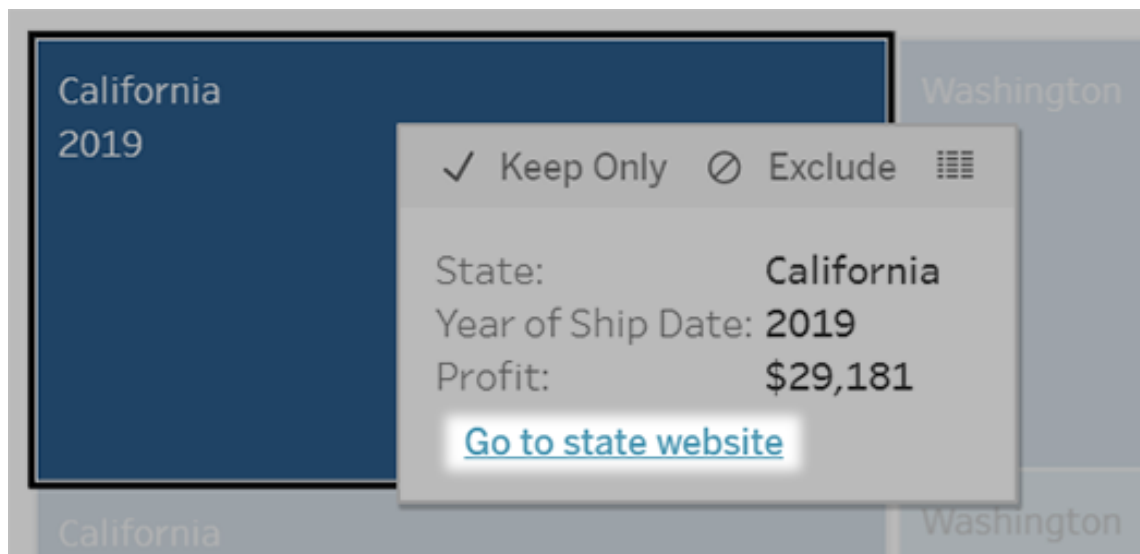
Unit of time	Notes
	<p>"W".</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• When working with "w", in contrast to ICU, .hyper extracts allow only valid weeks. A year has 52 or 53 weeks (ISO 8601). The DATEPARSE function validates the input. For example, an error occurs for the 53rd week of 2016 because the 53rd week doesn't exist for 2016.</li> <li>• When working with "W", ICU doesn't support this designation, but it's useful for dates like 1st Monday of September.</li> </ul>
Day	<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• When working with "d", in contrast to ICU, .hyper extracts only allow valid day numbers. For example, an error occurs for the 31st of February.</li> <li>• When working with "D", in contrast to ICU, .hyper extracts only allow valid day numbers. For example, an error occurs for the 366th day of 2017.</li> </ul>
Hour	<p>Only "h" and "H" symbols are supported in .hyper extracts.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• When working with "h", .hyper extracts don't allow negative values for this field. Negative values cause an error.</li> </ul>

Unit of time	Notes
	<ul style="list-style-type: none"> <li>When working with "H", .hyper extracts don't allow negative values for this field. Negative values cause an error.</li> </ul>
Minute	<b>Note:</b> In contrast to ICU, .hyper extracts don't allow negative values for this field. Negative values will cause an error.
Second	<b>Notes:</b> <ul style="list-style-type: none"> <li>In contrast to ICU, .hyper extracts don't allow negative values for this field. Negative values will cause an error.</li> <li>When working with "S", <code>DATEPARSE('ss.SSSS', '12.3456')</code> returns 1990-01-01 00:00:12:3456 AD.</li> </ul>
Quarter	<b>Note:</b> In contrast to ICU, .hyper extracts only allow values 1–4. All other values cause an error.
Weekday	<b>Notes:</b> <ul style="list-style-type: none"> <li>When working with "e" and "ee", in contrast to ICU, .hyper extracts only allow values 1–7. All other values cause an error.</li> <li>When working with "c..cc", in contrast to ICU, .hyper extracts only allow values 1–7. All other values cause an error.</li> </ul>
Period	n/a

## URL Actions

A URL action is a hyperlink that points to a web page, file, or other web-based resource outside of Tableau. You can use URL actions to create an email or link to additional information about your data. To customise links based on your data, you can automatically enter field values as parameters in URLs.

**Tip:** URL actions can also open in a web page object in a dashboard. See [Actions and Dashboards](#) to learn more.



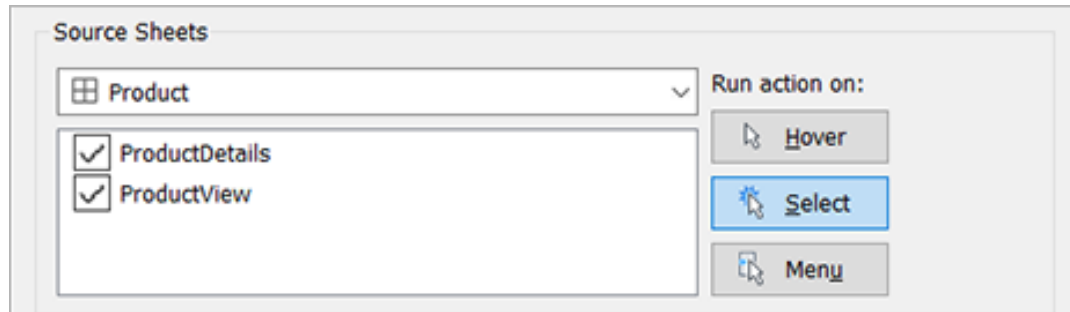
A URL action run from a tooltip menu. The link reflects the action name, not the target URL.

### Open a web page with a URL action

1. On a worksheet, select **Worksheet > Actions**. From a dashboard, select **Dashboard > Actions**.
2. In the Actions dialog box, click **Add Action** and then select **Go to URL**.
3. In the next dialog box, enter a name for the action. To enter field variables in the name, click the **Insert** menu to the right of the **Name** box.

**Note:** Give the action a descriptive name, because the link text in the tooltip is the name of the action, not the URL. For example, when linking to more product details, a good name could be "Show More Details".

4. Use the drop-down list to select a source sheet or data source. If you select a data source or dashboard you can select individual sheets within it.



5. Select how users will run the action.

**If you choose this option...**

<b>Hover</b>	<b>The action is run when the user...</b>
	Mouses over a mark in the view. This option works best for highlight actions within a dashboard.
<b>Select</b>	Clicks a mark in the view. This option works well for all types of actions.
<b>Menu</b>	Right-clicks (control-clicks on Mac) a selected mark in the view, then clicks an option in a tooltip (menu). This option works particularly well for URL actions.

6. For URL Target, specify where the link will open:
  - **New Tab if No Web Page Object Exists** – Ensures that the URL opens in a browser on sheets that lack web page objects. This is a good choice when Source Sheets is set to All or a data source.
  - **New Browser Tab** – Opens in the default browser.

- **Web Page Object** – (Available only for dashboards with Web Page objects)  
Opens in the web page object you select.



URL Target

☐ New Tab if No Web Page Object Exists

☐ New Browser Tab

☒ Web Page Object

 en.wikipedia.org ▼

## 7. Enter a URL

- The URL should start with one of the following prefixes: `http`, `https`, `ftp`, `mailto`, `news`, `gopher`, `tsc`, `tsl`, `sms`, or `tel`

**Note:** If no prefix is entered, `http://` is automatically appended to the beginning and the URL action will work in Tableau Desktop. However, if a URL action with no prefix is published to Tableau Server or Tableau Cloud, it will fail in the browser. Always provide a fully qualified URL for actions if the dashboard will be published.

**Note:** You can specify an ftp address only if the dashboard doesn't contain a web object. If a web object exists, the ftp address won't load.

- Tableau Desktop also supports local paths like `C:\Example folder-example.txt`, as well as file URL actions.
- To enter field and filter values as dynamic values in the URL, click the **Insert** menu to the right of the URL. Be aware that any referenced fields must be used in the view. For details, see Using field and filter values in URLs.



Add URL Action

Name

Show More Details

Insert ▼

Source Sheets

Product ▼

☒ ProductDetails

☒ ProductView

Run action on

☐ Hover

☒ Select

☐ Menu

URL Target

☐ New Tab if No Web Page Object Exists

☒ New Browser Tab

URL

http://www.staples.com/searchkey=<Product Name>

Insert ▼

<http://www.staples.com/searchkey=WhileWe200>

▼ Data Values

[Learn more](#)

☒ Encode data values that URLs do not support

☒ Allow multiple values via URL parameters

Value Delimiter

Delimiter Escape Character

.

/

Below the URL you enter is a hyperlinked example you can click for testing.

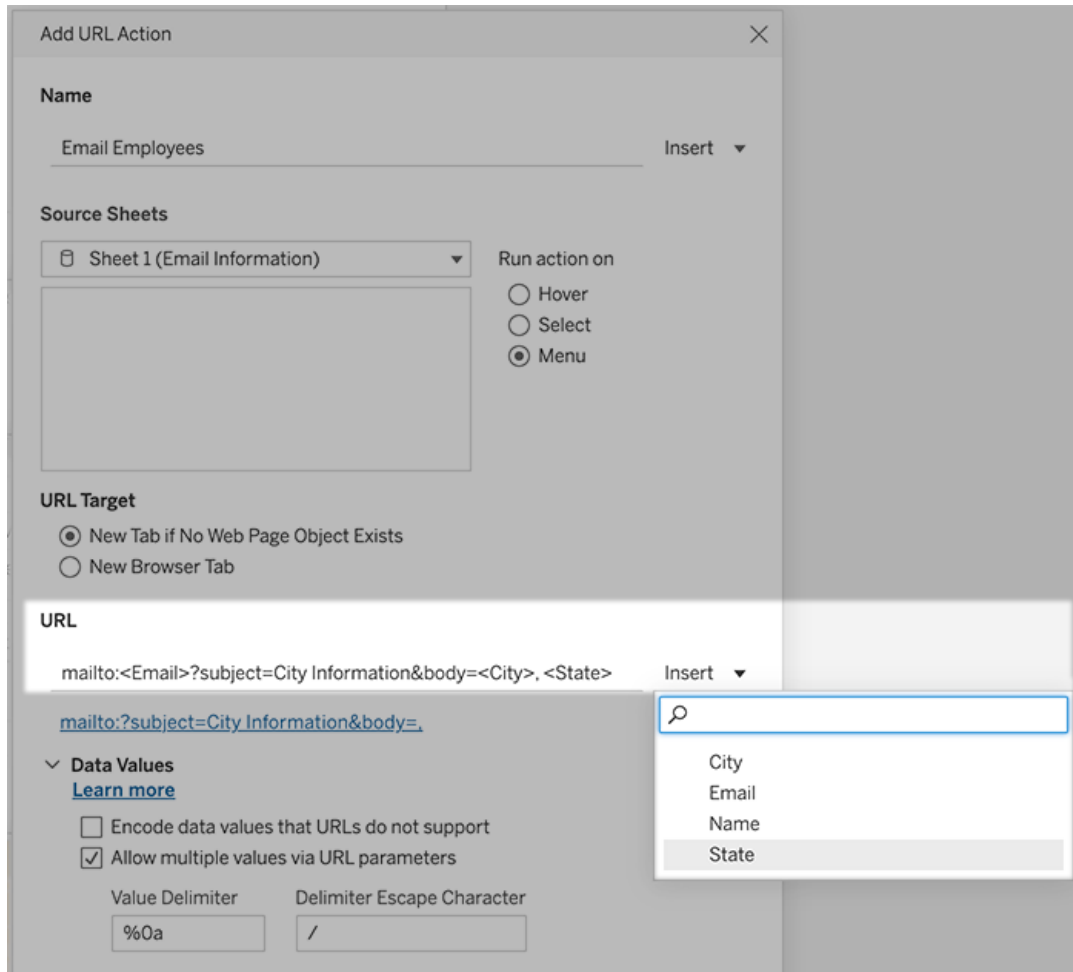
8. (Optional) In the Data Values section, select any of the following options:
- **Encode Data Values that URLs Do Not Support** – Select this option if your data contains values with characters that browsers don't allow in URLs. For example, if one of your data values contains an ampersand, such as “Sales & Finance”, the ampersand must be translated into characters that your browser understands.
  - **Allow Multiple Values via URL Parameters** – Select this option if you are linking to a web page that can receive lists of values via parameters in the URL. For example, say you select several products in a view and you want to see each product's details hosted on a webpage. If the server can load multiple product details based on a list of identifiers (product ID or product name), you could use multi-select to send the list of identifiers as parameters.

When you allow multiple values, you must also define the delimiter escape character, which is the character that separates each item in the list (for example, a comma). You must also define the Delimiter Escape, which is used if the delimiter character is used in a data value.

## Create an email with a URL action

1. On a worksheet, select **Worksheet > Actions**. From a dashboard, select **Dashboard > Actions**.
2. In the Actions dialog box, click **Add Action**, and select **Go to URL**.
3. In the Source Sheets drop-down list, select the sheet that contains the field with the email addresses you want to send to.
4. In the URL box, do the following:
  - Type **mailto:**, and click the **Insert** menu at right to select the data field that contains email addresses.
  - Type **?subject=**, and enter text for the Subject line.
  - Type **&body=**, and click the **Insert** menu at right to select the fields of information that you want to include in the body of the email.

In the example below, the “Email” field contains the email addresses, the subject is “City Information”, and the body text of the email consists of the city and state data that is associated with the email address.



:

5. (Optional) Display data from your workbook in the body of your email as a vertical list instead of the default horizontal list. For example, suppose you have a horizontal list of cities, such as Chicago, Paris, Barcelona, which you would rather display vertically, like this:

Chicago  
Paris  
Barcelona

To make the list vertical, in the Data Values section, do the following:

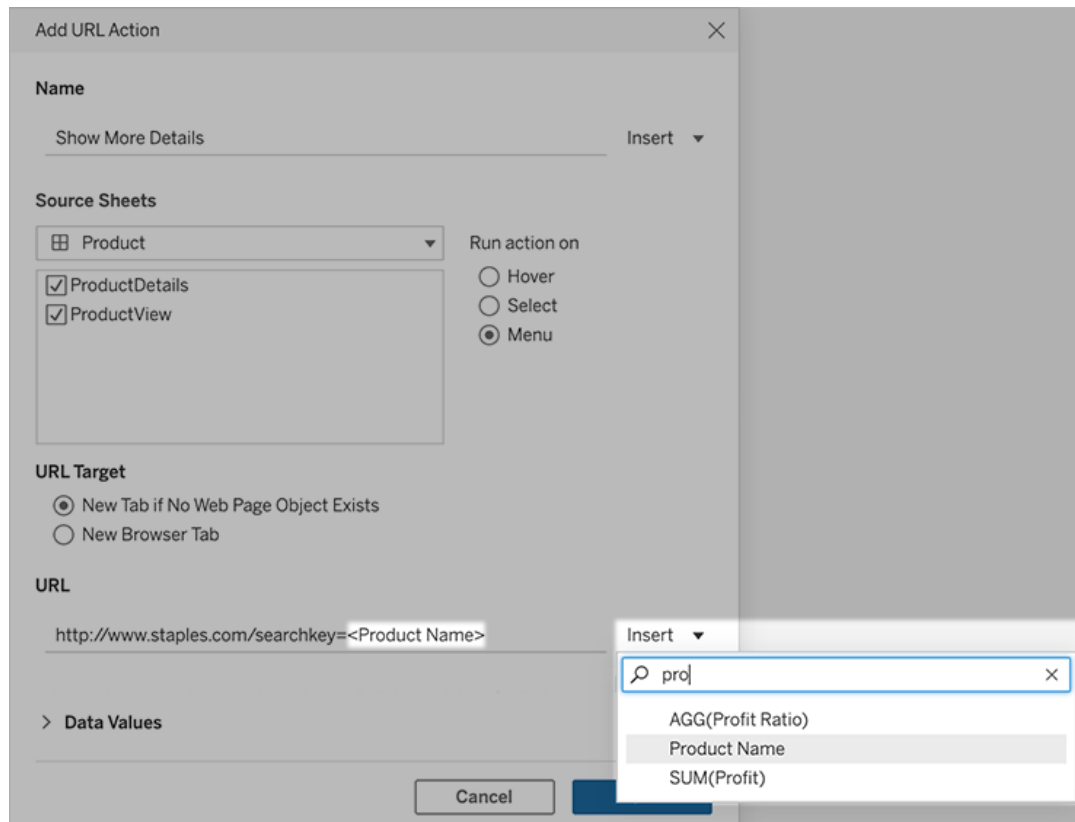
- Deselect **Encode Data Values that URLs Do Not Support**
- Select **Allow Multiple Values via URL Parameters**.
- Type **%0a** in the **Value Delimiter** text box to add line breaks between each item in the list. (These are the URL-encoded characters for a line break.)

## Using field and filter values in URLs

When users trigger URL actions from selected marks, Tableau can send field, filter and parameter values as variables in the URL. For example, if a URL action links to a mapping website, you could insert the address field to automatically open the currently selected address on the website.

1. In the Edit URL Action dialog box, begin typing the URL for the link.
2. Place the cursor where you want to insert a field, parameter or filter value.
3. Click the **Insert** menu to the right of the text box and select the field, parameter, or filter you want to insert. The variable appears within angle brackets. You can continue adding as many variables as you need.

**Note:** Any referenced fields must be used in the view. Otherwise, the link won't display in the viz, even if it functions when you click Test Link.



### Including aggregated fields

The list of available fields includes only non-aggregated fields. To use aggregated field values as link parameters, first create a related calculated field, and add that field to the view. (If you don't need the calculated field in the visualisation, drag it to Detail on the Marks card.)

### Inserting parameter values

When inserting parameter values, URL actions send the Display As value by default. To instead send the actual value, add the characters `~na` after the parameter name.

For example, say you have a parameter that includes IP addresses, with Actual Value strings such as 10.1.1.195 and Display As strings with more friendly values such as Computer A (10.1.1.195). To send the actual value, you'd revise the parameter in the URL to look like this: `http://<IPAddress~na>/page.htm`.

## Create a Subscription to a View or Workbook

Subscriptions email you an image or PDF snapshot of a view or workbook at regular intervals – without requiring you to sign in to Tableau Server.

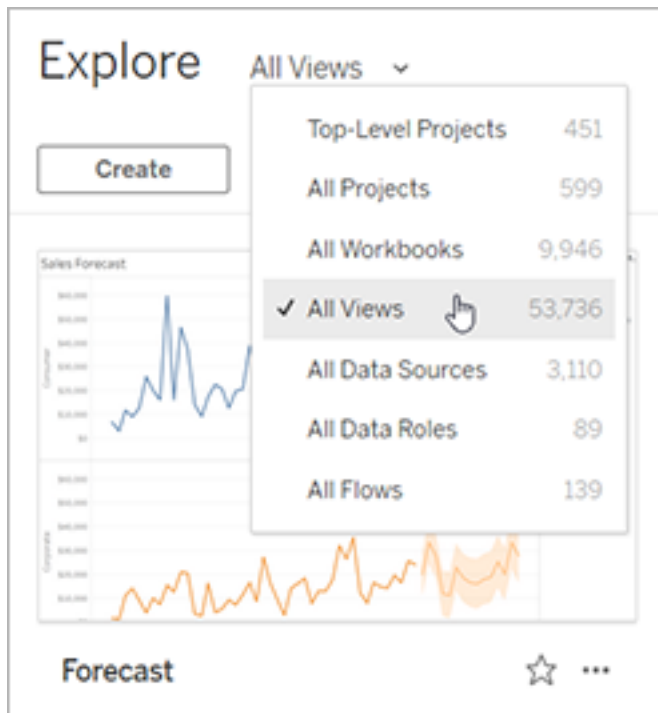
**Note:** Administrators determine whether subscriptions are turned on for a site.

If Tableau Catalogue is turned on for a site, administrators can also determine whether subscription emails include relevant upstream data quality warnings. Tableau Catalogue is available as part of the Data Management offering. For more information, see [About Tableau Catalogue](#).

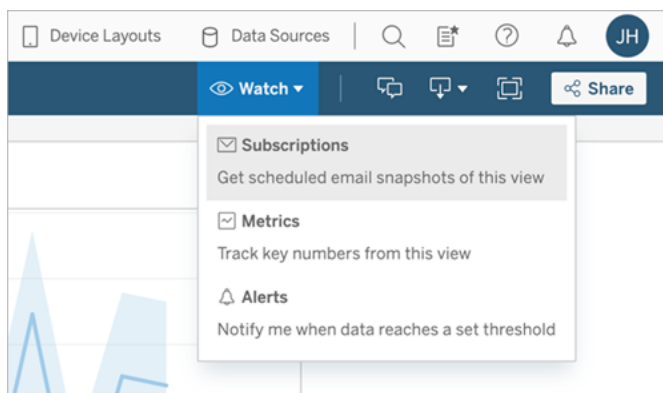
### Set up a subscription for yourself or others

When you open a view in Tableau Server, if you see a subscription icon (✉+) in the toolbar, you can subscribe to that view or to the entire workbook. You can subscribe other users who have permission to view the content if you own a workbook, if you are a project leader with an appropriate site role, or if you are an administrator.

1. From the Explore section of your site, select **All Workbooks** or **All Views**, or open the project that contains the view you want to subscribe to.



2. Open a view either directly, or after opening the containing workbook.
3. On the view toolbar, select **Watch** > **Subscriptions**.



4. Add the Tableau users or groups you want to receive the subscription. To receive a subscription, users must have the View and Download Image/PDF permissions and their accounts must also have email addresses.

If you own the workbook, select **Subscribe me**.

**Notes:**

- When you subscribe a group, each user is added individually at the time the subscription is created. If more users are added to the group later, you must re-subscribe the group for those new users to receive the subscription. Likewise, users later removed from the group will not have their subscriptions removed automatically unless their permissions to the subscribed view are removed.
  - You can't subscribe a group set.
5. Choose whether subscription emails include the current view or the entire workbook. If the view contains data only when high-priority information exists, select **Don't send if view is empty**.
  6. Choose the format for your snapshot: as a PNG image, a PDF attachment or both.
    - If PDFs, choose the paper size and orientation you'd like to receive.

The image shows a 'Format' dropdown menu with 'PDF' selected. Below this, there are two dropdown menus: 'Paper Size' with 'Letter' selected, and 'Orientation' with 'Portrait' selected. The 'Orientation' dropdown is open, showing 'Portrait' and 'Landscape' options. Below these is a 'Subject' field.

7. To clarify subscription emails, customise the subject line and add a message.

**Note:** To update the subscription message, you must unsubscribe from the existing subscription and create a new subscription with a different message. For more information, see [Update or unsubscribe from a subscription](#).

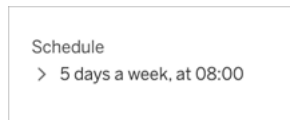
8. When the workbook uses one data extract on a published connection, you can pick a frequency:



- **When Data Refreshes:** Sends only when data in the view or workbook is refreshed by running refresh schedules.
- **On Selected Schedule:** Pick a schedule for the subscription.

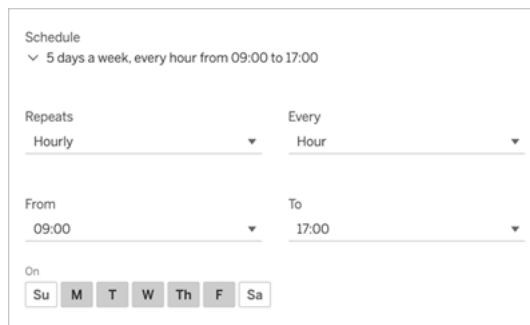
9. If frequency is not set to When Data Refreshes, pick a schedule:

- Choose from subscription schedules established by your administrator.
- For sites with **custom schedules enabled**, click the drop-down arrow to the left of the current settings.



Schedule  
> 5 days a week, at 08:00

Then specify a custom schedule that sends subscription emails whenever you wish. (The precise delivery time may vary if server load is high.)



Schedule  
▼ 5 days a week, every hour from 09:00 to 17:00

Repeats  
Hourly ▼

Every  
Hour ▼

From  
09:00 ▼

To  
17:00 ▼

On  
Su M T W Th F Sa

To change the time zone, click the Time Zone link to go to your account settings page.

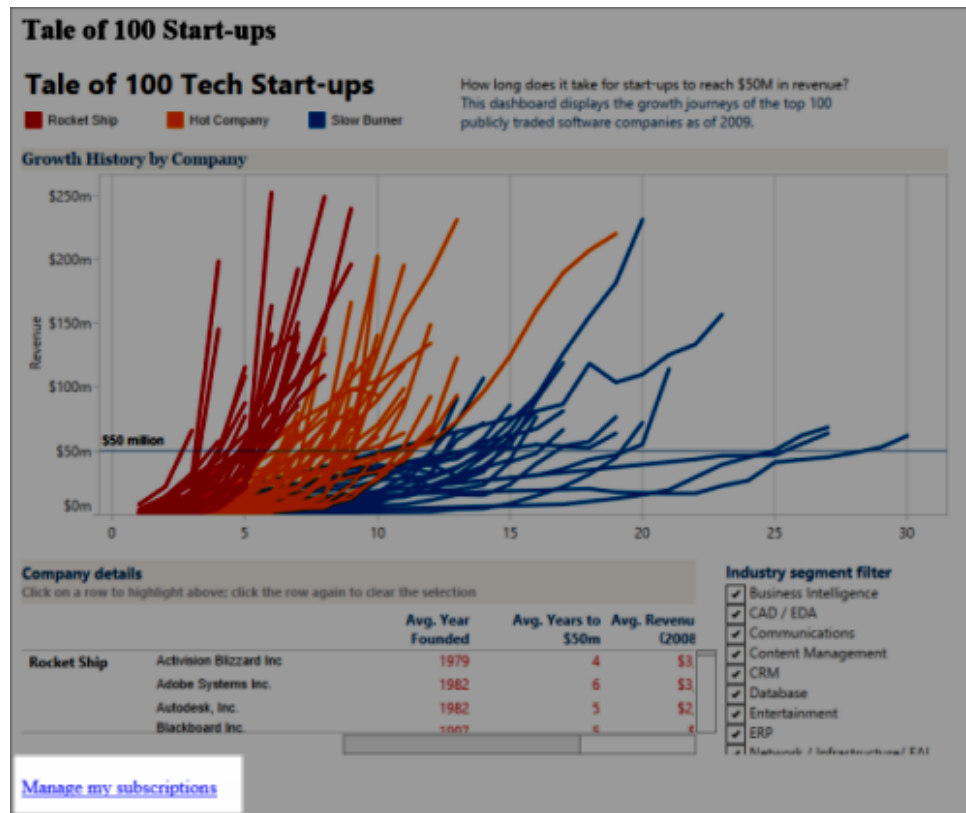
10. Click **Subscribe**.

When you receive a subscription email, you can select the image (or the link in the message body for PDF subscriptions) to be taken to the view or workbook in Tableau Server.

## Update or unsubscribe from a subscription

You can unsubscribe from an existing subscription, or make changes to a subscription's format, schedule, subject or empty view mode.

1. Access your Tableau Server account settings by doing one of the following:
  - Click **Manage my subscriptions** at the bottom of a subscription email.



- Sign in to Tableau Server. At the top of the page, select your user icon, and then

select **My Content**.



2. Click **Subscriptions**.
3. Tick the box next to the view you want to unsubscribe from, click **Actions**, and then click **Unsubscribe**, or select the subscription option you'd like to change.

## Resume or delete suspended subscriptions

Sometimes, subscriptions fail because of an issue with the workbook or a problem loading the view. If a subscription fails more than five times, you'll receive a notification email that your subscription has been suspended. There are a few ways to resume a suspended subscription if you're a subscription owner or administrator:

- From the My Content area of Tableau web pages, an icon appears in the Last update column to indicate that the subscription is suspended. Select ... > **Resume Subscription** to resume.
- From the Subscriptions tab of the affected workbook, an icon appears in the last update column to indicate that the subscription is suspended. Select ... > **Resume Subscription** to resume.

You'll receive an email notification when the subscription is working again.

## See also

[Change subscription settings](#) in the Tableau Desktop and Web Authoring Help.

[Project-level administration](#) in the Tableau Cloud Help, to learn which site roles allow full Project Leader capabilities.

## Use Custom Views

A custom view is a shortcut to a specific state of interaction, such as filter selections and sorting, for a published viz. Custom views don't impact the underlying content. They're a good option if you find yourself adjusting the same filters or zooming into the same data every time you look at a viz.

Custom views aren't the same as web editing, which changes the underlying published content itself. See [Edit Tableau Views on the Web](#).

If the custom views are specifically for filter settings, consider using embedding filter parameters in a shared URL. See [Filter a published dashboard by editing the URL](#) from [The Data School](#).

### Notes on custom views

- A custom view doesn't modify the content it's built on.
- Deleting the original content deletes its custom views.
- If the original content is updated or republished, the custom view is also updated.

**Tip:** Some changes to the original content can break the custom view. See [Maintain Content with Custom Views](#) for best practices on modifying content with custom views.

- If a user is removed from the site, any shared custom views they owned are also lost.
- Subscriptions based on custom views may be more fragile than subscriptions based on the original content.

**Note:** As of the 2022.3 release, Tableau replaced user names in the custom view URL with IDs. Bookmarked URLs still work but are redirected to the new URL schema. This change is to add more company and user data protection.

## Create a custom view

Start by navigating to the individual view. Make whatever changes you want to capture in the custom view, such as selecting marks, filtering data or changing sorts.

1. When you're ready to save the changes you've made as a custom view, select **Save Custom View** from the toolbar.

**Note:** The **Save Custom View** button appears in the toolbar after any changes are made to the current view.

2. In the **Save Custom View** dialogue, enter a name for the custom view.
3. (Optional) Select **Make it my default**.
4. (Optional) Select **Make visible to others**. This makes the custom view available to everyone who can see the original content. However, there are several instances when this option isn't available:
  - The user is a Viewer site role.
  - The site's **User Visibility setting** is set to Limited.
  - The permission capability **Share Customised** is denied on the workbook.
5. Click **Save**.

## Find a custom view


### From a view

When you're looking at a viz, you can change to a different custom view by selecting the View icon in the toolbar. If there's room in the toolbar, the name of the custom view you're looking at is shown.

Any custom views you've made, and all visible custom views made by other users, appear in the list.

### From the workbook

When you're looking at content at the workbook level, use the **Custom Views** tab to see all the available custom views for that workbook.



# Vocab test

☆ ⓘ ...

Owner **Admin**   Modified **Apr 5, 2023, 9:06 AM**

Edit Workbook

Views 12   Data Sources 1   Connected Metrics 0   **Custom Views 7**   Subse

Select All

	↑ Name	Actions	Original view	Owner
<input type="checkbox"/>	ESL	...	Right vs Full Score	Viewer
<input type="checkbox"/>	My View	...	Right vs Full Score	Admin
<input type="checkbox"/>	Rural	...	Right vs Full Score	Creator
<input type="checkbox"/>	Rural	...	Right vs Full Score	Admin
<input type="checkbox"/>	Suburban	...	Right vs Full Score	Creator

Set a default custom view

After you've found or made a custom view, you make it the default you see when you open that viz.

- 1. Select the **View** icon in the toolbar.
- 2. Check the **Set this view a your default** option.
- 3. Close the dialogue to save.

The next time you open that viz, you'll land on that custom view.

Share a custom view



By default, custom views are private and only appear for the user who created them.

**Note:** Users with a Viewer site role can't make custom views visible to others. However, they can share a custom view by copying and sharing the URL.

Users with a site role of Explorer or higher can set a custom view as visible to others. This setting allows anyone with access to the original content to see the custom view.

To change an existing private custom view to be visible to others (or to make a visible view private):

1. Select the **View** icon in the toolbar.
2. Toggle the eye icon to the view you want to share to the desired state.
3. Close the dialogue to save.

The eye with a slash  indicates the view is private to you. The eye  indicates the view is visible to others.

## Delete a custom view

To delete a custom view:

1. Select the **View** icon in the toolbar.
2. Select the trash icon of the view you want to delete.
3. Confirm that you want to delete the view.

Take care when deleting

If you're the owner of a custom view that's visible to others, remember it's deleted for everyone if you delete it.

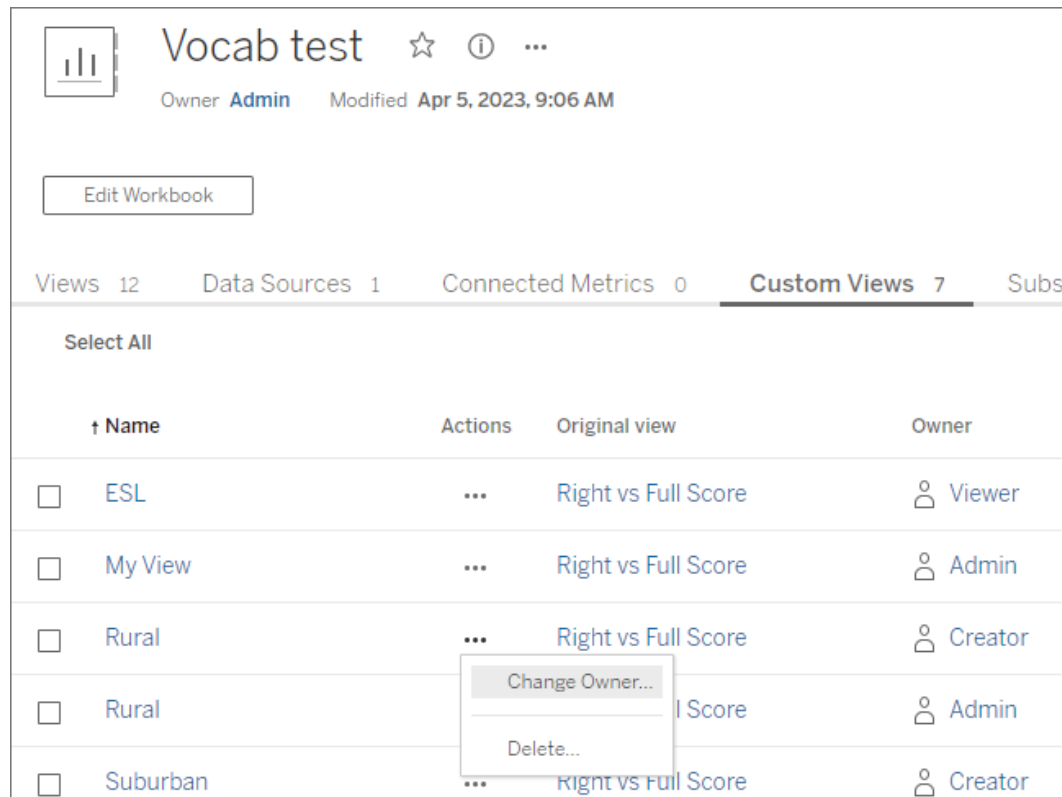
Deleting a custom view also deletes any subscriptions based on that custom view.

## Manage custom views

Administrators can change ownership for custom views and delete custom views created by other users.

Custom views can be managed for a piece of content or for a specific user.

1. Go to the Custom Views tab for the workbook or user.
2. Use the action menu to change the owner or delete the custom view.



**Tip:** It's a best practice to change ownership of any custom views belonging to a user before removing them from the site. Deleting a user also deletes their custom views, including public views others may be using.

### Safely change content with custom views

If you need to modify a view that has custom views (or the data source the view is built on), be aware that certain changes can break custom views. For more information, see [Maintain Content with Custom Views](#).

## Publish Views to Salesforce

Bring your views from Tableau Cloud or Tableau Server right to your Salesforce ecosystem by publishing views to a CRM Analytics app or Salesforce Lightning page.



For more information, see [Publish Tableau Content to CRM Analytics](#) in Salesforce Help.

## Prerequisites

See a complete list of [prerequisites](#) in Salesforce Help, including required licences, account setup, and permissions.

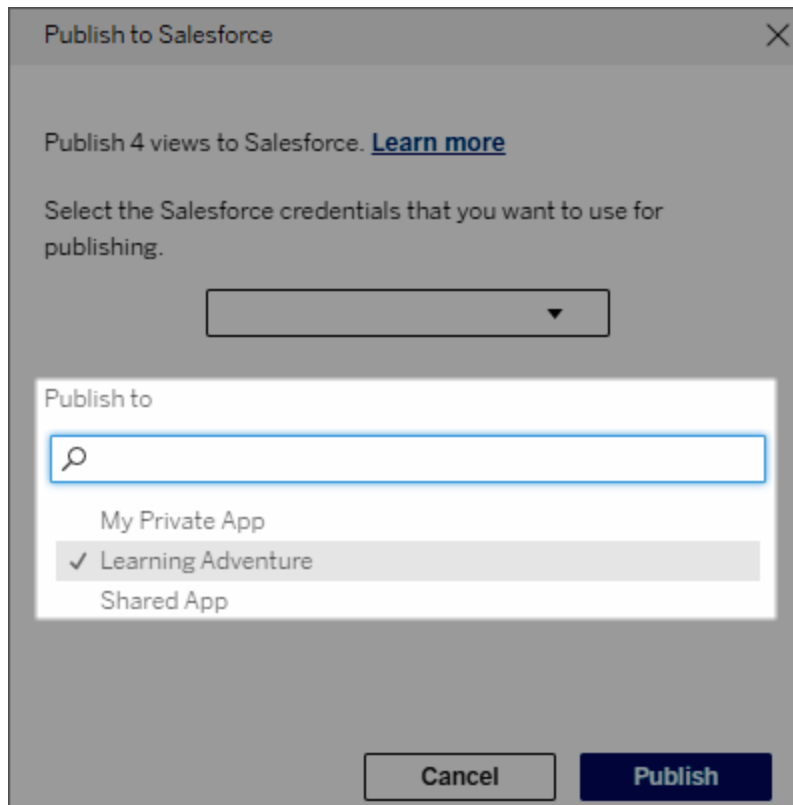
## Publish a view to Salesforce

Select one or more views, including dashboards, sheets and stories. Then, choose a destination from a list of CRM Analytics apps to which you have access to edit or manage.

1. Select the view that you want to publish to Salesforce.

**Note:** You can select a maximum of 25 views at a time to publish to Salesforce.

2. For **Actions**, select **Publish to Salesforce**.
3. Select the Salesforce credentials that you want to use for publishing.
4. Select the destination app that you want to publish to. You can only see apps that you can edit or manage with the signed-in Salesforce user.



5. Click **Publish**.

## Who can see the published view in Salesforce?

When you publish a view to Salesforce, anyone with access to the selected CRM Analytics app or Lightning page can see that the content exists. However, only those signed in with existing Tableau permissions can see the view.

## Configuring Tableau Lightning Web Components and Seamless Authentication

Tableau Lightning web components (LWC) allow Salesforce customers to drag and drop Tableau views and Tableau Pulse metrics onto Salesforce Lightning pages.

- The Tableau View component allows you to add embedded views from Tableau Cloud or Tableau Server.

- The Tableau Pulse component allows you to add embedded Tableau Pulse metrics from Tableau Cloud.

Tableau LWC seamless authentication allows you to view Tableau content using connected app trusted tokens without signing in. Seamless authentication is optional for Tableau View LWC, and is required for Tableau Pulse LWC.

## Add Trusted URL

The Tableau view or Pulse URL that you want to add to your Lightning page must be added as a Trusted URL.

1. From your Salesforce app, select the gear in the top-right corner, and then select **Setup**.
2. On the left navigation pane, enter “Trusted URLs” in the **Quick Find** search bar.
3. Select the **Trusted URLs** settings page.
4. Select **New Trusted URL**.
5. Enter an **API Name** and **URL**, following the instructions on the settings page. **Note:** The URL must begin with https://
6. For CSP Context, select **All**.
7. For CSP Directives, tick all boxes.
8. Select **Save**.

## Turn on Tableau LWCs and set up seamless authentication

### Configure Salesforce settings

The following steps only need to be completed one time by a Salesforce admin:

1. From your Salesforce app, select the gear in the top-right corner, and then select **Setup**.
2. On the left navigation pane, enter “Tableau” in the **Quick Find** search bar.
3. Select the **Tableau Embedding** settings page.
4. Select the tickboxes for **Turn on Tableau Lightning Web Components** and **Turn on token-based single sign-on authentication**.

**Note:** Both of these boxes must be ticked to configure the Tableau Pulse LWC. For the Tableau View LWC, you can choose not to set up token authentication and

instead sign in manually when the component loads.

To use Tableau View LWC on Mobile, you must turn on token-based authentication and set up seamless authentication.

5. For **Select Tableau User Identity field**, set an org-level user field to authenticate the user in Tableau. You must select the Salesforce user field that corresponds with the Tableau username. The drop-down shows the field value for the current user, or null if no value is defined. If none of the user fields match the Tableau username, select an empty field (for example, Federation ID or a custom field). Then, populate the empty field with the Tableau username for your users.

**Note:** The Tableau User Identity field setting applies to all users and doesn't need to be set on an individual basis.

6. Save your changes.
7. If you're the Tableau admin, keep the Salesforce settings **Tableau Embedding** tab open while you configure Tableau settings in the next section. If you aren't the admin, share the **Issue URL** and **JWKS URI** with your Tableau admin.

### Configure Tableau settings

In one tab, open the Tableau Embedding settings page in your Salesforce org. In another tab, go to your Tableau site and follow these instructions to set up the Connected App.

For Tableau Server, follow these steps:

1. As a Tableau Server admin, sign in to the Tableau Services Manager (TSM) web interface.
2. Navigate to **User Identity & Access**, and then select the **Authorisation Server** tab.
3. Select the tick box for **Enable OAuth access for embedded content**.
4. Enter the **Issue URL** and **JWKS URI**, which you can find on the Salesforce org Tableau Embedding settings page. Use the **Copy** button on the Salesforce org settings page to copy the Issuer URL value, and then paste it into the TSM web interface. Repeat this process for the JWKS URI value.

**Note:** The JWKS URI field is marked as optional in the TSM web interface. However, this value is required to use Tableau LWC seamless authentication.

5. Select **Save Pending Changes**.
6. Select **Pending Changes** in the upper-right corner of the page, and then select **Apply Changes and Restart** to stop and restart Tableau Server.

For more information, see [Register your EAS with Tableau Server](#).

For Tableau Cloud, follow these steps:

1. Open the Tableau **Settings** page, and then choose the **Connected Apps** tab.
2. From the New Connected App drop-down, select **OAuth 2.0 Trust**.
3. On the Create Connected App dialog, enter the **Issue URL** and **JWKS URI**, which you can find on the Salesforce org Tableau View Embedding settings page. Use the **Copy** button on the Salesforce org settings page to copy the Issuer URL value, and then paste it into the Tableau settings page. Repeat this process for the JWKS URI value.

**Important:** The Create Connected App dialog notes the JWKS URI field as optional. However, this value is required to use Tableau LWC seamless authentication.

4. Select the tick box for **Enable connected app**.
5. Select **Create**.

**Note:** The Connected App is named External Authorisation Server.

For more information, see [Register your EAS with Tableau Cloud](#).

If you want to create a host mapping for this site, leave the Connected Apps tab open. You can use the URL for this page and the Copy Site ID button to populate the host mapping fields in the following section.

## Set up or edit host mapping

Follow these steps to create or edit a host mapping.

**Tip:** The Tableau User Identity field setting applies to all users and doesn't need to be set on an individual basis.

#### Create a new host mapping

1. From your Salesforce app, select the gear in the top-right corner, and then select **Setup**.
2. On the left navigation pane, enter "Tableau" in the **Quick Find** search bar.
3. Select the **Tableau Embedding** settings page.
4. From the Tableau Host Mapping section, select **Create New**.
5. Fill in the host mapping details:
  - a. Tableau site URL: Enter a URL for the Tableau site that you want to map. The URL should contain the site name, unless it's an on-prem installation using the Default site. **Note:** If you want to create a host mapping for this site, leave the Connected Apps tab open. You can use the URL for this page and the Copy Site ID button to populate the host mapping fields in the following section.
  - b. Tableau site ID: Enter the site ID for the Tableau site that you want to map. You can use the Copy Site ID button on the Connected App settings page or on the Share dialogue.
  - c. Tableau site host type: Select Tableau Cloud or Tableau Server.
6. Select **Save**. Or, if you want to return to the Tableau Embedding settings page without saving, select **Cancel**.

#### Edit a host mapping

You can update the site ID and host type for an existing mapping. If you need to change the site URL, delete the existing mapping, and then create a new one with the correct URL.

1. From the Salesforce app Tableau Embeddings settings page, select Edit next to an existing host mapping.
2. Edit the **Tableau site ID** or **Tableau site host type** fields as needed.
3. Select **Save**. Or, if you want to return to the Tableau Embedding settings page without saving, select **Cancel**.

## Add Tableau LWCs to a Lightning page using Lightning App Builder

Tableau LWCs are available on App, Home and Record Lightning pages only. For more information about Lightning page types and using the Lightning App Builder, see Lightning App Builder in Salesforce Help.

To add a Tableau View or Tableau Pulse LWC to an existing Lightning page, follow these steps:

1. Navigate to the Lightning page that you want to edit.
2. Select the gear icon in the top right.
3. Select Edit Page.
4. Proceed to the **Add a Tableau LWC to a Lightning page** section below.

To add a Tableau View or Tableau Pulse LWC to a new Lightning page, follow these steps:

1. From your Salesforce app, select the gear in the top-right corner, and then select **Setup**.
2. On the left navigation pane, enter “Lightning App Builder” in the **Quick Find** search bar.
3. Select the **Lightning App Builder** setup page.
4. Select **New**.
5. Select the page type that you want to create. Tableau LWCs are available on App, Home and Record pages.
6. Select **Next**.
7. Enter a name and select a layout for the new page, and then select **Done**.

Add a Tableau LWC to a Lightning page

1. From the Components list on the left side of the page, drag and drop the Tableau View or Tableau Pulse component onto the page.
2. Configure the LWC:
  - [Configure a Tableau View Lightning Web Component](#)
  - [Configure a Tableau Pulse Lightning Web Component](#)

Save and activate the page

1. When you’ve finished adding and configuring a Tableau View or Tableau Pulse LWC, select **Save**.
2. If you’ve created a new page, you are prompted to activate the page so that it’s visible to users. Select **Activate**.
3. On the **Page Settings** tab of the Activation page, enter a name, choose an icon and select your visibility preference.
4. (Optional) On the **Lightning Experience** tab of the Activation page, you can add the page to various Lightning Experience Apps.
5. (Optional): On the **Mobile Navigation** tab of the Activation page, you can add the page to the Mobile Navigation Menu.

**Note:** Tableau Pulse LWC isn't available on Mobile.

6. Select **Save**.

## Embed multiple Tableau views

You can embed more than one Tableau view on a Salesforce Lightning page as long as all views come from the same site. Tableau only supports a single session, and that session is specific to the site. The most recently granted session will wipe out the previous one.

To embed Tableau views from multiple sites, you must create a separate Lightning page that is site-specific.

## Tableau View LWC seamless authentication on Mobile

**Note:** Tableau View LWC is available on iOS 17.2.1+. Tableau Pulse LWC isn't currently available on iOS or Android.

Consider the following best practices to prevent issues for mobile users:

- Lightning page type: Mobile users can access App Pages and Record Pages, but not Home Pages.

**Note:** Record Pages must be associated with a specific type of record.

- If you use the same page for both desktop and mobile users, select **Activation** to verify that the Lightning page is set as the Org Default for both desktop and phone form factors.
- Consider creating separate Lightning pages for desktop and mobile to provide a tailored visual experience. The height for the Tableau View component is fixed and won't dynamically adjust to different screen sizes.
- To add a scroll bar to a view, select **Show Toolbar** from the Tableau View component properties pane.
- For the App Page type, select **Activation**, and then select the **Lightning Experience** tab. Add your page to the LightningBolt list to make the page easier to find on mobile.



- On mobile, iOS blocks cross-site traffic by default. Open your mobile settings, select Salesforce settings and then turn on **Allow Cross-Website Tracking**. For more information, see [Enable cross-website tracking](#).

## Troubleshooting Tableau View LWC seamless authentication

Verify the Salesforce and Tableau configuration

1. Verify that the **Issuer URL** and **JWKS URI** values match in both Salesforce and Tableau Settings and that JWKS URI ends with **ID/keys**.
  - For Tableau Cloud, open the Salesforce Settings Tableau Embedding page in one tab. In another tab, open the Tableau Settings Connected Apps tab. On the Connected Apps tab, select **External Authorisation Server**, and then select **Edit**. Verify that the **Issuer URL** and **JWKS URI** values match and that the JWKS URI ends with ID/keys.
  - For Tableau Server, open the Salesforce Settings Tableau Embedding page in one tab. Then, sign in to the Tableau Services Manager (TSM) web interface, navigate to **User Identity & Access** and then open the **Authorisation Server** tab.
2. Verify Host Mapping: If you've saved a host mapping, verify that it has the correct site ID and host type.

Verify the JWT token

In the Tableau View Lightning web component property editor, select Debug Mode to verify that the JWT token is working as expected.

1. Open the console logs and copy the token.
2. Go to the [jwt.io](https://jwt.io) website and paste the token into the **Encoded** field.
3. Verify the following:
  - The subject ("sub") matches the Tableau username.
  - For Tableau Cloud, the audience ("aud") is "tableau+SiteID".  
For Tableau Server, the audience ("aud") is "tableau".
  - The scope ("scp") includes both "tableau:views:embed" and "tableau:insights:embed".
  - The issuer ("iss") EAS server is accurate.

## Verify page activation

Sometimes, a user creates a Lightning page, but it hasn't been activated or assigned anywhere, so users can't find it. Select **Activation** to verify that the Lightning page is set as the Org Default for the intended form factors.

**Tip:** When debugging, it's helpful to drag and drop a Rich Text component onto your page. Add a brief description of the page type and the view URL that you're trying to embed. This allows you to be sure that the page being viewed by the end user is the page that the admin is editing.

Confirm that Tableau View LWC is working without seamless authentication (Tableau View LWC only)

1. From the Tableau View pane on your Lightning page, clear the tick box for **Default Authentication Token**, and then save the changes.
2. If you're signed in to Tableau in another tab, sign out. Ensure that navigating to the View URL redirects you to the Tableau sign-in page. Do not sign in.
3. Navigate to the Lightning page. The Tableau View LWC should display a **Sign in to Tableau** button.
4. Select **Sign in to Tableau**, and then enter your Tableau credentials to sign in.  
**Note:** If the view doesn't load, this indicates a broader issue with authenticating to Tableau.

Error: LWC component version no longer supported (Tableau View LWC only)

To resolve this error, follow these steps:

1. In the Components list, search for "Tableau" and then drag and drop a new **Tableau View** component onto the page.
2. Copy all properties from the Tableau View pane for the old component over to the new component.
3. Select the delete icon on the old component.

## See Also

[Troubleshoot Connected Apps](#)

[Register EAS to Enable SSO for Embedded Content](#)

## Interact with Data in Tableau

This tutorial walks you through some of the basics of viewing and interacting with data visualisations, or views, in Tableau Server.

Tableau is a tool that lets you interact with published visualisations to explore insights, ask questions and stay on top of your data. Here's how to get started.

### Go ahead. It's safe to click around

Tableau is built for interaction. What you do to a visualisation changes how it looks for you, just for now.

Others will still see the visualisation as it originally appeared. And the data used to build it stays the same, too.

### 1: What is a Tableau Site?

A Tableau Site is a place for your team to share data and data visualisations with each other. You can explore what they've published and made available to you.

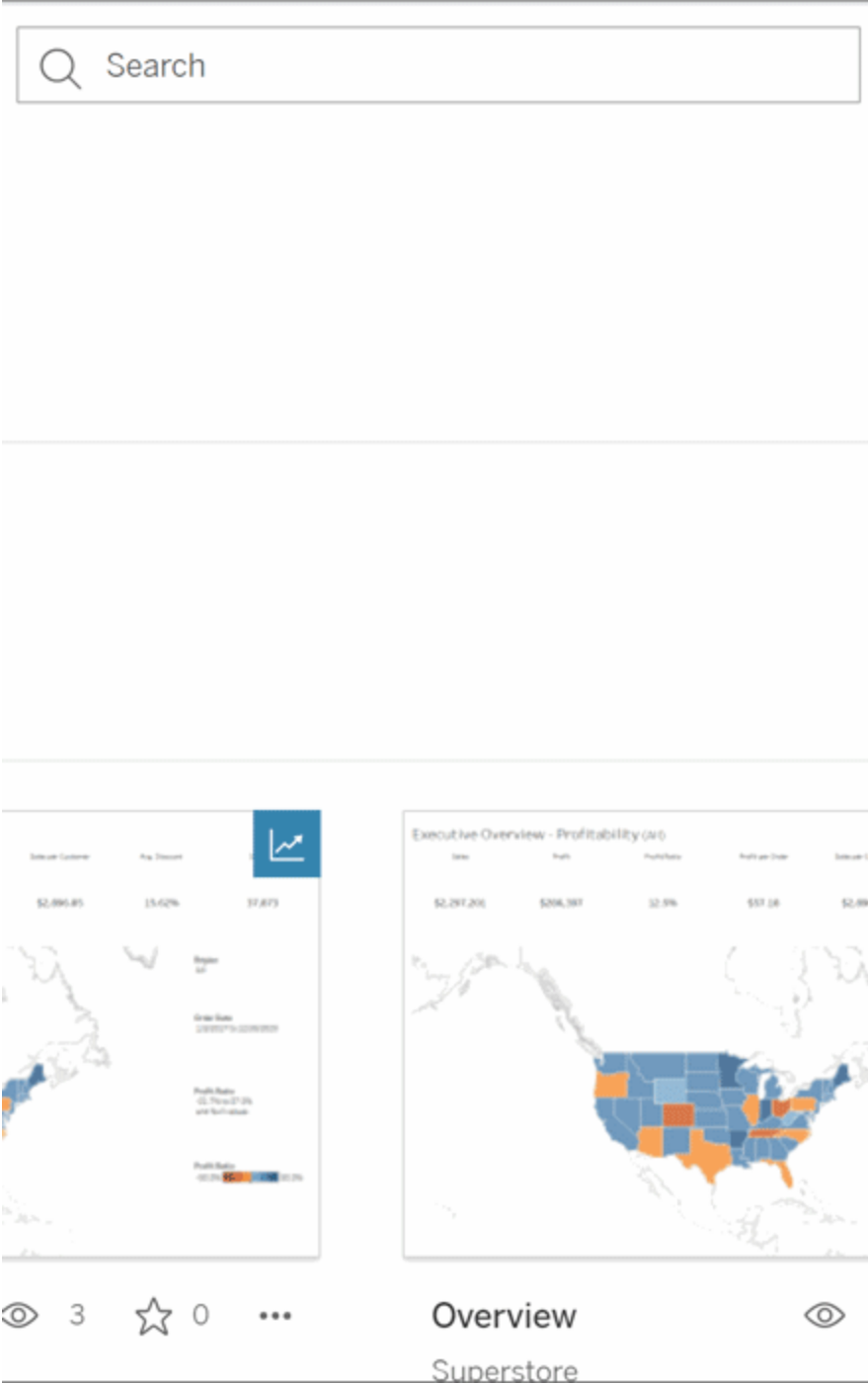
When you sign in to your Tableau site, you'll land on the home page.



## 2: Search for a viz

Tableau calls visualisations on a site Views. Use search to find views or workbooks (a package of views in a single file).

Search results will show all the different content types relevant to your query.



You can select See All for all search results if the views in the quick search aren't what you were looking for, or use the Explore page to browse. There you'll see all the different types of content a Tableau site can host.

### 3: Interact with Content

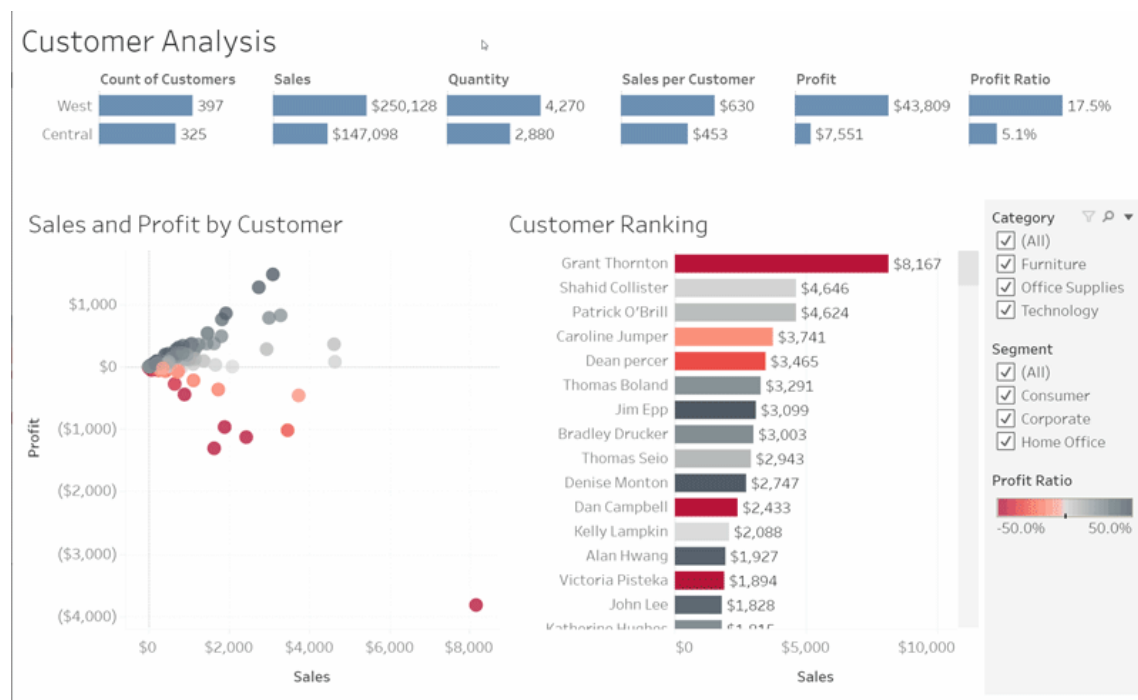
A published view is a canvas for you to interact and understand your data. Remember, you won't hurt or change the underlying data, or change what others see.

Here are some of the tools in your toolbox to find data insights.

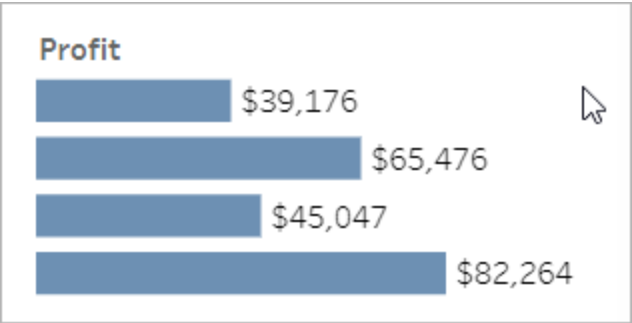
See Details and Sort Data

Now that you know you can click on the data, let's check it out.

As you move the mouse across a view, you might see tooltips that reveal details about each data point, or mark. You can also select multiple marks.

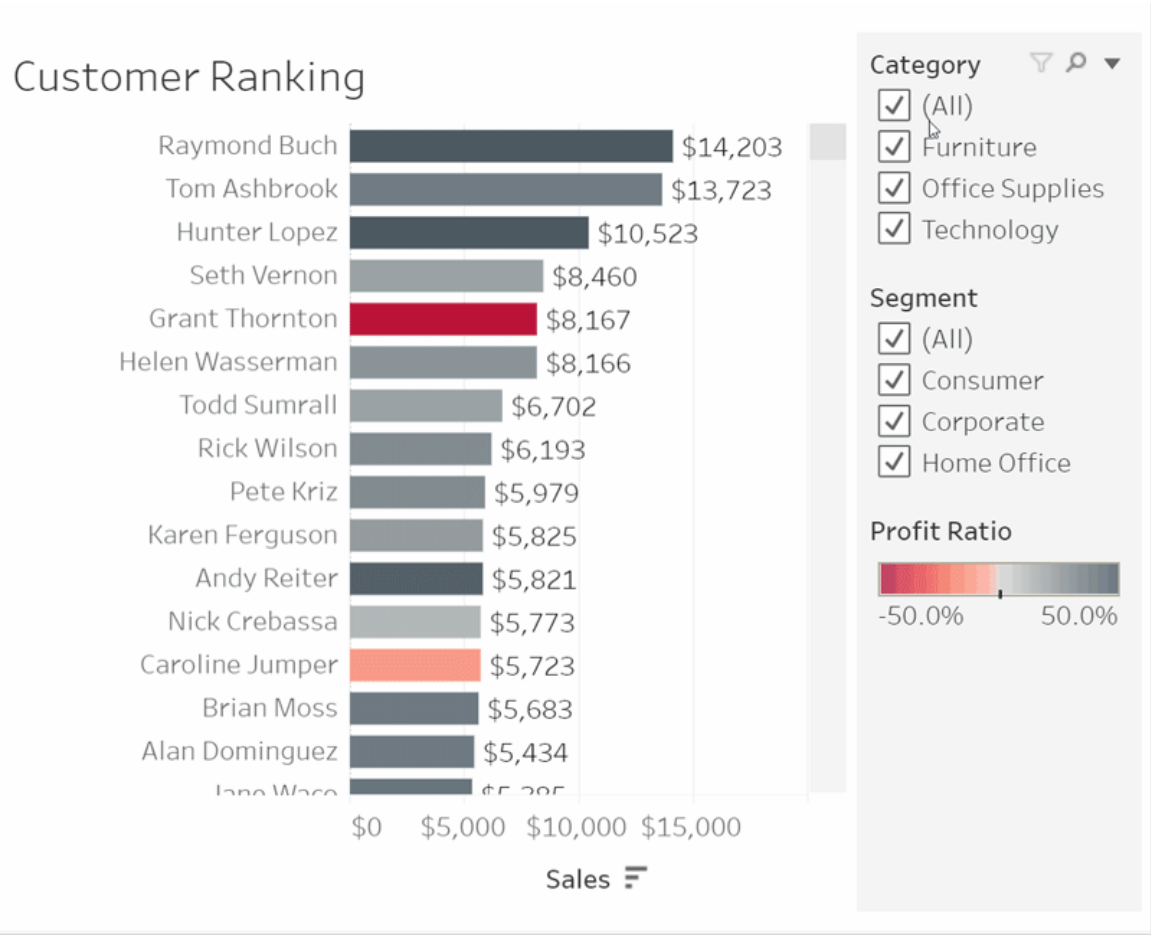


Sort tables alphabetically or numerically by hovering over a column header and clicking the sort icon.



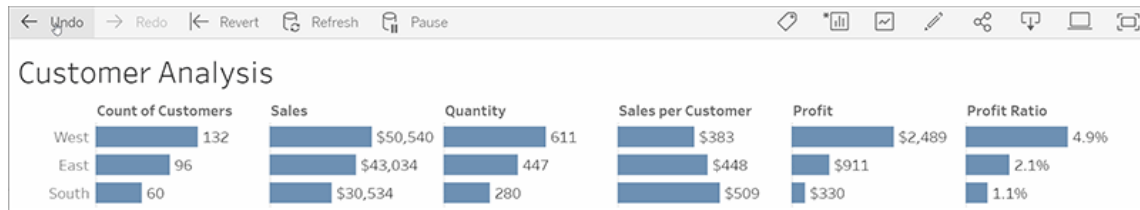
Filter Data

Trim or limit the visible data to a specific area, date or category.



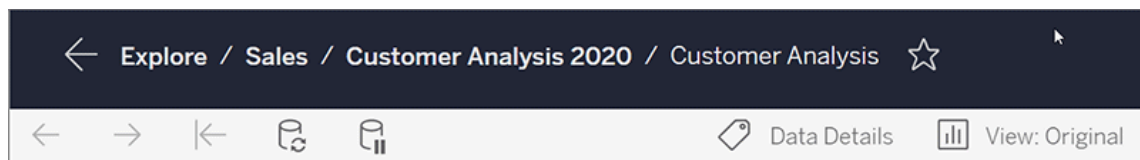
## Undo/Revert

Maybe you didn't mean to exclude everything but one area. Click Undo to remove the last change, or use Revert to undo all your selections.



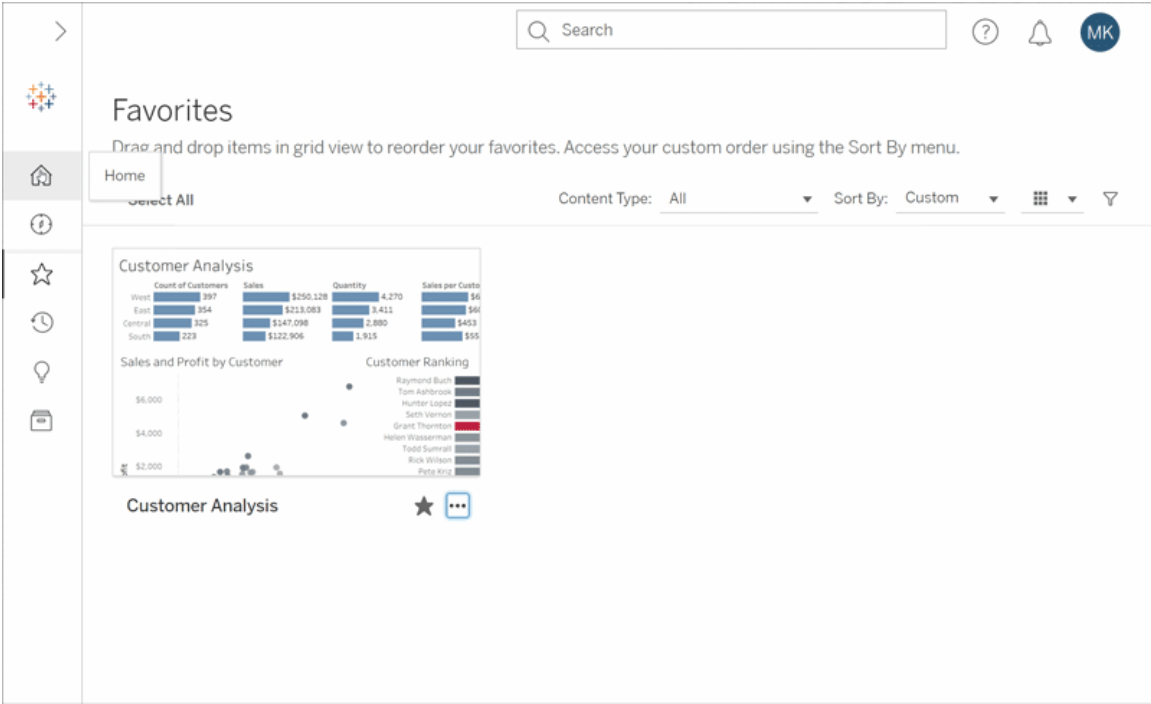
## 4: Keep up

This view can automatically update with new data, so you don't need to go searching for new charts to get the latest information. Keep it handy by clicking the star icon to add it to your favourites.



All favourites are added to the Favourites page in the navigation panel. And any recent dashboard or view you explored also appears in the Home page, waiting for you next time.





There's a lot you can do in Tableau Server, and this just explored some of the basics. For more information, see [What Can I Do with a Tableau Web View?](#)

Happy exploring!

## Select Background Maps

Tableau comes with a set of online and offline background maps that you can access to create map views.

By default, Tableau connects to an online map provider.

The three background maps that come with Tableau are described below. They can be found in the **Maps > Background Maps** menu. If the workbook author has added a WMS server or Mapbox map to the workbook, they will be listed using the name the author gave them in the **Maps > Background Maps** menu as well.

**None** Displays data between latitude and longitude axes.

<b>Offline</b>	This background map stores the images that make up the map in a cache on your machine for improved performance and offline access. For more information, see the offline maps section <a href="#">below</a> .
<b>Tableau</b>	Connects to the Tableau background map. By default, all map views connect to this background map, unless you specify otherwise.

### To select a new background map:

- In Tableau Desktop, Tableau Server or Tableau Cloud, select **Map > Background Maps** and then select the background map you want to use.

**Note:** In Tableau Server, your administrator can restrict you to using only Offline maps. The specific server commands to configure this behaviour can be found [here](#).

### Set a default background map in Tableau Desktop

By default, all map views connect to the Tableau background map. In Tableau Desktop, if you do not want maps views to automatically be created with the Tableau background map, you can specify a different background map as the default.

#### To specify a default background map:

1. In Tableau Desktop, select **Map > Background Maps**, and then select the background map that you want to make the default.
2. Select **Map > Background Maps > Set as Default** to set the selected background map to the default.

The background map is automatically saved as a Tableau Map Source (.tms) and placed in the Mapsources folder of your My Tableau Repository. It is now the default background map for all new worksheets.

## Use the Offline background map in Tableau Desktop, Tableau Cloud or Tableau Server

You can create and inspect data in a map view offline using the offline background map that comes with Tableau Desktop.

### To use the offline background map:

- In Tableau, select **Map > Background Maps > Offline**

**Note:** The offline background map uses map images stored on your machine. You can find these images in the following locations:

- On Windows: `C:\Program Files\Tableau\<Tableau Version>\Local\Maps`
- On Mac: `//Applications/<Tableau Version>.app/Contents/install/local/maps`

There are several actions, however, that require Tableau to retrieve a map image that may not be stored. If the new map image is not stored on your machine, you won't be able to load the map until you reconnect to the online map that comes with Tableau.

You may need to reconnect to the online map if you would like to do one or more of the following:

- **Turn layers on or off** - if you decide to turn on a layer that isn't stored in the cache, Tableau will need to connect to retrieve the necessary information.
- **Zoom in or out** - zooming in or out on a map requires different map images. If the images at the specified zoom level don't exist in the cache, Tableau will need to retrieve the updated maps.
- **Pan** - panning sometimes requires new map images. If you are working offline and don't have the necessary map images and legends stored in the cache, the new images and legends will not load.

### To reconnect to the Tableau map:

- On Tableau Desktop, select **Map > Background Maps > Tableau**

**Note:** If you set a map to Offline and then publish the workbook, the published workbook will still use the Offline, stored maps, with all of the functionality and limitations of Offline maps noted above.

### About the Tableau background map

The Tableau background map includes updated map and demographic data, as well as stylistic improvements. It has taken the place of the Tableau classic background map. Any map view created with an earlier version of Tableau Desktop, and with a connection to the Tableau classic background map, will automatically connect to the Tableau background map when opened in Tableau Desktop version 9.0 or later.

**Note:** If you create a map view with data layers in Tableau Desktop version 8.3 or earlier using the Tableau classic background map, and then open that view in Tableau Desktop 9.0 or later, the colour of the data layers may appear differently due to data layering and colour ramp (colour palette) improvements made to the Tableau background map.

## Create and Troubleshoot Metrics (Retired)

### Retirement of legacy metrics

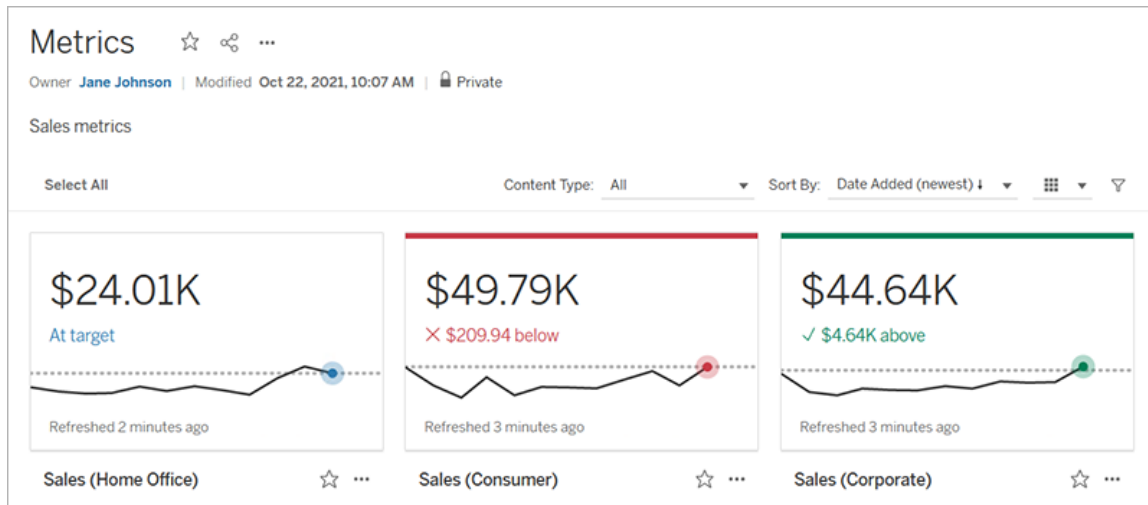
This article is about Tableau's legacy metrics feature, which was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3.

Tableau Pulse introduces a new way to track metrics. With Tableau Pulse, the metrics you create are used to generate insights about your data. These data insights are sent directly to users who follow the metrics, so they can learn about changes to their data in their flow of work. For more information, see [Create Metrics with Tableau Pulse](#).

## Tableau Server on Windows Help

If you have legacy metrics that you want to keep, note the data source, measure and time dimension for those metrics and recreate them in Tableau Pulse. Legacy metrics won't be automatically migrated to Tableau Pulse.

Metrics provide a fast way to stay informed about your data. Because metrics update automatically and display their current value in the grid and list view of your content, you can check all the key numbers you care about in seconds.



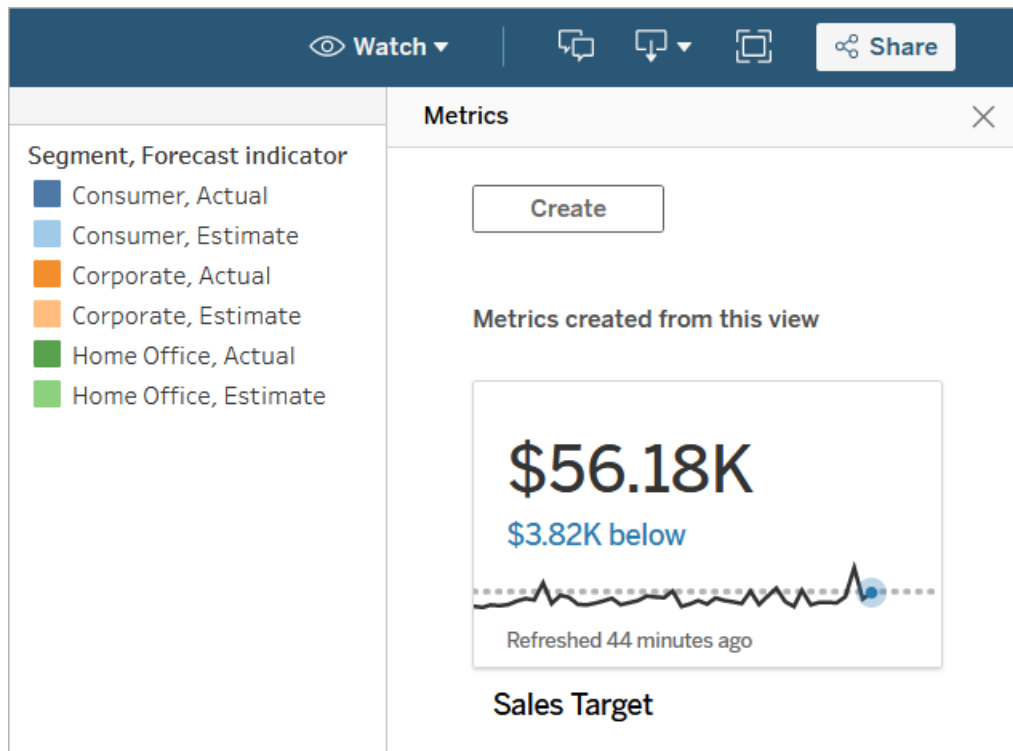
At their most basic level, metrics show the value of an aggregate measure, like the sum of sales. More complex metrics can include timelines, comparisons and statuses that provide an easy-to-understand indicator of how you're performing relative to a prior point in time or a value you have defined.

If you have a set of dashboards that you regularly check, create metrics for the numbers that you want to monitor then track them in one place by adding them to your favourites or a collection, or by creating them in the same project. That way, you don't need to load and filter the dashboards unless you want to dig deeper into your data.

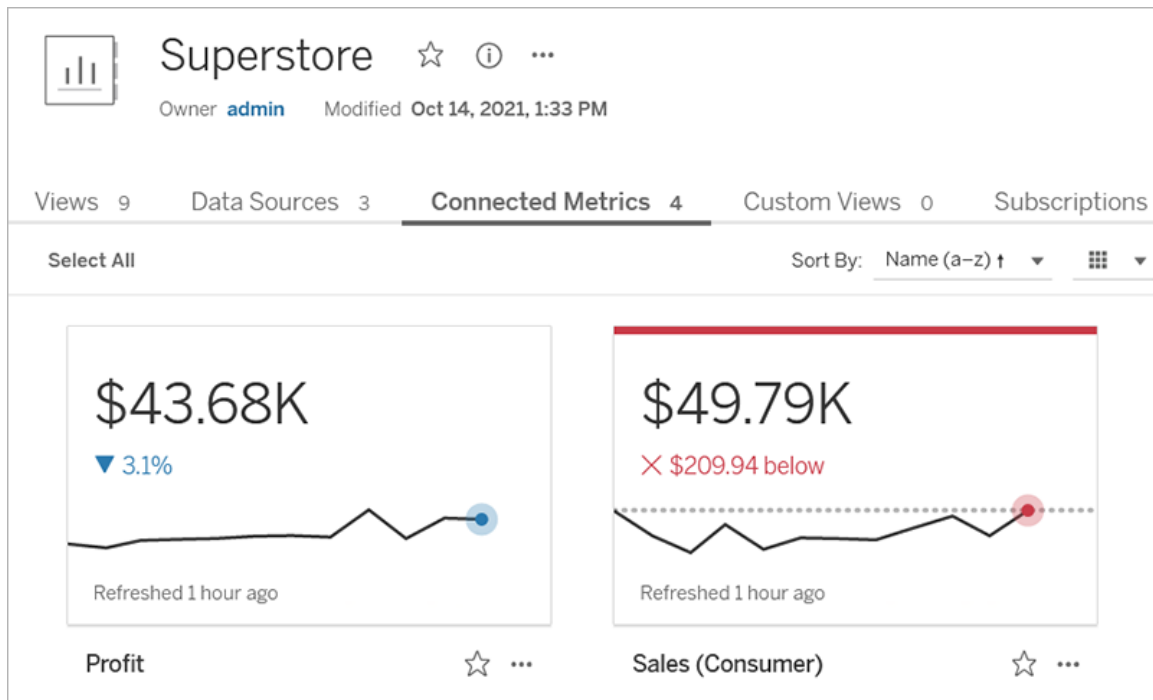
### Find metrics on your site

There are a few ways to find metrics on your Tableau site. To browse all the metrics that you have permission to view, navigate to the Explore page, then select **All Metrics** from the content type menu.

If you're looking for metrics related to a particular view or workbook, check the connected metrics for that content. To see connected metrics for a view, open the view, then click **Watch > Metrics** in the view toolbar. The metrics displayed are ordered from the newest creation date to the oldest.



To see connected metrics for all the views in a workbook, navigate to the workbook, then click the **Connected Metrics** tab. You can sort these metrics using the Sort By menu.

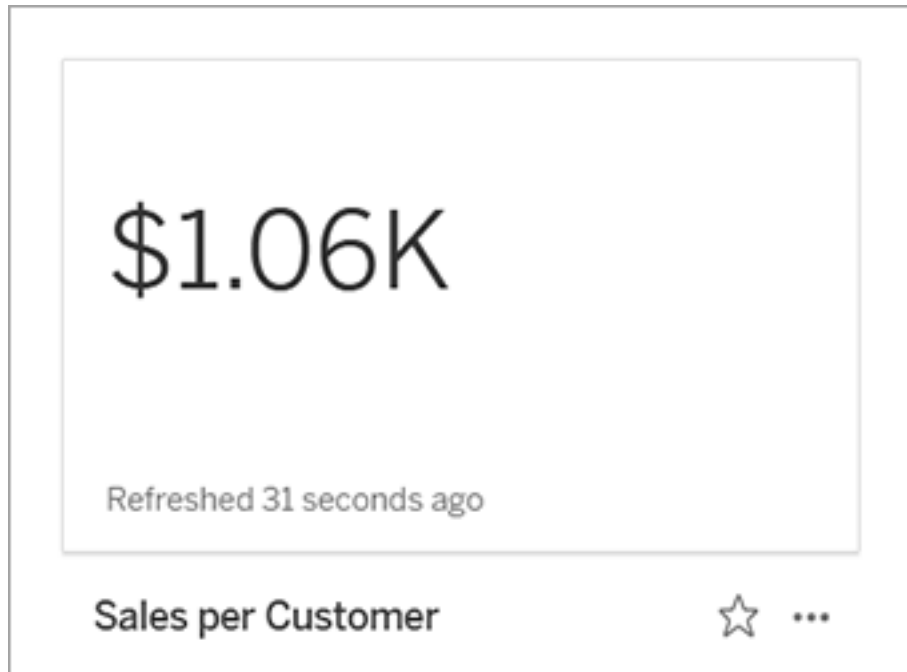


## Components of a metric

The only data required to define a metric is an aggregate measure. Metrics are created from a mark in a view, and the measure associated with that mark defines the metric. The measure must be aggregated because an unaggregated mark will not change over time. For information about dimensions and measures in Tableau, see [Dimensions and Measures, Blue and Green](#).

A metric can optionally be defined by a date dimension, and you can configure a comparison and a status for your metric. Each of these components will add context to the data presented on the metric card.

Metrics that have only a measure defining them will appear as a single number. This number will update when the data updates, but there will be no timeline on the card.

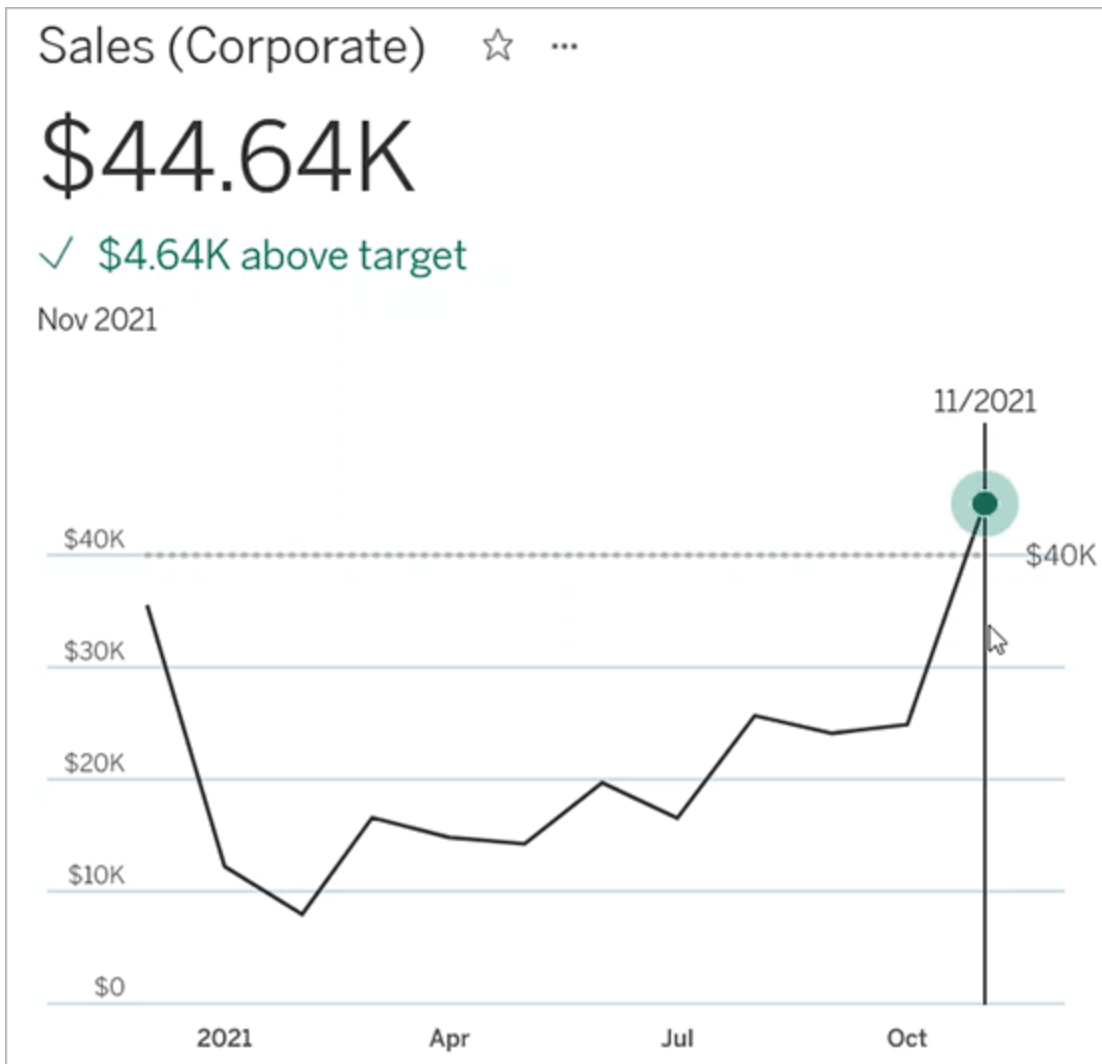


## Timeline

When you select a mark to define a metric, if the mark has a date dimension associated with it, that dimension becomes part of the metric definition. Metrics with a date dimension show a timeline, and you can configure the historical comparison for the metric. By default, the historical comparison is to the previous mark.

When you open a metric's details page, the timeline shows the value of the measure based on the granularity of the date dimension, for example, daily sales or monthly users. Hover over the points on the timeline to see historical values.



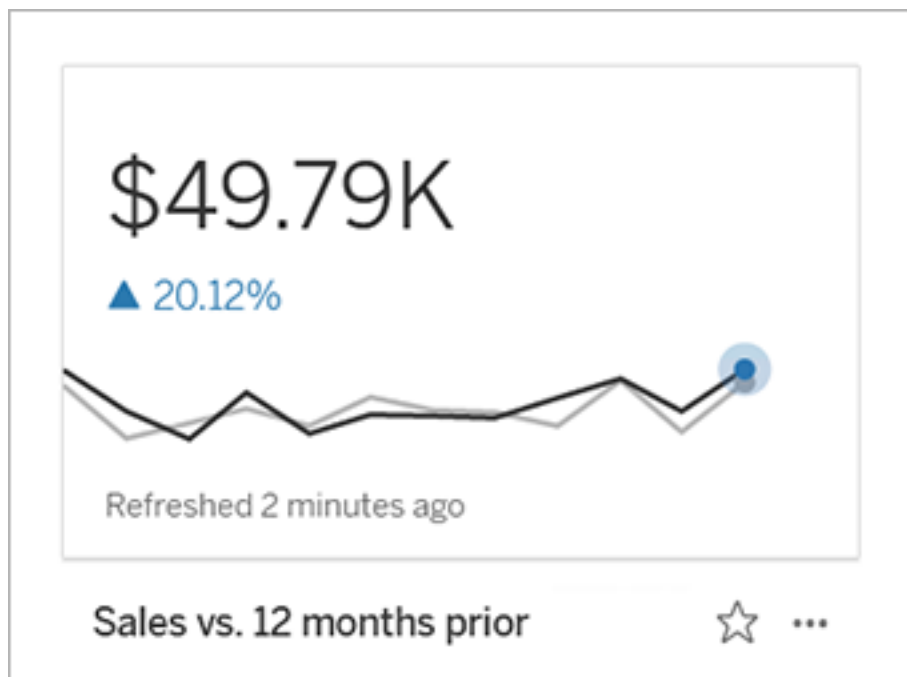


## Comparison

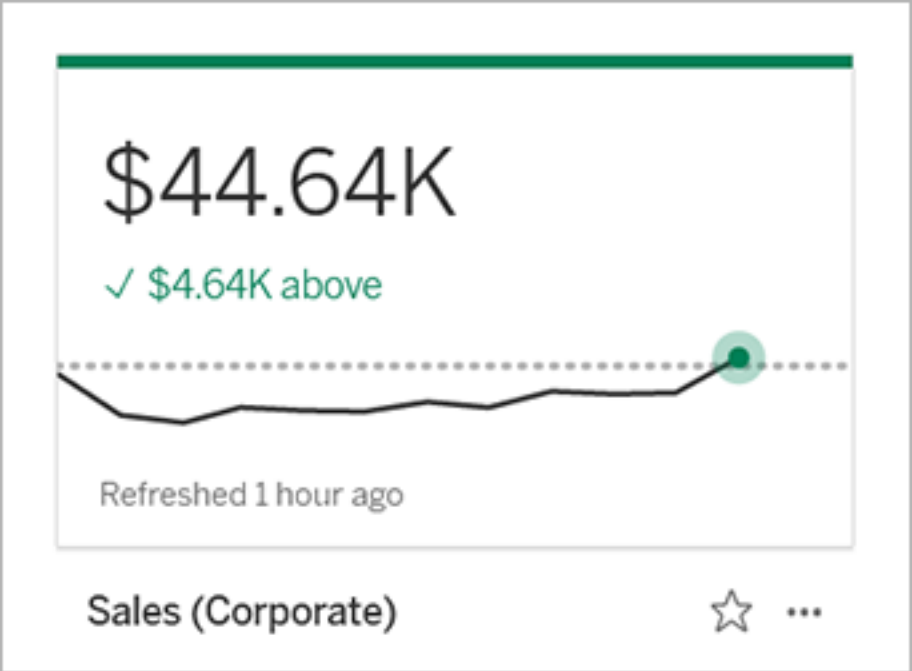
There are two types of comparisons that you can configure for metrics: historical comparisons and constant comparisons. You can configure a historical comparison only if a metric has a date dimension associated with it, but constant comparisons can be added for any type of metric.

A historical comparison is a relative comparison between the current value and a specified number of hours, days or other unit of time previous. For example, you could set a comparison between the current value for monthly sales and the value from 12 months ago. Every time

data is added to a metric, the historical comparison will adjust relative to the date or time of the new data.

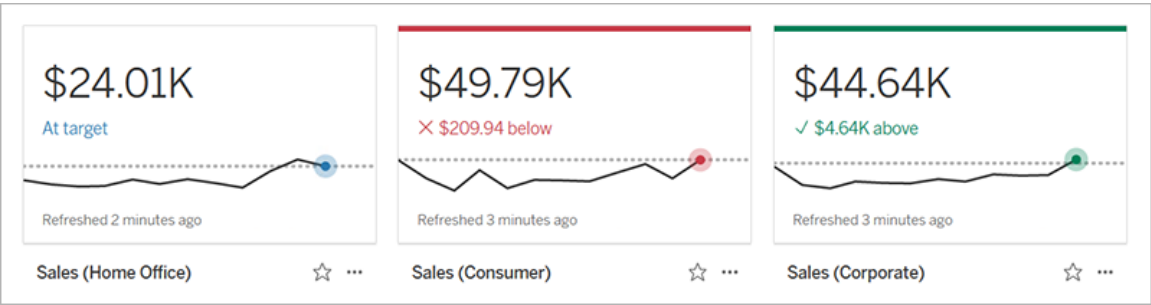


Constant comparisons are to a single value that doesn't change as new data is added. You might set a comparison to represent a threshold to stay above, for example, if you need to maintain a 90% on-time delivery rate. Or you might define a cumulative goal you are working towards, for example, a monthly sales target.



Status

For metrics with a constant comparison, you can define whether being above, below or at the comparison value is good, bad or neutral. A metric with a “good” status will display a tick next to the comparison value, and the metric card will have a green band at the top. A metric with a “bad” status will display an X next to the comparison value, and the metric card will have a red band at the top. Metrics with a “neutral” status appear the same as metrics without a status indicator; there is no icon or colour applied to the card.



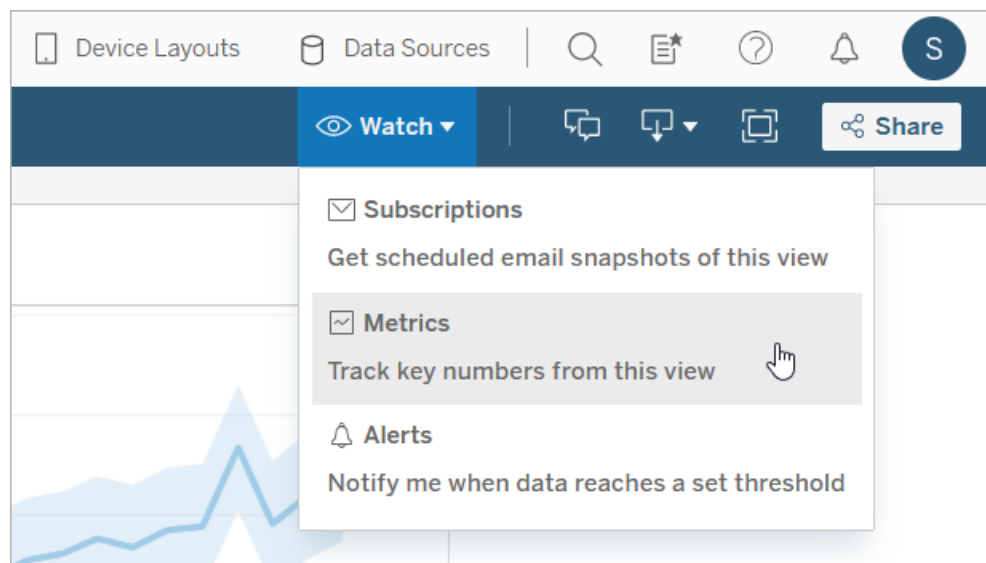
## Create a metric from a view

If you have a site role of Creator or Explorer (can publish), and you have the Create/Refresh Metric capability on the relevant workbook, you can create metrics on Tableau Cloud or Tableau Server.

Before you create a metric, check the connected metrics for the view to make sure that the metric you are planning to create doesn't already exist. Instead of creating a duplicate metric, open the existing metric and add it as a favourite.

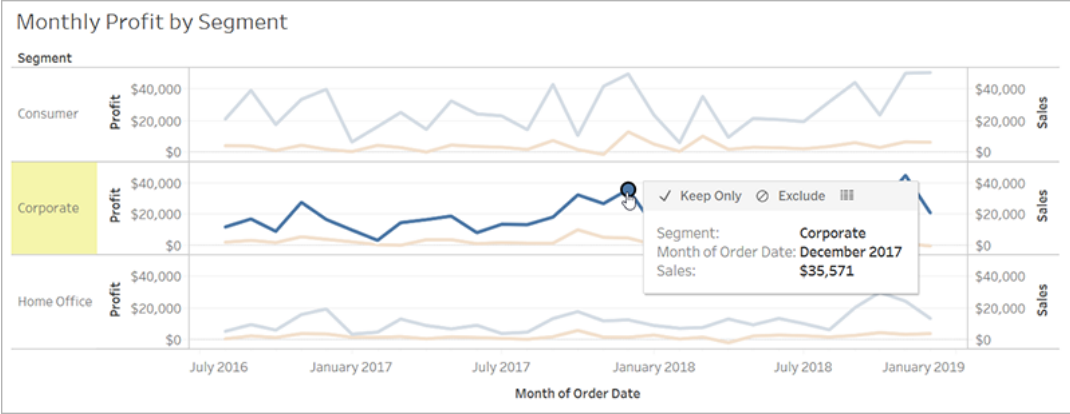
Select the mark to define your metric

1. Navigate to the view that you want to create a metric from.
2. On the view toolbar, select **Watch > Metrics**.



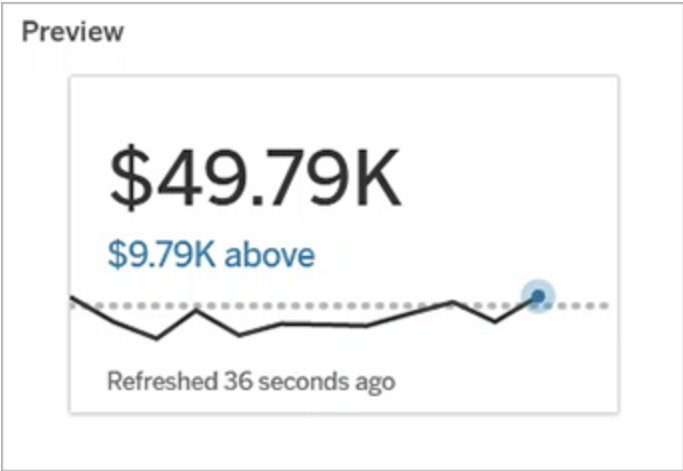
The metrics pane opens.

3. If the pane shows connected metrics, select the **Create** button to enter authoring mode.
4. Select a mark. If you encounter an error, see [When you can't create a metric](#).



The measure associated with this mark defines your metric. Any filters you apply to the mark are applied to your metric. If this mark has a date dimension associated with it, that date dimension also defines your metric, and your metric will display a timeline.

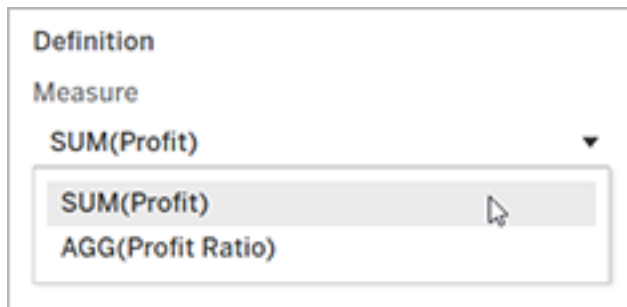
The metrics pane shows a preview of your metric. The value in the preview is the most recent value for the metric, which may differ from the value of the mark you selected if it was not the most recent in the time series. The preview updates as you try different configurations.



Describe and configure your metric

The options available to configure your metric depend on the mark you select and on the type of comparison you choose.

1. The **Name** field is pre-populated based on the mark you select. You can give the metric a different name. A metric must have a unique name within the project it belongs to.
2. Under **Description**, enter an optional message to help others understand your metric. For example, describe filters applied to the metric or indicate the data source used by the metric.
3. For the **Date Range** (only for metrics with a date dimension), select one of the default options, or set a custom range. If your metric has a large number of marks, limiting the date range can make it easier to read the timeline.
4. Select the **Comparison Type** for the metric: historical or constant.
5. For **Historical** comparisons:
  - Enter how far prior you want to compare against. The unit of time for the comparison is the same as the granularity of your data, such as hours or months.
  - Select **Show Comparison Line** to include a second line for the comparison period on the timeline.
6. For **Constant** comparisons:
  - Enter the value to compare against. Don't include commas or symbols in this field. To enter a percentage, simply type the number without the percent sign, for example, enter 25 instead of 0.25 for a target of 25%. When you enter a valid target value, the preview updates to show how far above or below the target the current value is.
  - Set the **Status** for the comparison to indicate whether being above, at or below the value is good, bad or neutral. By default, the status is set to neutral. Check the metric preview to see how different statuses affect your metric.
7. Under **Definition > Measure**, select the measure to use for your definition from the drop-down. This option appears only if the mark you select has more than one measure associated with it.



Finalise your metric

1. Under **Project**, select **Change Location** to choose a different project for the metric. By default, your metric will be added to the same project that the view belongs to.

Every metric in a project must have a unique name. Because a metric's name and project are initially set based on the mark you select, you might run into a conflict when you try to save your metric, if another user has already created a metric from that mark.

Either choose a different project or name for your metric or, if you want to overwrite the existing metric, see [Overwrite a metric](#).

2. Click the **Create** button.

A message appears with a link to the metric in the project you added it to.



3. Verify that the permissions for your metric are correct, following the guidance in [Set permissions](#).

By default, a metric inherits the permissions of the project it is created in. Anyone with access to your metric will be able to see the metric's data, even if they don't have permission to access the connected view or data source.

Now that you've created a metric, you can manage the metric the same way you manage other independent pieces of content on your Tableau site. Though metrics are created from a view, they exist independently of that view, unlike data driven alerts or subscriptions. You can move

the metric to a different project without moving the connected view. For information about managing content on your Tableau site, see [Manage Web Content](#).

### Overwrite a metric

Once a metric is created, you can change the name, description and configuration of the metric, but you can't change how the metric is defined. If you want to change the data that the metric uses, you must overwrite it. In order to overwrite a metric, you need to be the metric owner or be granted the correct permission capability.

1. To overwrite a metric, create a metric with the same name in the same project as the metric you want to overwrite.

The Overwrite Metric dialog appears.

2. Click the **Overwrite** button.

When you overwrite a metric, the metric continues to appear for those who have added it to their favourites, and any changes made to permissions for the previous metric will apply to the new metric.

### When you can't create a metric

If you select a mark on a chart that doesn't support metrics, you'll get an error message explaining why you can't create a metric. The table below summarises these scenarios.

Reason	Scenarios
You don't have the correct permissions.	<ul style="list-style-type: none"> <li>The workbook owner or an administrator has denied the Create/Refresh Metric capability. For more information, see <a href="#">Permissions</a>.</li> </ul>
You can't access the complete data.	<ul style="list-style-type: none"> <li>Row level security or user filters limit the data you can see. For more information, see <a href="#">Restrict Access at the Data Row Level</a>.</li> </ul>
The password for the workbook's data source is not embedded or is no longer	<ul style="list-style-type: none"> <li>The workbook prompts for a password. For more information, see <a href="#">Set Credentials for Accessing Your Published Data</a>.</li> </ul>



Reason	Scenarios
valid.	
The data isn't at the correct level of granularity.	<ul style="list-style-type: none"> <li>The data in the chart isn't aggregated. Metrics use aggregations, such as sum or average. For more information, see <a href="#">Data Aggregation in Tableau</a>.</li> <li>There are multiple values per cell of data – a result of data blending. For more information, see <a href="#">Troubleshoot Data Blending</a>.</li> </ul>
The date dimension is not supported.	<ul style="list-style-type: none"> <li>The chart includes both date parts and date values. For more information, see <a href="#">Change Date Levels</a>.</li> <li>The date dimension uses the ISO 8601 calendar rather than the standard Gregorian calendar. For more information, see <a href="#">ISO-8601 Week-Based Calendar</a>.</li> <li>The date dimension is aggregated at the custom level of Month / Year or Month / Day / Year. For more information, see <a href="#">Custom Dates</a>.</li> </ul>

## Edit a metric's configuration

Starting in 2022.2, you can change the configuration for a metric. A metric's configuration includes the comparison, date range and status indicator. The configuration options available depend on the type of metric. Metrics with a timeline allow you to set a historical comparison or a constant comparison. Single-number metrics support only a constant comparison.

A metric's configuration does not include the metric definition (the measure and date dimension that generate the metric value). If you want to change the definition, overwrite the metric with a new metric.

To edit a metric's configuration, you must have the overwrite capability for the metric.

1. Open the metric details page for the metric you want to edit.
2. Mouse over the configuration section. Click anywhere on the section to enter editing mode.

Metric Details

**Owner**  
Jane Johnson

**Description**  
No description available.

**Configuration**

Date Range      Last 12 months  
Comparison      1 month ago

- For a timeline metric, set the date range to be displayed on the metric card and details.
- Select the comparison type. For a constant comparison, set a comparison value and status. For a historical comparison, set how far prior you want to compare against and choose whether to show a comparison line on the timeline.
- Click **Save**. Your configuration changes will appear to anyone who views the metric.

## How metrics refresh

When a metric refreshes, it checks the connected view (the view the metric was created from) for new data. A refresh doesn't necessarily update the value of a metric, because there may be no changes to the data.

Metrics refresh at a frequency either based on an extract's refresh schedule or, for live data, every 60 minutes. The time of the last refresh is displayed on the metric.

## Fix failing refreshes

If a metric isn't able to access the connected view or its underlying data, the refresh will fail. If the refresh for your metric fails, you'll receive a notification, which notes the time of the failure and the affected metric.

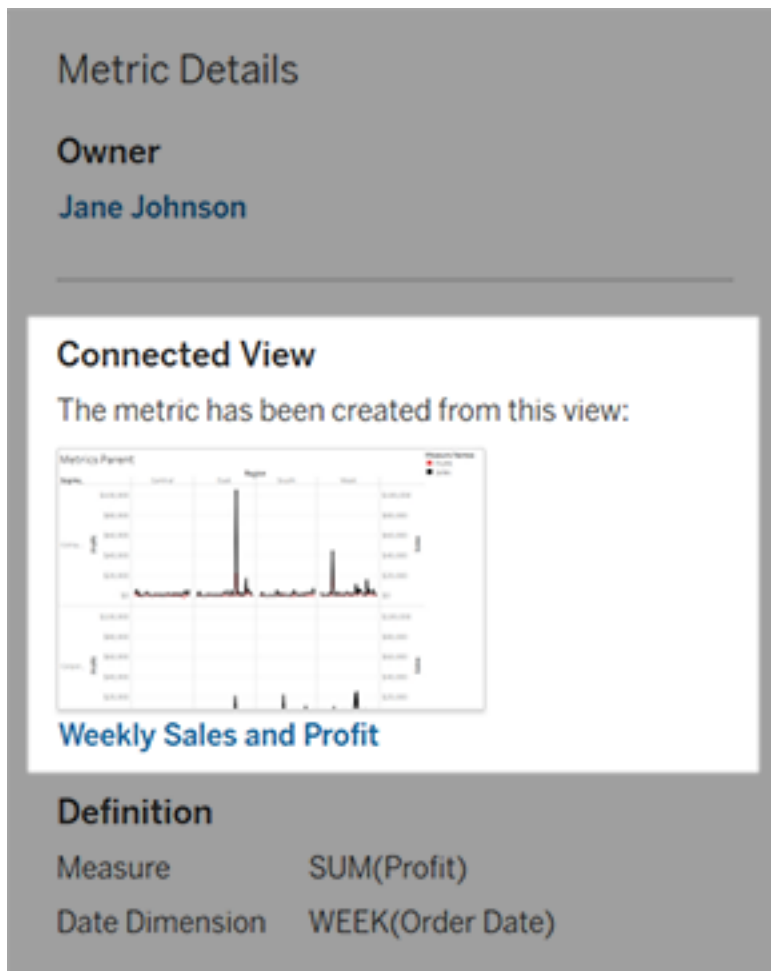
Metric refreshes may fail for one of the following reasons.

- The connected view was deleted or modified.
- Permissions changed for the connected view.

## Tableau Server on Windows Help

- The password for the data source is no longer embedded or is no longer valid.
- The metric owner doesn't have the required site role to refresh the metric. A site role of Creator or Explorer (can publish) is required.
- There was a temporary connectivity issue, which will resolve itself.

To identify the cause of the failure, look at the metric details. Make sure that the metric owner has the required site role to refresh the metric. Then inspect the **Connected View**.



If the connected view is still listed

Open the view to investigate the cause of the failure.

If the view loads, check that the measure and (optional) date dimension that define the metric are still present in the view.

- If the view appears to be unchanged, you might no longer have permission to refresh metrics from it. The content owner or a Tableau administrator can change the Create/Refresh Metric permission capability. For more information, see [Permissions](#).
- If the measure is no longer present, the view has been modified so the metric can't connect to the data needed to refresh. The content owner or a Tableau administrator can check the revision history and restore previous versions. For more information, see [View Revision History](#).

If the view doesn't load, but instead prompts for a password or displays an error when connecting to the data source, the password for the data source is not embedded or is no longer valid. The content owner or a Tableau administrator can edit the data source connection to embed the password. For more information, see [Edit Connections](#).

If there is no connected view listed

The view was deleted or you no longer have permission to access the view. Contact your Tableau administrator for assistance.

## Resume suspended refreshes

If a refresh fails enough times, the refresh is suspended. You'll receive a notification if the refresh for your metric is suspended.

When a metric refresh is suspended, Tableau no longer attempts to get new data for the metric. Metrics with suspended refreshes continue to present historical data.

If the cause of the failure is fixed, you can resume the refresh.

1. Open the affected metric.
2. On the warning message, click **Resume refresh**.

Tableau attempts to perform the refresh. If this attempt succeeds, you'll receive a notification, and the refresh will resume on schedule. If the attempt doesn't succeed, your refresh remains suspended.

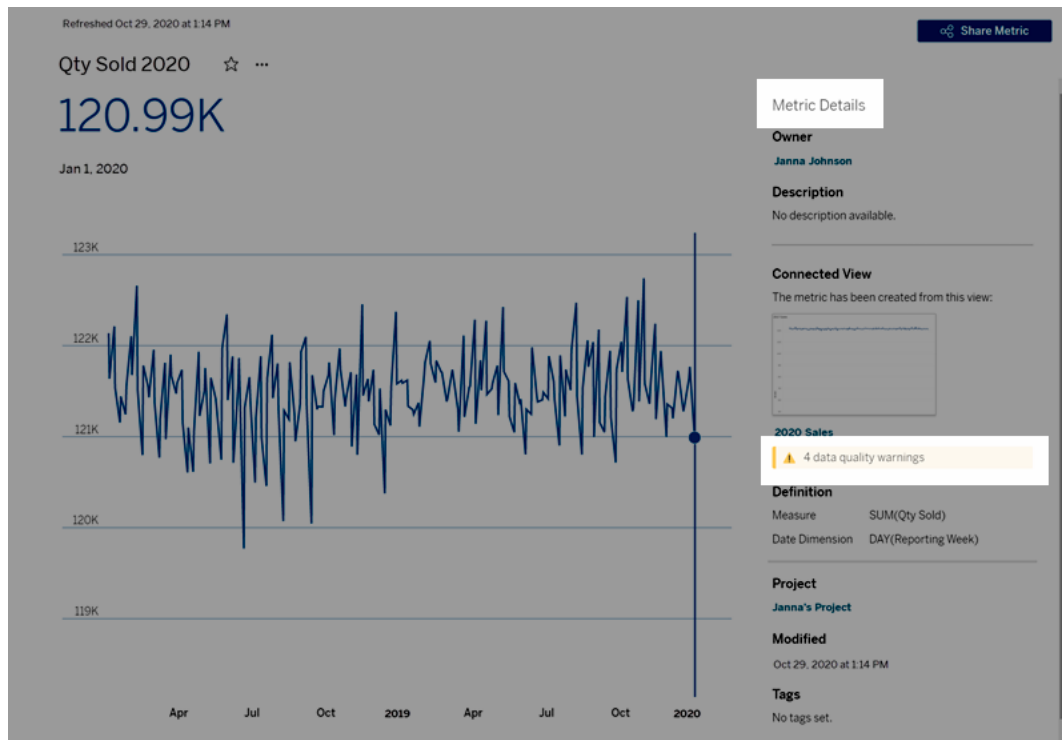
Try overwriting the metric if the connected view is still available. For more information, see [Overwrite a metric](#). Otherwise, you can keep the metric to reference past data or delete the metric.

**Note:** If the metric refresh is suspended because you don't have the required site role for it to refresh, you won't be able to resume the refresh or delete the metric.

## Metrics appear in Tableau Catalogue

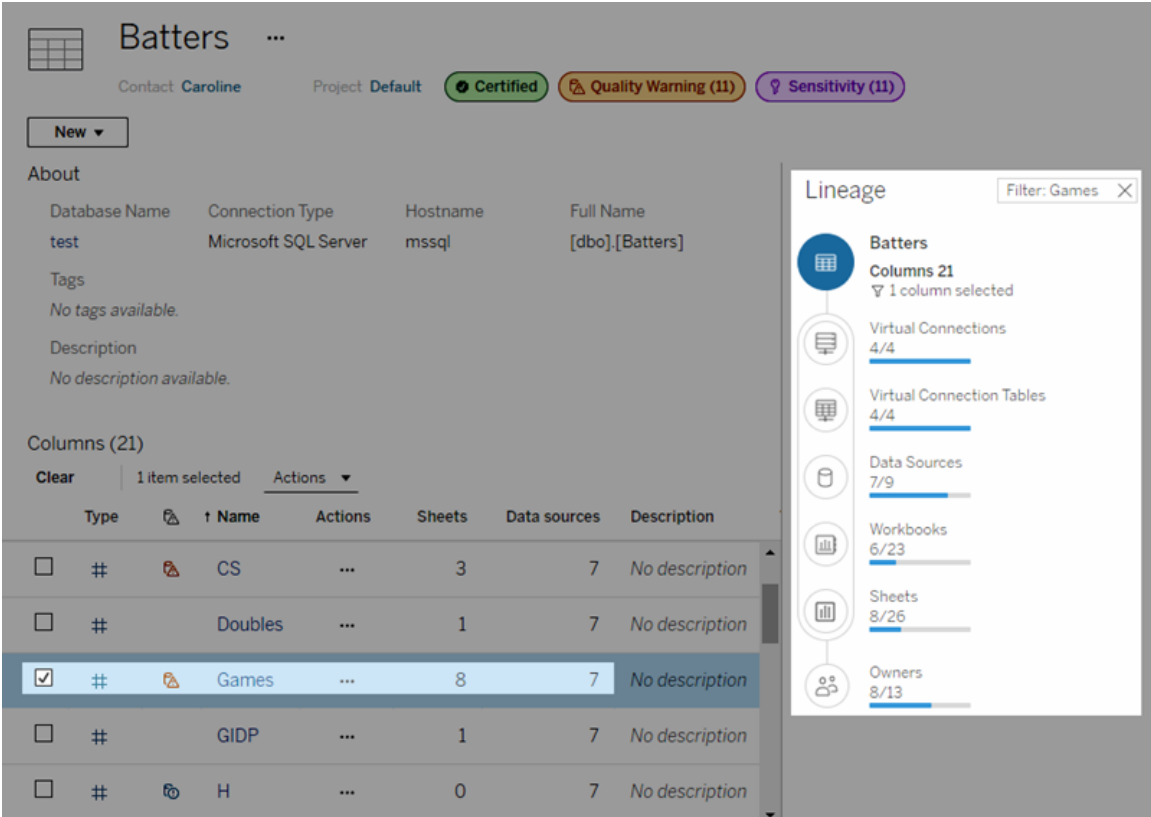
Starting in 2019.3, Tableau Catalog is available with Data Management in Tableau Cloud and Tableau Server. When the Tableau Catalogue is enabled in your environment, you can see metrics in the Catalogue lineage tool, and metrics affected by data quality warnings display those warnings. For more information about Tableau Catalog, see "About Tableau Catalog" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

When you have metrics defined for the numbers you want to monitor, it's important to know if the data that the metrics rely on are impacted in any way. You can use Catalogue in a couple of ways to know this. First, data quality warnings set on the data your metric is based on show on the metric. These warnings appear when you open a metric in Tableau Mobile and in Tableau Server and Tableau Cloud when you hover over a metric in grid view and on the metric details page, as shown below:



For more information, see "Set a Data Quality Warning" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

You can also use the lineage tool in Tableau Catalogue to see the upstream sources that your metric relies on. When doing an impact analysis, you can see which metrics are affected if a certain column or a table is changed or deprecated, or if certain workbooks are removed. Including metrics in the lineage means that Catalogue gives a full picture of the impact changes can have on the assets in your environment.



For more information, see "Use Lineage for Impact Analysis" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

## Set Credentials for Accessing Your Published Data

When you publish a workbook to Tableau Cloud or Tableau Server, you can publish the data source it connects to as part of the workbook (*embedded* into the workbook), or as a separate, standalone data source. In addition, if the data source you're publishing requires authentication, you can customise how credentials are obtained.

The type of authentication to your data source is independent on how people sign in to your Tableau Cloud or Tableau Server site. For example, to give people direct access to the data in a workbook, you would embed a database user's credentials into the data source's con-

nection. But anyone viewing the workbook would still need to be able to sign in to the site on Tableau Cloud or Tableau Server to open your workbook.

This topic describes how to set authentication on data connections as part of the publishing process.

**Note:** This topic doesn't apply to connections to that don't require authentication, such as text files or Excel files.

## Set the authentication type

For many types of connection, you can embed a database user's name and password, or use single sign-on (SSO). Specific exceptions are described later in this topic.

The following steps describe how to set authentication as part of publishing a data source or workbook. You can do this for each connection in the data source.

1. In the Publish Workbook dialog box, go to the **Data Sources** area, which lists the workbook's connections, and select **Edit**.
2. In the **Manage Data Sources** popup, after you decide whether to publish the data source separately or as part of the workbook, select an authentication type for each connection in the data source. The available authentication types depend on the connection type, and they can include one or more of the following:
  - **Prompt user:** Users must enter their own database credentials to access the published data when the view or workbook loads.
  - **Embedded password:** The credentials you used to connect to the data will be saved with the connection and used by everyone who accesses the data source or workbook you publish.
  - **Server run as account:** A single Kerberos service account is used to authenticate the user. On Windows this is the account that Tableau Server runs as. On Linux it can be any Kerberos account.
  - **Viewer credentials:** The viewer's credentials are passed through to the database using SSO (usually Kerberos).
  - **Impersonate with embedded account or Impersonate with server Run As service account:** Impersonation using embedded credentials connects with the



embedded credentials and then switches to the viewer's identity (only for databases that support this). Impersonation using the Run As service account is similar but first, connects with the Kerberos service account before switching to the viewer's identity.

- **Refresh not enabled** or **Allow refresh access**: These options appear when you publish an extract of cloud data such as from Salesforce, and database credentials are needed to access the underlying data. **Allow refresh access** embeds the credentials in the connection, so that you can set up refreshes of that extract on a regular schedule.

**Important:** How you want to keep extracted data fresh is also a factor:

- If you want to set up an automatic refresh schedule, you must embed the password in the connection.
- If you're publishing a cloud data connection to Tableau Cloud, the publishing steps alert you if you must add Tableau Cloud to the data provider's authorised list.
- You can't publish an extract that's created from a Kerberos-delegated, row-level-secure data source.

#### Dropbox, OneDrive connections

For Dropbox and OneDrive, when you publish a data source or workbook and select **Embedded password**, Tableau creates a saved credential and embeds it in the data source or workbook.

#### Workbook connections to Tableau data sources

When you publish a workbook that connects to a Tableau Cloud or Tableau Server data source, rather than setting the credentials to access the underlying data, you set whether the workbook can access the published data source it connects to. Regardless of the original data type, the choice for server data sources is always **Embedded password** or **Prompt users**.

If you select to prompt users, a user who opens the workbook must have **View** and **Connect** permissions on the data source to see the data. If you select embed password, users can see the information in the workbook even if they don't have View or Connect permissions.

## Virtual connections

As of Tableau Cloud and Tableau Server 2022.3 and Tableau Desktop 2022.4, when you publish Tableau content like a data source or workbook that uses a virtual connection and select **Embed password** or **Embed credentials**, the viewer of the content will have your permissions to connect to and query the virtual connection. However, any data policies associated with the virtual connection are always evaluated using the viewer's identity – not yours.

For example, you publish a workbook that uses a virtual connection. To let viewers of the workbook connect to and query data by way of the virtual connection, you embed your permissions to connect to and query the virtual connection. Then, any data policies associated with the virtual connection prevent the viewers of the workbook from accessing any sensitive data.

When evaluating whether the tables in a virtual connection can be viewed and accessed, the identity of the content creator is used. However, when evaluating any data policies associated with the tables in a virtual connection, the viewer's identity is used. And the content creator can only ever embed connect permissions to the virtual connection – not edit permissions.

If you choose not to embed permissions, then only users with permissions to access the workbook or data source and with connect permissions to the virtual connection can access the workbook or data source.

The embed password and embed credentials options for virtual connections don't work in Tableau Cloud 2022.2, Tableau Server 2022.1 and Tableau Desktop 2022.3 and earlier. If you select these options before you upgrade to 2022.3 (for Tableau Cloud and Tableau Server) or 2022.4 (for Tableau Desktop), the options will work as expected after you upgrade. Then, you're able to embed your permissions for querying a virtual connection.

## See also

- If you publish to Tableau Server, see [Edit Connections](#) in the Tableau Server Help.
- If you publish to Tableau Cloud and the workbook connects to Salesforce, Google Analytics, Google Sheets, Google BigQuery, OneDrive, Dropbox and QuickBooks Online data, see [Refresh Data Using Saved Credentials](#) in the Tableau Cloud Help.

- If you're a Tableau Server administrator looking for more information about authentication, see the Tableau Server help topics "Authentication" ([Windows](#) | [Linux](#)) and "Data Connection Authentication" ([Windows](#) | [Linux](#)).

## Explore Dashboards with Data Guide

Have you ever discovered a new Tableau dashboard and wondered what the data means or how to use it? Or, have you ever published a new dashboard and wished that you could include instructions about how to use your dashboard?

Data Guide provides helpful information about a dashboard and insights about the data behind it. Data Guide allows dashboard creators to provide more explanatory context for end users – like descriptions and links to resources – directly in the dashboard. And Data Guide automatically surfaces insights powered by [Explain Data](#) to help users find outliers and learn about explanations for a mark. Explain the Viz (powered by Explain Data) identifies outlier measures and potential key drivers behind them.

These contextually relevant details can help dashboard users navigate and use new dashboards more easily, allowing users to find insights faster, trust that they're looking at the right data, provide context for data and establish confidence in their understanding of the viz.

### Customise Data Guide as an author

1. From your dashboard, choose the **Edit** button.
2. Choose **Data Guide** in the toolbar.
3. In the Data Guide pane, type a description to help your end users understand the purpose of your dashboard.
4. Select **Add link**, and enter a descriptive label for your link text and the URL.
5. Choose **OK**.
6. Select a viz (a sheet in the dashboard). Data Guide updates automatically so you can add a description and resources that are relevant to each viz in your dashboard.
7. Type a description, and add links relevant to the viz.
8. Choose **OK**.

**Tip:** To use Data Guide to write custom alt text to improve the accessibility of your vizzes, see [Show more text and make it helpful](#).

## Explore Data Guide as a dashboard user

1. From the dashboard, choose **Data Guide** in the toolbar.
2. Read the description of the dashboard and explore resources provided by the dashboard author.
3. Expand **Data in This Dashboard** and **Detected Outliers** to learn more about the underlying data used in the dashboard.
4. Select a viz (an object in the dashboard).
5. Read the description of the viz and explore resources provided by the dashboard author.
6. Expand **Data Summary** and **Detected Outliers** to learn more about data in that viz.
7. Select a mark or multiple marks, such as a bar on a chart or a region on a map, to see information about **Data in This Mark** and **Applied Filters**. Select a single mark to see possible **Explanations** for its value.

The screenshot shows the Tableau Data Guide interface. The main view displays a map of the Southern United States with a color scale for Profit ranging from (\$7,491) to \$18,598. A list of states is shown on the right, all of which are checked: (All), Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia.

The sidebar on the right contains the following sections:

- Data Guide** (Title bar)
- Profit in the South** (Section header)
- Nancy Matthew published on Apr 26, 2023, 4:56 PM
- Dashboard Details** (Section header)
- This dashboard has details about profits in the Southern region only.
- [Watch this video to get started](#)
- Data in This Dashboard** (Section header)
- > Sample - Superstore
- Detected Outliers** (Section header)
- Tableau detected these marks as unusual compared to other marks in the same viz.
- Low** Burlington, United States, North C... Sum of Profit: (\$3,840) >
- Low** Jacksonville, United States, Florid... Sum of Profit: (\$1,828) >

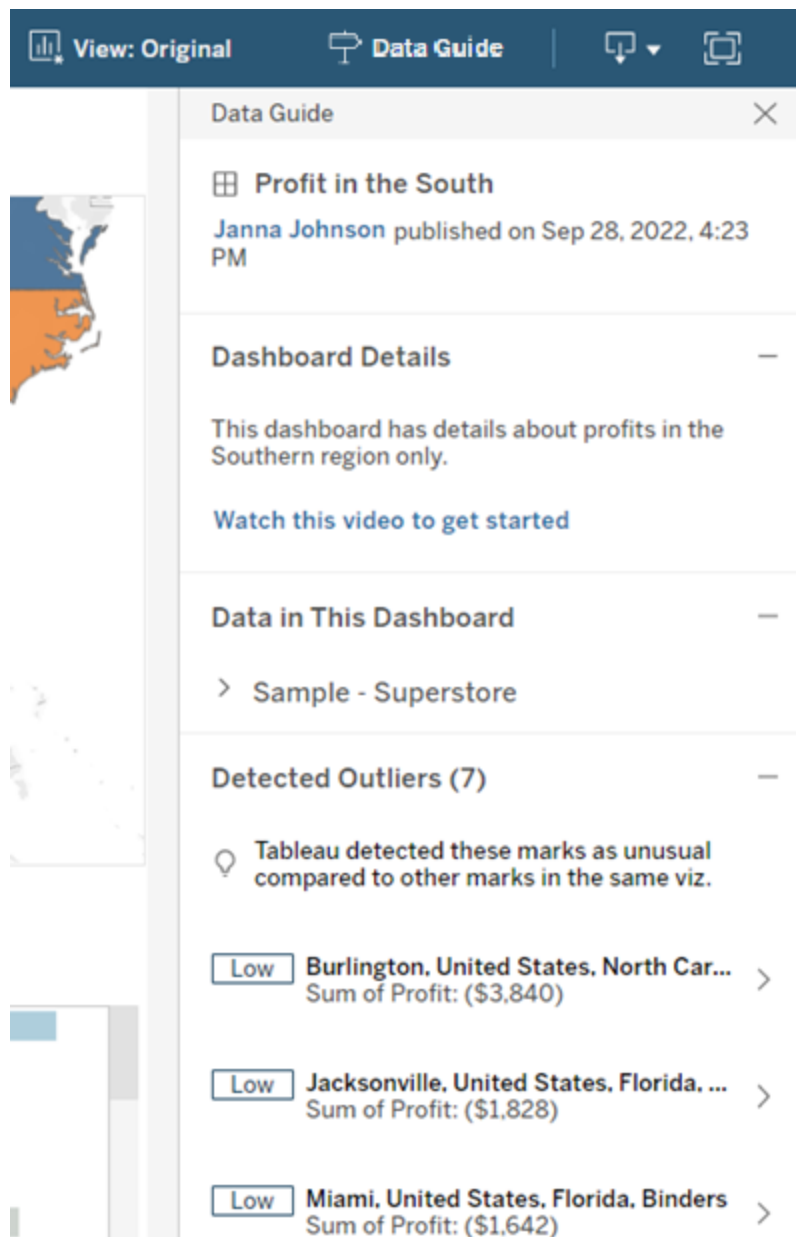
## Explore Data Guide at different levels

By default, Data Guide is closed when you open a workbook. And you can open Data Guide in the toolbar. At the top of the Data Guide pane, you see the name of the dashboard or viz that you selected. As a dashboard author, you can write descriptions for both the dashboard and for individual vizzes that make up your dashboard.

### Understand dashboard-level details

At the dashboard level, Data Guide:

- Displays the dashboard's name, author and last published date.
- Can include a description written by the dashboard author and links to related resources, such as videos or wiki pages.
- Lists the data sources used by the dashboard and details about the data, such as which dimensions and measures are used.
- Reveals detected outliers in the dashboard that are identified by Explain Data. For more information, see [Get Started with Explain Data](#).



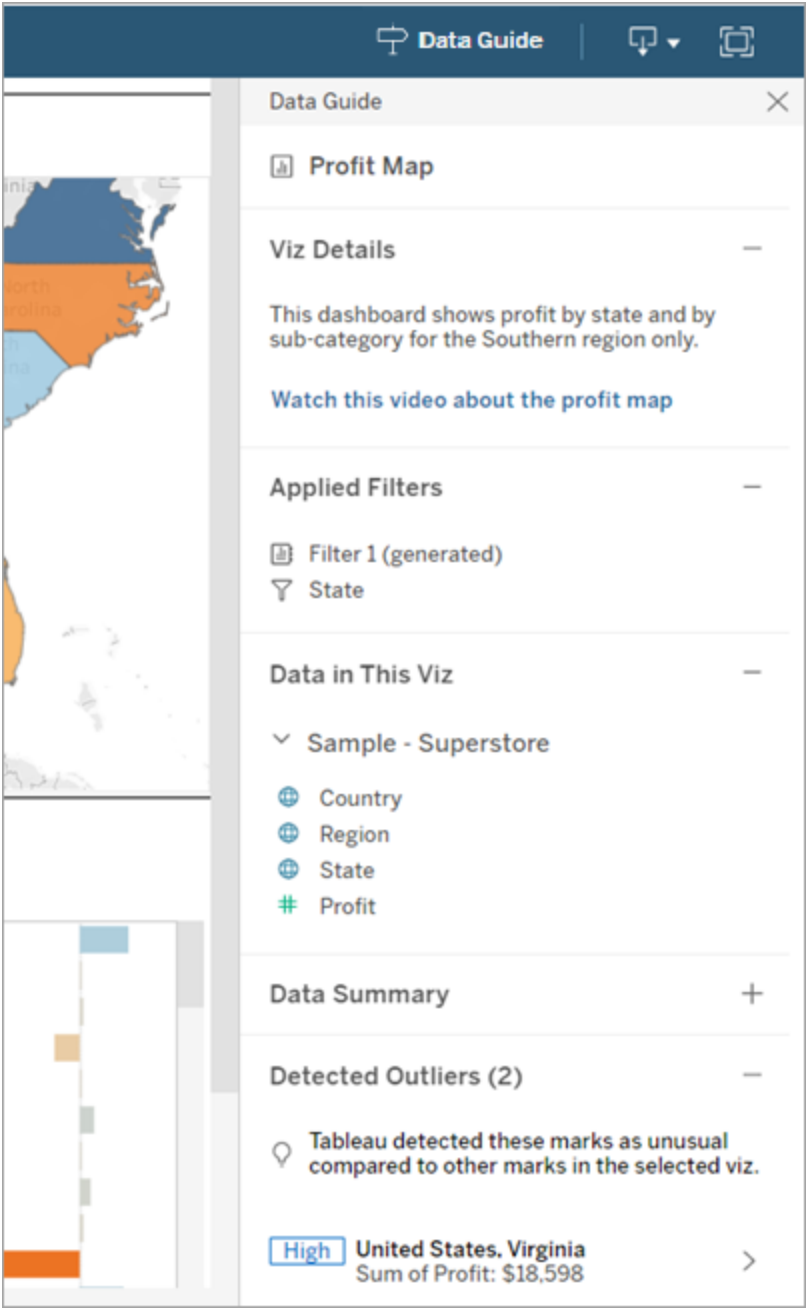
Understand viz-level details

When a user selects a specific viz (dashboard object), Data Guide:

- Displays the viz's name.
- Can include a description written by the dashboard author and links to related resources, such as videos or wiki pages.

## Tableau Server on Windows Help

- Lists the data sources used by the dashboard, including the dimensions and measures used.
- Lists applied filters and data used in the viz, so you can identify how the data is being influenced by filters that users interact with. Only filters that a user can change are shown.
- Has a summary of the data used in the viz, including the number of data points and sorting details.
- Reveals detected outliers in the viz that are identified by Explain Data. For more information, see [Get Started with Explain Data](#).



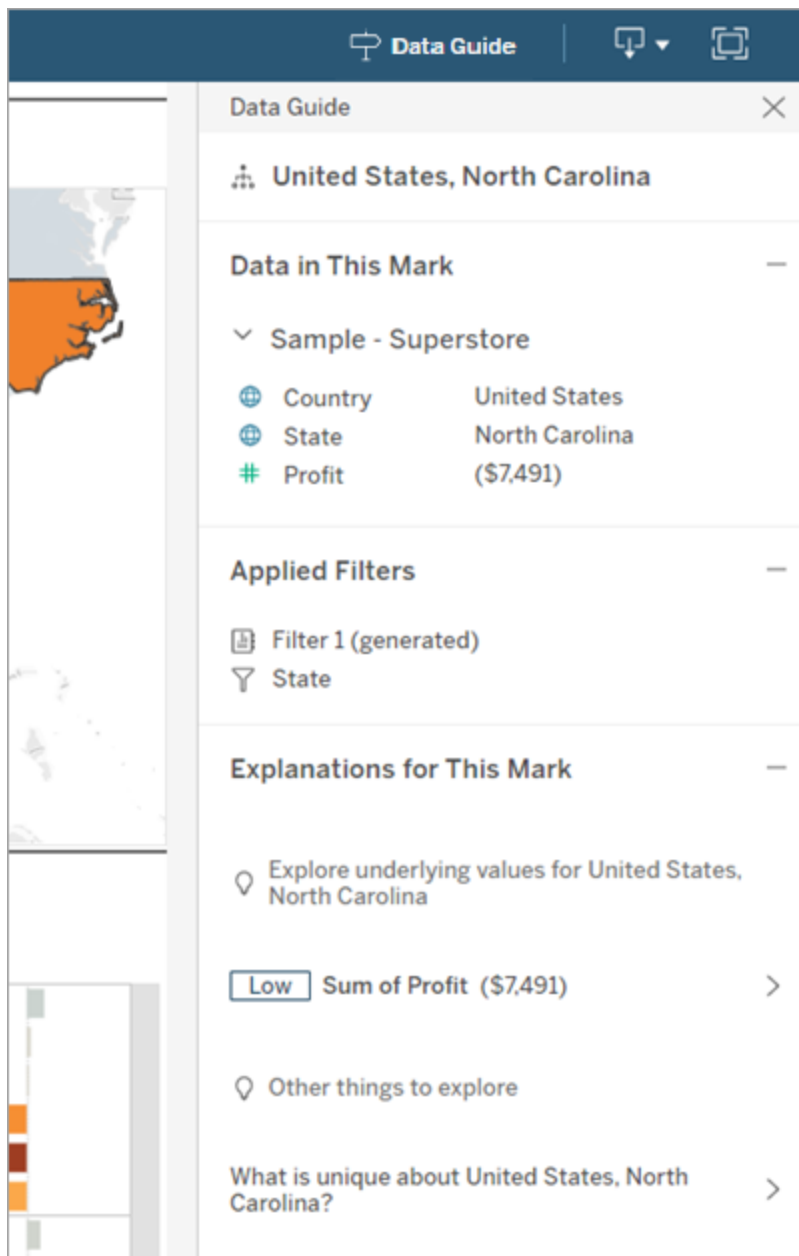
Understand mark-level details

When a user selects a mark (or marks) such as region on a map, Data Guide:



## Tableau Server on Windows Help

- Displays the name of the mark.
- Lists applied filters and data used in the viz, so you know what's included and what's excluded.
- Reveals detected outliers in the viz that are identified by Explain Data. For more information, see Get Started with Explain Data.



## Control Data Guide visibility

By default, Data Guide is closed when you open a workbook. When you open or close Data Guide, it remains in this state for all workbooks on the site. In 2023.1 or later, a server administrator can hide Data Guide for all users. This removes the Data Guide button from the Tableau toolbar on all workbooks on the site. To hide Data Guide:

1. From the left pane, choose **Settings**.
2. From the **General** tab, scroll to **Availability of Data Guide**.
3. Choose **Hide**.
4. Choose **Save**.

## Set a Data Freshness Policy for Query Caches and View Acceleration

### Understand data freshness for Query Caches

You've built your workbook, and your team loves it. But sometimes, people need to click the Refresh button for the most up-to-date data to appear in the viz. You built the workbook using a live connection, so why does the data need to be refreshed? The answer is performance.

To improve performance, Tableau caches the results of queries used to fetch data, so subsequent visits can reuse and return that cached data faster. You can click the Refresh button to retrieve updated data, but this can add to potential performance costs.

To balance data performance and freshness, set a data freshness policy for your workbook. When you set a data freshness policy, your data is refreshed at the time you specify. Tableau won't visualise cached data that doesn't meet the freshness policy you've set.

### Understand data freshness for View Acceleration

With the View Acceleration feature, Tableau precomputes selected workbooks to generate views, resulting in significantly reduced load times. A precomputation schedule is created based on the data freshness policy or extract schedule that you set for the selected workbooks to provide data that is both performant and fresh.

To minimise resource consumption, the number of precomputation jobs that you can run is limited to 12 per day. For example, if your data freshness policy is set to less than two hours, the performance benefits of View Acceleration are limited to the first 12 refreshes in a day.

## Choose what's best for your workbook

Some people might not want caching so that they always have the freshest data, while other people might want large caches to reduce overhead and improve workbook performance. The first step in setting a data freshness policy is to decide what's right for your business.


Tableau Cloud refreshes cached data every 12 hours by default, and workbook owners can set data freshness policies at the workbook level.

In Tableau Server, server administrators can [set a default caching policy for all sites on the server](#), and workbook owners can set data freshness policies at the workbook level.

**Note:** Data freshness policies aren't available in Tableau Desktop or for workbooks that use extract and file-based data sources.

## Edit a workbook data freshness policy

To edit a workbook data freshness policy, you must be the workbook owner, and the workbook must have a live connection to the data source.

1. Sign in to a site on Tableau Cloud or Tableau Server.
2. From the Home or Explore page, navigate to the workbook you want to set a policy for.
3. Click the details icon .
4. From the Workbook Details dialog, click **Edit Data Freshness Policy**.
5. Choose one of the following options:
  - Site default (12 hours)
  - Always live (Tableau will always get the latest data)
  - Ensure data is fresh every
  - Ensure data is fresh at
6. Click **OK**.

Personal Space / Regional Sales

Search for views, metrics, workbooks, and more

Regional Sales ☆ ⓘ ...

Owner [Avatar] Modified Aug 5, 2021, 10:21 AM

Edit Workbook

Views 1 Data Sources 1 Connected Metrics 0 Custom Views 0 Subscriptions 0 Lineage

Select All Sort By: Sheet (first-last) ↑

Type	Name	Actions	Views (all-time)
<input type="checkbox"/> ☆	Regional Sales	...	26

**Site default** refreshes your data every 12 hours, which is a great option if your audience regularly uses your dashboard, but doesn't need up-to-the-minute data freshness.

**Always live** provides the freshest data at all times, which can increase loading time.

**Ensure data is fresh every...** allows you to specify how often data is refreshed with the granularity of minutes, hours, days or weeks.

**Ensure data is fresh at...** allows you to schedule the time and day for data refreshes. If you have an important meeting every Monday, Wednesday and Friday at 09:00 AM Pacific time, then you can set your data refresh to occur at 08:45 AM every Monday, Wednesday and Friday, so you have the freshest data when your meeting starts.

## Use Dynamic Axis Ranges

It's key that your users understand the range represented in a viz so that they can correctly analyse the data. Especially when analysing multiple vizzes in a dashboard or multiple worksheets at the same time, it can be easy for users to misinterpret data when the range of the axes is different between vizzes. For example, when two bar charts appear next to each other, the bars in both charts might appear to be equivalent sizes. However, the axes might have very different ranges, making the charts misleading.

To help users understand the range of the axis, authors can use Dynamic Axis Ranges to set the minimum and maximum values of an axis range by using numeric parameters or date parameters. Then, as users navigate across vizzes, the axes update synchronously. This makes it easier for your users to analyse data across vizzes easily and accurately. And by limiting the range of the data, you can view a subset of data without filtering the underlying data or impacting the moving average of your data.

Dynamic Axis Ranges can also be used to extend or shorten the range of an axis without filtering out the underlying data. This is ideal for showing progress against a goal or showing a moving average.

### Supported field types

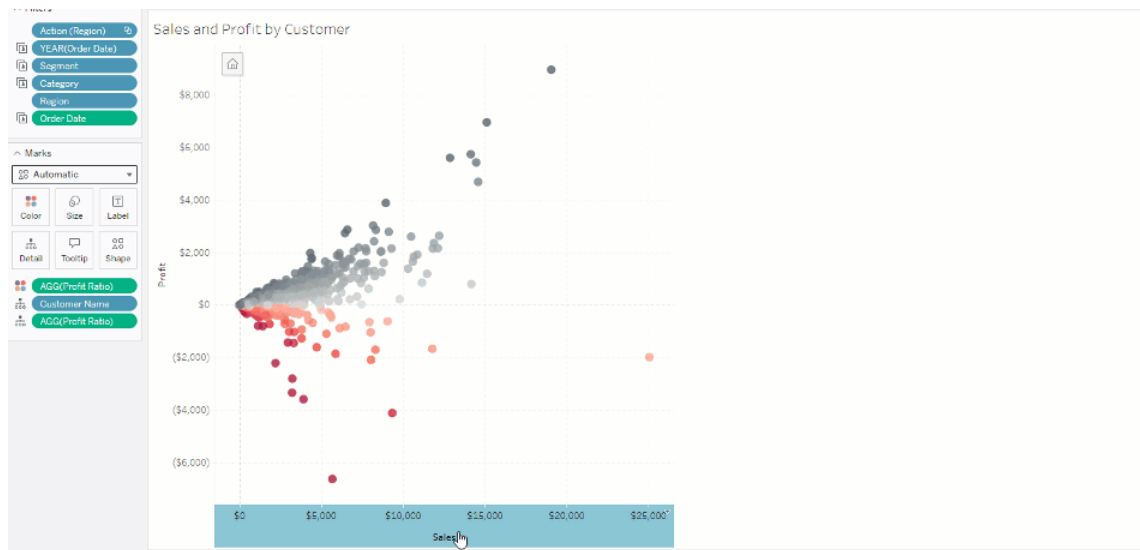
Dynamic Axis Ranges support any parameter that is compatible with the selected continuous axis, for example:

- Numeric parameters
- Temporal parameters (date or dateTime)

### Configure a dynamic axis range

1. From a Tableau sheet, **create a parameter** for your axis.
2. Right-click the axis, and choose **Edit Axis**.
3. For the Range, choose **Custom**. Then, select the parameter that you created for either the start or end axis extent.
4. Close the dialog box.

5. If you're using multiple sheets on a dashboard, repeat these steps for the axes across the different sheets.



## Understand limitations and edge cases

Dynamic Axis Ranges aren't updated within **Stories**. If the parameter used for the axis is deleted, then the most recent parameter value remains as the axis extent. The next time you edit the axis, an error message will prompt you to choose a new parameter to be used.

## Use Dynamic Axis Titles

Tableau's flexibility empowers authors to quickly analyse different data sets and visualise data differently for deeper analysis. But with that flexibility, comes the responsibility to communicate accurately the data that is used in a viz. For example, it's critical to communicate the units of measure that change based on a parameter value. Imagine that you're looking at a viz of the weather that shows a forecast of 25 degrees. In Fahrenheit, that forecast might be a great ski trip. But in Celsius, that forecast might call for a trip to the beach.

As an author, you can use Dynamic Axis Titles to update the axis title based on the value of a parameter or a single-value field (for example, an LOD calculation). If you use **swap parameters**, the axis titles update to match the data being used.

## Supported field types

To be used as a Dynamic Axis Title, fields must be:

- A single-valued and a **fixed LOD calculation**
- A parameter
- A constant calculated field
- A top 1 set

## Configure a dynamic axis title

1. From a Tableau sheet, drag a continuous field onto a shelf.
2. Double-click the axis to open the **Edit Axis** dialog.
3. Under the **Axis Titles** section, choose the field you want to use for your axis title from the list.
4. Close the **Edit Axis** dialog.

For a more complex use case, first follow the steps in [Example: Swap Measures Using Parameters](#). Then, follow these steps:

1. Double-click the X axis to open the **Edit Axis** dialog.
2. Under the **Axis Titles** section, select **Parameter**, and then choose the Placeholder 2 selector.
3. Close the **Edit Axis** dialog.
4. Repeat these steps for the Y axis using Placeholder 1.

Now, when the parameters are changed, the axes titles update to reflect the data being displayed.

## Understand limitations and edge cases

Dynamic axis titles are cleared when the viz type is changed using Show Me. Also if you use subtitles, then the subtitle appears after the Dynamic Axis Title, just as it does for custom titles. Automatic subtitles are populated only when you have a continuous date value axis that is filtered to a single year with at least two time periods. The dynamic axis title functionality doesn't work when using the worksheet in a story (a sequence of visualisations that work together to convey information).

## Use Dynamic Zone Visibility

Dashboard space is valuable, especially when you want to progressively reveal insights about data. With Dynamic Zone Visibility, you can hide or reveal zones (tiled or floating dashboard elements) based on the value of a field or parameter. As you interact, zones on your dashboard appear or disappear. The result is a dynamic dashboard that doesn't compromise your desired layout.

While you can [show or hide objects by clicking a button on a dashboard](#), Dynamic Zone Visibility allows you to show and hide objects automatically. This is ideal for dashboards that are used by different user groups. For example, you might want to show different user groups different zones when they visit your dashboard.

And you can use Dynamic Zone Visibility with [Parameter Actions](#). For example, when a user clicks a mark on a viz, a previously hidden zone appears. This is ideal for complex dashboards because it allows you to choose when deeper levels of data are revealed.

### Supported field types

To be used for Dynamic Zone Visibility, a field or parameter must be:

- Boolean.
- Single value.
- Independent of the viz, meaning the field returns a constant value independent of the structure of the viz, such as a fixed level of detail (LOD) calculation.

### Configure a dynamic dashboard zone

The following example has two sheets that use [Superstore data](#): the first sheet has a bar chart with Sales by Category, and the second sheet has a bar chart with Sales by Sub-Category. By using Dynamic Zone Visibility, the second sheet is visible only after a mark is clicked in the Sales by Category zone. This example relies on a boolean calculated field, which is used as the source field for a parameter action. For the calculation to be used as the source field for the parameter action, the calculation must be added to the marks card.



1. From the Sales by Category sheet, [create a parameter](#). In this example, the parameter **Data type** must be set to **Boolean**.
2. From the Sales by Category sheet, [create a calculated field](#). This example uses the following calculation: `True`
3. On the Sales by Category sheet, drag the calculation that you created to **Details** on the marks card.
4. Create a dashboard.
5. Drag the sheet that you always want to be visible onto your dashboard. In our example, we want Sales by Category to be visible.
6. From your dashboard, click the Sales by Category zone (dashboard object). Then, from the Worksheet menu on your dashboard, [create a parameter action](#). This example uses the following **Change Parameter** action:

The source sheet is set to use the dashboard you created and the Category Sales sheet.

The **Target Parameter** is the parameter you created.

The **Source Field** is the calculation you created.

**Add Parameter Action**

Name  
Dynamic zone action Insert ▼

Source Sheets  
☐ Dynamic product sales dashboard  
☒ Category Sales  
☐ Subcategory Sales

Target Parameter  
T/F Hide zone with parameter ▼

Source Field  
T/F Calc for dy... ▼

Aggregation  
None ▼

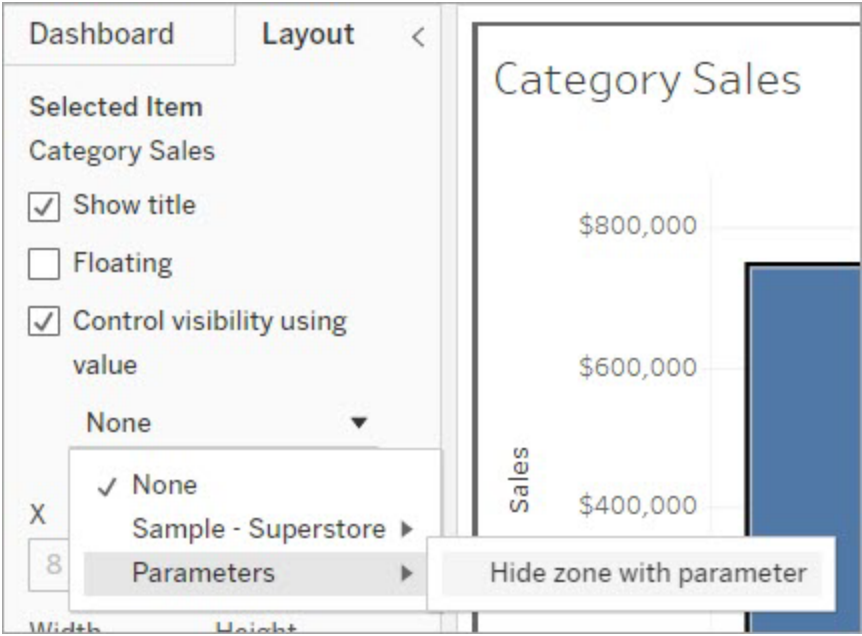
Run action on  
☐ Hover  
☒ Select  
☐ Menu

Clearing the selection will  
☐ Keep current value  
☒ Set value to  
 False ▼

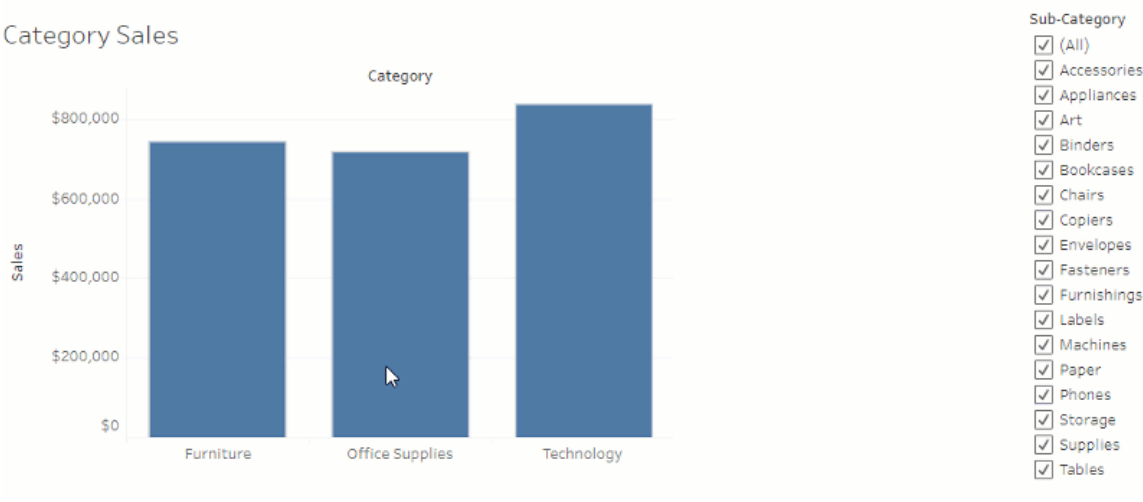
Cancel OK

7. Drag the Sales by Sub-Category worksheet onto your dashboard.
8. Click the Sales by Category zone. From the upper right corner, click the drop-down arrow and select **Use as Filter**.
9. Click the Sales by Sub-Category zone, and then click the **Layout** tab.
10. Check the box for **Control visibility using value**.
11. From the drop-down, choose the parameter you created to control zone visibility.

**Note:** If the option to Control visibility using value doesn't contain the field you want to use, be sure that the field is a supported field type.



Now, when you click a category mark in the Sales by Category zone, the Sales by Sub-Category zone appears in your dashboard.



## Workbook Optimiser

The Workbook Optimiser is a tool that identifies whether a workbook follows certain performance best practices. These guidelines are limited to what can be parsed from the

workbook's metadata and evaluated by a rules engine algorithm. Not all of its recommendations are applicable to or appropriate for every workbook. There are many aspects of performance that aren't captured by the Optimiser, some of which can offer easy wins. For more information, refer to [Streamline your workbook](#) and the whitepaper [Designing Efficient Production Workbooks](#).

## Run the Workbook Optimiser

The Workbook Optimiser is available from the publishing menu and publishing dialog in web authoring.

1. From the **File** menu, select **Publish** or **Publish As**. Alternatively, click the drop-down next to Publish.
2. Click **Run Optimiser**. This opens a new dialog for the Workbook Optimiser.
3. The workbook is automatically evaluated against the guidelines, and results display in one of three categories: Take action, Needs review or Passed (or Passed and ignored).
  - You may see fewer than three categories. If no guidelines fall into a category, it isn't displayed.
  - Expand each category to see the guidelines. You can also expand each guideline for more information about why it's a recommendation. Some have additional information specific to your workbook:
  - You can choose to address any or none of the guidelines. As running the Optimiser is a voluntary step in the publishing process, it doesn't prevent you from being able to publish.
4. To close the dialog and go back to the workbook, click Close.
5. To close the dialog and go back to (or open) the publishing dialog, click Publish.

The Workbook Optimiser is available from the publishing menu and publishing dialog in web authoring.

## Optimiser categories

The Optimiser breaks down its guidelines into three categories: take action, needs review and passed.

**Take action** indicates that updating the workbook to follow these best practices has minimal to no impact on the functionality of the workbook. There's probably no reason to avoid making these changes.

**Needs review** indicates that following these best practices may involve modifying the workbook in more involved ways, such as restructuring a data source or simplifying a dashboard.

- For these guidelines, use your best judgement to determine what is possible or practical to address.
- Some recommendations may involve a lot of effort for minimal performance gain and aren't worth it.
- It may be useful to use the Performance Recorder to get a performance benchmark.
- Some may be deliberate choices you've made.

As the author, you're the final authority on what makes a workbook as efficient as possible.

*Remember that some best practices should be broken to effectively deliver content.* Always weigh the goal of the workbook against changes to improve performance.

**Passed** indicates the guidelines are met and the workbook is already following best practices in that area. But remember, there are many aspects of performance that aren't captured by the Optimiser. This category is renamed **Passed and ignored** if any guidelines are ignored for the workbook.

## Ignore a guideline

Guidelines aren't always applicable to your situation. Perhaps you're publishing a template workbook for others to use and need to preserve unused fields and data sources. You don't want the optimiser to continue to notify you about those guidelines.

It's possible to ignore a guideline for a workbook.

1. From a specific guideline, click the **Ignore** button.
  - The guideline is muted and moves to the **Passed and ignored** section. Even if you run the optimiser again, that guideline won't appear in the Take action or Needs review section.
2. To resume evaluating the guideline, find its row in the **Passed and ignored** section and click the **Ignore** button again.

- The optimiser runs again and the guideline is evaluated. It continues to be checked each time the optimiser runs.

## Autofix a guideline

Some suggestions from the workbook optimiser can be implemented without user input. For these guidelines, there's a button to autofix the rule. If the button doesn't appear you must manually address the issue.

From a specific guideline, click the Autofix button.

- The recommended action (such as closing an unused data source) is taken behind the scenes and the guideline moves to the Passed section.
- If the autofix fails for any reason, you'll be notified and prompted to resolve the issue manually.
- If the button isn't available, that guideline cannot be autofixed and must be addressed manually.

## The guidelines

Every guideline contains a “consider” statement that suggests a potential way to address the performance impact. These are necessarily general and may not apply in every situation. These suggestions are a starting point only; always frame your decisions in the context of your environment and the goals of your workbook.

**Note:** Not all suggestions are possible to perform in the browser and may require **editing in Tableau Desktop** instead.

---

Navigate to a guideline by letter: **A . B . C . D . E . F . G . H . I . J . K . L . M . N . O . P . Q . R . S . T . U . V . W . X . Y . Z**

---

## Calculation length

From the Workbook Optimiser

*Sample output message:* The calculation **My calculation** is 600 characters long

Computing the results of complex calculations can impact performance.

Consider breaking the calculation apart and moving whatever is possible to the database, or using Tableau Prep to create the calculations prior to analysis.

## Additional information

Complex and long calculations can either be written in a single calculation or nested (with some components written as stand-alone calculations that are used in the larger calculation). Building a calculation with nested components may make it easier to troubleshoot and maintain, but it can add complications and additional processing. If possible, pushing these components back to the data source may aid performance.

Comments in calculations count against the length, so this guideline may be triggered by a long comment rather than a long and complex calculation.

---

## Calculation uses multiple data sources

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** includes 17 calculations using fields from another data source.

When calculations use fields from multiple data sources, Tableau can't use any optimisations and must compute the calculation locally.

Consider using Tableau Prep to create the calculation and using an extract.

## Additional information

By moving the cross-database calculation to the data layer, the processing can be performed before the user even requests the dashboard. See [Join your data \(Prep\)](#) and [Create level of](#)

[detail and rank calculations](#) for more information.

Under some conditions, a parameter may trigger this guideline. If a calculation is indicated that doesn't use multiple data sources, check to see if it has a parameter and if that parameter can be simplified.

---

#### Dashboard size not fixed

From the Workbook Optimiser

*Sample output message:* The dashboard **Q3 analytics** isn't fixed-size.

Fixed-sized dashboards can be cached because they're a predictable size. Using automatic dashboard sizing means the results depend on the user's screen, and therefore the dashboard must be rendered every time. Rendering dashboards more often comes with a performance hit.

Consider using fixed dashboard sizing.

#### Additional information

Although responsive elements are a best practice in web design, letting your dashboard resize can distort the layout of the content in addition to the performance impact of re-rendering. For Tableau visualisations, it's best to use a [fixed dashboard size](#) and use [device-specific dashboards](#) to support different devices and screen sizes.

---

#### Filter uses conditional logic

From the Workbook Optimiser

*Sample output message:* The filter **Sample Type** uses conditional logic.

Dimension filtering can be done in various ways, such as on a list of values, by wildcard matching or using conditional logic. Conditional logic can be slow.

Consider changing the filter to not use conditional logic. If necessary, make sure your logic tests for the most frequent outcome first and use ELSEIF or CASE when possible.



#### Additional information

For more information on filtering, see [Filter Your Data](#).

---

Filter uses "Only Relevant Values"

From the Workbook Optimiser

*Sample output message:* The filter **Sample Type** uses "Only Relevant Values".

When a filter uses "Only Relevant Values", the interactive filter control only shows options that are applicable given the current state of the view. Every time a change is made to other filters, the list of values to be displayed must be requiered, which has a performance impact.

Consider using dashboard filter actions instead. If the end-user benefit is valuable enough that this feature should be used, consider extracting the data and optimising the extract.

#### Additional information

There are situations where using "Only Relevant Values" is necessary to avoid an unwieldy filter list. Instead of using interactive filters in that situation, try using [action filters](#). For example, consider a dashboard that has cascading filters for Category, Sub-Category and Product ID, where Product ID is set to show "Only Relevant Values". Removing that restriction would expand the list of products significantly. Rather than using filters, you can build simple visualisations (such as a bar chart of Category and Sub-Category) and use it as a filter. The user clicks on a bar and the action filter is applied to the rest of the visualisations on the dashboard. For more information, see [Dashboard Actions](#).

---

#### Live data connections

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** isn't an extract.

Tableau extracts are designed to be as efficient as possible for use with analytics. Using extracts is one of the easiest ways to improve performance due to the data source. Extracts also have many native features for optimisation.

Consider extracting the data source.

#### Additional information

In some instances, taking an extract may put undesirable strain on the Tableau Server or Tableau Site's resources. Work with your Tableau administrator to determine the best course of action.

The whitepaper [Designing Efficient Workbooks](#) has extensive information about extracts and how to use them for performance. (You may need to sign in to access the whitepaper.)

#### Multiple connections in a data source

From the Workbook Optimiser

*Sample output message:* The data source **Supply chain** uses multiple data connections.

Data sources that include multiple connections can't be computed locally.

Consider combining the data sources in Tableau Prep and using an extract for analysis.

#### Additional information

See [Join your data \(Prep\)](#) for more information.

---

#### Nested calculations

From the Workbook Optimiser

*Sample output message:* The calculation **My Calculation** references another calculation.

Nesting calculations can add complications and additional processing, especially with IF statements and other performance-intensive functions.

Consider pushing the calculations to the data source or materialise them in an extract.

#### Additional information

This rule may be triggered for a calculation that isn't in the viz itself but is referenced by a calculation in the viz. For example, imagine four fields:

1. **Points earned** (a field in the data source)
2. **Quiz score** = [Points earned]\*10
3. **Curved grade** = [Quiz score]\*1.05
4. **Letter grade** = IF [Curved grade] >= 90 THEN "A" ELSEIF [Curved grade] >= 80 THEN "B" ELSEIF [Curved grade] >=70 THEN "C" ELSEIF [Curved grade] >=60 THEN "D" ELSE "F" END

**Quiz score** is a non-nested calculation that only references a field. Both **Curved grade** and **Letter grade** are nested calculations because they contain references to other calculations. Even if only **Letter grade** is used in the viz, **Curved grade** also triggers the nested calculation rule because it's in use inside **Letter grade**.

For more information on materialising calculations in an extract (Compute Calculations Now), see [Materialise Calculations in Your Extracts](#).

For more information about building calculations in Tableau Prep, see [Calculations in Tableau Prep](#).

---

## Non-materialised calculations

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** hasn't been pre-computed.

Computing the results of a calculation can impact performance.

Consider pushing calculations to the data source when possible. If using an extract, materialise calculations to pre-compute their results.

## Additional information

Pre-compute the data and calculations either in an extract or your back-end data source. By moving this additional processing to the data layer, the processing is completed before the user even requests the dashboard.

Taking an extract of your data often boosts performance, though there are trade-offs in data freshness and some functionality. See [Extract Your Data](#) for more information about options

for extracts and [Materialise Calculations in Your Extracts](#) for more information on materialising calculations.

Extract your data: Right-click on the data source's name at the top of the Data pane and select **Extract Data**. In the configuration dialog, choose **Compute Calculations Now**.

---

Number of data sources

From the Workbook Optimiser

*Sample output message:* The workbook contains 17 data sources.

Each data source contributes to the amount of time Tableau spends loading and rendering a workbook.

Consider combining data sources if possible, especially when the level of granularity is the same or they support the same analysis.

Additional information

See [Relate Your Data](#) for more information on combining data sources, or consider using Tableau Prep.

However, be wary of over-combining data sources. Workbooks perform best when each type of analysis is built off a well-designed data source. If it's hard to combine your data sources, this could be a sign that the analysis should be split into multiple workbooks, each with a more targeted purpose.

**To split your analysis across multiple workbooks**, try one of these methods:

- Save a copy of the workbook and delete unnecessary sheets, dashboards and data sources from each one. See [Streamline your workbook](#) for more information.
  - Copy specific sheets into a new workbook. This may be more efficient because copying a dashboard into a new workbook carries over only what is needed for that dashboard. However, not all formatting options are transferred. See [Copying Information Between Workbooks](#) for more information.
-

## Tableau Server on Windows Help

### Number of filters

From the Workbook Optimiser

*Sample output message:* The sheet **Classroom Distribution** contains 17 filters.

Excessive filters on a view create a more complex query.

Consider reducing the number of filters and using filter actions wherever possible. Not all types and formats of filters are created equal in terms of performance, so consider optimising necessary filters.

### Additional information

The whitepaper [Designing Efficient Production Workbooks](#) has an entire section on filters that goes into much more detail. In brief:

- Reduce the overall number of filters
- Filters applied to multiple worksheets trigger multiple queries with every change
- Limit use of **Show only relevant values**. Using an extract helps optimise this feature if it's needed.
- Avoid high cardinality include/exclude filters
- Use the **Apply** button to prevent multiple refreshes as the user interacts with the filter
- Filter on fields that are present in the view
- Use continuous date filters rather than discrete date filters
- Context filters shouldn't be used purely to boost performance

Filter actions are an efficient way to guide the user through a dashboard. See [Filter Actions](#) for more information.

---

### Number of layout containers

From the Workbook Optimiser

*Sample output message:* The dashboard **Q3 analytics** contains 42 layout containers.

Layout containers can complicate dashboard rendering.

Consider removing unnecessary layout containers and simplifying the dashboard design.

### Additional information

For more information about layout containers and the Layout pane, see [Group items using layout containers](#).

---

### Number of LOD calculations

From the Workbook Optimiser

*Sample output message:* The workbook contains 42 LOD calculations.

Computing the results of complex calculations can impact performance. Often, LODs are used on the fly to address issues of granularity in the data source that could be handled prior to analysis.

Consider tailoring the data source to the analysis to avoid the need for as many LODs.

### Additional information

Level of Detail calculations are powerful tools, but they're expensive. Make sure you're only using them when necessary.

Production databases are designed to handle significant query loads and are a great option for moving processing out of Tableau. FIXED LOD calculations can sometimes be performed by the database. Tableau Prep also supports FIXED LOD calculations. See [Create level of detail and rank calculations](#) for more information.

---

### Number of views in a dashboard

From the Workbook Optimiser

*Sample output message:* Dashboard **Q3 analytics** contains 17 views

A dashboard must load all elements before it can be displayed. The more views a dashboard contains, the longer it takes to load. Although it often involves a redesign, reducing the number of views in a dashboard is often the best way to boost its efficiency.

Consider streamlining the dashboard to be as effective and simple as possible by reducing the number of views, filters and other elements. Start with anything that can be removed immediately. See [Streamline your workbook](#) for other ways to reduce clutter in your dashboard

### Additional information

If a more substantial redesign is needed, remember that not all views have an equal impact on performance. Focus on sheets with the most marks, filters or other complexity. A good strategy can be to limit the initial dashboard to summary information and only provide more details when the user requests them. There are many strategies for this sort of guided drill-down, including:

- Use action filters. See [Filter Actions](#) for more information.
  - Hide detailed views in a container using a layout container with a show/hide button. See [Show and hide objects by clicking a button](#) for more information.
  - Break the dashboard into multiple dashboards and use navigation buttons. See [Detailed options for Navigation and Download objects](#) for more information
- 

### Number of workbook sheets

From the Workbook Optimiser

*Sample output message:* The workbook contains 42 visible sheets

The overall size of a workbook impacts how long it takes to be processed and displayed. All visible sheets must be loaded before Tableau can display a workbook or view. Reducing the number of sheets can help speed up load time.

Consider reducing the number of sheets in the workbook by closing unneeded sheets, hiding sheets that are used in a dashboard or splitting the analysis into multiple workbooks.

### Additional information

**Delete sheets that aren't necessary for the analysis:** right-click on the sheet tab along the bottom of the workbook and select Delete.

**Hide sheets in use:** Worksheets used in a dashboard or story can't be deleted, but they can be hidden. See [Manage Sheets in Dashboards and Stories](#) for more information.

- Hide all a dashboard's sheets: Right-click the dashboard tab at the bottom of the workbook and select Hide All Sheets.
- Hide a specific sheet: Right-click the sheet tab at the bottom of the workbook and select Hide.

**If all sheets are needed,** decide if the analysis can be split into multiple workbooks, each with a more targeted purpose.

- Save a copy of the workbook and delete unnecessary sheets, dashboards and data sources from each one. See [Streamline your workbook](#) for more information.
- Copy specific sheets into a new workbook. This may be more efficient because copying a dashboard into a new workbook carries over only what is needed for that dashboard. However, not all formatting options are transferred. See [Copying Information Between Workbooks](#) for more information.

---

## Unused data sources

### From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** isn't used in the workbook.

Each data source contributes to the amount of time Tableau spends loading and rendering a workbook.

Consider closing data sources that aren't in use.

### Additional information

If any data sources aren't being used, close them: right-click on the data source's name at the top of the Data pane and select **Close**.

---



## Tableau Server on Windows Help

### Unused fields

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** contains 42 fields that aren't being used.

Hiding unused fields prevents them from being unnecessarily queried and reduces the size of extracts.

Consider hiding any fields that aren't being used, regardless of whether the data source is an extract.

Additional information

#### Hide unused fields

- In Tableau Desktop: open the drop-down menu at the top of the Data pane and select **Hide All Unused Fields**.
  - In web authoring: right-click on an unused field and select **Hide**. There's no way to bulk hide unused fields in web authoring. If hiding fields individually is prohibitive, consider [editing in Tableau Desktop](#) instead of working in the browser.
- 

### Uses data blending

From the Workbook Optimiser

*Sample output message:* The sheet **Classroom Distribution** uses data blending.

Data blending performance is driven by the number of unique members in the linking fields.

Consider using relationships when possible. If a blend is required, try to use low cardinality linking fields.

Additional information

There are [several ways to combine data](#) from multiple sources. [Data blending](#) sends two separate queries to two separate data sources and displays the results together in the viz. These

queries are at the level of the [linking fields](#) and the results are merged in memory in Tableau. Large query results require more processing to generate the final viz.

**Tip:** If you're not using data blending but the Workbook Optimiser failed this rule, check if the workbook is using [cross data source filtering](#). Filtering across data sources suffers from similar performance issues around field cardinality.

---

Uses date calculations

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** contains 17 date calculations.

Date logic can be complicated. Minimise the number of date calculations and conversions you have to do in Tableau.

Consider using DATEPARSE and MAKEDATE before other methods, and try to use built-in functions like DATEDIFF() when possible. If filtering on a date, use relative date filters or a continuous date filter instead of a discrete filter.

Additional information

Computing calculations in Tableau can have a significant performance impact, especially [date functions](#). Consider taking an extract and [materialising calculations](#), or pushing calculations to your data source. For more information about building calculations in Tableau Prep, see [Create Calculations in Tableau Prep](#).

**Note:** If a date calculation is nested in another calculation, the optimiser flags the nested date calculation, even if the parent calculation is the field used in the viz.

---

Uses grouping

From the Workbook Optimiser

*Sample output message:* The data source **Supply Chain** uses 17 grouped fields

Tableau's native grouping functionality loads the entire domain of the field, which can have a performance impact.

Consider using a calculated field with a CASE statement or sets instead of groups.

### Additional information

In the testing performed for the [Designing Efficient Workbooks](#) whitepaper, grouping with CASE and sets performed better than the native group functionality.

The **CASE** function can be used to create groups. Imagine a scenario where the data involved a deck of cards. There's a field for the card value (2–10, J, Q, K, A) but the analysis should compare face cards to number cards. The case statement to make that grouping could be

```
CASE [Value]
  WHEN "J" THEN "Face card"
  WHEN "Q" THEN "Face card"
  WHEN "K" THEN "Face card"
  ELSE "Number card"
END
```

Sets have the added benefit of set actions, which make sets more powerful and flexible than traditional grouping. For more information, see [Create Sets](#) and [Set Actions](#).



# Manage Server

After installing Tableau Server, you can customise and manage your server. For example, you can manage security, licences, sites, subscriptions and data-driven alerts and more.

<b>Security</b>	<b>1238</b>
<b>Supported data sources</b>	<b>1470</b>
<b>Requirements</b>	<b>1470</b>
<b>Configuration process</b>	<b>1471</b>
<b>Step 1: Create a Salesforce connected app</b>	<b>1486</b>
<b>Step 2: Configure Tableau Server for Salesforce.com OAuth</b>	<b>1488</b>
<b>Configure custom OAuth for a site</b>	<b>1489</b>
<b>Manage access tokens</b>	<b>1491</b>
<b>Forward proxy for OAuth authentication</b>	<b>1491</b>
<b>Tableau Server (version 2023.3 and later)</b>	<b>1492</b>
<b>Configure custom OAuth for a site</b>	<b>1495</b>
<b>Tableau Server (version 2023.1 and earlier)</b>	<b>1495</b>
<b>Use OAuth with the Customer Data Platform</b>	<b>1498</b>
<b>Enable Hyper Query Processing in Tableau Server</b>	<b>1502</b>
<b>Obtain a client ID and enable Google APIs</b>	<b>1504</b>
<b>Configure Tableau Server for Google OAuth</b>	<b>1506</b>
<b>Configure custom OAuth for a site</b>	<b>1507</b>
<b>Create and edit Google data source</b>	<b>1509</b>

<b>Managing access tokens .....</b>	<b>1510</b>
<b>Forward proxy for OAuth authentication .....</b>	<b>1510</b>
<b>Step 1: Register OAuth client for Azure .....</b>	<b>1510</b>
<b>Step 2: Configure Tableau Server for Azure .....</b>	<b>1512</b>
<b>Configure custom OAuth for a site .....</b>	<b>1517</b>
<b>Forward proxy for OAuth authentication .....</b>	<b>1519</b>
<b>Step 1: Obtain a client ID with Snowflake .....</b>	<b>1520</b>
<b>Option 1: Configure Tableau Server for Snowflake OAuth .....</b>	<b>1520</b>
<b>Option 2: Configure OAuth with a site .....</b>	<b>1522</b>
<b>Forward proxy for OAuth authentication .....</b>	<b>1525</b>
<b>Step 1: Create an Intuit app .....</b>	<b>1525</b>
<b>Step 2: Configure Tableau Server for Intuit QuickBooks Online .....</b>	<b>1526</b>
<b>Managing access tokens .....</b>	<b>1526</b>
<b>Step 1: Register OAuth client in Dremio .....</b>	<b>1527</b>
<b>Step 2: Configure Tableau Server for Dremio OAuth .....</b>	<b>1527</b>
<b>Configure custom OAuth for a site .....</b>	<b>1529</b>
<b>Forward proxy for OAuth authentication .....</b>	<b>1531</b>
<b>Step 1: Create a new app .....</b>	<b>1532</b>
<b>Step 2: Configure Tableau Server for Dropbox .....</b>	<b>1532</b>
<b>Configure custom OAuth for a site .....</b>	<b>1533</b>
<b>Forward proxy for OAuth authentication .....</b>	<b>1536</b>
<b>Configure the IDP .....</b>	<b>1537</b>

<b>Configure IDP on AWS</b> .....	<b>1537</b>
<b>Configure Roles for Redshift Users</b> .....	<b>1537</b>
<b>Connect to Redshift</b> .....	<b>1539</b>
<b>Okta</b> .....	<b>1541</b>
<b>Update Driver</b> .....	<b>1541</b>
<b>Troubleshooting</b> .....	<b>1542</b>
<b>Configure the IDP</b> .....	<b>1544</b>
<b>Step 2: Configure IDP and Roles on AWS</b> .....	<b>1545</b>
<b>Step 3: Connect to Redshift</b> .....	<b>1545</b>
<b>Okta</b> .....	<b>1547</b>
<b>Update the driver</b> .....	<b>1547</b>
<b>Troubleshooting Redshift IAM IDC OAuth</b> .....	<b>1547</b>
<b>Managing credentials centrally</b> .....	<b>1551</b>
<b>Forward proxy for OAuth authentication</b> .....	<b>1551</b>
<b>See also</b> .....	<b>1552</b>
<b>Conflict error</b> .....	<b>1552</b>
<b>Manage Licences</b> .....	<b>1669</b>
<b>About the Identity Migration</b> .....	<b>1743</b>
<b>Provision and Authenticate Users Using Identity Pools</b> .....	<b>1769</b>
<b>Add Users to Tableau Server</b> .....	<b>1786</b>
<b>Sign in to the Tableau Server Admin Area</b> .....	<b>1796</b>
<b>Sign in to Tableau Services Manager Web UI</b> .....	<b>1803</b>

<b>Customise Your Server</b> .....	<b>1806</b>
<b>Manage Sites Across a Server</b> .....	<b>1810</b>
<b>Extract Refresh Schedules</b> .....	<b>1834</b>
<b>Managing Background Jobs in Tableau Server</b> .....	<b>1866</b>
<b>Tableau Service Manager Jobs</b> .....	<b>1874</b>
<b>Administrative Views</b> .....	<b>1878</b>
<b>Performance</b> .....	<b>1928</b>
<b>Monitoring Tableau Server</b> .....	<b>1997</b>
<b>Maintenance</b> .....	<b>2013</b>
<b>tsm Command Line Reference</b> .....	<b>2079</b>
<b>Entity Definitions and Templates</b> .....	<b>2343</b>
<b>tabcmd</b> .....	<b>2389</b>
<b>Troubleshooting</b> .....	<b>2534</b>
<b>Server Administrator Reference</b> .....	<b>2629</b>
<b>Archived Content</b> .....	<b>2782</b>
<b>About Tableau Advanced Management on Tableau Server</b> .....	<b>2784</b>
<b>Who can do this</b> .....	<b>2961</b>
<b>Agents Unlicensed</b> .....	<b>2962</b>
<b>Incompatible Agent Version</b> .....	<b>2963</b>
<b>Agent Message Queue Credential Rotation Failure</b> .....	<b>2965</b>
<b>Agent Down</b> .....	<b>2966</b>
<b>Who can do this</b> .....	<b>2967</b>



<b>Who can do this</b>	<b>2967</b>
<b>Use the RMT Server web interface</b>	<b>2968</b>
<b>Use the configuration file (config.json)</b>	<b>2970</b>
<b>Who can do this</b>	<b>2972</b>
<b>Who can do this</b>	<b>2973</b>
<b>Use the RMT Server web interface</b>	<b>2973</b>
<b>Use the configuration file (config.json)</b>	<b>2974</b>
<b>Who can do this</b>	<b>2975</b>
<b>Configure Slow View Incident Thresholds</b>	<b>2975</b>
<b>Environment Tab</b>	<b>2993</b>
<b>Server Tab</b>	<b>2996</b>
<b>Insights Tab</b>	<b>2996</b>
<b>Status Tab</b>	<b>2997</b>
<b>Who can do this</b>	<b>2997</b>
<b>Related Topics</b>	<b>2997</b>
<b>VizQL Sessions</b>	<b>2998</b>
<b>Background Tasks</b>	<b>2998</b>
<b>Data Queries</b>	<b>2999</b>
<b>View Loads</b>	<b>2999</b>
<b>Slow Views</b>	<b>2999</b>
<b>Who can do this</b>	<b>3000</b>
<b>Related Topics</b>	<b>3000</b>

- Sites ..... 3001**
- Projects ..... 3001**
- Workbooks ..... 3001**
- Views ..... 3002**
- Who can do this ..... 3002**
- Related Topics ..... 3002**
- Who can do this ..... 3005**
- About Data Management ..... 3295**

# Security

As a part of managing Tableau Server, you can configure authentication, data security and network security.

## Authentication

Authentication verifies a user's identity. Everyone who needs to access Tableau Server – whether to manage the server, or to publish, browse or administer content – must be represented as a user in the Tableau Server repository. The method of authentication may be performed by Tableau Server ('local authentication'), or authentication may be performed by an external process. In the latter case, you must configure Tableau Server for external authentication technologies such as Kerberos, SSPI, SAML or OpenID. In all cases, whether authentication takes place locally or is external, each user identity must be represented in the Tableau Server repository. The repository manages authorisation meta data for user identities.

Looking for Tableau Server on Linux? See [Authentication](#).

Although all user identities are ultimately represented and stored in the Tableau Server repository, you must manage user accounts for Tableau Server in an identity store. There are two, mutually exclusive, identity store options: LDAP and local. Tableau Server supports arbitrary LDAP directories, but it's been optimised for Active Directory LDAP implementation. Alternatively, if you are not running an LDAP directory, you can use the Tableau Server local identity store. For more information see Identity Store.

As shown in the following table, the type of identity store you implement, in part, will determine your authentication options.

Identity Store	Authentication Mechanism								
	Basic	SAML	Site SAML	Kerberos	(Windows only) Automatic Logon (Microsoft SSPI)	OpenID Connect	Connected Apps	Trusted Auth	Mutual SSL
Local	X	X	X			X	X	X	X
Active Directory	X	X		X	X		X	X	X
LDAP	X	X					X	X	X

Access and management permissions are implemented through site roles. Site roles define which users are administrators, and which users are content consumers and publishers on the

server. For more information about administrators, site roles, groups, Guest User and user-related administrative tasks, see [Users](#) and [Site Roles for Users](#).

**Note:** In the context of authentication, it's important to understand that users are not authorised to access external data sources through Tableau Server by virtue of having an account on the server. In other words, in the default configuration, Tableau Server does not act as a proxy to external data sources. Such access requires additional configuration of the data source on Tableau Server or authentication at the data source when the user connects from Tableau Desktop.

## Add-on authentication compatibility

Some authentication methods can be used together. The following table shows authentication methods that can be combined. Cells marked with an "X" indicate a compatible authentication set. Blank cells indicate incompatible authentication sets.

	Con- nected Apps	Trusted Authentic- ation	Serve- r-wide SAML	Site SAM- L	Ker- beros	(Win- dows only)  Auto- matic Logon (Micros- oft SSPI)	Mutu- al SSL	Open- ID Con- nect
Tableau Connected Apps	N/A		X	X	X		X	X
Trusted		N/A	X	X	X		X	X

## Tableau Server on Windows Help

Authentic- ation								
Server- wide SAML	X	X	N/A	X				
Site SAML	X	X	X	N/A				
Kerberos	X	X			N/A			
Automatic Logon (Microsoft SSPI)						N/A		
Mutual SSL	X	X					N/A	
OpenID Connect	X	X						N/A
Personal Access Token (PAT)	*	*	*	*	*	*	*	*

\* PATs, by design, do not work directly with the authentication mechanism listed in these columns to authenticate to the REST API. Instead, PATs use Tableau Server user account credentials to authenticate to the REST API.

## Client authentication compatibility

Authentication handled through a user interface (UI)

Clients	Authentication Mechanism									
	Basic	SA-ML	Site SA-ML	Kerberos	(Windows only) Automatic Logon (Microsoft SSPI)	OpenID Connect	Connected Apps	Trusted Auth	Mutual SSL	Personal Access Token (PAT)
Tableau Desktop	X	X	X	X	X	X			X	
Tableau Prep Builder	X	X	X	X	X	X			X	
Tableau Mobile	X	X	X	X (iOS only *)	X **	X			X	
Web	X	X	X	X	X	X	X	X	X	

## Tableau Server on Windows Help

Browsers							***			
----------	--	--	--	--	--	--	-----	--	--	--

\* Kerberos SSO isn't supported for Android, but a fall-back to username and password is possible. For more information, see Note 5: Android platform.

\*\* SSPI is not compatible with the Workspace ONE version of the Tableau Mobile app.

\*\*\* In embedding workflows only.

Authentication handled programmatically

Clients	Authentication Mechanism									
	Basic	SA-ML	Site SA-ML	Kerberos	(Windows only) Automatic Logon (Microsoft SSPI)	Open-ID Connect	Connected Apps	Trusted Auth	Mutual SSL	Personal Access Token (PAT)
RES-T API	X						X			X
tab-cmd 2.0	X									X
tab-cmd	X									

## Local authentication

If the server is configured to use local authentication, then Tableau Server authenticates users. When users sign-in and enter their credentials, either through Tableau Desktop, `tabcmd`, API or web client, Tableau Server verifies the credentials.

To enable this scenario, you must first create an identity for each user. To create an identity, you specify a username and a password. To access or interact with content on the server, users must also be assigned a site role. User identities can be added to Tableau Server in the server UI, using [tabcmd Commands](#), or using the [REST API](#).

You can also create groups in Tableau Server to help manage and assign roles to large sets of related user groups (e.g., 'Marketing').

When you configure Tableau Server for local authentication, you can set password policies and account lockout on failed password attempts. See [Local Authentication](#).

**Note:** Tableau with multi-factor (MFA) authentication is available for Tableau Cloud only.

## External authentication solutions

Tableau Server can be configured to work with a number of external authentication solutions.

### NTLM and SSPI

If you configure Tableau Server to use Active Directory during installation, then NTLM will be the default user authentication method.

When a user logs onto Tableau Server from Tableau Desktop or a web client, the credentials are passed through to Active Directory, which then verifies them and sends an access token to Tableau Server. Tableau Server will then manage user access to Tableau resources based on the site roles stored in the repository.

If Tableau Server is installed on a Windows computer in Active Directory, then you may optionally enable automatic logon. In this scenario, Tableau Server will use Microsoft SSPI to auto-



matically sign in your users based on their Windows username and password. This creates an experience similar to single sign-on (SSO).

Do not enable SSPI if you plan to configure Tableau Server for SAML, trusted authentication, a load balancer or for a proxy server. SSPI is not supported in these scenarios. See `tsm authentication sspi <commands>`.

### Kerberos

You can configure Tableau Server to use Kerberos for Active Directory. See [Kerberos](#).

### SAML

You can configure Tableau Server to use SAML (security assertion markup language) authentication. With SAML, an external identity provider (IdP) authenticates the user's credentials, and then sends a security assertion to Tableau Server that provides information about the user's identity.

For more information, see [SAML](#).

### OpenID Connect

OpenID Connect (OIDC) is a standard authentication protocol that lets users sign in to an identity provider (IdP) such as Google. After they've successfully signed in to their IdP, they are automatically signed in to Tableau Server. To use OIDC on Tableau Server, the server must be configured to use the local identity store. Active Directory or LDAP identity stores are not supported with OIDC. For more information, see [OpenID Connect](#).

### Mutual SSL

Using mutual SSL, you can provide users of Tableau Desktop, Tableau Mobile and other approved Tableau clients a secure, direct-access experience to Tableau Server. With mutual SSL, when a client with a valid SSL certificate connects to Tableau Server, Tableau Server confirms the existence of the client certificate and authenticates the user, based on the username in the client certificate. If the client does not have a valid SSL certificate, Tableau Server can refuse the connection. For more information, see [Configure Mutual SSL Authentication](#).

## Connected apps

### Direct trust

Tableau connected apps enable a seamless and secure authentication experience by facilitating an explicit trust relationship between your Tableau Server site and external applications where Tableau content is embedded. Using connected apps also enables a programmatic way to authorise access to the Tableau REST API using JSON Web Tokens (JWTs). For more information, see [Use Tableau Connected Apps for Application Integration](#).

### EAS or OAuth 2.0 trust

You can register an external authorisation server (EAS) with Tableau Server to establish a trust relationship between your Tableau Server and an EAS using the OAuth 2.0 standard protocol. The trust relationship provides your users with single sign-on experience, through your IdP, to embedded Tableau content. In addition, registering an EAS enables a programmatic way to authorise access to the Tableau REST API using JSON Web Tokens (JWTs). For more information, see [Configure Connected Apps with OAuth 2.0 Trust](#).

### Trusted authentication

Trusted authentication (also referred to as 'Trusted tickets') lets you set up a trusted relationship between Tableau Server and one or more web servers. When Tableau Server receives requests from a trusted web server, it assumes that the web server has already handled whatever authentication is necessary. Tableau Server receives the request with a redeemable token or ticket and presents the user with a personalised view which takes into consideration the user's role and permissions. For more information, see [Trusted Authentication](#).

### LDAP

You can also configure Tableau Server to use LDAP for user authentication. Users are authenticated by submitting their credentials to Tableau Server, which will then attempt to bind to the LDAP instance using the user credentials. If the bind works then the credentials are valid and Tableau Server grants the user a session.

'Binding' is the handshake/authentication step that happens when a client tries to access an LDAP server. Tableau Server does this for itself when it makes various non-authentication related queries (such as importing users and groups).

You can configure the type of bind you want Tableau Server to use when verifying user credentials. Tableau Server supports GSSAPI and simple bind. Simple bind passes credentials directly to the LDAP instance. We recommend that you configure SSL to encrypt the bind communication. Authentication in this scenario may be provided by the native LDAP solution, or with an external process, like SAML.

For more information about planning for and configuring LDAP, see [Identity Store and External Identity Store Configuration Reference](#).

### Other authentication scenarios

- REST API: [Signing In and Out \(Authentication\)](#)

**Note:** REST API does not support SAML single-sign (SSO).

- Mobile device authentication: [Single sign-on for Tableau Mobile](#)
- Certificate trust for TSM clients: [Connecting TSM clients](#)

### Data access and source authentication

You can configure Tableau Server to support a number of different authentication protocols to various different data sources. Data connection authentication may be independent of Tableau Server authentication.

For example, you may configure user authentication to Tableau Server with local authentication, while configuring OAuth or SAML authentication to specific data sources. See [Data Connection Authentication](#).

### Local Authentication

If the server is configured to use local identity store, then Tableau Server authenticates users. When users sign-in and enter their credentials, either through Tableau Desktop, tabcmd, API

or web client, Tableau Server verifies the credentials. Tableau user names stored in the identity store are associated with rights and permissions for Tableau Server. After authentication is verified, Tableau Server manages user access (authorisation) for Tableau resources.

To use local authentication, you must configure Tableau Server with a local identity store during Setup. You cannot use local authentication if your Tableau Server has been configured with an external identity store (LDAP, Active Directory, etc).

**Note:** Identity pools, which is a tool designed to complement and support additional user provisioning and authentication options you might need in your organisation, supports OpenID Connect (OIDC) authentication only. For more information, see Provision and Authenticate Users Using Identity Pools.

### Password storage

When local authentication is used, the user's salted and hashed password is stored in the repository. Passwords are never stored directly, rather, the result of salting and hashing the password is stored. Server uses the PBKDF2 derivation function with the HMAC SHA512 hashing function.

### Configure password settings

After you install Tableau Server with local authentication, you can use Tableau Server Manager (TSM) to configure a number of password-related settings:

- Password policies: these policies define the requirement for password structure, such as length, character types and other requirements.
- Password expiration: enable and specify password expiry.
- Login rate limit: Tableau Server throttles the time between sign-in attempts after users enter 5 incorrect passwords. Users will need to wait a few seconds before attempting another sign-in. If users continue to enter incorrect passwords, then they must wait for exponentially longer periods of time in between sign-in attempts. By default, the maximum time between sign-in attempts is 60 minutes.

## Tableau Server on Windows Help

Lock out account access after too many failed attempts. You can specify how many failed attempts users are allowed to enter before they are locked out. For information on how to unlock access to a locked account, see [View and manage users on a site](#).

- **User password reset:** Enable users to reset passwords. Enabling password reset will configure Tableau Server to display a link on the sign-in page. Users who forget passwords or want to reset a password can click the link to initiate a reset-password workflow. Password reset must be configured using TSM CLI, as described below.

### Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click on **User Identity & Access** on the **Configuration** tab and then click **Authentication Method**.
3. Select Local authentication from the drop-down menu to display the password settings.
4. Configure the password settings and then click **Save Pending Changes**.
5. Click **Pending Changes** at the top of the page:



6. Click **Apply Changes and Restart**.

### Use the TSM CLI

For the initial configuration of password policies, we recommend that you use the configuration file template below to create a json file. You can also set any single configuration key listed below with the syntax described in [tsm configuration set](#).

1. Copy the following json template to a file. Fill in the key values with your password policy configuration. See the reference section that follows for more information about key options.

```
{
  "configKeys": {
    "wgserver.localauth.policies.mustcontainletters.enabled":
    false,
    "wgserver.localauth.policies.mustcontainuppercase.enabled":
    false,
    "wgserver.localauth.policies.mustcontainnumbers.enabled":
    false,
    "wgserver.localauth.policies.mustcontainsymbols.enabled":
    false,
    "wgserver.localauth.policies.minimumpasswordlength.enabled":
    false,
    "wgserver.localauth.policies.minimumpasswordlength.value": 8,
    "wgserver.localauth.policies.maximumpasswordlength.enabled":
    false,
    "wgserver.localauth.policies.maximumpasswordlength.value":
    255,
    "wgserver.localauth.passwordexpiration.enabled": false,
    "wgserver.localauth.passwordexpiration.days": 90,
    "wgserver.localauth.ratelimiting.maxbackoff.minutes": 60,
    "wgserver.localauth.ratelimiting.maxattempts.enabled": false,
    "wgserver.localauth.ratelimiting.maxattempts.value": 5,
    "features.PasswordReset": false
  }
}
```

```
}
```

2. Run the `tsm settings import -f file.json` to pass the json file with the appropriate values to Tableau Services Manager to configure Tableau Server.
3. Run the `tsm pending-changes apply` command to apply the changes. See `tsm pending-changes apply`.

#### Configuration file reference

This section lists all of the options that can be used to configure password policies.

```
wgserver.localauth.policies.mustcontainletters.enabled
```

Default value: `false`

Require at least one letter in passwords.

```
wgserver.localauth.policies.mustcontainuppercase.enabled
```

Default value: `false`

Require at least one upper-case letter in passwords.

```
wgserver.localauth.policies.mustcontainnumbers.enabled
```

Default value: `false`

Require at least one number letter in passwords.

```
wgserver.localauth.policies.mustcontainsymbols.enabled
```

Default value: `false`

Require at least one special character in passwords.

```
wgserver.localauth.policies.minimumpasswordlength.enabled
```

Default value: `false`

Enforce minimum-length passwords.

`wgserver.localauth.policies.minimumpasswordlength.value`

Default value: 8

The minimum number of characters passwords must have. Enter a value between 4 and 255, inclusive. You must set `wgserver.localauth.policies.minimumpasswordlength.enabled` to `true` to enforce this value.

`wgserver.localauth.policies.maximumpasswordlength.enabled`

Default value: `false`

Enforce maximum-length passwords.

`wgserver.localauth.policies.maximumpasswordlength.value`

Default value: 255

The maximum number of characters passwords may have. Enter a value between 8 and 225, inclusive. You must set `wgserver.localauth.policies.maximumpasswordlength.enabled` to `true` to enforce this value.

`wgserver.localauth.passwordexpiration.enabled`

Default value: `false`

Enforce password expiry.

`wgserver.localauth.passwordexpiration.days`

Default value: 90



The number of days before a password expires. Enter a value between 1 and 365, inclusive. You must set `wgserver.localauth.passwordexpiration.enabled` to `true` to enforce this value.

`wgserver.localauth.ratelimiting.maxbackoff.minutes`

Default value: 60

Maximum time between sign-in attempts after a user enters multiple incorrect passwords. Enter a value between 5 and 1440, inclusive.

`wgserver.localauth.ratelimiting.maxattempts.enabled`

Default value: `false`

Enforce account lock out after 5 incorrect passwords are entered. To change the number of incorrect passwords that will trigger account lock out, you set `wgserver.localauth.ratelimiting.maxattempts.value`.

`wgserver.localauth.ratelimiting.maxattempts.value`

Default value: 5

The number of incorrect passwords that a user may enter to trigger account lock out. Enter a value between 5 and 100, inclusive. You must set `wgserver.localauth.ratelimiting.maxattempts.enabled` to `true` to enforce this value.

`features.PasswordReset`

Default value: `false`

Enable users to reset passwords. Tableau Server must be configured to send email for this feature to operate. See [Configure SMTP Setup](#).

## SAML

SAML (Security Assertion Markup Language) is an XML standard that allows secure web domains to exchange user authentication and authorisation data. You can configure Tableau

Server to use an external identity provider (IdP) to authenticate users over SAML 2.0. No user credentials are stored with Tableau Server, and using SAML enables you to add Tableau to your organisation's single sign-on environment.

You can use SAML server wide, or you can configure sites individually. Here's an overview of those options:

- **Server-wide SAML authentication.** A single SAML IdP application handles authentication for all Tableau Server users. Use this option if your server has only the Default site, as it is unnecessary to configure site specific SAML in this case. You may also use Server-wide SAML in multisite environments, but users are limited to a single IdP to across all sites.
- **Server-wide local authentication and site-specific SAML authentication.** In a multi-site environment, users who are not enabled for SAML authentication at the site level can sign in using local authentication.
- **Server-wide SAML authentication and site-specific SAML authentication.** In a multi-site environment, all users authenticate through a SAML IdP configured at the site level, and you specify a server-wide default SAML IdP for users that belong to multiple sites.

If you want to use site-specific SAML, you must configure server-wide SAML before you configure individual sites. Server-side SAML does not need to be enabled for site-specific SAML to function, but it must be configured.

User authentication through SAML does not apply to permissions and authorisation for Tableau Server content, such as data sources and workbooks. It also does not control access to underlying data that workbooks and data sources connect to.

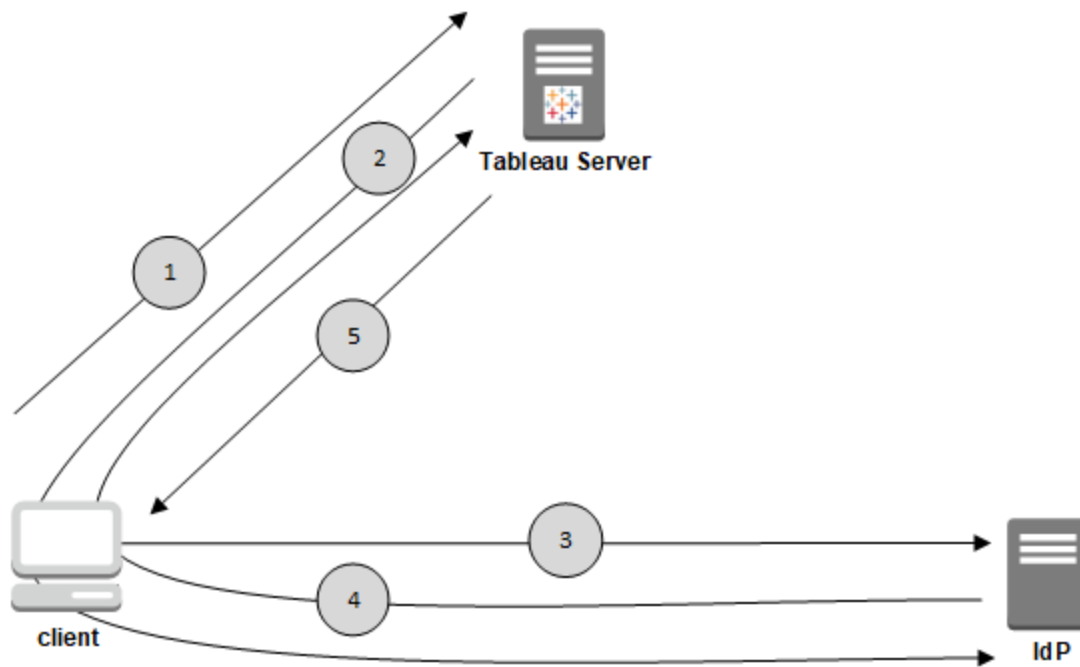
**Notes:**

- Tableau Server supports both service provider initiated and IdP initiated SAML in browsers and in the Tableau Mobile app. SAML connections from Tableau Desktop must be service provider initiated.

- Identity pools, which is a tool designed to complement and support additional user provisioning and authentication options you might need in your organisation, supports OpenID Connect (OIDC) authentication only. For more information, see Provision and Authenticate Users Using Identity Pools.

### Authentication overview

The following image shows the steps to authenticate a user with single sign-on in a typical service provider initiated flow:



1. User navigates to the Tableau Server sign-in page or clicks a published workbook URL.
2. Tableau Server starts the authentication process by redirecting the client to the configured IdP.
3. The IdP requests the user's username and password from the user. After the user submits valid credentials, the IdP authenticates the user.
4. The IdP returns the successful authentication in the form of a SAML Response to the client. The client passes the SAML Response to Tableau Server.

5. Tableau Server verifies that the username in the SAML Response matches a licensed user stored in the Tableau Server Repository. If a match is verified, then Tableau Server responds to the client with the requested content.

## SAML Requirements

Before you configure SAML on Tableau Server, make sure your environment meets the requirements.

**Important:** SAML configurations, both with the IdP and on Tableau Server, are case sensitive. For example, URLs configured with the IdP and on Tableau Server must match exactly.

### Certificate and identity provider (IdP) requirements

To configure Tableau Server for SAML, you need the following:

- **Certificate file.** A PEM-encoded x509 certificate file with a **.crt** extension. This file is used by Tableau Server, not the IdP. If you have an SSL certificate, it is possible in some circumstances to use the same certificate with SAML. For more information, see [Using SSL certificate and key files for SAML](#) later in this article.

Tableau Server requires a certificate-key pair to sign the request that is sent to the IdP. This reduces the threat of a man-in-the-middle attack given the difficulty of spoofing a signed request. Additionally, Tableau Server verifies that the AuthNResponse it receives from the trusted IdP. Tableau Server verifies the AuthNResponse by using the signature produced by the IdP. The IdP certificate metadata is provided to Tableau Server as part of the initial SAML configuration process.

Signed requests are not always necessary for all IdPs. By default, Tableau Server requires signed requests. We recommend this configuration to ensure a more secure communication transmission with the IdP. Work with your IdP team to understand if disabling signed requests is necessary. To disable signed requests see [samlSettings Entity](#).

- **Signature algorithm.** The certificate must use a secure signature algorithm, for example SHA-256. If you attempt to configure Tableau Server for SAML with a certificate that uses SHA-1 signature hash, Tableau Server will reject the certificate. You can configure Tableau Server to accept the less-secure SHA-1 hash by setting the `tgserver.saml.blocklisted_digest_algorithms` configuration key.
- **RSA key and ECDSA curve sizes.** The Tableau Server certificate must have an RSA key strength of 2048, and the IdP certificate must have either an RSA key strength of 2048 or ECDSA curve size of 256.

You can configure Tableau Server to accept the less-secure sizes by setting the respective configuration keys, `tgserver.saml.min_allowed_rsa_key_size` and `tgserver.saml.min_allowed_elliptic_curve_size`.

- **Certificate key file.** An RSA or DSA private key file that has the **.key** extension. RSA keys must be in PKCS#1 or PKCS#8 format.

Password protection requirements are as follows:

- The PKCS#1 RSA key file cannot be password protected.
- To use a password-protected key file, you must configure SAML with a RSA PKCS#8 file. **Note:** A PKCS#8 file with a null password is not supported.
- Password-protected key files are not supported in site-specific SAML deployments.

### Summary of support

Key file format	Server-Wide SAML Support	Site-Level SAML Support
PKCS#8 RSA	Yes	No
PKCS#8 (no/null password)	No	No

Key file format	Server-Wide SAML Support	Site-Level SAML Support
PKCS#1 RSA	Yes	Yes
PKCS#1 RSA (password)	No	No
PKCS#1 DSA (password)	No	No

- **IdP must sign SAML assertions with a secure signature algorithm.** By default, Tableau Server will reject SAML assertions signed with the SHA-1 algorithm. You can configure Tableau Server to accept assertions signed with the less-secure SHA-1 hash by setting the `tsm wgserver.saml.blocklisted_digest_algorithms` configuration key.
- **IdP account that supports SAML 2.0 or later.** You need an account with an external identity provider. Some examples are PingFederate, SiteMinder and Open AM.
- **IdP provider that supports import and export of XML metadata.** Although a manually created metadata file might work, Tableau Technical Support cannot assist with generating the file or troubleshooting it.
- **Username:** Required. The IdP configuration must include the "username" attribute or claim, and the corresponding SAML configuration attribute on Tableau Server must be set to "username" as well.

## SSL off-loading

If your organisation terminates SSL connections from the IdP at a proxy server before sending the authentication request to Tableau Server, then you may need to make a proxy configuration. In this scenario, SSL is "off-loaded" at the proxy server, which means the https request is terminated at the proxy server and then forwarded to Tableau Server over http.

Tableau Server validates the SAML response message returned from the IdP. Since SSL is off-loaded at the proxy, Tableau Server will validate with the protocol that it receives (http), but

the IdP response is formatted with `https`, so validation will fail unless your proxy server includes the `X-Forwarded-Proto` header set to `https`. See [Configure Tableau Server to work with a reverse proxy server and/or load balancer](#).

## Using SSL certificate and key files for SAML

If you are using a PEM-encoded x509 certificate file for SSL, you can use the same file for SAML. For SSL, the certificate file is used to encrypt traffic. For SAML, the certificate is used for authentication.

In addition to the requirements listed in [Certificate and identity provider \(IdP\) requirements](#) above, to use the same certificate for both SSL and SAML, the certificate must also meet the following condition to work for SAML:

- Confirm that the certificate includes only the certificate that applies to Tableau Server and not any other certificates or keys.

To do this, you can create a backup copy of the certificate file, and then open the copy in a text editor to review its contents.

### User management requirements

When you enable SAML, user authentication is performed outside of Tableau, by the IdP. However, user management is performed by an identity store: either an external identity store (Active Directory or LDAP) or by Tableau Server in a local identity store. For more information about planning for user management with Tableau Server, see [Identity Store](#).

When you configure the identity store during Setup, you must select the option that reflects how you want to use SAML. Note, if you want to use site-specific SAML, you must configure server-wide SAML before you configure individual sites.

- **For site-specific SAML:** If you have multiple sites on Tableau Server and want to set up each site for a particular IdP or IdP application (or configure some sites not to use SAML), configure Tableau Server to manage user with a local identity store. For site-specific SAML, Tableau Server relies on the IdP for authentication and does not use

passwords.

- **For server-wide SAML:** If you configure server-wide SAML with a single IdP, you can configure Tableau Server to use the local identity store or an external identity store. If you are using Active Directory (AD), you must disable the **Enable automatic log-on** (Microsoft SSPI) option.
- **For both server-wide SAML authentication and site-specific SAML authentication:**
  - **When using a local identity store,** it is important that you use a username that has email address formatting. Using a complete email address helps to guarantee the uniqueness of the username in Tableau Server, even when two users have the same email prefix but have different email domains. To ensure uniqueness in identities, leverage full email address formatting across both systems or upgrade Tableau Server to version 2022.1.x or later and run the **identity migration** background job.
  - **In a multi-site environment,** all users authenticate through a SAML IdP configured at the site level. In this scenario, you specify a server-wide default SAML IdP for users who belong to multiple sites. To configure this scenario, Tableau Server must be configured with a local identity store.
  - **Ignore domain when matching SAML username attribute.** Beginning in Tableau Server versions 2021.4.21, 2022.1.17, 2022.3.9 and 2023.1.5, you can configure Tableau Server to ignore the domain portion of the username attribute when matching the identity provider (IdP) user name to a user account on Tableau Server. For example, the username attribute in the IdP might be `alice@example.com` to match a user named `alice` in Tableau Server. Ignoring the domain portion of the username attribute might be useful if you already have users defined in Tableau Server that match the prefix portion of the username attribute but not the domain portion of the username attribute.



**Important:** We do not recommend ignoring the domain name without taking precautions. Specifically, verify that user names are unique across the configured domains that you've created in your IdP. Configuring Tableau Server to ignore the domain name has the potential to result in unintended user sign-in. Consider the case where your IdP has been configured for multiple domains (e.g. `example.com` and `tableau.com`). If two users with the same first name, but different user accounts (e.g., `alice@tableau.com` and `alice@example.com`) are in your organisation, then you could have a mapping mismatch.

To configure Tableau Server to ignore domain names in the username attribute from the IdP, set `wgserver.ignore_domain_in_username_for_matching` to `true`. For more information, see `wgserver.ignore_domain_in_username_for_matching`.

### Notes:

- This command only works in Tableau Server deployments that are in `legacy-identity-mode` or deployments that have not been updated through the [identity migration](#) to use the Identity Service.
- When you change the tsm command to ignore the domain name in the username attribute, all user names in Tableau Server must have a domain name.

**Note:** The [REST API](#) and `tabcmd` do not support SAML single-sign (SSO). To sign in, you must specify the name and password of a user who has been created on the server. The user may be managed by the local identity store or an external identity store, depending on how you have configured Tableau Server. REST API or `tabcmd` calls will have the permissions of the user you sign in as.

### SAML compatibility notes and requirements

- **Matching usernames:** The username stored in Tableau Server must match the configured username attribute sent by the IdP in the SAML assertion. By default, Tableau

Server expects the incoming assertion to contain an attribute called "username" with that user's information. For example, if the user name for Jane Smith is stored in PingFederate as **jsmith**, it must also be stored in Tableau Server as **jsmith**.

### When configuring SAML during authentication

If you are configuring SAML as part of the initial Tableau Server setup, make sure the account you plan to use exists in your IdP before you run setup. During Tableau Server setup you create the server administrator account.

### When running multiple domains

If you use an Active Directory or LDAP external identity store and you are running in multiple domains (that is, users belong to multiple domains, or your Tableau Server installation includes multiple domains), the IdP must send both the username *and* domain attributes for a user in the SAML assertion. Both these username and domain attributes must match exactly the username and domain stored in Tableau Server. Do *one* of the following:

- Set `domain\username` in the username field
- Set domain in the domain field and set user name in the username field

When setting the domain attribute, you can use the fully qualified domain name (FQDN) or the shortname.

Where the domain isn't specified, it will be considered the default domain.

For more information, see Support for multiple domains and the "Match Assertions" section in the **Use TSM CLI** tab of Configure Server-Wide SAML.

- **Signature algorithm:** Tableau Server uses SHA256 signature algorithm.
- **Single Log Out (SLO):** Tableau Server supports both service provider (SP)-initiated SLO and identity provider (IdP)-initiated SLO for both server-wide SAML and site-specific SAML.

- **External authentication types:** Tableau Server supports using one external authentication type at a time.
- **Mutual SSL:** Tableau Server does not support mutual SSL (two-way SSL) and SAML together. If you want to use mutual SSL, you can configure it on the IdP.
- **Assertions encoding:** Assertions must be UTF-8 encoded.
- **Encryption and SAML assertions:**
  - **Server-wide SAML:** When Tableau Server is configured for server-wide SAML, Tableau Server supports encrypted assertions from the IdP. Encryption assertions are enabled by the certificate that you upload as part of the initial configuration for server-wide SAML. SAML requests and responses can be sent over HTTP or HTTPS.
  - **Site-specific SAML:** When Tableau Server is configured for site-specific SAML, Tableau Server does not support encrypted assertions from the IdP. However, all SAML requests and responses are sent over HTTPS to secure communication with the IdP. HTTP requests and responses are not supported.
- **User identity in Tableau Server for `tabcmd` users:** As described in User management requirements section above, to use `tabcmd`, you must sign in as a user defined on the server. You cannot use SAML accounts with **`tabcmd`**.
- **Using SAML SSO with Tableau Desktop:** By default, Tableau Desktop allows SP-initiated SAML authentication.

If your IdP does not support this functionality, you can disable SAML sign-in for Tableau Desktop using the following command:

```
tsm authentication saml configure --desktop-access disable
```

For more information, see `tsm authentication saml <commands>`.

- **Distributed installations:** TSM versions of Tableau Server (2018.2 and newer) use the Client File Service to share files in a multi node cluster. After you have configured SAML on the initial node in your cluster, the Client File Service will distribute certificate and key files to the other nodes.
- **Login URL:** For users to be able to sign in, your IdP must be configured with SAML Login endpoint that sends a POST request to the following URL:

```
https://<tableauserver>/wg/saml/SSO/index.html.
```

- **Logout URL:** To enable users to sign out after signing in with SAML (single logout, or SLO), your IdP must be configured with a SAML Logout endpoint that sends a POST request to the following URL:

```
https://<tableauserver>/wg/saml/SingleLogout/index.html.
```

**Note:** Tableau Server supports both service provider (SP)-initiated SLO and identity provider (IdP)-initiated SLO for both server-wide SAML and site-specific SAML.

- **Post-logout redirect URL:** By default, when a user signs out of Tableau Server, the sign-in page is displayed.

To display a different page after sign-out, use the `tsm authentication saml configure` command with the `-su` or `--signout-url` option.

- To specify an absolute URL, use a fully-qualified URL starting with `http://` or `https://`, as in this example:

```
tsm authentication saml configure -su https://example.com
```

- To specify a URL relative to the Tableau Server host, use a page starting with a `/` (slash):

```
tsm authentication saml configure -su /ourlogoutpage.html
```

- **Active Directory Federation Service (AD FS):** You must configure AD FS to return additional attributes for Tableau authentication with SAML. The **Name ID** and **user-name** attributes can be mapped to the same AD attribute: **SAM-Account-Name**.

For configuration information, see [Configure SAML with AD FS on Tableau Server](#).

- **AuthNContextClassRef** : AuthNContextClassRef is an optional SAML attribute that enforces validation of certain authentication "contexts" in IdP initiated flows. You can set comma-separated values for this attribute with TSM. When this attribute is set, Tableau Server validates that the SAML response contains at least one of the values listed. If the SAML response does not contain one of the configured values, authentication will be rejected, even if the user has successfully authenticated with the IdP.

Leaving this optional attribute blank will result in default behaviour: any successfully authenticated SAML response will result in a user being granted a session within Tableau Server.

This value is only evaluated for server-wide SAML. If site-SAML is configured, the `AuthNContextClassRef` attribute will be ignored.

To set this value with TSM web interface, see [Configure Server-Wide SAML](#).

To set this value with tsm configuration set, use the key, `wgserver.saml.authcontexts`, to set a comma-separated list of values.

To set this value with a JSON configuration file, see [samlSettings Entity](#).

## Using SAML SSO with Tableau client applications

Tableau Server users with SAML credentials can sign in to the server from Tableau Desktop or the Tableau Mobile app. For full compatibility, we recommend that the Tableau client application version matches that of the server. To connect using site-specific SAML, users must run version 10.0 or later of the Tableau client application.

Connecting to Tableau Server from Tableau Desktop or Tableau Mobile uses a service provider (SP) initiated connection.

## Redirecting authenticated users back to Tableau clients

When a user signs in to Tableau Server, Tableau Server sends a SAML request (`AuthnRequest`) to the IdP, which includes the Tableau application's **RelayState** value. If the user has signed in to Tableau Server from a Tableau client such as Tableau Desktop or Tableau Mobile, it's important that the RelayState value is returned within the IdP's SAML response back to Tableau.

When the RelayState value is not returned properly in this scenario, the user is taken to their Tableau Server home page in the web browser, rather than being redirected back to the application they signed in from.

Work with your Identity Provider and internal IT team to confirm that this value will be included as part of the IdP's SAML response, and then preserved by any network appliance (such as a proxy or load balancer) that resides between your IdP and Tableau Server.

### XML data requirements

As part of SAML configuration, you exchange XML metadata between Tableau Server and the IdP. This XML metadata is used to verify a user's authentication information when the user initiates the Tableau Server sign-in process.

Tableau Server and the IdP each generates its own metadata. Each set of metadata must contain the information described in the following list. If either set is missing information, errors can occur when you configure SAML or when users try to sign in.

- **HTTP POST and HTTP REDIRECT:** Tableau Server supports HTTP POST and HTTP REDIRECT requests for SAML communications. In the SAML metadata XML document that is exported by the IdP, the `Binding` attribute can be set to HTTP-POST or HTTP-REDIRECT.
- When the `Binding` attribute is set to HTTP-POST, the SAML metadata that Tableau Server and the IdP each export must contain the following elements.

- The element that specifies the URL that the IdP redirects to after successful authentication. This is required in the Service Provider metadata, not the Identity Provider metadata.

```
<md:AssertionConsumerService Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST" Location="https://<tableau-server>/wg/saml/SSO/index.html" index="0" isDefault="true"/>
```

For Site SAML, the Location endpoint is /samlservice/public/sp/metadata?alias=<site alias>.

- The logout endpoint element appears in Tableau Server metadata and specifies the URL that the IdP will use for Tableau Server's logout endpoint. If this element is not in the IdP metadata, Tableau Server cannot negotiate a logout endpoint with the IdP, and the SAML Logout feature will not be available within Tableau Server:

```
<md:SingleLogoutService Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST" Location="https://SERVER-NAME:9031/idp/slo"
```

**Note:** SP-initiated SLO is supported for both server-wide and site-specific SAML. However, IdP-initiated SLO is not supported.

- Verify that the metadata XML from the IdP includes a **SingleSignOnService** element, in which the binding is set to HTTP-POST, as in the following example:

```
<md:SingleSignOnService Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST" Location="https://SERVER-NAME:9031/idp/SSO.saml2"/>
```

- This element should appear in IdP metadata and specifies the URL that Tableau Server will use for the IdP's logout endpoint.

```
<md:SingleLogoutService Bind-
ing="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST" Loca-
tion="https://SERVER-NAME:9031/idp/slo"/>
```

- **Attribute named *username*:** You must configure the IdP to return an assertion that includes the `username` attribute in the `saml:AttributeStatement` element. The assertion's attribute type must be `xs:string` (it should *not* be typed as `xs:any`).

The following example shows what this might look like.

```
<saml:Assertion assertion-element-attributes>
  <saml:Issuer>issuer-information</saml:Issuer>
  <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
    ...
  </Signature>
  <saml:Subject>
    ...
  </saml:Subject>
  <saml:Conditions condition-attributes >
    ...
  </saml:Conditions>
  <saml:AuthnStatement authn-statement-attributes >
    ...
  </saml:AuthnStatement>

  <saml:AttributeStatement>
    <saml:Attribute Name="username" NameFormat-
t="urn:oasis:names:tc:SAML:2.0:attrname-format:basic">
      <saml:AttributeValue xmlns:x-
s="http://www.w3.org/2001/XMLSchema" xmlns:x-
si="http://www.w3.org/2001/XMLSchema-instance">
```



## Tableau Server on Windows Help

```
xsi:type="xs:string">  
    user-name  
</saml:AttributeValue>  
</saml:Attribute>  
</saml:AttributeStatement>  
</saml:Assertion>
```

By default, Tableau Server will read the `username` attribute in the `AuthNResponse` returned from the IdP. However, some IdPs may return a different attribute that is intended to identify the user.

To change the SAML attribute that passes the `username` value, run the following TSM command:

```
tsm authentication saml map-assertions --user-name <USER-NAME>.
```

See `tsm authentication`.

- **Dynamic group membership using SAML assertions:**

Beginning in Tableau Server 2024.2, if SAML (or site SAML) is configured and the capability's setting enabled (server-wide or site-level), you can dynamically control group membership through custom claims included in the SAML XML response sent by the identity provider (IdP).

When configured, during user authentication, the IdP sends the SAML assertion that contains two custom group membership claims: `group` (`https://tableau.com/groups`) and group names (for example, "Group1" and "Group2") to assert the user into. Tableau validates the assertion and then enables access to the groups and the content whose permissions are dependent on those groups.

For more information, see [Dynamic group membership using assertions](#).

### Example SAML XML response

```

<saml2p:Response
  xmlns:saml2p="urn:oasis:names:tc:SAML:2.0:protocol"
  .....
  .....
  <saml2:Assertion
    .....
    .....
    xmlns:saml2="urn:oasis:names:tc:SAML:2.0:assertion"
    <saml2:AttributeStatement
      xmlns:saml2="urn:oasis:names:tc:SAML:2.0:assertion">
        <saml2:Attribute
          Name="https://tableau.com/groups"
          NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-form-
at:unspecified">
          <saml2:AttributeValue
            xmlns:xs="http://www.w3.org/2001/XMLSchema"
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-ins
            xsi:type="xs:string">Group1
          </saml2:AttributeValue>
          <saml2:AttributeValue
            xmlns:xs="http://www.w3.org/2001/XMLSchema"
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-ins
            xsi:type="xs:string">Group2
          </saml2:AttributeValue>
        <saml2:Attribute>
      </saml2:AttributeStatement>
    </saml2:Assertion>
  </saml2p:Response>

```

## Configure Server-Wide SAML

Configure server-wide SAML when you want all single sign-on (SSO) users on Tableau Server to authenticate through a single SAML identity provider (IdP), or as the first step to configuring site-specific SAML in a multi-site environment.

If you have configured server-wide SAML and are ready to configure a site, see [Configure Site-Specific SAML](#).

The SAML configuration steps we provide make the following assumptions:

- You are familiar with the options for configuring SAML authentication on Tableau Server, as described in the SAML topic.
- You have verified that your environment meets the SAML Requirements, and obtained the SAML certificate files described in those requirements.

Before you begin

As part of your disaster recovery plan, we recommend keeping a backup of certificate and IdP files in a safe location off of the Tableau Server. The SAML asset files that you upload to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, these files are not stored in a recoverable format. See Tableau Server Client File Service.

**Note:** If you use the same certificate files for SSL, you could alternatively use the existing certificate location for configuring SAML, and add the IdP metadata file to that directory when you download it later in this procedure. For more information, see Using SSL certificate and key files for SAML in the SAML requirements.

If you are running Tableau Server in a cluster, then the SAML certificates, keys and metadata file will be automatically distributed across the nodes when you enable SAML.

Use the TSM web interface

This procedure requires that you upload the SAML certificates to TSM so that they are properly stored and distributed in the server configuration. The SAML files must be available to the browser on the local computer where you are running the TSM web interface in this procedure.

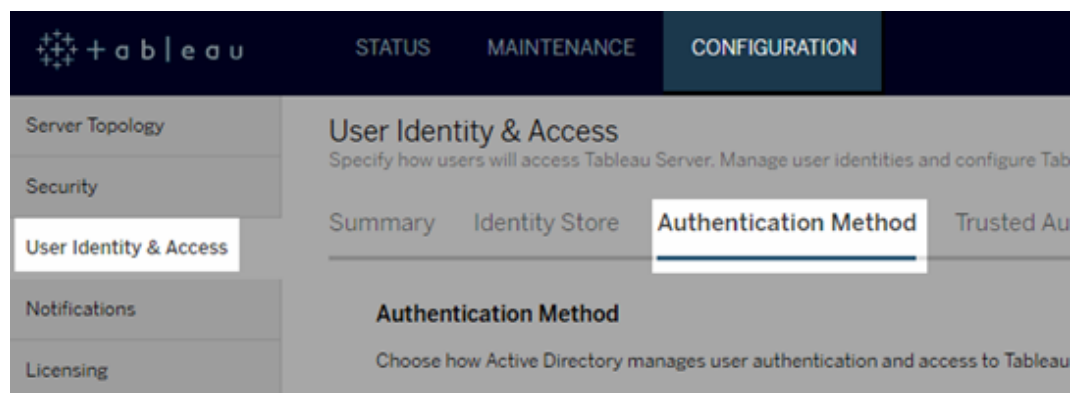
If you have gathered and saved the SAML files to the Tableau Server as recommended in the previous section, run the TSM web interface from the Tableau Server computer where you copied the files.

If you are running the TSM web interface from a different computer, you will need to copy all SAML files locally before proceeding. As you follow the procedure below, browse to the files on the local computer to upload them to TSM.

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. On the **Configuration** tab, select **User Identity & Access**, and then select the **Authentication Method** tab.



3. For **Authentication Method**, select **SAML**.
4. In the SAML section that appears, complete Step 1 in the GUI, entering the following settings (do not tick the box yet to enable SAML for the server):

- **Tableau Server return URL** – The URL that Tableau Server users will access, such as `https://tableau-server`.

Using `https://localhost` or a URL with a trailing slash (for example, `http://tableau_server/`) is not supported.

- **SAML entity ID** – The entity ID uniquely identifies your Tableau Server installation to the IdP.

You can enter your Tableau Server URL again here. If you plan to enable site-specific SAML later, this URL also serves as the base for each site's unique ID.

- **SAML certificate and key files** – Click **Select File** to upload each of these files.

If you are using a PKCS#8 passphrase-protected key file, you must enter the passphrase with TSM CLI:

```
tsm configuration set -k wgserver.saml.key.passphrase -v  
<passphrase>
```

After you provide the information required in Step 1 in the GUI, the **Download XML Metadata File** button in Step 2 in the GUI becomes available.

5. Now select the **Enable SAML authentication for the server** check box above Step 1 in the GUI.
6. Complete the remaining SAML settings.
  - a. For Steps 2 and 3 in the GUI, exchange metadata between Tableau Server and the IdP. (Here's where you might need to check in with the IdP's documentation.)

Select **Download XML Metadata File**, and specify the file location.

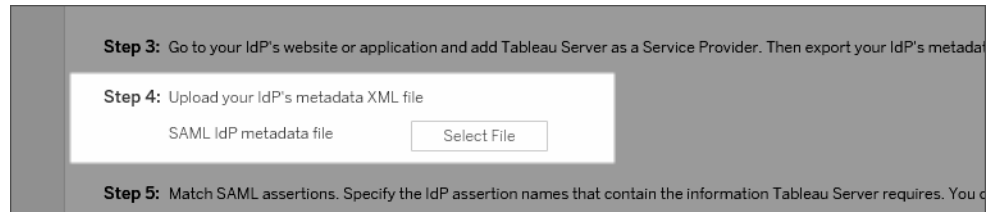
If you are configuring SAML with AD FS, you can return to Step 3: Configure AD FS to accept sign-in requests from Tableau Server of "Configure SAML with AD FS on Tableau Server".

For other IdPs, go to your IdP account to add Tableau Server to its applications (as a service provider), providing the Tableau metadata as appropriate.

Follow the instructions in the IdP's website or documentation to download the IdP's metadata. Save the .xml file to the same location that holds your SAML certificate and key files. For example:

C:\Program Files\Tableau\Tableau Server\SAML\idp-metadata.xml

- b. Return to the TSM web UI. For Step 4 in the GUI, enter the path to the IdP metadata file, and then click **Select File**.



- c. For Step 5 in the GUI: In some cases, you may need to change the assertion values in the Tableau Server configuration to match the assertion names that are passed by your IdP.

You can find assertion names in the IdP's SAML configuration. If different assertion names are passed from your IdP, then you must update Tableau Server to use the same assertion value.

**Tip:** “Assertions” are a key SAML component, and the concept of mapping assertions can be tricky at first. It might help to put this in a tabular-data context, in which the assertion (attribute) name is equivalent to a column heading in the table. You enter that “heading” name, rather than an example of a value that might appear in that column.

- d. For Step 6 in the GUI, select the Tableau applications in which you want to give users a single sign-on experience.

**Note:** The option to disable mobile access is ignored by devices running Tableau Mobile app version 19.225.1731 and higher. To disable SAML for

devices running these versions you must disable SAML as a client login option on Tableau Server.

- e. For the SAML sign-out redirect, if your IdP supports single logout (SLO), enter the page you want to redirect users to after they sign out, relative to the path you entered for the Tableau Server return URL.
  - f. (Optional) For Step 7 in the GUI, do the following:
    - Add a comma-separated value for the `AuthNContextClassRef` attribute. For more information about how this attribute is used, see SAML compatibility notes and requirements.
    - Specify a domain attribute if not sending the domain as part of the username (i.e. `domain\username`). For more information, see When running multiple domains.
7. Click **Save Pending Changes** after you've entered your configuration information.
  8. Click **Pending Changes** at the top of the page:



9. Click **Apply Changes and Restart**.

Use the TSM CLI

## Before you begin

Before you begin, do the following:

- Go to your IdP's website or application, and export the IdP's metadata XML file.

Confirm that the metadata XML from the IdP includes a **SingleSignOnService** element, in which the binding is set to `HTTP-POST`, as in the following example:

```
<md:SingleSignOnService Bind-
ing="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST" Loca-
tion="https://SERVER-NAME:9031/idp/SSO.saml2"/>
```

- Gather the certificate files and place them on Tableau Server.

In the Tableau Server folder, create a new folder named `SAML`, and place copies of the SAML certificate files in that folder. For example:

```
C:\Program Files\Tableau\Tableau Server\SAML
```

This is the recommended location because the user account that runs Tableau Server has the necessary permissions to access this folder.

## Step 1: Configure return URL, SAML entity ID and specify certificate and key files

1. Open the command prompt shell and configure the SAML settings for the server (replacing placeholder values with your environment path and file names).

```
tsm authentication saml configure --idp-entity-id https://t-
ableau-server --idp-metadata "C:\Program Files\Tableau\Tableau
Server\SAML\<metadata-file.xml>" --idp-return-url https://t-
ableau-server --cert-file "C:\Program Files\Tableau\Tableau
Server\SAML\<file.crt>" --key-file "C:\Program Files\T-
ableau\Tableau Server\SAML\<file.key>"
```

For more information, see `tsm authentication saml configure`.



2. If you are using a PKCS#8 key that is protected with a passphrase, enter the passphrase as follows:

```
tsm configuration set -k wgserver.saml.key.passphrase -v <passphrase>
```

3. If SAML is not already enabled on Tableau Server; for example, you're configuring it for the first time, or you have disabled it, enable it now:

```
tsm authentication saml enable
```

4. Apply the changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Step 2: Generate Tableau Server metadata and configure the IdP

1. Run the following command to generate the required XML metadata file for Tableau server.

```
tsm authentication saml export-metadata -f <file-name.xml>
```

You can specify a file name, or omit the `-f` parameter to create a default file named `samlmetadata.xml`.

2. On your IdP's website or in its application:

- Add Tableau Server as a Service Provider.

Refer to your IdP documentation for information about how to do this. As part of the process of configuring Tableau Server as a Service Provider, you will import the Tableau Server metadata file you generated from the `export-metadata` command.

- Confirm that your IdP uses **username** as the attribute to verify users.

## Step 3: Match assertions

In some cases, you may need to change the assertion values in the Tableau Server configuration to match the assertion names that are passed by your IdP.

You can find assertion names in the IdP's SAML configuration. If different assertion names are passed from your IdP, then you must update Tableau Server to use the same assertion value.

**Tip:** “Assertions” are a key SAML component, and the concept of mapping assertions can be tricky at first. It might help to put this in a tabular-data context, in which the assertion (attribute) name is equivalent to a column heading in the table. You enter that “heading” name, rather than an example of a value that might appear in that column.

The following table shows the default assertion values and the configuration key that stores the value.

Assertion	Default value	Key
Username	username	wgserver.saml.idpattribute.username
Display name	displayName	Tableau does not support this attribute type.
Email	email	Tableau does not support this attribute type.
Domain	(not mapped by default)	wgserver.saml.idpattribute.domain

## Tableau Server on Windows Help

To change a given value, run the `tsm configuration set` command with the appropriate key:value pair.

For example, to change the `username` assertion to the value, `name`, run the following commands:

```
tsm configuration set -k wgserver.saml.idpattribute.username -v name  
  
tsm pending-changes apply
```

Alternatively, you can use the `tsm authentication saml map-assertions` command to change a given value.

For example, to set the domain assertion to a value called `domain` and specify its value as "example.myco.com", run the following commands:

```
tsm authentication saml map-assertions --domain example.myco.com  
  
tsm pending-changes apply
```

## Optional: Disable client types from using SAML

By default, both Tableau Desktop and the Tableau Mobile app allow SAML authentication.

If your IdP does not support this functionality, you can disable SAML sign-in for Tableau clients using the following commands:

```
tsm authentication saml configure --desktop-access disable  
  
tsm authentication saml configure --mobile-access disable
```

**Note:** The `--mobile-access disable` option is ignored by devices running Tableau Mobile app version 19.225.1731 and higher. To disable SAML for devices running these versions you must disable SAML as a client login option on Tableau Server.

```
tsm pending-changes apply
```

## Optional: Add AuthNContextClassRef value

Add a comma-separated value for the `AuthNContextClassRef` attribute. For more information about how this attribute is used, see SAML compatibility notes and requirements.

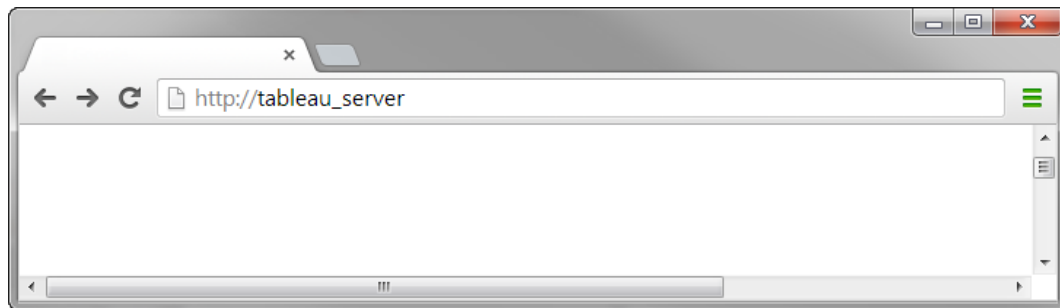
To set this attribute run the following commands:

```
tsm configuration set -k wgserver.saml.authcontexts -v <value>
```

```
tsm pending-changes apply
```

Test the configuration

1. In your web browser, open a new page or tab, and enter the Tableau Server URL.



The browser redirects you to the IdP's sign-in form.

2. Enter your single sign-on user name and password.

A screenshot of a sign-in form. At the top, there is a green checkmark icon followed by the text 'Please sign on first and we'll send you right along.' Below this, there are two input fields: 'Username' with the text 'jsmith' and 'Password' with masked characters (dots). At the bottom, there are two buttons: 'Sign On' (teal) and 'Cancel' (dark blue).

The IdP verifies your credentials and redirects you back to your Tableau Server start page.

### Configure SAML with Salesforce IdP on Tableau Server

This topic provides road-map steps that describe how to configure SAML on Tableau Server with the Salesforce IdP.

This topic also explains how to enable Lightning Web Component (LWC). The LWC allows Salesforce administrators to embed a Tableau visualisation within a Lightning page. When SSO is configured for Tableau Viz LWC on Tableau Server, the user experience is seamless: after the user signs into Salesforce, embedded Tableau views will work without further authentication to Tableau Server.

### Enable Salesforce as a SAML Identity Provider

If you have not yet configured Salesforce as an IdP, then follow the procedure, [Enable Salesforce as a SAML Identity Provider](#), on the Salesforce Help site.

During the process to enable Salesforce as a SAML IdP, you will either specify a certificate or Salesforce will generate a self-signed certificate for use with SAML. Download this certificate (.crt file) and the associated provider metadata file (.xml). You will need these assets in the next step.

### Configure SAML on Tableau Server

Using the certificate and metadata files that you downloaded in the previous step, follow the procedure in [Configure Server-Wide SAML](#).

As part of the configuration process, you will generate a SAML Entity ID and a login URL for Tableau Server. You will need these assets for the next step.

(Optional) After you have configured server-wide SAML, you can configure site-specific SAML on Tableau Server. See [Configure Site-Specific SAML](#).

## Add Tableau Server as a Connected App in Salesforce

Follow the procedure, [Integrate Service Providers as Connected Apps with SAML 2.0](#), on the Salesforce Help site.

In this process, you will create a new connected app (Tableau Server). Some important details follow:

- Select "Enable SAML"
- Enter the Entity ID and the login URL that you generated when configuring Tableau in the previous section. By default, login URL is `https://tableauserver>/wg/saml/SSO/index.html`.
- For the IdP certificate, be sure to select the same certificate that you specified or generated when you enabled Salesforce as a SAML provider.
- To allow users to sign in to Tableau Server from your org, manage access to your connected app by assigning the appropriate profiles or permission sets.

## Enable Lightning Web Component

To enable LWC for SAML SSO on Tableau Server, you must enable in-frame authentication. Before you enable LWC, upgrade to the latest maintenance release of Tableau Server. Two additional version details are important:

- If you are not running the latest maintenance release, and your users are running Chrome browsers to access Salesforce Lightning, then review the Tableau KB article, [Embedded Views Fail to Load After Updating to Chrome 80](#).
- If you are using LWC with site-specific SAML on Tableau Server, then you must be running the Tableau Server 2020.4 or later.

After you have configured SAML on Tableau Server, run the following TSM commands to enable in-frame authentication:

```
tsm configuration set -k wgserver.saml.iframe_idp.enabled -v true  
  
tsm pending-changes apply
```

### Embed Tableau Views into Salesforce

After you have configured Tableau Server for SSO, you can then install the LWC in your Salesforce org and embed Tableau views. See [Embed Tableau Views into Salesforce](#).

### Configure SAML for Tableau Viz Lightning Web Component

Tableau provides a Lightning Web Component (LWC) for embedding a Tableau visualisation within a Salesforce Lightning page.

This topic describes how to enable a SSO experience for embedded Tableau visualisations in a Salesforce Lightning page. SSO for the Tableau Viz LWC scenario requires SAML configuration. The SAML IdP used for Tableau authentication must be either the Salesforce IdP or same IdP that is used for your Salesforce instance.

In this scenario, Salesforce administrators can drag-and-drop Tableau Viz LWC into the Lightning page to embed a visualisation. Any view that is available to them on Tableau Server can be displayed in the dashboard by entering the embedded URL to the view.

When single sign-on (SSO) is configured for Tableau Viz LWC on Tableau Server, the user experience is seamless: after the user signs in to Salesforce, embedded Tableau views will work without further authentication to Tableau Server.

When SSO is not configured, users will need to re-authenticate with Tableau Server to view embedded visualisations from Tableau Server.

### Requirements

- The SAML IdP used for Tableau authentication must be either the Salesforce IdP or same IdP that is used for your Salesforce instance. See [Configure SAML with Salesforce IdP on Tableau Server](#).
- SAML must be configured on Tableau Server. See [Configure Server-Wide SAML](#), or [Configure Site-Specific SAML](#).
- SAML must be configured for Salesforce.
- Install the Tableau Viz Lightning Web Component. See [Embed Tableau Views into Salesforce](#).

## Configuring the authentication workflow

You may need to make additional configurations to optimise the sign-in experience for users who access Lightning with embedded Tableau views.

If a seamless authentication user experience is important, then you will need to make some additional configurations. In this context, “seamless” means that users who access the Salesforce Lightning page where Tableau Viz LWC SSO has been enabled, will not be required to perform any action to view the embedded Tableau view. In the seamless scenario, if the user is logged into Salesforce, then embedded Tableau views will be displayed with no additional user action. This scenario is enabled by *in-frame authentication*.

For a seamless user experience, you will need to enable in-frame authentication on Tableau Server and at your IdP. The sections below describe how to configure in-frame authentication.

On the other hand, there are scenarios where users are interacting with the Lightning page that will require them to click a “Sign in” button to view the embedded Tableau view. This scenario, where a user must take another action to view the embedded Tableau view, is called pop-up authentication.

Pop-up authentication is the default user experience if you do not enable in-frame authentication.

### Enable in-frame authentication on Tableau Server

Before you enable in-frame authentication on Tableau Server, you must have already configured and enabled SAML on Tableau Server.

Run the following TSM commands to enable in-frame authentication:

```
tsm configuration set -k wgserver.saml.iframed_idp.enabled -v true  
  
tsm pending-changes apply
```



**Note:** Clickjack protection is enabled by default on Tableau Server. When you enable in-frame authentication, clickjack protection is temporarily disabled for the in-frame authentication session. You should evaluate the risk of disabling clickjack protection. See [Clickjack Protection](#).

## Tableau Server Versioning

For the best user experience, run the latest maintenance release of Tableau Server.

If you are not running the latest maintenance release, and your users are running Chrome browsers to access Salesforce Lightning, then review the Tableau KB article, [Embedded Views Fail to Load After Updating to Chrome 80](#).

Enable in-frame authentication with your SAML IdP

As described above, a seamless authentication user experience with Salesforce Mobile requires IdP support for in-frame authentication. This functionality may also be referred to as “iframe embedding” or “framing protection” at IdPs.

## Salesforce safelist domains

In some cases, IdPs only allow enabling in-frame authentication by domain. In those cases, set the following Salesforce wildcard domains when you enable in-frame authentication:

```
*.force
```

```
*.visualforce
```

## Salesforce IdP

Salesforce IdP supports in-frame authentication by default. You do not need to enable or configure in-frame authentication in the Salesforce configuration. However, you must run the TSM command on Tableau Server as described above.

## Okta IdP

See *Embed Okta in an iframe*, in the Okta Help Centre topic, [General customisation options](#).

## Ping IdP

See the Ping support topic, [How to Disable the "X-Frame-Options=SAMEORIGIN" Header in PingFederate](#).

## OneLogin IdP

See *Framing protection*, in the OneLogin Knowledge Base article, [Account Settings for Account Owners](#).

## ADFS and EntraID IdP

Microsoft has blocked all in-frame authentication and it cannot be enabled. Instead, Microsoft only supports pop-up authentication in a second window. As a result, pop up behaviour can be blocked by some browsers, which will require users to accept pop ups for the `force.com` and `visualforce.com` sites.

### Salesforce Mobile App

If your users primarily interact with Lightning on the Salesforce Mobile App, then you should be aware of the following scenarios:

- The Salesforce Mobile App requires that you configure SSO/SAML to view embedded Tableau.
- The Salesforce Mobile App requires in-frame authentication. Pop-up authentication does not work. Instead, users on the Salesforce Mobile App will see the Tableau sign-in button but will not be able to sign to Tableau.
- Mobile App will not work on ADFS and Azure AD IdP.
- The Mobile App uses OAuth tokens to enable SSO. There are scenarios where the OAuth token refreshes and logs users out, requiring users to log back in. To learn more, see the Tableau KB article, [Tableau Viz Lightning Web Component On Salesforce Mobile App Prompts for Sign-in](#).

## Tableau Server on Windows Help

- The SSO behaviour differs according to the version of Salesforce Mobile App (iOS vs Android) and the IdP:

IdP	Mobile OS	SSO behaviour
Salesforce IdP	Android	SSO works initially, but users will need to sign-in after some time.
	iOS	
External IdP	Android	SSO does not work. Users will need to manually sign-in. (SSO must still be configured to enable users access to embedded Tableau views).
	iOS	SSO works initially, but users will need to sign-in after some time.

### Configure SAML with Azure AD IdP on Tableau Server

You can configure Azure AD as a SAML identity provider (IdP), and add Tableau Server to your supported single sign-on (SSO) applications. When you integrate Azure AD with SAML and Tableau Server, your users can sign in to Tableau Server using their standard network credentials.

#### Before you begin: Prerequisites

Before you can configure Tableau Server and SAML with Azure AD, your environment must have the following:

- SSL certificate encrypted using SHA-2 (256 or 512 bit) encryption, and that meets the additional requirements listed in the following sections:
  - SSL certificate requirements
  - SAML Certificate and identity provider (IdP) requirements
- If your users are signing in from a domain that's not the default domain, review SAML Requirements and User Management in Deployments with External Identity Stores to ensure the domain attribute value is set and defined to avoid any sign-in issues later on.

### Step 1: Verify SSL connection to Azure AD

Azure AD requires an SSL connection. If you haven't done so yet, complete the steps in [Configure SSL for External HTTP Traffic to and from Tableau Server](#), using a certificate that meets the requirements as specified above.

Alternatively, if Tableau Server is configured to work with a reverse proxy or load balancer where SSL is being terminated (commonly referred to as SSL off-loading), then you don't need to configure external SSL.

If your organisation uses Azure AD App proxy, see the section below, [Azure AD App Proxy](#).

### Step 2: Configure SAML on Tableau Server

Complete the steps in [Configure Server-Wide SAML](#) through downloading the Tableau Server metadata to an XML file. At that point, return here and continue to the next section.

### Step 3: Configure Azure AD claim rules

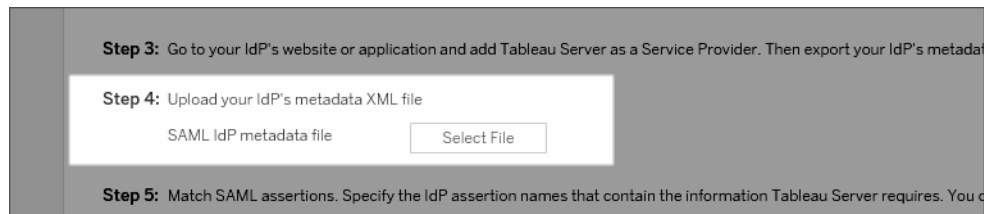
The mapping is case sensitive and requires exact spelling, so double-check your entries. The table here shows common attributes and claim mappings. You should verify the attributes with your specific Azure AD configuration.

LDAP Attribute	Outgoing Claim Type
onpremisesamaccountname	username
Given-Name	firstName <b>Note:</b> This is optional.
Surname	lastName <b>Note:</b> This is optional.
netbiosname	domain <b>Note:</b> This is only required if you have users signing in from a domain that's not the default domain.

In some organisations, Azure AD as a SAML IdP is used with Active Directory as the identity store for Tableau Server. In this case, `username` is usually the `sAMAccountName` name. See Microsoft's documentation for identifying the `sAMAccountName` attribute within Azure AD to map to the `username` attribute.

### Step 4: Provide Azure AD metadata to Tableau Server

1. Return to the TSM web UI, and navigate to **Configuration > User Identity & Access > Authentication Method** tab.
2. In Step 4 of the SAML configuration pane, enter the location of the XML file you exported from Azure AD, and select **Upload**.



3. Complete the remaining steps (matching assertions and specifying client type access) as specified in Configure Server-Wide SAML. Save and apply changes.
4. Perform the following steps if this isn't the first time configuring SAML:
  - a. Stop Tableau Server, open TSM CLI and run the following commands.

```
tsm configuration set -k wgserver.saml.sha256 -v true
```

```
tsm authentication saml configure -a 7776000
```

- b. Apply the changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt

displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

## Azure AD App Proxy

If you're running Azure AD App Proxy in front of Tableau Server and SAML is enabled, then you'll need to make an additional configuration to Azure AD App Proxy.

Tableau Server can only accept traffic from one URL when SAML is enabled. However, by default, Azure AD App Proxy sets an external URL and an internal URL.

You must set both of these values to the same URL in your customised domain. For more information, see the Microsoft documentation, [Configure custom domains with Azure AD Application Proxy](#).

## Troubleshooting

### Azure AD App Proxy

In some cases, links to views render internally but fail externally when traffic is crossing an Azure AD App Proxy. The issue arises when there's a pound sign (#) in the URL and users are accessing the link with a browser. The Tableau Mobile app is able to access URLs with a pound sign.

### User session timeouts appear to be ignored

When Tableau Server is configured for SAML, users might experience sign-in errors because the IdP maximum authentication age setting is set to a value greater than Tableau's maximum authentication age setting. To resolve this issue, you can use the `tsm configuration set` option `wgserver.saml.forceauthn` to require the IdP to reauthenticate the user each time Tableau redirects the authentication request, even if the IdP session for the user is still active.

For example, when the Azure AD setting `maxInactiveTime` is greater than Tableau Server's setting `maxAuthenticationAge`, Tableau redirects the authentication request to the IdP, who subsequently sends Tableau an assertion that the user is already authenticated. However, because the user was authenticated outside of Tableau Server's `maxAuthenticationAge`, Tableau rejects the user authentication. In cases like this, you can do one or both of the following:

- Enable the `wgserver.saml.forceauthn` option to require the IdP to reauthenticate the user every time Tableau redirects the authentication request. For more information, see `wgserver.saml.forceauthn`.
- Increase Tableau Server's `maxAuthenticationAge` setting. For more information, see “a, --max-auth-age <max-auth-age>” in the tsm authentication topic.

### AppID mismatch

When reviewing the `vizportal.log` file, you might see *"The intended audience doesn't match the recipient"* error.

To resolve this issue, ensure the `appID` matches what is sent. Azure will automatically append "SPN" to the `appID` when using the application ID with the app that is being used. You can change the value in the Tableau SAML settings by adding "SPN:" prefix to the application ID.

For example: `SPN:myazureappid1234`

### Configure SAML with AD FS on Tableau Server

You can configure Active Directory Federation Services (AD FS) as a SAML identity provider, and add Tableau Server to your supported single sign-on applications. When you integrate AD FS with SAML and Tableau Server, your users can sign in to Tableau Server using their standard network credentials.

#### Prerequisites

Before you can configure Tableau Server and SAML with AD FS, your environment must have the following:

- A server running Microsoft Windows Server 2008 R2 (or later) with AD FS 2.0 (or later) and IIS installed.
- We recommend that you secure your AD FS server (for example, using a reverse proxy). When your AD FS server is accessible from outside your firewall, Tableau Server can redirect users to the sign in page hosted by AD FS.
- SSL certificate encrypted using SHA-2 (256 or 512 bit) encryption, and that meets the additional requirements listed in the following sections:
  - SSL certificate requirements
  - SAML Certificate and identity provider (IdP) requirements

#### Step 1: Verify SSL connection to AD FS

AD FS requires an SSL connection. If you haven't done so yet, complete the steps in [Configure SSL for External HTTP Traffic to and from Tableau Server](#), using a certificate that meets the requirements as specified above.

Alternatively, if Tableau Server is configured to work with a reverse proxy or load balancer where SSL is being terminated (commonly referred to as SSL off-loading), then you do not need to configure external SSL.

#### Step 2: Configure SAML on Tableau Server

Complete the steps in [Configure Server-Wide SAML](#) through downloading the Tableau Server metadata to an XML file. At that point, return here and continue to the next section.

#### Step 3: Configure AD FS to accept sign-in requests from Tableau Server

**Note:** These steps reflect a third-party application and are subject to change without our knowledge.

Configuring AD FS to accept Tableau Server sign-in requests is a multi-step process, starting with importing the Tableau Server XML metadata file to AD FS.



1. Do one of the following to open the **Add Relying Party Trust Wizard**:

**Windows Server 2008 R2:**

- a. Select **Start menu> to Administrative Tools> AD FS 2.0**.
- b. In **AD FS 2.0**, under **Trust Relationships**, right-click the **Relying Party Trusts** folder, and then click **Add Relying Party Trust**.

**Windows Server 2012 R2:**

- a. Open **Server Manager**, and then on the **Tools** menu, click **AD FS Management**.
  - b. In **AD FS Management**, on the **Action** menu, click **Add Relying Party Trust**.
2. In the **Add Relying Party Trust Wizard**, click **Start**.
  3. On the **Select Data Source** page, select **Import data about the relying party from a file**, and then click **Browse** to locate your Tableau Server XML metadata file. By default, this file is named **samlspmetadata.xml**.
  4. Click **Next**, and on the **Specify Display Name** page, type a name and description for the relying party trust in the **Display name** and **Notes** boxes.
  5. Click **Next** to skip the **Configure Multi-factor Authentication Now** page.
  6. Click **Next** to skip the **Choose Issuance Authorisation Rules** page.
  7. Click **Next** to skip the **Ready to Add Trust** page.
  8. On the **Finish** page, tick the **Open the Edit Claim Rules dialog for this relying party trust when the wizard closes** box and then click **Close**.

Next, you'll work in the **Edit Claim Rules** dialog, to add a rule that makes sure the assertions sent by AD FS match the assertions Tableau Server expects. At a minimum, Tableau Server needs an email address. However, including first and last names in addition to email will ensure the user names displayed in Tableau Server are the same as those in your AD account.

1. In the **Edit Claim Rules** dialog box, click **Add Rule**.
2. On the **Choose Rule Type** page, for **Claim rule template**, select **Send LDAP Attributes as Claims**, and then click **Next**.
3. On the **Configure Claim Rule** page, for **Claim rule name**, enter a name for the rule that makes sense to you.
4. For **Attribute store**, select **Active Directory**, complete the mapping as shown below, and then click **Finish**.

The mapping is case sensitive and requires exact spelling, so double-check your entries. The table here shows common attributes and claim mappings. Verify attributes with your specific Active Directory configuration.

LDAP Attribute	Outgoing Claim Type
SAM-Account-Name	Name ID
SAM-Account-Name	username
Given-Name	firstName
Surname	lastName

If you are running AD FS 2016 or later, then you must add a rule to pass through all claim values. If you are running an older version of AD FS, skip to the next procedure to export AD FS metadata.

1. Click **Add Rule**.
2. Under **Claim rule template**, choose **Pass Through or Filter an Incoming Claim**.
3. Under **Claim rule name**, enter Windows.
4. On the **Edit Rule - Windows** pop-up:
  - Under **Incoming claim type**, select **Windows account name**.
  - Select **Pass through all claim values**.
  - Click **OK**.

Now you will export AD FS metadata that you'll import to Tableau Server later. You will also make sure the metadata is configured and encoded properly for Tableau Server, and verify other AD FS requirements for your SAML configuration.

1. Export AD FS Federation metadata to an XML file, and then download the file from **`https://<adfs server name>/federationmetadata/2007-06/FederationMetadata.xml`**.
2. Open the metadata file in a text editor like Sublime Text or Notepad++, and verify that it is correctly encoded as UTF-8 without BOM.

If the file shows some other encoding type, save it from the text editor with the correct encoding.

3. Verify that AD FS uses forms-based authentication. Sign-ins are performed in a browser window, so you need AD FS to default to this type of authentication.

Edit **`c:\inetpub\adfs\ls\web.config`**, search for the tag and move the line so it appears first in the list. Save the file so that IIS can automatically reload it.

**Note:** If you don't see the **`c:\inetpub\adfs\ls\web.config`** file, IIS is not installed and configured on your AD FS server.

4. (Optional) This step is required only if AD FS is configured as an IDP for site-specific SAML. This step is not required if AD FS is configured as the IDP for server-wide SAML.

Configure an additional AD FS relying party identifier. This allows your system to work around any AD FS issues with SAML logout.

Do one of the following:

**Windows Server 2008 R2:**

- a. In **AD FS 2.0**, right-click on the relying party you created for Tableau Server earlier, and click **Properties**.

- b. On the **Identifiers** tab, in the **Relying party identifier** box, enter **https://<tableauservername>/public/sp/metadata** and then click **Add**.

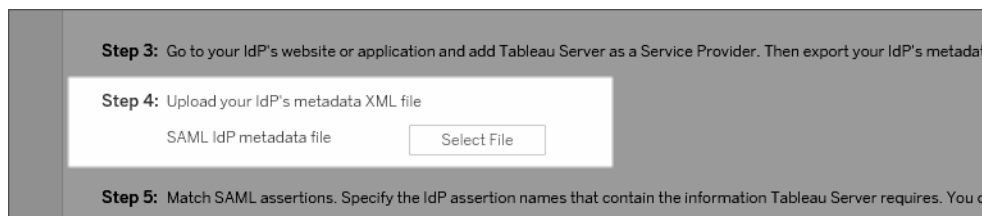
#### Windows Server 2012 R2:

- a. In **AD FS Management**, in the **Relying Party Trusts** list, right-click on the relying party you created for Tableau Server earlier, and click **Properties**.
- b. On the **Identifiers** tab, in the **Relying party identifier** box, enter **https://<tableauservername>/public/sp/metadata** and then click **Add**.

**Note:** AD FS can be used with Tableau Server for a single relying party to the same instance. AD FS cannot be used for multiple relying parties to the same instance, for example, multiple site-SAML sites or server-wide and site SAML configurations.

#### Step 4: Provide AD FS metadata to Tableau Server

1. Return to the TSM web UI, and navigate to **Configuration > User Identity & Access > Authentication Method** tab.
2. In Step 4 of the SAML configuration window, enter the location of the XML file you exported from AD FS, and select **Upload**.



3. Complete the remaining steps (matching assertions and specifying client type access) as specified in **Configure Server-Wide SAML**.
4. Save and apply changes.
5. Perform the following steps if this is not the first time configuring SAML:

## Tableau Server on Windows Help

- a. Stop Tableau Server, open TSM CLI and run the following commands:

```
tsm configuration set -k wgserver.saml.sha256 -v true  
  
tsm authentication saml configure -a 7776000
```

- b. Apply the changes:

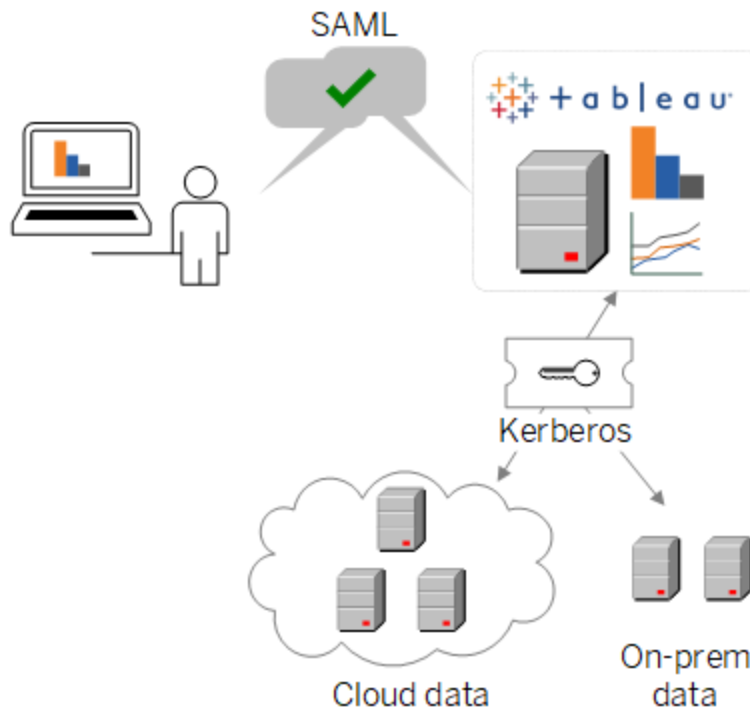
```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Use SAML SSO with Kerberos Database Delegation

In a Windows Active Directory (AD) environment, you can enable SAML single sign-on (SSO) to Tableau Server, along with Kerberos database delegation. This provides authorised users direct access to Tableau Server, as well as to the underlying data defined in their published workbooks and data sources.

## Overview of the process



In a typical scenario:

1. One of your Tableau analysts publishes a dashboard to Tableau Server. That dashboard contains a connection to a Hadoop cluster, for example, that is configured to accept Kerberos credentials.  
  
Then the workbook publisher sends a link to colleagues for review.
2. When a colleague clicks the link, Tableau Server authenticates the user through the SAML SSO process. Then it looks at the user's authorisation scheme, and if allowed, uses the Tableau Server keytab to access the underlying database on behalf of the user. This populates the dashboard with the Hadoop data that the user is authorised to see.

## Configure Tableau Server for SAML with Kerberos

Using SAML with Kerberos works inherently when you complete the processes to enable each separately:

1. Configure Tableau Server for SAML, as described in [Configure Server-Wide SAML](#).
2. Configure Tableau Server and your underlying databases to accept Kerberos credentials, as described in [Enable Kerberos Delegation](#) and related articles.

## Configure Site-Specific SAML

Use site-specific SAML in a multi-site environment when you want to enable single sign-on, and you also use multiple SAML identity providers (IdPs) or IdP applications. When you enable site SAML, you can specify the IdP or IdP application for each site, or configure some sites to use SAML and the others to use the default server-wide authentication method.

If you want all server users to use SAML and sign in through the same IdP application, see [Configure Server-Wide SAML](#).

## Prerequisites for enabling site-specific SAML

Before you can enable SAML single sign-on at the site level, complete the following requirements:

- The Tableau Server identity store must be configured for local identity store.

You cannot configure site-specific SAML if Tableau Server is configured with an external identity store such as Active Directory or OpenLDAP.

- Make sure your environment and your IdP meet the general SAML Requirements.

Some features are supported only in server-wide SAML deployments, including but not limited to:

- Password-protected key files, which are not supported in site-specific SAML deployments.

- You must configure server-wide SAML before you configure site-specific SAML. You do not need to enable server-wide SAML, but site-specific SAML requires the server-wide configuration. See [Configure Server-Wide SAML](#).
- Note the location of the SAML certificate files. You will provide this when you Configure the server to support site-specific SAML.

For more information, see [Put metadata and certificate files in place](#) in the topic on configuring server-wide SAML.

- Add Tableau Server as a service provider to your IdP. You can find this information in the documentation the IdP provides.
- Confirm that the system clocks of the computer hosting the site-SAML IdP and the computer hosting Tableau Server are within 59 seconds of each other. Tableau Server does not have a configuration option to adjust the response skew (time difference) between the Tableau Server computer and the IdP.

## Server-wide settings related to site-specific SAML

**Return URL and entity ID:** In the settings for configuring site-specific SAML, Tableau provides a site-specific return URL and entity ID based on these settings. The site-specific return URL and entity ID cannot be modified. These configurations are set by TSM as described in [Configure Server-Wide SAML](#).

**Authentication age and response skew:** Server-wide settings, maximum authentication age and response skew, do not apply to site-specific SAML. These configurations are hard-coded:

- The maximum authentication age refers to how long an authentication token from the IdP is valid after it is issued. The hard-coded maximum authentication age site-specific SAML is 24 days.
- The response skew is the maximum number of seconds difference between Tableau Server time and the time of the assertion creation (based on the IdP server time) that still allows the message to be processed. The hard-coded site-specific value for this is 59 seconds.



**Username:** Required. In addition to the server-wide SAML configuration attribute, the site-specific SAML configuration attribute must be set to "username".

**Note:** For site-specific SAML to operate successfully with a server-wide SAML default, the username attribute configured for server-wide SAML with the `wgserver.saml.idpattribute.username` configuration key must be "username". The IdP used for server-wide SAML must deliver the username in an attribute named "username".

5 Match attributes

Match the attribute names (assertions) in the IdP's SAML configuration to the corresponding attribute names on Tableau Server. Click Test Connection to fetch available attributes.

Tableau Server Attribute	Identity Provider (IdP) Assertion Name
<b>Username or Email</b> Enter the username or email address attribute that the IdP sends during the authentication process. This must match the attribute name in Tableau	<input type="text" value="username"/>
<b>Display Name</b> Enter an assertion name for either the first name and last name, or for the full name, depending on how the IdP stores this information. Tableau Server uses these attributes to set the display name.	
<input checked="" type="radio"/> First name	<input type="text" value="firstName"/>
<input type="radio"/> Last name	<input type="text" value="lastName"/>
<input type="radio"/> Full name	<input type="text" value="FullName"/>

Apply

**HTTP POST and HTTP REDIRECT:** For site-specific SAML, Tableau Server supports HTTP-POST, HTTP-REDIRECT and HTTP-POST-SimpleSign.

Configure the server to support site-specific SAML

After you complete the prerequisites listed above, you can run the following commands to configure the server to support site-specific SAML.

1. **Configure Server-Wide SAML.** At a minimum, you must run the following TSM command (if you have already configured server-wide SAML, skip to Step 2):

```
tsm authentication saml configure --idp-entity-id <tableau-server-entity-id> --idp-return-url <tableau-server-return-url>
```

```
--cert-file <path-to-saml-certificate.crt> --key-file <path-to-saml-keyfile.key>
```

2. Enable site SAML. Run the following commands:

```
tsm authentication sitesaml enable
```

```
tsm pending-changes apply
```

## About the commands

The `sitesaml enable` command exposes the **Authentication** tab on each site's **Settings** page in the Tableau Server web UI. After you configure the server to support site SAML, you can continue to Configure SAML for a site to work through the settings on the **Authentication** tab.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

If you want to review the commands and settings that will be carried out when you run `pending-changes apply`, you can run the following command first:

```
tsm pending-changes list --config-only
```

### Configure SAML for a site

This section takes you through the configuration steps that appear on the **Authentication** tab in the Tableau Server Settings page. In a self-hosted Tableau Server installation, this page appears only when support for site-specific SAML is enabled at the server level.

**Note:** To complete this process, you will also need the documentation your IDP provides. Look for topics that refer to configuring or defining a service provider for a SAML connection, or adding an application.

## Step 1: Export metadata from Tableau

To create the SAML connection between Tableau Server and your IdP, you need to exchange required metadata between the two services. To get metadata from Tableau Server, choose one of the following methods. See the IdP's SAML configuration documentation to confirm the correct option.

- Select **Export metadata** button to download an XML file that contains the Tableau Server SAML entity ID, Assertion Consumer Service (ACS) URL and X.509 certificate.

The entity ID is site-specific, and based on the server-wide entity ID that you specified when you enabled site SAML on the server. For example, if you specified `https://tableau_server`, you might see the following entity ID for the site:

```
https://tableau_server-  
/samlservice/public/sp/metadata?alias=48957410-9396-430a-967c-  
75bdb6e002a0
```

You cannot modify the site-specific entity ID or ACS URL that Tableau generates.

- Select **Download certificate** if your IdP expects the required information in a different way. For example, if it wants you to enter the Tableau Server entity ID, ACS URL and X.509 certificate in separate locations.

The following image has been edited to show that these settings are the same in

## Tableau Cloud and Tableau Server.

1 Export metadata from Tableau Online | Server

Select an option for obtaining metadata required by the Identity Provider (IdP):

- Export an XML file that contains the metadata.

or

- Copy the Tableau Online entity ID and ACS URL individually, and download the X.509 certificate and save it as a CER file.

Tableau Online entity ID

Assertion Consumer Service URL (ACS)

## Step 2 and Step 3: External steps

For step 2, to import the metadata you exported in step 1, sign in to your IdP account and use the instructions provided by the IdP's documentation to submit the Tableau Server metadata.

For step 3, the IdP's documentation will also guide you in how to provide metadata to a service provider. It will instruct you to download a metadata file, or it will display XML code. If it displays XML code, copy and paste the code into a new text file, and save the file with a .xml extension.

## Step 4: Import IdP metadata to the Tableau site

On the **Authentication** page in Tableau Server, import the metadata file that you downloaded from the IdP or configured manually from XML it provided.

**Note:** If editing the configuration, you will need to upload the metadata file so Tableau knows to use the correct IdP entity ID and SSO service URL.

## Step 5: Match attributes

Attributes contain authentication, authorisation and other information about a user. In the **Identity Provider (IdP) Assertion Name** column, provide the attributes that contain the information Tableau Server requires.

- **Username or Email:** (Required) Enter the name of the attribute that stores usernames or email addresses.
- **Display name:** (Optional) Some IdPs use separate attributes for first and last names, and others store the full name in one attribute. If you're using SAML with local authentication, the display name attribute isn't synchronised with the SAML IdP.

Select the button that corresponds to the way your IdP stores the names. For example, if the IdP combines first and last name in one attribute, select **Display name**, and then enter the attribute name.

5 Match attributes

Match the attribute names (assertions) in the IdP's SAML configuration to the corresponding attribute names on Tableau Server. Click Test Connection to fetch available attributes.

Tableau Server Attribute	Identity Provider (IdP) Assertion Name
<div>Username or Email</div> <div>Enter the username or email address attribute that the IdP sends during the authentication process. This must match the attribute name in Tableau</div>	<input type="text" value="NameID"/>
<div>Display Name</div> <div>Enter an assertion name for either the first name and last name, or for the full name, depending on how the IdP stores this information. Tableau Server uses these attributes to set the display name.</div> <div><div><div><input checked="" type="radio"/> First name</div><div><input type="text" value="firstName"/></div></div><div><div><input type="radio"/> Last name</div><div><input type="text" value="lastName"/></div></div><div><div><input type="radio"/> Full name</div><div><input type="text" value="FullName"/></div></div></div>	

Apply

## Step 6: Manage users

Select existing Tableau Server users, or add new users you want to approve for single sign-on.

When you add or import users, you also specify their authentication type. On the Users page, you can change users' authentication type any time after adding them.

For more information, see [Add Users to a Site or Import Users and Set the User Authentication Type for SAML](#).

**Important:** Users that authenticate with site-specific SAML can belong only to one site. If a user needs to access multiple sites, set their authentication type to the server default. Depending on how site-specific SAML was configured by the server administrator, the server default is either local authentication or server-wide SAML.

## Step 7: Troubleshooting

Start with the troubleshooting steps suggested on the [Authentication](#) page. If those steps do not resolve the issue, see [Troubleshoot SAML](#).

### Update SAML Certificate

After you have configured SAML authentication, you may need to periodically update the certificate. In some cases, you may need to change the certificate for operational changes in your IT environment. In either case, you must use TSM or the [Site Authentication](#) page to update the SAML certificate that has already been configured.

Below are the steps to update the certificate and key files for server-wide and site-specific SAML implementations.

### Update certificate for server-wide SAML

To change or update the certificate (and the corresponding key file if required) for server-wide SAML, follow the steps below:

## Tableau Server on Windows Help

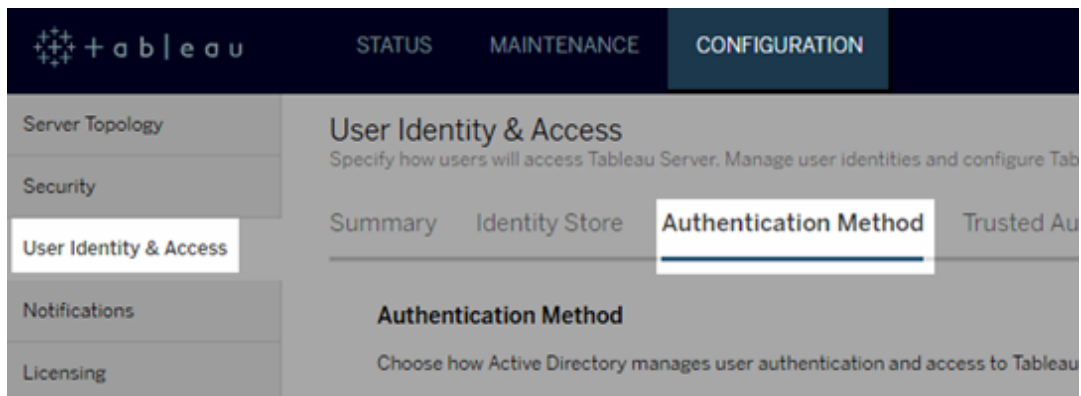
1. Open TSM in a browser:

<https://<tsm-computer-name>:8850>. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Stop Tableau Server.

You can do this either from the TSM web UI, by clicking **Tableau Server is running**, and selecting **Stop Tableau Server**, or from the command line, using the `tsm stop` command.

3. On the **Configuration** tab, select **User Identity & Access**, and then select the **Authentication Method** tab.



4. For **Authentication Method**, select **SAML**.
5. Complete Step 1 - Step 4 in the GUI to update the SAML certificate file and exchange metadata between Tableau Server and your IdP.

**Step 1:** Provide the location for the following SAML attributes and files.

Tableau Server return URL	<input type="text" value="Required"/>
SAML entity ID	<input type="text" value="Required"/>
SAML certificate file	<input type="button" value="Select File"/>
SAML key file	<input type="button" value="Select File"/>

**Step 2:** Download XML metadata file, and register it with your IdP.

**Step 3:** Go to your IdP's website or application and add Tableau Server as a Service Provider. Then export your IdP's metadata XML file.

**Step 4:** Upload your IdP's metadata XML file

SAML IdP metadata file	<input type="button" value="Select File"/>
------------------------	--

- Click **Save Pending Changes** after you've entered your configuration information.
- Click **Pending Changes** at the top of the page:



- Click **Apply Changes and Restart**.

After you change the certificate, you must run `tsm pending-changes apply` to restart Tableau Server services. We also recommend restarting any other services on the computer that use the SAML certificate. If you are changing a root certificate on the operating system, you must reboot the computer.

#### Update certificate for site-specific SAML

The certificate used for Tableau site metadata is provided by Tableau and not configurable. To update the certificate for site-specific SAML, you must upload a new certificate to your IdP and re-exchange the metadata with Tableau Server.

- Sign in to the site as a server or site administrator, and select **Settings > Authentication**.
- Under Authentication types, select **Edit connection** to expand the UI.
- Open a new tab or window, and sign in to your IdP account.



## Tableau Server on Windows Help

4. Use the instructions provided by the IdP's documentation to upload a new SAML certificate.
5. Download the new XML metadata file to provide to Tableau Server.
6. Return to the **Authentication** page in Tableau Server, and in Step 4 of the UI, import the metadata file that you downloaded from the IdP.
7. Click the **Apply** button .

### Troubleshoot SAML

This topic provides information about resolving issues that can occur when you configure SAML authentication.

#### SAML and Enable Automatic Logon

If you are using SAML and if Tableau Server is also configured to use Active Directory, do not also select **Enable automatic logon**. **Enable automatic logon** and SAML cannot both be used on the same server installation.

#### HTTP status 500 error when configuring SAML

Under some circumstances you might get an HTTP status 500 error and see the following error after enabling SAML and navigating to the Tableau Server URL in a browser:

```
org.opensaml.saml2.metadata.provider.MetadataProviderException: User  
specified binding is not supported by the Identity Provider using  
profile urn:oasis:names:tc:SAML:2.0:profiles:SSO:browser
```

To help resolve this error, make sure of the following:

- The IdP URL for the SSO profile specified in the SAML tab is correct.
- The IdP URL for the SSO profile provided while creating the service provider in the IdP is correct.

- The IdP is configured to use `HTTP-POST` requests. (Redirect and SOAP are not supported.)

If any of these settings were not correct, make appropriate updates and then perform the SAML configuration steps again, starting with generating and exporting the XML metadata document from Tableau Server.

If these settings are correct, but you still see the error, examine the metadata XML that is produced by Tableau Server and by the IdP, as described in SAML Requirements.

Signing in from the command line

SAML is not used for authentication when you sign in to Tableau Server using `tabcmd` or the [Tableau Data Extract command line utility](#) (provided with Tableau Desktop), even if Tableau Server is configured to use SAML. These tools require the authentication configured when Tableau Server was originally installed (either local authentication or AD).

Login fails: Failed to find the user

Login fails with the following message:

```
>Login failure: Identity Provider authentication successful for  
user <username from IdP>. Failed to find the user in Tableau  
Server.
```

This error typically means that there is a mismatch between the usernames stored in Tableau Server and provided by the IdP. To fix this, make sure that they match. For example, if Jane Smith's username is stored in the IdP as `j.smith` it must be stored in Tableau Server as `j.smith`.

Login fails: SSL offloading

Login fails with the following message:

```
Unable to Sign In - Invalid username or password.
```

Additionally, the vizportal logs (set to `debug` mode) contain the following message:

## Tableau Server on Windows Help

```
DEBUG com.tableau.core.util.RemoteIP - Found header null in X-  
FORWARDED-PROTO
```

**Note:** To log SAML-related events, `vizportal.log.level` must be set to `debug`. For more information, see [Change Logging Levels](#).

This combination of messages indicates a misconfiguration of an external proxy server that is offloading SSL for the connection to Tableau Server. To resolve this issue, see the KB article, ["Unable to Sign In" and "Invalid username or password" Error With SAML After Upgrading](#).

### SAML error log

SAML authentication takes place outside Tableau Server, so troubleshooting authentication issues can be difficult. However, login attempts are logged by Tableau Server. You can create a snapshot of log files and use them to troubleshoot problems. For more information, see [Log File Snapshots \(Archive Logs\)](#).

**Note:** To log SAML-related events, `vizportal.log.level` must be set to `debug`. For more information, see [Change Logging Levels](#).

Check for SAML errors in the following files in the unzipped log file snapshot:

```
\vizportal\vizportal-<n>.log
```

The application process (`vizportal.exe`) handles authentication, so SAML responses are logged by that process.

### Trailing slash

On the SAML tab, confirm that the **Tableau Server return URL** does not end with a trailing slash

Correct: `http://tableau_server`

Incorrect: `http://tableau_server/`

### Confirm connectivity

Confirm that the Tableau Server you are configuring has either a route-able IP address or a NAT at the firewall that allows two-way traffic directly to the server.

You can test your connectivity by running telnet on Tableau Server and attempting to connect with the SAML IdP. For example: `C:\telnet 12.360.325.10 80`

The above test should connect you to the HTTP port (80) on the IdP and you should receive an HTTP header.

### Multiple domains

On the SAML tab, confirm that the Tableau Server **Domain** attribute will detect the domain in the `domain\username` format in the SAML assertion by leaving it blank.

Correct: `<empty>`

Incorrect: `yourdomain.com`

## Kerberos

Kerberos is a three-way authentication protocol that relies on the use of a trusted third-party network service called the Key Distribution Center (KDC) to verify the identity of computers and provide for secure connections between the computers through the exchange of *tickets*. These tickets provide mutual authentication between computers or services, verifying that one has permission to access the other.

Tableau Server supports Kerberos authentication in an Active Directory Kerberos environment, with authentication to Tableau Server being handled by Kerberos.

### Notes:

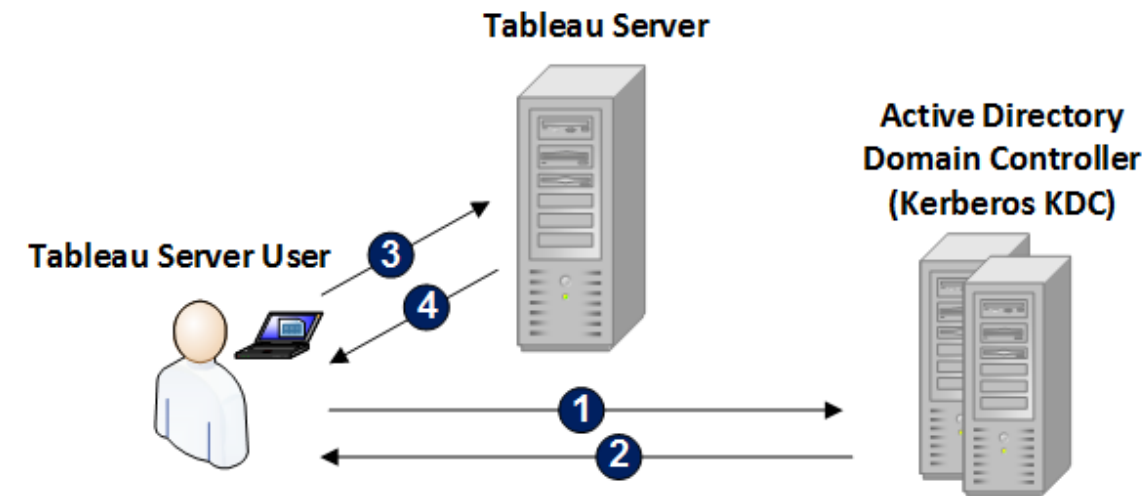
- The Kerberos support in Tableau Server is for user authentication. It does not handle internal permissions and authorisation related to Tableau Server content, such as workbooks.
- Identity pools, which is a tool designed to complement and support additional user provisioning and authentication options you might need in your organisation, supports

OpenID Connect (OIDC) authentication only. For more information, see [Provision and Authenticate Users Using Identity Pools](#).

### How Kerberos works

When you configure Tableau Server for Kerberos in an Active Directory (AD) environment, the AD domain controller also serves as the Kerberos Key Distribution Center (KDC) and issues Ticket Granting Tickets to the other nodes in the domain. Users authenticated by the KDC do not have to authenticate further when connecting to Tableau Server.

The following is a diagram of the authentication workflow.



- |  |   |
|--|---|
| <b>1</b> User logs into their Active Directory domain.                               | <b>2</b> The Kerberos KDC authenticates the user and sends a Ticket Granting Ticket (TGT) to the user's computer. |
| <b>3</b> The user connects to Tableau Server in Tableau Desktop or in a web browser. | <b>4</b> Tableau Server authenticates the user.   |

## Kerberos Requirements

You can configure Kerberos authentication for Tableau Server running in Active Directory environments.

### General requirements

- **External Load Balancer/Proxy Server:** If you are going to use Tableau Server with Kerberos in an environment that has external load balancers (ELBs) or proxy server, you need to set these up before you configure Kerberos in the Tableau Server Configuration utility. See [Configuring Proxies and Load Balancers for Tableau Server](#).
- **iOS Browser Support:** An iOS user can use Kerberos authentication with mobile Safari if a Configuration Profile specifying the user's Kerberos identity is installed. See [Configuring an iOS Device for Kerberos Support](#) in the Tableau Mobile Help. For more information about browser support for Kerberos SSO, see [Tableau Client Support for Kerberos SSO](#).
- Tableau Server supports constrained delegation for authentication to data sources. In this scenario, the Tableau data access account is specifically granted rights to the target database SPNs. Unconstrained delegation is not supported.
- The supported data sources (SQL Server, MSAS, PostgreSQL, Hive/Impala and Teradata) must be configured for Kerberos authentication.
- A keytab file that is configured with the service provider name for the Tableau Server for user authentication. For more information, see [Understanding Keytab Requirements](#).
- Beginning in Tableau Server 2021.2.25, 2021.3.24, 2021.4.19, 2022.1.15, 2022.3.7 and 2023.1.3 (or later), ensure keytab files are created with AES-128 or AES-256 ciphers. RC4 and 3DES ciphers are no longer supported. For more information, see ["Tableau Server could not authenticate you automatically"](#) in the Tableau Knowledge Base.

### Active Directory requirements

You must meet the following requirements to run Tableau Server with Kerberos in an Active Directory environment:

- Tableau Server must use Active Directory (AD) for authentication.
- The domain must be an AD 2003 or later domain for Kerberos connections to Tableau Server.
- Smart Card Support: Smart cards are supported when users sign into their workstations with a smartcard and this results in a Kerberos TGT being granted to the user from Active Directory.
- Single-Sign On (SSO): Users must be granted a Kerberos Ticket Granting Ticket (TGT) from Active Directory when they sign into their computers. This is standard behaviour for domain-joined Windows computers and standard for Mac computers that use AD as their network account server. For more information on using Mac computers and Active Directory, see [Join your Mac to a network account server](#) in the Apple Knowledge Base.

## Kerberos delegation

For Kerberos delegation scenarios the following are required:

- If the domain is AD 2003 or later, single domain Kerberos delegation is supported. The users, Tableau Server and backend database must be on the same domain.
- If the domain is AD 2008, there is limited cross domain support. Users from other domains can be delegated if the following conditions are met. Tableau Server and the backend database must be on the same domain, and a two way trust is required between the domain where Tableau Server resides and the user's domain.
- If the domain is 2012 or later, full cross-domain delegation is supported. AD 2012 R2 is preferred because it has a dialog for configuring constrained delegation, while 2012 non-R2 requires manual configuration.

Understanding Keytab Requirements

Kerberos authentication relies on credentials that are stored in specially formatted files called keytab files. You may need to generate keytab files for your Tableau Server deployment. This topic describes the keytab files that Tableau Server uses to access various services in a typical organisation. You may need to generate keytabs for Tableau Server to integrate into the following services:

- User authentication (SSO) in Windows Active Directory
- Data source delegation
- Operating system
- Directory service

**Important:** Beginning in Tableau Server 2021.2.25, 2021.3.24, 2021.4.19, 2022.1.15, 2022.3.7 and 2023.1.3 (or later), ensure keytab files are created with AES-128 or AES-256 ciphers. RC4 and 3DES ciphers are no longer supported. For more information, see ["Tableau Server could not authenticate you automatically"](#) in the Tableau Knowledge Base.

If your organisation includes IT professionals who handle identity, authentication, and/or security, then you should work with them to create a plan for generating appropriate keytabs for your Tableau Server deployment.

User authentication (SSO) in Windows Active Directory

If you will be using Active Directory as the identity store for Tableau Server, and you want users to authenticate with Kerberos SSO, then you will need to generate a keytab file for Tableau Server.

Tableau is running on...	Need to manually generate a keytab?
Windows in Active Directory domain	Yes
Linux in Active Directory domain	Yes
Windows or Linux in non-Active Directory environment	Kerberos SSO is not a supported scenario.



Follow these recommendations (for Windows and Linux versions of Tableau Server):

- Create a service account in your directory for Tableau Server.
- Create a keytab specifically for the Tableau Server service account. Do not reuse the keytab file that the computer account/OS uses to authenticate. You may use the same keytab for Kerberos SSO as you use for the directory authentication in the scenario above.
- You must create service principal names (SPN) in Active Directory for the Tableau Server service.
- Use the batch file in the next section to create the SPNs and the keytab file.
- After you have created the SPNs, upload the keytab file as described in [Configure Kerberos](#).

### Batch file: Set SPN and create keytab in Active Directory

You can use a batch file to set the service principal names (SPN) and create a keytab file. These operations are a part of the process to enable Kerberos SSO for Tableau Server (on Windows or Linux) running in Active Directory.

In previous versions of Tableau Server (before 2018.2), the configuration script was generated from the Tableau Server Configuration utility.

To generate a configuration script, copy and paste the following batch file contents into a text file. The batch file creates service principal names (SPN) for Tableau Server and will create a keytab file for the user you specify in the file.

Follow the directions in the file contents. After you have finished customising the file, save it as a .bat file.

This file must be run in an Active Directory domain by a Domain admin, who will be prompted for the service account password of the account you specify in the file.

The batch file uses the Windows [set](#), [setspn](#), and [ktpass](#) commands.

**Note:** The batch file below is self-documented. However, if you do not have experience with Kerberos and generating keytab files, we recommend that you read the Microsoft blog post, [All you need to know about Keytab files](#), before proceeding. Environmental details in your organisation may require additional configuration of the ktpass command. For example, you must determine what to set for the `/crypto` parameter. We recommend specifying a single `/crypto` value that is required by your KDC. See the Microsoft article, [ktpass](#) for the full list of supported values for the `/crypto` parameter.

## SPN and keytab batch file contents

**Beginning in Tableau Server 2022.3, 2022.1.8, 2021.4.12, 2021.3.17, 2021.2.18, 2021.1.20 and 2020.4.23**

```
@echo off
setlocal EnableDelayedExpansion

REM *****

REM This script generates the Service Principal Names (SPNs) and
keytab files required for
REM Kerberos SSO with Apache.
REM This script executes set, setspn, and ktpass commands included
in any Windows Server
REM Operating System from 2003 on.
REM Before running this script you must enter configuration inform-
ation for the setspn and
REM ktpass commands.
REM Elements that require your configuration information are
enclosed in as such:
REM ! -- and --!.
REM After you customize this file, save it as a .bat file, and run
on a domain-joined
REM computer.
```

## Tableau Server on Windows Help

```
REM This script must be run by a Domain admin.

REM *****

REM The following set command will prompt the domain admin for cre-
dentials of the
REM Tableau Server service account.
REM This account must be a valid domain user account.
REM If the password contains a literal \" (backslash - double
quote), all backslashes
REM immediately before the double quote must be
REM duplicated when typed for the password to work, e.g. if password
contains
REM \" replace with \\\", if passwords contains \\" replace with
\\\\\"

set /p adpass= "Enter password for the Tableau Server service
account."
set adpass=!adpass:=\"=!

REM *****

REM The following setspn commands create the SPN in the domain.
REM More information on setspn can be found here:
REM http://technet.microsoft.com/en-us/library/cc731241\(WS.10\).aspx
REM Enter the canonical FQDN and the host names for Tableau Server
followed by the
REM Tableau Server service account name.
REM Use this syntax: HTTP/hostname domain\service_account_name.
REM The example below shows syntax for a computer named "tableau01"
in the "example.lan"
REM domain, with service account, "tab-serv-account":
REM setspn -s HTTP/tableau01 example\tab-serv-account
REM setspn -s HTTP/tableau01.example.lan example\tab-serv-account
REM DNS and AD are not case sensitive, but the keytab files are.
Verify that host names
```

```

REM match letter case as stored in DNS.
REM Use Windows Server's DNS Manager utility to verify host name
case.

REM *****

echo Creating SPNs...
setspn -s HTTP/!--replace with canonical host name and service
account --!
setspn -s HTTP/!--replace with canonical FQDN and service account -
-!

REM *****

REM The following commands create the keytab file in the same dir-
ectory where the
REM bat file is run. More information on ktpass can be found here:
REM https://docs.microsoft.com/en-us/windows-server-
/administration/windows-commands/ktpass
REM Note: keytab files are case-sensitive.
REM The realm following the FQDN should be all uppercase.
REM Syntax is:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass!
REM /pttype KRB5_NTPRINCIPAL /crypto !--cipher--! /out
keytabs\kerberos.keytab
REM Best practice: specify the /crypto value that is required by
your KDC.
REM Options for /crypto = {DES-CBC-CRC|DES-CBC-MD5|AES256-
SHA1|AES128-SHA1|All}
REM Do not specify /crypto All because it will result in a keytab
that contains ciphers that are not supported
REM and cause errors.
REM When using AES256-SHA1 OR AES128-SHA1, the /mapuser option must
be included
REM in the ktpass command to ensure the keytab file is mapped

```

## Tableau Server on Windows Help

```
properly to the user. For example:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass! /ptype KRB5_NT_PRINCIPAL /mapuser <domain\username> /crypto
AES256-SHA1 /out keytabs\kerberos.keytab
REM The following example shows the ktpass syntax with the
example.lan configuration from above:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass! /ptype KRB5_NT_PRINCIPAL /crypto DES-CBC-CRC /out keyt-
abs\kerberos.keytab

REM *****

echo Creating Keytab files in %CD%\keytabs
mkdir keytabs
ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !adpass!
/ptype KRB5_NT_PRINCIPAL /crypto DES-CBC-CRC /out keyt-
abs\kerberos.keytab
```

### For earlier versions of Tableau Server

```
@echo off
setlocal EnableDelayedExpansion

REM *****

REM This script generates the Service Principal Names (SPNs) and
keytab files required for
REM Kerberos SSO with Apache.
REM This script executes set, setspn, and ktpass commands included
in any Windows Server
REM Operating System from 2003 on.
REM Before running this script you must enter configuration inform-
ation for the setspn and
REM ktpass commands.
REM Elements that require your configuration information are
enclosed in as such:
```

```

REM  ! -- and --!.
REM After you customize this file, save it as a .bat file, and run
on a domain-joined
REM computer.
REM This script must be run by a Domain admin.

REM *****

REM The following set command will prompt the domain admin for cre-
dentials of the
REM Tableau Server service account.
REM This account must be a valid domain user account.
REM If the password contains a literal \" (backslash - double
quote), all backslashes
REM immediately before the double quote must be
REM duplicated when typed for the password to work, e.g. if pass-
word contains
REM \" replace with \\\", if passwords contains \\" replace with
\\\\\"

set /p adpass= "Enter password for the Tableau Server service
account."
set adpass=!adpass:="\!"

REM *****

REM The following setspn commands create the SPN in the domain.
REM More information on setspn can be found here:
REM http://technet.microsoft.com/en-us/library/cc731241\(WS.10\).aspx

REM Enter the canonical FQDN and the host names for Tableau Server
followed by the
REM Tableau Server service account name.
REM Use this syntax: HTTP/hostname domain\service_account_name.
REM The example below shows syntax for a computer named "tableau01"
in the "example.lan"

```

## Tableau Server on Windows Help

```
REM domain, with service account, "tab-serv-account":
REM setspn -s HTTP/tableau01 example\tab-serv-account
REM setspn -s HTTP/tableau01.example.lan example\tab-serv-account
REM DNS and AD are not case sensitive, but the keytab files are.
Verify that host names
REM match letter case as stored in DNS.
REM Use Windows Server's DNS Manager utility to verify host name
case.

REM *****

echo Creating SPNs...
setspn -s HTTP/!--replace with canonical host name and service
account --!
setspn -s HTTP/!--replace with canonical FQDN and service account -
-!

REM *****

REM The following commands create the keytab file in the same dir-
ectory where the
REM bat file is run. More information on ktpass can be found here:
REM https://docs.microsoft.com/en-us/windows-server-
/administration/windows-commands/ktpass
REM Note: keytab files are case-sensitive.
REM The realm following the FQDN should be all uppercase.
REM Syntax is:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass!
REM /pttype KRB5_NTPRINCIPAL /crypto !--cipher--! /out
keytabs\kerberos.keytab
REM Best practice: specify the /crypto value that is required by
your KDC.
REM Options for /crypto = {DES-CBC-CRC|DES-CBC-MD5|RC4-HMAC-
NT|AES256-SHA1|AES128-SHA1|All}
REM Specifying /crypto All will result in passwords stored with RC4
```

```

cipher, which is
REM no longer considered secure.
REM When using AES256-SHA1 OR AES128-SHA1, the /mapuser option must
be included
REM in the ktpass command to ensure the keytab file is mapped prop-
erly to the user. For example:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass! /ptype KRB5_NT_PRINCIPAL /mapuser <domain\username> /crypto
AES256-SHA1 /out keytabs\kerberos.keytab
REM The following example shows the ktpass syntax with the
example.lan configuration from above:
REM ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !ad-
pass! /ptype KRB5_NT_PRINCIPAL /crypto DES-CBC-CRC /out keyt-
abs\kerberos.keytab

REM *****

echo Creating Keytab files in %CD%\keytabs
mkdir keytabs
ktpass /princ HTTP/!--FQDN--!@!--Kerberos_Realm--! /pass !adpass!
/ptype KRB5_NT_PRINCIPAL /crypto DES-CBC-CRC /out keyt-
abs\kerberos.keytab

```

### Operating system

If your organisation uses Kerberos for authentication, then the computer where Tableau Server is running must be authenticated with the Kerberos realm in which it's running.

Tableau is running on...	Need to manually generate a keytab?
Windows in Active Directory domain	No
Linux in Active Directory domain	Yes
Windows or Linux in non-Active Directory environment	Yes



## Tableau Server on Windows Help

If you are running Tableau Server on Windows, and the computer is joined to the Active Directory, then you do not need to manage or generate a keytab file for the operating system.

If you are running Tableau Server on Linux in a Kerberos realm (MIT KDC or Active Directory), then you will need to generate a keytab file specifically for the computer operating system. The keytab you create for the computer should be specifically for OS authentication. Do not use the same keytab file for OS authentication that you will be using for the other services described later in this topic.

### Directory service

If your organisation uses a directory service, such as LDAP or Active Directory, to manage user identity, then Tableau Server requires read-only access to the directory.

Alternatively, you can configure Tableau Server to manage all accounts by installing with a local identity store. In this case, you do not need a keytab.

The following table summarises keytab requirements:

<b>Tableau is running on...</b>	<b>Directory service</b>	<b>Need to manually generate a keytab?</b>
Windows in AD domain	Active Directory	No
Windows	LDAP (GSSAPI bind)	Yes
Linux	Active Directory or LDAP (GSSAPI bind)	Yes
Windows or Linux	Active Directory or LDAP (Simple bind)	No
Windows or Linux	Local identity store	No keytab required.

If you need to manually generate a keytab for this scenario, then you will use it for GSSAPI bind to the directory. Follow these recommendations:

- Create a service account in your directory for Tableau Server.
- Create a keytab specifically for the Tableau Server service account. Do not reuse the keytab file that the computer account/OS uses to authenticate.
- Upload the keytab file as part of the json configuration of the Tableau Server identity store. See `identityStore Entity`.

As part of your disaster recovery plan, we recommend keeping a backup of the keytab and conf files in a safe location off of the Tableau Server. The keytab and conf files that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the files are not stored in a recoverable format. See [Tableau Server Client File Service](#).

### Datasource delegation

You can also use Kerberos delegation to access data sources in an Active Directory. In this scenario, users can be authenticated to Tableau Server with any supported authentication mechanism (SAML, local authentication, Kerberos, etc), but can access datasources that are enabled by Kerberos.

Follow these recommendations:

- The computer account for Tableau Server (Windows or Linux) must be in Active Directory domain.
- The keytab file that you use for Kerberos delegation can be the same keytab that you use for Kerberos user authentication (SSO).
- The keytab must be mapped to the service principal for Kerberos delegation in Active Directory.
- You may use the same keytab for multiple data sources.

For more information, see the following configuration topics:

- Tableau Server on Linux: [Enable Kerberos Delegation](#)
- Tableau Server on Windows: [Enabling Kerberos Delegation](#)

## Configure Kerberos

You can configure Tableau Server to use Kerberos. This allows you to provide a single sign-on (SSO) experience across all the applications in your organisation. Before you configure Tableau Server for Kerberos make sure your environment meets the Kerberos Requirements.

**Note:** Kerberos constrained delegation for SSO to Tableau Server is not supported. (Constrained delegation for data sources is supported.) For more information, see Single-Sign On (SSO) in Kerberos Requirements.

To configure Kerberos, you must first enable Kerberos, and then specify a keytab file for user authentication. The keytab file you specify must be configured with the service provider name for the Tableau Server for user authentication. If you are using Kerberos authentication for data sources, those credentials should be included in the single keytab file that you will specify during Kerberos configuration on Tableau Server.

As part of your disaster recovery plan, we recommend keeping a backup of the keytab file in a safe location off of the Tableau Server. The keytab file that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the file is not stored in a recoverable format. See Tableau Server Client File Service.

## Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click User **Identity & Access** on the **Configuration** tab and then click **Authentication Method**.
3. Under **Authentication Method**, select **Kerberos** in the drop-down menu.

- Under Kerberos, select **Enable Kerberos for single sign-on (SSO)**.
- To copy the keytab file to the server, click **Select File**, and then browse to the file on your computer.

- Click **Save Pending Changes** after you've entered your configuration information.
- Click **Pending Changes** at the top of the page:



- Click **Apply Changes and Restart**.

#### Use the TSM CLI

- If you are running Tableau Server on in a distributed cluster deployment, then you will need to manually distribute the keytab file to each node and then set the permissions. Copy the keytab file to the same directory on each node in the cluster. After you have copied the keytab file to each node and set permissions on the file, then run the following TSM commands on one node. The configuration will propagate to each node.
- Type the following command to specify the location and name of the keytab file:

## Tableau Server on Windows Help

```
tsm authentication kerberos configure --keytab-file <path-to-keytab_file>
```

3. Type the following command to enable Kerberos:

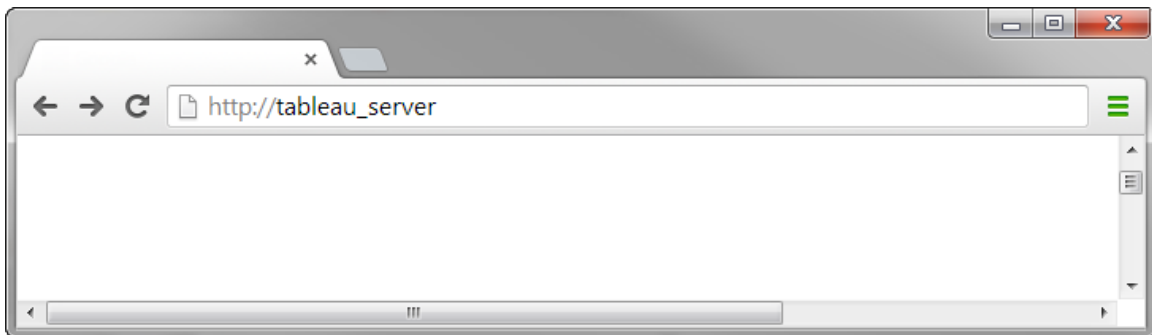
```
tsm authentication kerberos enable
```

4. Run `tsm pending-changes apply` to apply changes.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Confirm your SSO configuration

Once Tableau Server has restarted, test your Kerberos configuration from a web browser on a different computer by typing the Tableau Server name in the URL window:



You should be automatically authenticated to Tableau Server.

### Tableau Client Support for Kerberos SSO

This article describes some requirements for and nuances with using Kerberos single sign-on (SSO) with Tableau Server, depending on the particular Tableau client and operating system.

Tableau clients covered in this article include common web browsers, Tableau Desktop, and the Tableau Mobile app.

### General browser client support

To use browser-based Kerberos Single Sign-on (SSO), the following must be true:

- Kerberos must be enabled on Tableau Server.
- The user must have a user name and password to sign in to Tableau Server.

**Note:** When Kerberos SSO fails, users can fall back on their username and password credentials, if a fall-back is set up.

- The user must be authenticated to Active Directory through Kerberos on the client computer or mobile device. Specifically, this means that they have a Kerberos Ticket Granting Ticket (TGT).

### Tableau Desktop and browser clients

On Windows or the Mac, you can use Kerberos SSO to sign in to Tableau Server from the following versions of Tableau Desktop or browser. Where noted, additional configuration is required.

#### Windows

- Tableau Desktop 10.3 or later supported.
- Internet Explorer - supported, may require configuration - see [Note 1](#)
- Chrome - supported, may require configuration - see [Note 1](#)
- Firefox - requires configuration - see [Note 2](#)
- Safari - not supported

#### Mac OS X

- Tableau Desktop 10.3 or newer
- Safari - supported
- Chrome - see [Note 3](#)
- Firefox - see [Note 2](#)
- Internet Explorer - not supported

### Tableau Mobile app clients

On a iOS or Andoid device, you can use the following Tableau Mobile or mobile browser versions to use Kerberos authentication to Tableau Server:

#### iOS

- Tableau Mobile app- see [Note 4](#)
- Safari - see [Note 4](#)
- Chrome - not supported

#### Android - see [Note 5](#)

- Tableau Mobile app
- Chrome

### Operating system and browser-specific notes

The following notes describe configuration requirements or issues with specific operating system and client combinations.

## Note 1: Internet Explorer or Chrome on Windows desktop

Kerberos SSO is supported in both Internet Explorer and Chrome, but it requires configuration in **Windows Internet Options**:

1. Enable **Integrated Windows Authentication**.
2. Verify that Tableau Server URL is in the local intranet zone.

Internet Explorer can sometimes detect intranet zones and configure this setting. If it has not detected and configured the Tableau Server URL, you must manually add the URL to the local intranet zone.

To enable Integrated Windows Authentication:

1. In Windows Control Panel, open **Internet Options**.
2. On the **Advanced** tab scroll down to the **Security** section.

3. Select **Enable Integrated Windows Authentication**.
4. Click **Apply**.

To verify or add the Tableau Server URL to the local intranet zone:

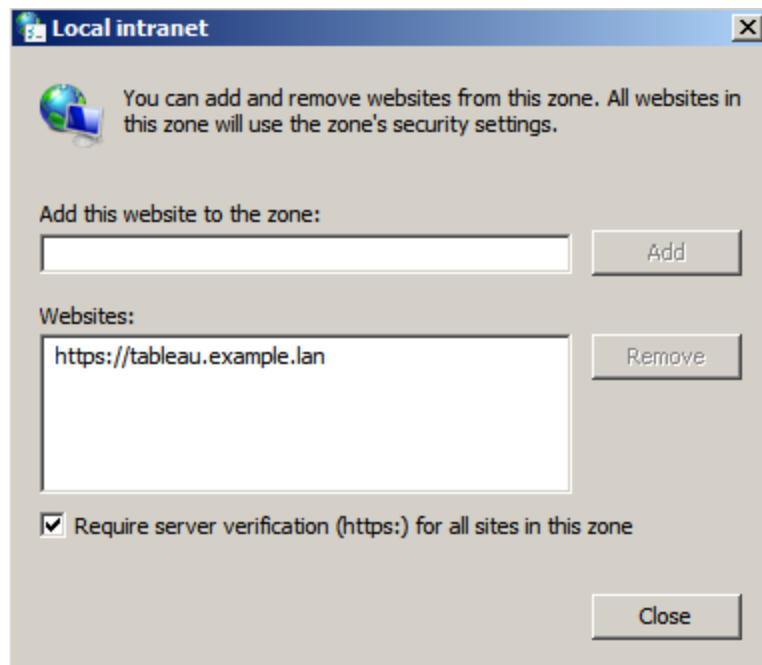
1. In Windows Control Panel, open **Internet Options**.
2. On the **Security** tab, select **Local intranet**, and then click **Sites**.
3. On the **Local intranet** dialog box, click **Advanced**.

In the **Websites** field, look for the internal Tableau Server URL.

In some organisations, IT administrators will use a wildcard (\*) to specify internal URLs. For example, the following URL includes all servers in the internal `example.lan` namespace in the local intranet zone:

```
https://*.example.lan
```

The following image shows a specific URL of `https://tableau.example.lan`.





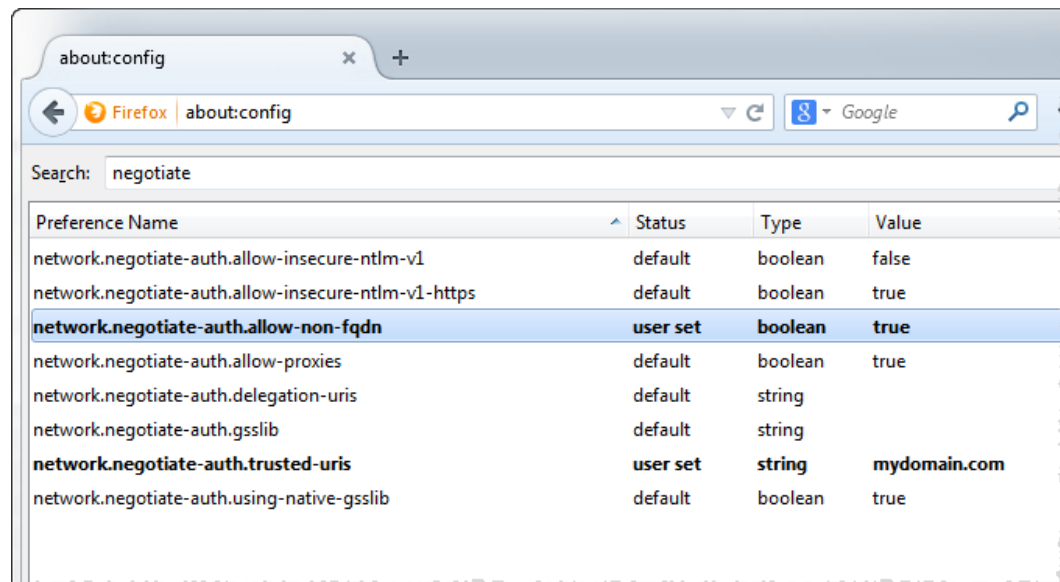
4. If the Tableau Server URL or a wildcard URL is not specified in the **Websites** field, enter the Tableau Server URL in the **Add the website to the zone** field, click **Add**, and then click **OK**.

If the Tableau Server URL is already listed in **Websites**, you can simply close the dialog.

## Note 2: Firefox on Windows or Mac OS X desktop

You can use Firefox with Kerberos SSO on either Windows or Mac to sign in to Tableau Server. To do this, you must complete the following steps to configure Firefox to support Kerberos:

1. In Firefox, enter `about:config` in the address bar.
2. Click **I'll be careful, I promise** when warned about changing advanced settings.
3. Enter `negotiate` in the **Search** box.



4. Double-click **`network.negotiate-auth.allow-non-fqdn`**, and then set the value to **true**.

5. Double-click **network.negotiate-auth.trusted-uris** and enter the Tableau Server fully qualified domain name (FQDN). For example, `tableau.example.com`.

## Note 3: Chrome on Mac OS X desktop

According to Chrome documentation, Kerberos SSO works on a Mac when you launch Chrome from a terminal window with the following command:

```
open -a "Google Chrome.app" --args --auth-server-whitel-  
ist="tableauserver.example.com"
```

where `tableauserver.example.com` is the URL for Tableau Server in your environment.

However, we have found inconsistent results in our testing. Therefore, if you want to use Kerberos SSO on a Mac, we recommend that you use Safari or Firefox. For more information, see the *Integrated Authentication* section at [HTTP authentication](#) on The Chromium Projects site.

**Note:** Users can still use Chrome on Mac OS X to sign in to Tableau Server, but they might be prompted to enter their user name and password (single sign-on may not work).

## Note 4: Mobile Safari or Tableau Mobile on iOS

Kerberos SSO is supported if iOS is configured for Kerberos. The iOS device must have a Kerberos authentication configuration profile installed. This is usually done by an enterprise IT group. Tableau Support cannot assist with configuring iOS devices for Kerberos. See the [authentication topic](#) in the *Tableau Mobile Deployment Guide*.

## Note 5: Android platform

Kerberos SSO is not supported on the Tableau Mobile app on the Android operating system. You can still use your Android device and the Tableau Mobile app or a supported mobile browser to connect to Tableau Server if Kerberos has a fall-back set up for when SSO fails to

accept username and password authentication. In this scenario, rather than authenticating with Kerberos, users will be prompted to enter their credentials when accessing Tableau Server.

## More information

- *Tableau Mobile Deployment Guide*: [Control authentication and access for Tableau Mobile](#)
- See *Web Browsers* under [Tableau Server Tech Specs](#)

### Troubleshoot Kerberos

The troubleshooting suggestions in this topic are divided into issues related to single sign-on (SSO) on the server and issues with the delegated data sources.

### Single sign-on to Tableau Server

In a Kerberos SSO environment, a user signing in to Tableau Server from a web browser or Tableau Desktop might see a message indicating that Tableau Server can't sign them in automatically (using single sign-on). It suggests that they provide a Tableau Server user name and password instead.



## Troubleshooting sign-in errors on the client computer

- **Enter the user name and password** – To check the user's general access to Tableau Server, sign in by entering the user's name and password.

If these credentials fail, the user might not be a user on Tableau Server. For Kerberos SSO to work, the user must be able to access Tableau Server, and they must be granted a Ticket Granting Ticket (TGT) by Active Directory (as described in the **TGT** item later in this list).

- **Check other users' SSO credentials** – Try to connect with SSO to Tableau Server using other user accounts. If all users are affected, the problem might be in the Kerberos configuration.
- **Use a computer other than the server computer** – Kerberos SSO does not work when you sign in to Tableau Server on localhost. Clients must connect from a computer other than the Tableau Server computer.
- **Use a server name, not IP address** – Kerberos SSO does not work if you enter an IP address as the Tableau Server name. In addition, the server name you use to access Tableau Server must match the name used in the Kerberos configuration (see [Key table entry](#), below).
- **Confirm that the client has TGT** – The client computer must have a TGT (Ticket Granting Ticket) from the Active Directory domain. Constrained delegation, with the proxy granting a ticket, is not supported.

To confirm the client computer has a TGT, do the following:

- On Windows, open a command prompt and type the following: `klist tgt`
- On the Mac, open a terminal window and type the following: `klist`

The output should show a TGT for the user/domain trying to authenticate to Tableau Server.

The client computer might not have a TGT in the following circumstances:

- The client computer is using a VPN connection.
  - The client computer is not joined to the domain (for example, it is a non-work computer being used at work).
  - The user signed in to the computer with a local (non-domain) account.
  - The computer is a Mac that is not using Active Directory as a network account server.
- **Confirm browser version and settings** – For web browser sign-in, make sure the browser is supported for Kerberos and, if necessary, is configured correctly.
    - Internet Explorer (IE) and Chrome work “out of the box” on Windows.
    - Safari works “out of the box” on the Mac.
    - Firefox requires additional configuration.

For more information, see Tableau Client Support for Kerberos SSO.

## Troubleshooting sign-in errors on the server

If you cannot solve the problem from the client computer, your next steps are to troubleshoot on the computer running Tableau Server. The administrator can use the request ID to locate the sign-in attempt in the Apache logs on Tableau Server.

- **Log files** – Check the Apache error.log for an error with the exact time/date of the failed sign-in attempt.
  - In a ziplog archive, these logs are in the \httpd folder.
  - On Tableau Server, these logs are in the \data\tabsvc\logs\httpd\ folder.

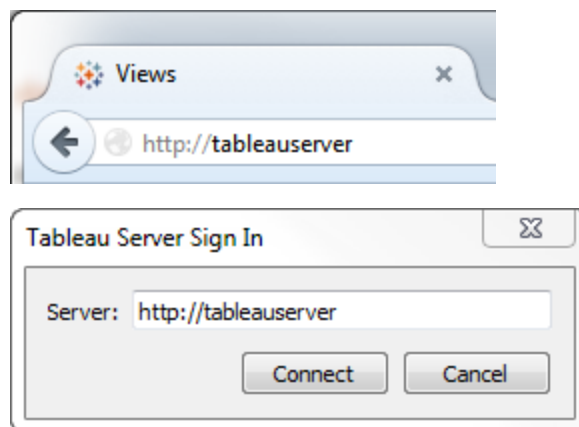
- **Key table entry** – If the error.log entry includes the message, “No key table entry matching HTTP/<servername>.<domain>.<org>@”, for example:

```
[Fri Oct 24 10:58:46.087683 2014] [:error] [pid 2104:tid 4776]  
[client 10.10.1.62:56789] gss_acquire_cred() failed: Unspe-  
cified GSS failure. Minor code may provide more information (  
No key table entry found matching HTTP/servername.domain.com@)
```

This error is a result of a mismatch of any of the following:

- **Tableau Server URL** - The URL used by the client computer to access the server.

This is the name that you type into Tableau Desktop or a browser address bar. It could be a shortname (`http://servername`) or a fully-qualified domain name (`http://servername.domain.com`)



- **DNS reverse lookup** for the server IP address.

This looks up a DNS name using an IP address.

At a command prompt type:

```
ping servername
```

with the IP address returned by pinging the server, do a reverse DNS lookup type:

```
nslookup <ip address>
```

The nslookup command will return network information for the IP address. In the *Non-authoritative answer* portion of the response, verify that the fully qualified domain name (FQDN) matches the following configured values:

- The Kerberos .keytab file
- Service Principal Name (SPN) for the server

For more information about configuring these values, see [Understanding Keytab Requirements](#).

## Verify Kerberos configuration script

You may need to modify the ktpass command that you used to generate the keytab file for environmental variables. Review the troubleshooting steps in the Knowledge Base article, [Unable to Generate Kerberos Script Configuration for Tableau Server](#).

Data source SSO

## Delegated data source access failures

Check the vizqlserver log files for "workgroup-auth-mode."

- In a ziplog archive, these logs are in the \vizqlserver\Logs folder
- On the Tableau Server, these logs are in the \data\tabsvc\vizqlserver\Logs folder

Look for "workgroup-auth-mode" in the log files. It should say "kerberos-impersonate" not "as-is".

## Kerberos delegation multi-domain configuration

Tableau Server can delegate users from other Active Directory domains. If your database uses MIT Kerberos, you may need to adjust your Kerberos principal to database user mapping. Specifically, you will need to update `krb5.conf` with rules for each Kerberos realm that users will connect from. Use the `auth_to_local` tag in the `[realms]` section to map principal names to local user names.

For example, consider a user, `EXAMPLE\jsmith`, whose Kerberos Principal is `jsmith@EXAMPLE.LAN`. In this case, Tableau Server will specify a delegated user, `jsmith@EXAMPLE`. Tableau Server will use the Active Directory legacy domain alias as the Kerberos Realm.

The target database may already have a rule such as the following to map the user, `jsmith@EXAMPLE.LAN` to the database user, `jsmith`.

```
EXAMPLE.LAN = {
    RULE:[1:$1@$0] (. *@EXAMPLE.LAN) s/@.*//
    DEFAULT
}
```

To support delegation, you must add another rule to map `jsmith@EXAMPLE` to a database user:

```
EXAMPLE.LAN = {
    RULE:[1:$1@$0] (. *@EXAMPLE.LAN) s/@.*//
    RULE:[1:$1@$0] (. *@EXAMPLE) s/@.*//
    DEFAULT
}
```

See the MIT Kerberos Documentation topic, [krb5.conf](#), for more information.



## Cross-domain constrained delegation

In some cross-domain scenarios where the KDC is running on a Windows Server prior to Windows 2012, delegation may fail. Errors you may see include:

- SQL Server Network Interfaces: The system cannot contact a domain controller to service the authentication request. Please try again later.
- SQL Server Native Client: Cannot generate SSPI context.
- The Domain Controller returns: KRB-ERR-POLICY error with a status `STATUS_CROSSREALM_DELEGATION_FAILURE (0xc000040b)`.

Cross-domain refers to a scenario where Tableau Server is running in a different domain than the data source with different service accounts. For example:

- Tableau Server runs on DomainA with DomainA service account.
- SQL Server runs on DomainB with DomainB service account.

Traditional constrained delegation only works if both servers are in the same domain. The user can come from other domains.

If you are seeing the errors noted above, then to enable this scenario, your Active Directory administrator should remove any traditional constrained delegation which is configured on the delegating account. Removing delegation can be achieved with Active Directory management tools or by removing the values associated with the Active Directory property, `msDS-AllowedToDelegateTo`.

If you want to preserve an existing single domain delegation alongside cross-domain delegation, you must configure both using resource-based constrained delegation.

For more information about Kerberos and constrained delegation, see the Microsoft topic, [Kerberos Constrained Delegation Overview](#).

## Web authoring

There are two web authoring scenarios that do not support Kerberos delegation: "Connect to data on the web" and "Create datasource on the web" feature does not support delegation yet.

Specifically, if you create a datasource that uses Kerberos on the with web authoring, the data source will use Run As service account authentication. If you want to use Kerberos delegation to create a datasource, then you must publish with Tableau Desktop. For more information on Run As service account, see [Data Access with the Run As Service Account](#).

## Configure Mutual SSL Authentication

Using mutual SSL, you can provide users of Tableau Desktop, Tableau Mobile, and other approved Tableau clients a secure, direct-access experience to Tableau Server. With mutual SSL, when a client with a valid SSL certificate connects to Tableau Server, Tableau Server confirms the existence of the client certificate and authenticates the user, based on the user name in the client certificate. If the client does not have a valid SSL certificate, Tableau Server can refuse the connection.

You can also configure Tableau Server to fall back to username/password authentication if mutual SSL fails. Additionally, a user can log in using the REST API with a username and password (if one exists) whether or not fallback authentication is configured.

### User authentication session time limits

When users log in with mutual SSL, the authentication session is governed by the same method that governs the Tableau Server global authentication session configuration.

For clients that connect to Tableau Server using a web browser, configuration of the global authentication session is described in the *Security Hardening Checklist*, see 10. Verify session lifetime configuration.

Sessions for connected clients (Tableau Desktop, Tableau Mobile, Tableau Prep Builder and Bridge) use OAuth tokens to keep users logged in by re-establishing a session. By default, OAuth client tokens reset after a year. If a client token has not been used in 14 days, then it will expire. You can change these values by setting the `refresh_token.absolute_expiry_in_seconds` and `refresh_token.idle_expiry_in_seconds` options. See [tsm configuration set Options](#).

### Certificate usage

Before you enable and configure mutual SSL, you must configure external SSL. External SSL authenticates Tableau Server to the client and encrypts the session using the certificate and key that is required when you configure external SSL.

For mutual SSL, an additional certificate file is required. The file is a concatenation of CA certificate files. The file type must be `.cert`. A "CA" is a *certificate authority* that issues certificates to the client computers that will connect to Tableau Server. The action of uploading the CA certificate file establishes a trust, which enables Tableau Server to authenticate the individual certificates that are presented by the client computers.

As part of your disaster recovery plan, we recommend keeping a backup of the certificate and revocation (if applicable) files in a safe location off of the Tableau Server. The certificate and revocation files that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the files are not stored in a recoverable format. See Tableau Server Client File Service.

### RSA key and ECDSA curve sizes

The CA certificate used for mutual SSL must either have an RSA key strength of 2048, or ECDSA curve size of 256.

.You can configure Tableau Server to accept the less secure sizes by setting the respective configuration keys:

- `ssl.client_certificate_login.min_allowed.rsa_key_size`
- `ssl.client_certificate_login.min_allowed.elliptic_curve_size`

See tsm configuration set Options.

### Client certificate requirements

Users authenticating to Tableau Server with mutual SSL must present a client certificate that meets minimum security requirements.

### Signing algorithm

Client certificates must use a SHA-256 or greater signing algorithm.

Tableau Server configured for mutual SSL authentication will block authentication of users with client certificates that use the SHA-1 signing algorithm.

Users who attempt to log in with SHA-1 client certificates encounter an "Unable to sign in" error, and the following error will be visible in the VizPortal logs:

```
Unsupported client certificate signature detected: [certificate Signature Algorithm name]
```

You can configure Tableau Server to accept the less secure SHA-1 signing algorithm by setting the `ssl.client_certificate_login.blocklisted_signature_algorithms` tsm configuration option.

### **RSA key and ECDSA curve sizes**

The client certificate used for mutual SSL must either have an RSA key strength of 2048, or ECDSA curve size of 256.

Tableau Server will fail mutual authentication requests from client certificates that do not meet these requirements. You can configure Tableau Server to accept the less-secure sizes by setting the respective configuration keys:

- `ssl.client_certificate_login.min_allowed.rsa_key_size`
- `ssl.client_certificate_login.min_allowed.elliptic_curve_size`

See [tsm configuration set Options](#).

Use the TSM web interface

1. Configure SSL for External HTTP Traffic to and from Tableau Server.
2. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

3. On the **Configuration** tab, select **User Identity & Access > Authentication Method**.

4. Under **Authentication Method**, select **Mutual SSL** in the drop-down menu.
5. Under Mutual SSL, select **Use mutual SSL and automatic sign in with client certificates**.
6. Click **Select File** and upload your certificate authority (CA) certificate file to the server.

The file (.crt) is an all-in-one file that includes certificates of CAs that are used for client authentication. The file you upload must be a concatenation of the various PEM-encoded certificate files, in order of preference.

7. Enter remaining SSL configuration information for your organisation.

**Username format:** When Tableau Server is configured for mutual SSL, the server gets the user name from the client certificate, so it can establish a direct sign-in for the client user. The name that Tableau Server uses depends on how Tableau Server is configured for user authentication:

- Local Authentication – Tableau Server uses the UPN (User Principal Name) from the certificate.
- Active Directory (AD) – Tableau Server uses LDAP (Lightweight Directory Access Protocol) to get the user name.

Alternatively, you can set Tableau Server to use the CN (Common Name) from the client certificate.

**Authentication Method**

Specify how Active Directory manages user authentication and access to Tableau Server.

Mutual SSL ▼

**Mutual SSL**

Use mutual SSL for secure communication between Tableau Server and web clients and for automatic sign-in across all Tableau Server components. [Learn more](#)

☐ Use mutual SSL and automatic sign in with client certificates

SSL CA certificate file

☐ Use username and password if SSL authentication fails

Specify a method for retrieving the username from the certificate.

Username retrieval method

☐ LDAP (Lightweight Directory Access Protocol)

☒ UPN (User Principal Name)

☐ CN (Common Name)

8. Click **Save Pending Changes** after you've entered your configuration information.
9. Click **Pending Changes** at the top of the page:



10. Click **Apply Changes and Restart**.

Use the TSM CLI

#### Step 1: Require SSL for external server communication

To configure Tableau Server to use SSL for external communication between Tableau Server and web clients, run the `external-ssl enable` command as follows, providing the names for the server certificate's `.crt` and `.key` files:

```
tsm security external-ssl enable --cert-file <file.crt> --key-file <file.key>
```

- For `--cert-file` and `--key-file`, specify the location and file name where you saved the server's CA-issued SSL certificate (`.crt`) and key (`.key`) files.

- The above command assumes the you are signed in as a user that has the **Server Administrator** site role on Tableau Server. You can instead use the `-u` and `-p` parameters to specify an administrator user and password.
- If the certificate key file requires a passphrase, include the `--passphrase` parameter and value.

## Step 2: Configure and enable mutual SSL

Add mutual authentication between the server and each client, and allow for Tableau client users to be authenticated directly after the first time they provide their credentials.

1. Run the following command:

```
tsm authentication mutual-ssl configure --ca-cert <certificate-file.crt>
```

For `--ca-cert`, specify the location and file name of the certificate authority (CA) certificate file.

The file (.crt) is an all-in-one file that includes certificates of CAs that are used for client authentication. The file you upload must be a concatenation of the various PEM-encoded certificate files, in order of preference.

2. Run the following commands to enable mutual SSL and apply the changes:

```
tsm authentication mutual-ssl enable
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Additional options for mutual SSL

You can use `mutual-ssl configure` to configure Tableau Server to support the following options.

For more information, see [tsm authentication mutual-ssl <commands>](#).

## Fallback authentication

When Tableau Server is configured for mutual SSL, authentication is automatic and clients must have a valid certificate. You can configure Tableau Server to allow a fallback option, to accept user name and password authentication.

```
tsm authentication mutual-ssl configure -fb true
```

Tableau Server accepts username and password authentication from REST API clients, even if the above option is set to `false`.

## User name mapping

When Tableau Server is configured for mutual SSL, the server authenticates the user directly by getting the user name from their client certificate. The name that Tableau Server uses depends on how the server is configured for user authentication:

- **Local Authentication** – uses the UPN (User Principal Name) from the certificate.
- **Active Directory (AD)** – uses LDAP (Lightweight Directory Access Protocol) to get the user name.

You can override either of these defaults to set Tableau Server to use the common name.

```
tsm authentication mutual-ssl configure -m cn
```

For more information, see [Mapping a Client Certificate to a User During Mutual Authentication](#)



## Certificate Revocation List (CRL)

You might need to specify a CRL if you suspect that a private key has been compromised, or if a certificate authority (CA) did not issue a certificate properly.

```
tsm authentication mutual-ssl configure -rf <revoke-file.pem>
```

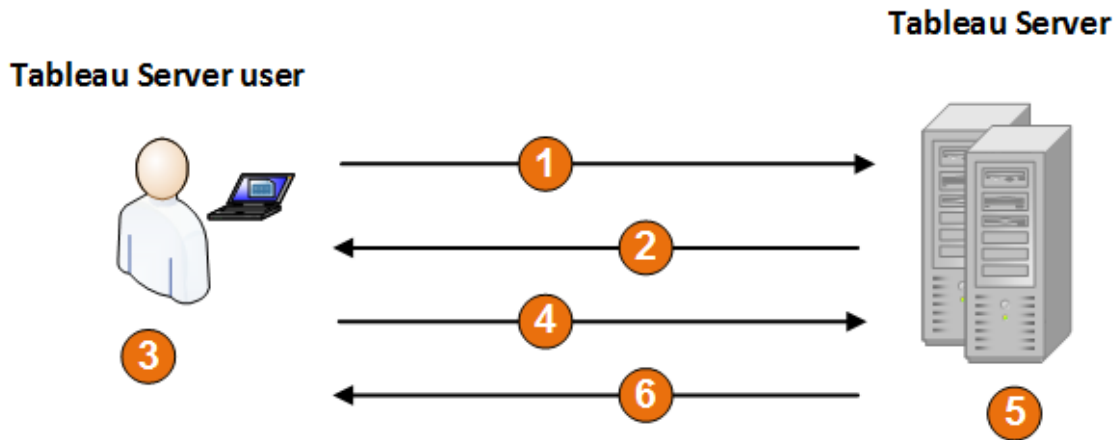
### How Mutual SSL Authentication Works

Mutual (or two-way) SSL authentication provides a combination of an encrypted data stream, mutual authentication of both server and client, and direct access convenience. To use mutual SSL with Tableau Server, you need the following:

- External SSL configured on Tableau Server.
- A trusted CA-issued SSL certificate for Tableau Server. The file is a concatenation of CA certificate files. A "CA" is a *certificate authority* that issues certificates to the client computers that will connect to Tableau Server. The action of uploading the CA certificate file establishes a trust, which enables Tableau Server to authenticate the individual certificates that are presented by the client computers.
- A certificate on each client that will connect to Tableau Server.
- A Tableau Server configured to use mutual SSL.

Tableau Server and the client verify that each other has a valid certificate, and Tableau Server authenticates the user, based on the user name in the client certificate.

The following image shows a little more detail about the sequence of events that occurs with mutual SSL.



1. The user navigates to Tableau Server.
2. Tableau Server sends its SSL certificate to the client computer.
3. The client computer verifies the Tableau Server certificate.
4. The client computer sends its certificate to Tableau Server.
5. Tableau Server verifies the client certificate.
6. Tableau Server references the user name in the client certificate to authenticate the user.

### Mapping a Client Certificate to a User During Mutual Authentication

When you use mutual (two-way) SSL authentication, the client presents its certificate to Tableau Server as part of the authentication process. Tableau Server then maps user information in the client certificate to a known user identity. The strategy that Tableau Server uses to perform client mapping depends on the content of your organisation's client certificates.

This topic discusses the ways information in a client certificate can map to a user identity, and how to change the way Tableau Server performs that mapping. To understand how the mapping happens and whether you need to change it, you must know how client certificates are structured in your organisation.

- [User-name mapping options](#)
- [Change the certificate mapping](#)
- [Address user-name ambiguity in multi-domain organisations](#)

## User-name mapping options

Tableau Server uses one of the following approaches to map a client certificate to a user identity:

- **Active Directory.** If Tableau Server is configured to use Active Directory for user authentication, when Tableau Server receives a client certificate, it passes the certificate to Active Directory, which maps the certificate to an Active Directory identity. Any explicit user name information in the certificate is ignored.

**Note:** This approach requires client certificates to be published for the user accounts in Active Directory.

- **User principal name (UPN).** A client certificate can be configured to store the user name in the user principal name field. Tableau Server reads the UPN value and maps it to a user in Active Directory or to a local user.
- **Common name (CN).** A client certificate can be configured to store the user name in the common name field of the certificate. Tableau Server reads the CN value and maps it to a user in Active Directory or to a local user.

If you configure the server for Active Directory authentication and UPN or CN user-name mapping, put the user name in one of the following formats:

`username, domain/username` **or** `username@domain`.

**For example:** `jsmith, example.org/jsmith` **or** `jsmith@example.org`.

If the server uses local authentication, the format of the name in the UPN or CN fields is not predetermined, but the name in the field must match a user name on the server.

## Change the certificate mapping

You use the `tsm authentication mutual-ssl <commands>` commands to map a client certificate to a user identity in Tableau Server:

```
tsm authentication mutual-ssl configure -m <value>
```

Possible values are `ldap` for Active Directory mapping, `upn` for UPN mapping, or `cn` for CN mapping.

When you first install and configure Tableau Server, the server sets the default user-name mapping to match the server's authentication type:

- If the server is configured to use Active Directory, it also uses Active Directory to map the certificate to the user identity.
- If the server is configured to use local authentication, the server gets the user-name value from the UPN field in the certificate.

If the default behaviour for how Tableau Server maps a user name to an identity is not correct for your server configuration, run the following set of commands to change the mapping to use the CN value:

```
tsm authentication mutual-ssl configure -m cn
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Address user-name mapping ambiguity in multi-domain organisations

In some circumstances, the user name in a certificate's UPN or CN field can be ambiguous. This ambiguity can lead to unexpected results when the user name is mapped to a user identity on the server.

For example, if Tableau Server is presented with a user name that does not include a domain, the server maps the user name to an identity using the default domain. This can cause an incorrect user-name mapping, potentially assigning a user a different user's identity and permissions.

This can occur particularly in environments where the following conditions apply:

- Your organisation supports multiple Active Directory domains.
- The server is configured to use Active Directory authentication.
- The server is configured to use UPN or CN mapping.
- Some users have the same user name but different domains. For example, `jsmith@example.org` and `jsmith@example.com`.
- The user name in the certificate's UPN or CN fields does not include the domain as part of the user name – for example, it shows `jsmith`.

To avoid incorrect user-name mapping, make sure the client certificates include fully qualified user names with the domain, using the format `jsmith@example.org` or `example.org/jsmith`.

## OpenID Connect

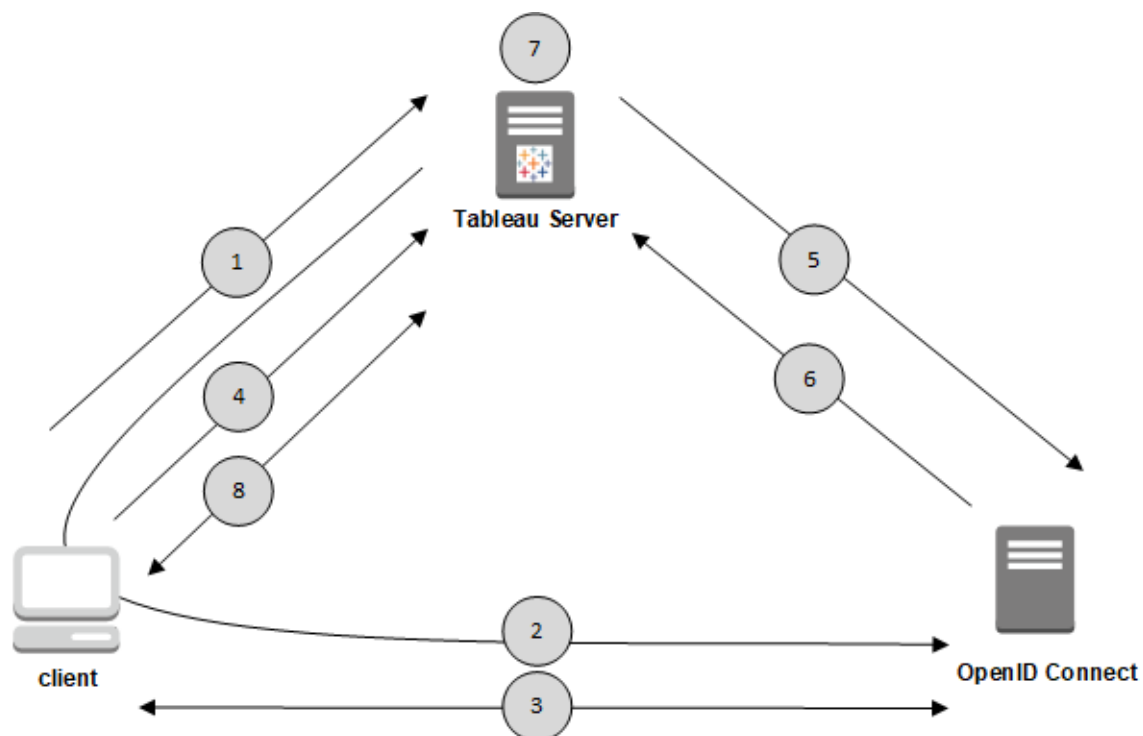
You can configure Tableau Server to support OpenID Connect (OIDC) for single sign-in (SSO). OIDC is a standard authentication protocol that lets users sign in to an identity provider (IdP) such as Google or Salesforce. After they've successfully signed in to their IdP, they are automatically signed in to Tableau Server.

Configuring OIDC involves several steps. The topics in this section provide general information about using Tableau Server with OIDC, and provide a sequence for configuring the IdP and Tableau Server.

**Note:** Unless otherwise noted, information about OIDC authentication applies to both OIDC authentication configured in TSM during Tableau Server setup or OIDC authentication configured with [identity pools](#).

#### Authentication overview

This section describes the OpenID Connect (OIDC) authentication process with Tableau Server.



1. A user attempts to log in to Tableau Server from a client computer.
2. Tableau Server redirects the request for authentication to the IdP gateway.

3. The user is prompted for credentials and successfully authenticates to the IdP. The IdP responds with a redirect URL back to Tableau Server. The redirect URL includes an authorisation code for the user.
4. The client is redirected to Tableau Server and presents the authorisation code.
5. Tableau Server presents the client's authorisation code to the IdP along with its own client credentials. Tableau Server is also a client of the IdP. This step is intended to prevent spoofing or man-in-the-middle attacks.
6. The IdP returns an access token and an ID token to Tableau Server.
  - JSON Web Token (JWT) validation: By default, Tableau Server performs a validation of the IdP JWT. During discovery, Tableau Server retrieves the public keys specified by the `jwtks_uri` in the IdP configuration discovery document. Tableau Server validates the ID token for expiry and then verifies the JSON web signature (JWS), the issuer (IdP) and the client ID. You can learn more about the JWT process in the OpenID documentation, [10. Signatures and Encryption](#), and the IETF proposed standard, [JSON Web Token](#). We recommend leaving JWT validation enabled, unless your IdP does not support it.
  - The ID token is a set of attribute key-pairs for the user. The key-pairs are called *claims*. Here is an example IdP claim for a user:

```
"sub" :  
"7gYhRR3HiRRCaRcgY50ubrtjGQBMJW4rXbpPFp-  
g2cptHP62m2sqowM7G1LwjN5"  
"email" : "alice@example.com",  
"email_verified" : true,  
"name" : "Alice Adams",  
"given_name" : "Alice",  
"family_name" : "Adams",  
"phone_number" : "+359 (99) 100200305",  
"profile" : "https://tableau.com/users/alice"
```

7. Tableau Server identifies the user from the IdP claims and completes the authentication request from step 1. Tableau Server searches for the user's account record stored in the repository by matching the "sub" (subject identifier) to identify the correct user account. If no user account is stored with the sub claim value, then Tableau Server searches for a username in the repository that matches the "email" claim from the IdP. When a username match succeeds, Tableau Server will store the corresponding sub claim to the user's record in the repository. Tableau Server can be configured to use different claims for this process. See [Requirements for Using OpenID Connect](#).

8. Tableau Server authorises the user.

#### How Tableau Server works with OpenID Connect

OpenID Connect (OIDC) is a flexible protocol that supports many options for the information that's exchanged between a service provider (here, Tableau Server) and an IdP. The following list provides details about the Tableau Server implementation of OIDC. These details can help you understand what types of information Tableau Server sends and expects, and how to configure an IdP.

- Tableau Server supports only the OpenID Authorisation Code Flow as described in the [OpenID Connect final specification](#) in the OpenID Connect documentation.
- Tableau Server relies on using discovery or a provider URL to retrieve the OpenID provider metadata. Alternatively, you can host a static discovery document on Tableau Server. For more information see [Configure Tableau Server for OpenID Connect](#).
- Tableau Server supports the `client_secret_basic` and `client_secret_post` client authentication.
- Tableau Server expects a `kid` value in the `id_token` attribute's JOSE Header. This value is matched with one of the keys found in the JWK Set document, whose URI is specified by the `jwks_uri` value in the OpenID discovery document. A `kid` value must be present even if there is only one key in the JWK Set document.



- Tableau Server does include OpenID support for the JWK `x5c` parameter or for using X.509 certificates.
- By default, Tableau Server ignores proxy settings and sends all OpenID requests directly to the IdP.

If Tableau Server is configured to use a forward proxy to connect to the internet, then you must make additional changes as described in [Configure Tableau Server for OpenID Connect](#).

### Requirements for Using OpenID Connect

This topic describes the requirements to use OpenID Connect with Tableau Server.

**Note:** The TSM authentication configuration commands apply only to OIDC authentication configured in TSM during Tableau Server setup. To make OIDC authentication configuration changes for identity pools, you can use the [Update Authentication Configuration](#) endpoint using Tableau REST OpenAPI.

### Summary of requirements

- IdP account
- Local identity store
- IdP claims – mapping users
- Authentication context

#### IdP account

You must have access to an identity provider (IdP) that supports the OpenID Connect (OIDC) protocol. You must also have an account with the IdP. OpenID Connect is supported by many identity providers. The OIDC protocol is an open and flexible standard, and as such, not all implementations of the standard are identical. As you configure Tableau Server for OIDC, work with your IdP.

The Google IdP implementation has been extensively tested with Tableau Server and is the model IdP for the configuration documented in these topics.

### Local identity store

To use OpenID Connect on Tableau Server, one of the following must be true:

- **If configuring OIDC in TSM during Tableau Server setup**, Tableau Server must be configured to use a local identity store. The server must be configured so that you explicitly create users on the Tableau Server, rather than importing them from an external directory such as Active Directory. Managing users with an external identity store is not supported with OpenID.
- **If configuring OIDC using *identity pools***, OIDC can be configured with 1) a local identity store or 2) AD or LDAP is the identity store configured in TSM during Tableau Server setup.

### IdP claims – mapping users

To sign in successfully to Tableau Server, a given user must be provisioned in OpenID and then mapped to a user account on Tableau Server. OpenID uses a method that relies on *claims* to share user account attributes with other applications. Claims include user account attributes such as email, phone number, given name, etc. To understand how Tableau Server maps IdP claims to user accounts, see OpenID Connect.

Tableau Server relies on the IdP claims to map user accounts from the IdP to those hosted on Tableau Server. By default, Tableau Server expects the IdP to pass the email claim. Depending on your IdP, you may need to configure Tableau Server to use a different IdP claim.

If you are using Google as an IdP, then use the default `email` claim to map IdP identities to Tableau Server user accounts. If you are not using Google as an IdP, then work with your IdP to determine the claim for which you should configure Tableau Server.

## Default: using email claim to map users

By default, the user's username in Tableau Server must match the `email` claim in the IdP ID token. Therefore, in the default configuration, you must use email addresses (also referred to

as UPN) as the username in Tableau Server. If you use Google as the IdP, the username in Tableau Server must be the user's Gmail address (`alice@gmail.com`). Using a complete email address helps to guarantee the uniqueness of the user name in Tableau Server, even when two users have the same email but are on different email hosts.

**Note:** When you create a user identity in Tableau Server, you specify a username, password and optionally an email address. For using OpenID Connect in the default configuration, the user name (expressed as an email address) is the value that must match the user's name in the IdP. The optional email address in the Tableau Server user identity is not used for OpenID authentication.

## Ignoring the domain name

You can configure Tableau to ignore the domain portion of an email address when matching the IdP `email` claim to a user account on Tableau Server. In this scenario, the `email` claim in the IdP might be `alice@example.com`, but this will match a user named `alice` in Tableau Server. Ignoring the domain name might be useful if you already have users defined in Tableau Server that match the usernames portion of the `email` claim, but not the domain portions.

**Important:** We do not recommend ignoring the user domain name without taking precautions. Specifically, verify that user names are unique across the configured domains that you've created in your IdP.

Setting Tableau Server to ignore the user domain name has the potential to result in unintended user log on. Consider the case where your IdP has been configured for multiple domains (`example.com` and `tableau.com`). If two users with the same first name, but different user accounts (`alice@tableau.com` and `alice@example.com`) are in your organisation, then the first one to complete the OpenID provisioning sequence will claim the `sub` mapping in the IdP. If the wrong user is mapped, then the other user will be unable to log on until the associated `sub` value is reset.

To configure Tableau Server to ignore domain names in user names from the IdP, set `tsm authentication openid configure --ignore-domain` to `true`. For more information, see `tsm authentication openid <commands>`.

When you change the `tsm authentication openid configure --ignore-domain` option to ignore the domain in user names, all user names in Tableau Server must have a domain name.

## Using custom claims to map users

As referenced in OpenID Connect, the `sub` claim is often included in IdP claims. Typically, the `sub` claim is a unique string that identifies a given user account. The benefit of using a `sub` claim is that it will not change, even if you or another admin updates other user attributes or IdP claims (email, phone number, etc) associated with that account. By default, Tableau Server identifies and verifies OpenID users according to the `sub` claim in the IdP ID token.

The OpenID `sub` claim value must be mapped to the corresponding user in Tableau Server. Since the `sub` claim is an arbitrary string, a different claim is used to associate accounts during the first sign-in session. The first time a user signs in to Tableau Server with OpenID, Tableau will match the OpenID user account to a corresponding user account in Tableau Server. By default, Tableau will use the IdP claim, `email`, to identify the Tableau user. Tableau will then update that user's record with the `sub` claim from OpenID. Since the ID token always includes the `sub` claim along with other claims, on subsequent sessions, Tableau will identify that user with the `sub` claim only.

For some organisations, mapping user names with the email address is not reliable or not supported by the IdP. Beginning with Tableau Server 10.2, you can map user accounts from any arbitrary IdP claim to the Tableau Server username.

The IdP claim you are using must map exactly to a corresponding Tableau Server username. In the example below, the username is `kwilliams`.

The screenshot shows the Tableau Server interface with the 'New User' dialog box open. The background shows the 'Server Users' page with 77 users, an 'Add Users' button, and a search bar. The 'New User' dialog has the following fields and options:

- Username:** kwilliams (with a green message 'Username available')
- Display name:** Kirk Williams
- Password:** (masked with dots)
- Confirm password:** (masked with dots)
- Email (optional):** (empty field)
- Site selection:** A table with columns 'Site' and 'Site role'.
 

Site	Site role
<input checked="" type="checkbox"/> Customer Support	Interactor
<input checked="" type="checkbox"/> Default	Publisher
<input type="checkbox"/> Development	
- ☐ Selected users are Server Administrators
- Buttons:** Cancel, Create

To change the IdP claim that is used to map identity on Tableau Server, use the `tsm authentication openid map-claims --user-name` command. For more information, see `tsm authentication openid <commands>`.

## Changing the `sub` claim

As described above, the `sub` claim is the identifier that Tableau Server uses to identify users after the initial mapping session. The `sub` claim is written to the corresponding user account in Tableau Server. If your IdP does not provide a `sub` claim, then you can specify an arbitrary claim to use instead. Like `sub`, the claim value you specify must be unique and should not change when other user claims are updated.

To specify a different IdP claim for default sub claim, use the use the `tsm authentication openid map-claims --id` command. For more information, see `tsm authentication openid <commands>`.

Where `arbitraryClaim` is the name of the IdP claim that you want to use as the replacement for the `sub` claim.

### Authentication context

If your OpenID Connect IdP requires a specific authentication context, you can specify a list of essential and voluntary ACR values using the `vizportal.openid.essential_acr_values` and `vizportal.openid.voluntary_acr_values` configuration keys. For more information, see `tsm configuration set Options`.

### Configure the Identity Provider for OpenID Connect

This topic provides information about configuring an identity provider (IdP) to use OpenID Connect (OIDC) with Tableau Server. This is one step in a multi-step process. The following topics provide information about configuring and using OIDC with Tableau Server.

1. OpenID Connect Overview
2. Configure the Identity Provider for OpenID Connect (you are here)
3. Configure Tableau Server for OpenID Connect
4. Signing In to Tableau Server Using OpenID Connect

### Configure the IdP

Before you can use OpenID Connect with Tableau Server, you must have an account with an identity provider (IdP) and a project or application with the IdP. When you configure Tableau Server, you will need to be able to provide the following information:

- Client ID. This is the identifier that the IdP assigned to your application.
- Client secret. This is a token that is used by Tableau to verify the authenticity of the response from the IdP. This value is a secret and should be kept securely.
- Configuration URL. This is the URL at the provider's site that Tableau Server should send authentication requests to.

## Redirect URL

Some IdPs will require a redirect URL for your Tableau Server.

You can manually construct your URL for the IdP using the following syntax:

```
<protocol>://<host>/vizportal/api/web/v1/auth/openIdLogin
```

For example, `https://t-`

`ableau.example.com/vizportal/api/web/v1/auth/openIdLogin`.

## Example IdP process

The following procedure provides an outline of the steps that you follow with the provider. As an example, the procedure discusses using Google as a provider. However, each provider has a somewhat different flow, so the specifics of the steps (and their order) might vary depending on your provider.

1. Register at the provider's developer site and sign in. For example, for Google, you can go to the Developers Console at this URL: <https://console.developers.google.com>
2. Create a new project, application or relying party account.
3. In the developer dashboard, follow the steps for getting an OAuth 2.0 client ID and client secret. Record these values for later.

**Note:** Keep the client secret in a secure place.

4. On the developer site, find the URL of the endpoint that the IdP uses for OpenID Connect discovery. For example, Google uses the URL <https://accounts.google.com/.well-known/openid-configuration>. Record this URL for later.

Alternatively, if your IdP has provided you with a static discovery document, copy that file to a local directory on the Tableau Server for later.

## Configure Tableau Server for OpenID Connect

This topic describes how to configure Tableau Server to use OpenID Connect (OIDC) for single-sign on (SSO). This is one step in a multi-step process. The following topics provide information about configuring and using OIDC with Tableau Server.

1. OpenID Connect Overview
2. Configure the Identity Provider for OpenID Connect
3. Configure Tableau Server for OpenID Connect (you are here)
4. Signing In to Tableau Server Using OpenID Connect

### Notes:

- Before you perform the steps described here, you must configure the OpenID identity provider (IdP) as described in Configure the Identity Provider for OpenID Connect.
- The procedures described in this topic apply to OIDC authentication configured in TSM during Tableau Server setup and not OIDC authentication configured with identity pools. For more information about identity pools, see Provision and Authenticate Users Using Identity Pools.

### Use the TSM web interface

1. Open TSM in a browser:

<https://<tsm-computer-name>:8850>. For more information, see Sign in to Tableau Services Manager Web UI.



2. Click **User Identity & Access** on the **Configuration** tab and then click **Authentication Method**.
3. Under **Authentication Method**, select **OpenID Connect** in the drop-down menu.
4. Under OpenID Connect, select **Enable OpenID authentication for the server**.
5. Enter the OpenID configuration information for your organisation:

**Authentication Method**  
Specify how the identity store manages user authentication and access to Tableau Server.

OpenID Connect ▼

**OpenID Connect**  
Use OpenID when you want users on Tableau Server to authenticate with an external OpenID Connect Identity Provider. Follow the steps below to configure OpenID.

☒ Enable OpenID authentication for the server

**Step 1:** Create the OpenID configuration by providing the client id, secret, and discovery URL provided by your OpenID Connect Identity Provider.

Provider client ID

Provider client secret

Provider configuration URL

**Step 2:** Provide the hostname and protocol of the return URL your OpenID Connect Identity Provider will use to redirect users back to Tableau Server.

Tableau Server external URL

**Step 3:** Copy the URL below and configure your OpenID Connect Identity Provider to redirect users to this endpoint after authenticating.

**Note:** If your provider relies on a configuration file hosted on the local computer (rather than a file hosted at a public URL), you can specify the file with the tsm authentication `openid <commands>`. Use the `--metadata-file <file_path>` option to specify a local IdP configuration file.

6. Click **Save Pending Changes** after you've entered your configuration information.
7. Click **Pending Changes** at the top of the page:



8. Click **Apply Changes and Restart**.

### Use the TSM CLI

The procedure in this section describes how to use TSM command line interface to configure OpenID Connect. You can also use a configuration file for the initial configuration of OpenID Connect. See `openIDSettings` Entity.

1. Use the `configure` command of `tsm authentication openid <commands>` to set the following required options:

`--client-id <id>`: Specifies the provider client ID that your IdP has assigned to your application. For example, `"laakjwdlnaoiloadjkwha"`.

`--client-secret <secret>`: Specifies the provider client secret. This is a token that is used by Tableau to verify the authenticity of the response from the IdP. This value is a secret and should be kept securely. For example, `"fwahfkjaw72123="`.

`--config-url <url>` or `--metadata-file <file_path>`: Specifies location of provider configuration json file. If the provider hosts a public json discovery file, then use `--config-url`. Otherwise, specify a path on the local computer and file name for `--metadata-file` instead.

`--return-url <url>`: The URL of your server. This is typically is the public name of your server, such as `"http://example.tableau.com"`.

For example, run the command:

```
tsm authentication openid configure --client-id "laakjwdlnaoiloadjkwha" --client-secret "fwahfkjaw72123=" --config-url "https://example.com/openid-configuration" --return-url "http://tableau.example.com"
```

There are additional, optional configurations that you can set for Open ID Connect using either `openIDSettings` Entity or `tsm authentication openid <commands>`. In

addition, if you need to configure IdP claim mapping, see Options for openid map-claims.

2. Type the following command to enable Open ID Connect:

```
tsm authentication openid enable
```

3. Run `tsm pending-changes apply` to apply changes.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt.

For more information, see `tsm pending-changes apply`.

### Configure OpenID to work with a forward proxy

By default, Tableau Server ignores proxy settings and sends all OpenID requests directly to the IdP.

Beginning with Tableau Server 2021.2.2 and newer, if Tableau is configured to use a forward proxy to connect to the internet, then you may configure Tableau Server to use the proxy host and port settings to contact the OpenID IdP.

How you configure Tableau Server is different depending on how you have implemented forward proxy in your organisation:

- Forward proxy is configured on the Windows computer where Tableau Server is running.
- Tableau Server sends all outbound traffic directly to a forward proxy server running in your organisation.

## Windows system proxy configuration

If your organisation has configured forward proxy on each Windows computer, use this method to use the system proxy configuration for OpenID on Tableau Server. Run the

following commands:

```
tsm configuration set -k tomcat.useSystemProxies -v true  
tsm pending-changes apply
```

## Forward proxy server

Use the command `tsm configuration set` to make the changes.

- For HTTPS proxy hosts, use the following key-value pairs:

```
-k tomcat.https.proxyHost -v host.domain  
  
-k tomcat.https.proxyPort -v port_number
```

For example, if your proxy server is at `https://proxy.example.lan:8443`, then run the following commands:

```
tsm configuration set -k tomcat.https.proxyHost -v proxy.ex-  
ample.lan  
  
tsm configuration set -k tomcat.https.proxyPort -v 8443  
  
tsm pending-changes apply
```

- For HTTP proxy hosts, use the following key-value pairs:

```
-k tomcat.http.proxyHost -v host.domain  
  
-k tomcat.http.proxyPort -v port_number
```

After you have set these keys, run `tsm pending-changes apply`.

## Signing In to Tableau Server Using OpenID Connect

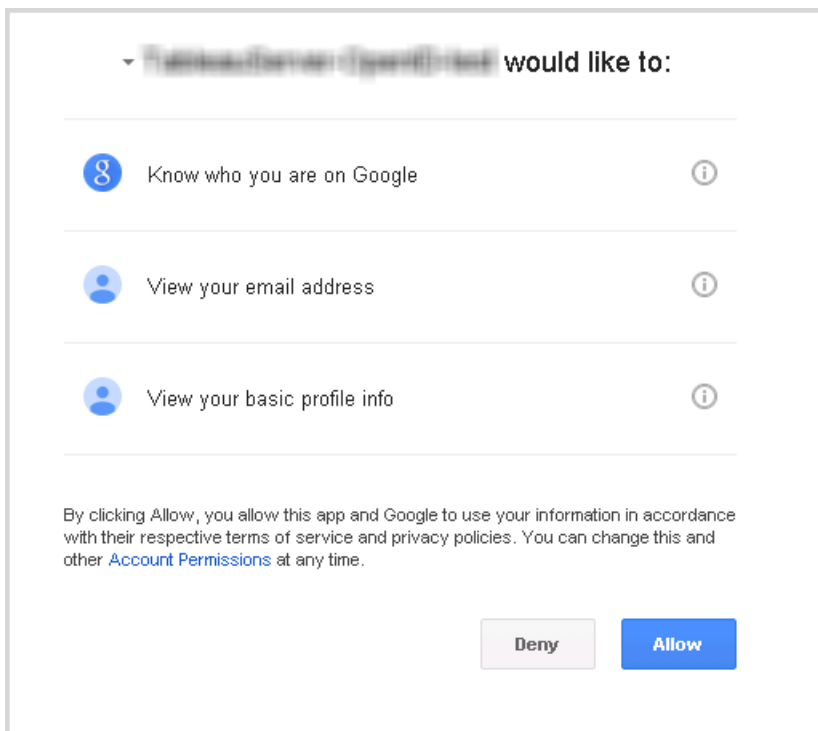
This topic provides information about signing in to Tableau Server using OpenID Connect. The following topics provide information about configuring and using OpenID Connect with Tableau Server.

## Tableau Server on Windows Help

- OpenID Connect
- Configure the Identity Provider for OpenID Connect
- Configure Tableau Server for OpenID Connect
- Signing In to Tableau Server Using OpenID Connect (you are here)

### Signing in using OpenID Connect

After Tableau Server has been configured to use OpenID Connect, users who access the server and aren't already signed in are redirected to the IdP site, where they are prompted to sign in. Users enter the credentials that they have with the IdP. In many cases, the user is also asked to authorise the IdP to share information with Tableau Server, as in the following example:



When a user signs in using OpenID Connect, the IdP sends a unique user identifier (known in OpenID as the sub value) as part of the information that's redirected to Tableau Server. This sub value is associated with the user's Tableau user identity.

## Restricting sign-in to server administrators for command-line tools

Command-line tools for working with Tableau Server (`tabcmd`, TSM, and `tableau.com`) do not support sign-in using OpenID Connect. When OpenID Connect is enabled for the server, these tools still require sign-in using a Tableau Server username and password.

Even if users normally authenticate using OpenID Connect, each user has a Tableau Server username and password. This means that users could use command-line tools like `tabcmd`. As a security measure, you can make sure that *only* server administrators can use command-line tools. To do this, use `tsm configuration set` to set `wgserver.authentication.restricted` to `true`. When this setting is `true`, only server administrators can sign in to Tableau Server using a username and password; all other users *must* sign in to the server using a single sign-on (SSO) option like OpenID Connect. The effect is that users who are not administrators also cannot then use command-line tools. To make this change, run the following sequence of TSM commands:

```
tsm configuration set -k wgserver.authentication.restricted -v true
tsm pending-changes apply
```

## OpenID Connect Authentication Request Parameters

The OpenID authentication request sent from Tableau Server passes information using a limited set of parameters, as listed in this topic. If your OpenID IdP requires parameters that are not in the following list, it is not compatible for use with Tableau Server.

- `scope`. This value specifies a profile that tells the IdP what user information claims to return. This value can be configured by a Tableau Server administrator. The default value is "openid email profile". For more information, see [Configure the scope value](#) later in this document.
- `response_type`. OpenID Connect supports multiple flows. This value tells the IdP which flow Tableau Server expects. Tableau supports only the authorisation code flow, and the value is always set to "code".

## Tableau Server on Windows Help

- `client_id`. This value specifies the server's ID (**Provider client ID** in the Tableau Server Configuration dialog box), which lets the IdP know where the request came from. It is provided by the IdP when the service is registered. The value is configurable by a Tableau Server administrator.
- `redirect_uri`. This value specifies the URL that the IdP redirects to after the user has authenticated using OpenID Connect. The URL must include the host and protocol (for example, `http://example.tableau.com`), but Tableau provides the URL endpoint.
- `nonce`. Tableau Server generates a nonce value to verify that the client that it redirected to matches the entity that comes back from the IdP.

### Configure the scope value

The `scope` value indicates to the IdP the information that Tableau Server requests about the user. By default, Tableau Server sends the value "openid profile email". This indicates that Tableau uses OpenID to authenticate (this part of the `scope` attribute value must always be included) and that Tableau Server is requesting the user profile and email information during the exchange of the user authorisation code.

If this default scope is not appropriate for your scenario, you can have Tableau Server request custom information about the user. To do so, you configure the IdP with a custom profile (for example, something like "tableau-scope"). You can then configure Tableau Server to send the scope request using the name of the custom profile.

To change the scope value that Tableau Server requests, use the following TSM CLI command:

```
tsm authentication openid configure --custom-scope-name custom-scope-name
```

### Notes:

- Tableau Server always includes "openid" as part of the scope value (even if you don't include it in the `custom_scope` setting).

- The TSM authentication configuration commands apply only to OIDC authentication configured in TSM during Tableau Server setup. To make OIDC authentication configuration changes for identity pools, you can use the [Update Authentication Configuration](#) endpoint using Tableau REST OpenAPI.

## Changing IdPs in Tableau Server for OpenID Connect

This topic provides information about changing an identity provider (IdP) if you have configured Tableau Server to use OpenID Connect.

### Change providers

You might decide to change the IdP that Tableau Server is configured to use. To do so, you follow the procedure that you used to configure the first IdP: establish an account, get a customer ID and secret, configure Tableau Server with that information and provide the IdP with the redirect URL for Tableau Server. For more information, see [Configure Tableau Server for OpenID Connect](#).

## Reset user identifiers

However, you also need to perform an additional step: you must clear any user identifiers (`sub` values or claims) that have already been associated with Tableau Server users. The new IdP will have different `sub` values for each user, and you must clear the existing ones so that Tableau Server can store a new `sub` value when the user signs in using the new IdP.

To clear `sub` values for users, use the `tabcmd reset_openid_sub` command. You can reset (that is, clear) `sub` values for an individual user, as in the following example:

```
tabcmd reset_openid_sub --target-username jsmith
```

You can also clear the `sub` value for all users using this command:

```
tabcmd reset_openid_sub --all
```

**Note:** Clearing user identifiers for members of an [identity pool](#) is not supported.



### Troubleshoot OpenID Connect

Use the following topics to troubleshoot OpenID Connect (OIDC) issues in Tableau Server.

OIDC protocol is supported by many identity providers. The OIDC protocol is an open and flexible standard, and as such, not all implementations of the standard are identical. Most issues that administrators encounter when configuring Tableau Server for OIDC are the result of how different identity providers implement OIDC. If you encounter errors as you set up OIDC with Tableau Server, we recommend that you work with your IdP to resolve them.

#### Enabling enhanced OpenID logging

To efficiently troubleshoot OpenID Connect issues in Tableau Server, enable enhanced logging by setting the logging level to debug, and full logging for OpenID using the `vizportal.openid.full_server_request_logging_enabled` configuration key to `true` using these TSM commands:

```
tsm configuration set -k vizportal.log.level -v debug
```

```
tsm configuration set -k vizportal.openid.full_server_request_logging_enabled -v true
```

```
tsm pending-changes apply
```

After completing your troubleshooting, we recommend setting the values of both configuration keys back to their defaults to limit the information collected in logs and to reduce log file sizes. For details on resetting configuration keys to defaults, see [Resetting a configuration key to default](#).

**Note:** Enhanced logging for [identity pools](#) isn't supported. However, `vizportal.log.level debug` logging is supported.

#### Signing in from the command line

Even if Tableau Server is configured to use OIDC, it isn't used if you sign in to Tableau Server using `tabcmd`, the [Tableau REST API](#) or the [Tableau Data Extract command line utility](#) (provided with Tableau Desktop).

## Login failed

Login can fail with the following message:

```
Login failure: Identity Provider authentication unsuccessful for
user <username from IdP>. Failed to find the user in Tableau Cloud.
```

This error typically means that there's a mismatch between a username stored in Tableau Server and the username provided by the IdP. To fix this, make sure that they match. For example, if Jane Smith's username is stored in the IdP as `j.smith` it must be stored in Tableau Server as `j.smith` as well.

## Error 69: "Unable to Sign In"

An error 69 might be returned when you attempt to sign in to Tableau Server with a web browser and receive an "Unable to Sign In" error. Sign in failed. Contact your Tableau Server administrator." The URL that returns this message is `https://example.com/#/error/signin/69?redirectPath=%2.`

If you receive this error, check with your IDP provider to verify whether the IdP is expecting `client_secret_post` instead of `client_secret_basic` (the Tableau default).

If the IdP is expecting `client_secret_post`, then you must set the `vizportal.openid.client_authentication` parameter to `client_secret_post`.

For example, if you receive this error and you have configured OIDC for the Salesforce IdP, then you must set the `vizportal.openid.client_authentication` parameter.

See tsm configuration set Options for more information.

## OpenID error log

OpenID authentication takes place outside Tableau Server, so troubleshooting authentication issues can be difficult. However, sign-in attempts are logged by Tableau Server. You can create a snapshot of log files and use them to troubleshoot problems. For more information, see [Tableau Server Logs and Log File Locations](#).

**Note:** To log OpenID-related events, `vizportal.log.level` must be set to `debug` with tsm configuration set Options.

Check for OpenID errors in the following files in the unzipped log file snapshot:

```
\vizportal\vizportal-<n>.log
```

### User not found

A "user not found" error might be returned if the "sub" claims have changed after initial login of users. You can verify this issue if you see the following in the vizportal logs: Possible conflicting or stale account: <username> A different user already owns this account.

If you continue to see this issue, reset the "sub" claims for that user or for all users on Tableau Server. For more information, see [Reset user identifiers](#).

## Trusted Authentication

When you embed Tableau Server views into web pages, everyone who visits the page must be a licensed user on Tableau Server. When users visit the page they are prompted to sign in to Tableau Server before they can see the view. If you already have a way of authenticating users on the web page or within your web application, you can avoid this prompt and save your users from having to sign in twice by setting up trusted authentication.

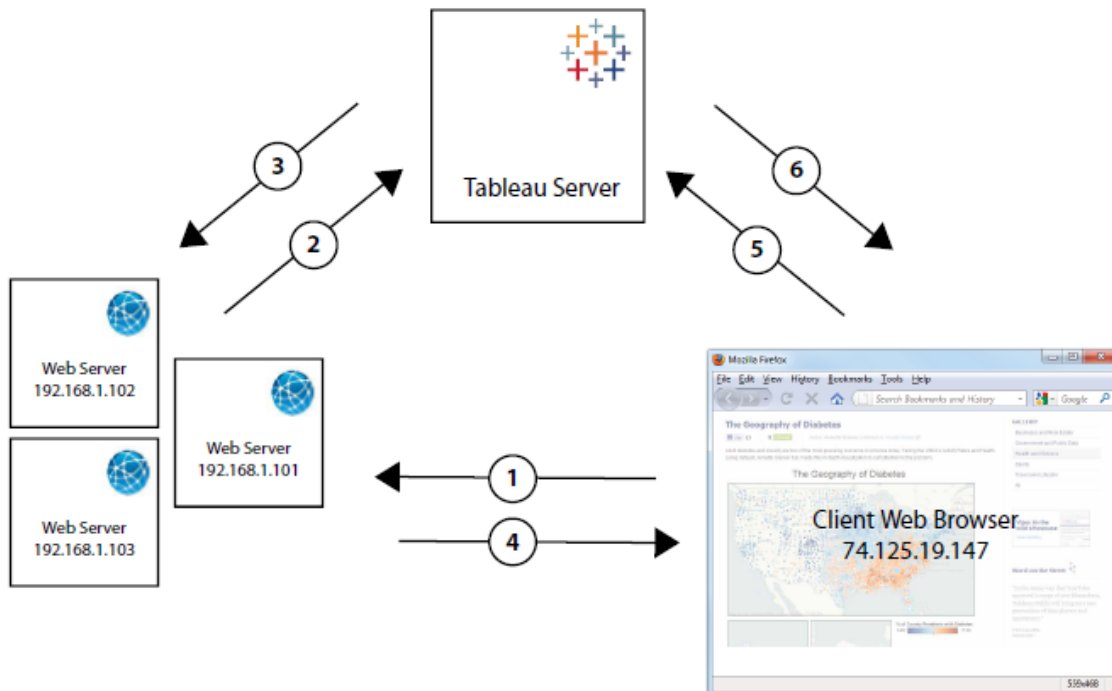
Trusted authentication simply means that you have set up a trusted relationship between Tableau Server and one or more web servers. When Tableau Server receives requests from these trusted web servers it assumes that your web server has handled whatever authentication is necessary.

If your web server uses SSPI (Security Support Provider Interface), you do not need to set up trusted authentication. You can embed views and your users will have secure access to them as long as they are licensed Tableau Server users and members of your Active Directory.

**Note:** Client browsers must be configured to **allow third-party cookies** if you want to use trusted authentication with embedded views.

### How Trusted Authentication Works

The diagram below describes how trusted authentication works between the client's web browser, your web server(s) and Tableau Server.



**1 User visits the web page:** When a user visits the webpage with the embedded Tableau Server view, the webpage sends a GET request to your web server for the HTML for that page.

**2 Web server POSTS to Tableau Server:** The web server sends a POST request to the trusted Tableau Server (for example, `https://<server_name>/trusted`, not `https://<server_name>`). That POST request must have a `username` parameter. The

`username` value must be the username for a licensed Tableau Server user. If Tableau Server is hosting multiple sites and the view is on a site other than the Default site, then the POST request must also include a `target_site` parameter.

**3 Tableau Server creates a ticket:** Tableau Server checks the IP address or host name of the web server (192.168.1.XXX in the above diagram) that sent the POST request. If the web server is listed as a trusted host then Tableau Server creates a ticket in the form of a unique string. Tickets must be redeemed within three minutes after they are issued. Tableau Server responds to the POST request with that ticket. Or if there is an error and the ticket cannot be created, then Tableau Server responds with a value of -1. The server must have an IPv4 address. IPv6 addresses are not supported. For more information, see Ticket Value of -1 Returned from Tableau Server.

**4 Web server passes the URL to the browser:** The web server constructs the URL for the view and inserts it into the HTML for the page. The ticket is included (for example, `https://<server_name>/trusted/<unique_ticket>/views/<view_name>`). The web server passes the HTML back to the client's web browser.

**5 Browser requests view from Tableau Server:** The client web browser sends a GET request to Tableau Server that includes the URL with the ticket.

**6 Tableau Server redeems the ticket:** Tableau Server redeems the ticket, creates a session, logs the user in, removes the ticket from the URL, and then sends the final URL for the embedded view to the client.

The session allows the user to access any of the views that the user would have if they logged onto the server. In the default configuration, users authenticated with trusted tickets have restricted access such that only views are available. They cannot access workbooks, project pages, or other content hosted on the server.

To change this behaviour, see the `wgserver.unrestricted_ticket` option at [tsm configuration set Options](#).

How is a trusted ticket stored?

Tableau Server stores trusted tickets in the Tableau Server repository using the following process:

1. Tableau Server generates a two-part ticket: the first part is a Base64-encoded unique ID (UUID) and the second part is a 24-character random secret string.
2. Tableau Server hashes the secret string and stores it with the unique ID in the repository. Hashing takes the secret string as input, and uses an algorithm to compute a unique string. This unique string protects the security of the secret string from unauthorised users.
3. Tableau Server sends the Base64 UUID and the original 24-character random string to the client.
4. The client returns the Base64 UUID and the original 24-character secret string to Tableau Server as part of the request for a view.
5. Tableau Server locates the string pair with the Base64 UUID, and then hashes the secret string to verify that it matches the hash stored in the repository.

This process ensures that any trusted ticket content stored on Tableau Server cannot be used to impersonate users or access content protected by authentication. However, because the full trusted ticket is sent over HTTP between Tableau Server and the client, the process relies on secure and encrypted transmission of HTTP data. Therefore, we recommend that you only deploy trusted tickets over SSL/TLS or another layer of network encryption.

#### Add Trusted IP Addresses or Host Names to Tableau Server

The first step in setting up trusted authentication is to configure Tableau Server to recognise and trust requests from one or more web servers:

Use the TSM web interface

1. Open TSM in a browser:

`https://<server_name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click User **Identity & Access** on the **Configuration** tab and then click **Trusted Authentication**.
3. Under **Trusted Authentication**, for each trusted host, enter the name or IP address and then click **Add**:

**Trusted Authentication**  
Use trusted authentication to allow single sign-on to view Tableau Server content embedded in webpages. Establish a trusted relationship between Tableau Server and one or more web server by adding trusted hosts and specifying token length for each trusted ticket. Do not set up trusted authentication if your web server uses SSPI. [Learn more](#)

Trusted hosts	<input type="text" value="10.32.139.6"/>	<input type="button" value="Delete"/>
	<input type="text" value="webserver1"/>	<input type="button" value="Delete"/>
	<input type="text" value="webserver2"/>	<input type="button" value="Add"/>
Token Length	<input type="text" value="24"/>	<input type="button" value="x"/>

### Notes:

The values you specify completely overwrite any previous setting. Therefore, you must include the full list of hosts if you want to amend an existing list.

Static IP addresses are required: The web servers you specify must use static IP addresses, even if you use host names.

If you have one or more proxy servers between the computer that is requesting the trusted ticket (one of those configured in Step 2 as shown at Trusted Authentication) and Tableau Server, you also need to add them as trusted gateways using the `tsm configuration set gateway.trusted` option. See [Configuring Proxies and Load Balancers for Tableau Server](#) for steps.

4. Enter a value in **Token Length** (Optional).

The token length determines the number of characters in each trusted ticket. The default setting of 24 characters provides 144 bits of randomness. The value can be set to any integer between 9 and 255, inclusive.

5. Click **Save Pending Changes** after you've entered your configuration information.
6. Click **Pending Changes** at the top of the page:



7. Click **Apply Changes and Restart**.

### Use the TSM CLI

1. Enter the following command:

```
tsm authentication trusted configure -th <trusted IP address or host name>
```

In the command above, <trusted IP address> should be a comma-separated list of the IPv4 addresses or host names of your web server(s), with each host name or IP address in quotes.

**Note:** The values you specify completely overwrite any previous setting. Therefore, you must include the full list of hosts in the `tsm authentication trusted configure -th` command. (You cannot amend the list of hosts by running the `tsm authentication trusted configure -th` command repeatedly.)

For example:

```
tsm authentication trusted configure -th "192.168.1.101",  
"192.168.1.102", "192.168.1.103"
```

or



## Tableau Server on Windows Help

```
tsm authentication trusted configure -th "webserv1", "web-  
serv2", "webserv3"
```

### Notes:

Each host name or IP address in the list must be in double-quotes, followed by a comma and one space after each comma.

The web servers you specify must use static IP addresses, even if you use host names.

2. If you have one or more proxy servers between the computer that is requesting the trusted ticket (one of those configured in Step 2 as shown at Trusted Authentication) and Tableau Server, you also need to add them as trusted gateways using the `tsm configuration set gateway.trusted` option. See [Configuring Proxies and Load Balancers for Tableau Server](#) for steps.

Type the following command to save the changes to all the server configuration files:

```
tsm pending-changes apply
```

- 3.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

There are other optional trusted authentication configurations (legacy support, logging and timeout settings) that you can make by passing a json file to Tableau Server. See `trustedAuthenticationSettings` Entity.

Next, you need to [configure your web server to receive tickets from Tableau Server](#).

## Get a Ticket from Tableau Server

After you've [added trusted IP addresses](#) to Tableau Server, you're ready to configure your web server to get tickets from Tableau Server via POST requests ([Step 2 in the diagram](#)). The POST request must be sent to `http://<server_name>/trusted`. For example, the POST request must be sent to `http://tabserv/trusted` not `http://tabserv`.

**Note:** If SSL is enabled you must use https instead of http. For example: `https://tabserv/trusted`.

Here's the data you can use in a POST request to Tableau Server:

- **username=<username>** (required): The username for a licensed Tableau Server user. If you are using Local Authentication the username can be a simple string (for example, `username=jsmith`). If you are using Active Directory with multiple domains you must include the domain name with the user name (for example, `username=MyCo\jsmith`).
- **target\_site=<site id>** (required if view not on Default site): Specifies the site containing the view if Tableau Server is running [multiple sites](#) and the view is on a site other than the Default site (for example, `target_site=Sales`). The value you use for `<site id>` should be the [Site ID](#) that was provided when the site was created. This value is case sensitive. If the **Site ID** is `SAles`, then the `target_site=SAles`.
- **client\_ip=<IP address>** (optional): Used to specify the IP address of the computer whose web browser is accessing the view (for example, `client_ip=123.45.67.891`). It is not the IP address of the web server making the POST request of Tableau Server. If you decide to use this parameter, see [Optional: Configure Client IP Matching](#) for more information.

Tableau Server's response to the POST request will be a unique string (the ticket). If Tableau Server isn't able to process the request, the return will be `-1`. See [Ticket Value of -1 Returned from Tableau Server](#) for tips on how to correct this. Also, in order for users to successfully

## Tableau Server on Windows Help

authenticate when they click an embedded view, their browsers must be configured to **allow third-party cookies**.

The ticket format changed in Tableau Server 10.2. The ticket format is now a string composed of two parts. Each part is a 128 bit string that is encoded before it is returned to the client. The first part is a universally unique ID (UUID v4) that is Base64-encoded. The second part is a 24-character secure random string. The concatenation of these parts can be expressed as Base64(UUIDv4):SecureRandomString. An example of a ticket might look like this:

```
9D1ObyqDQmSIOyQpKdy4Sw==:dg62gCsSE0QRArXNTOp6mlJ5.
```

Next, you need to add code that allows the web server to **construct an URL** for the view that includes the view's location and the ticket.

### Display the View with the Ticket

After you **create the POST request**, you need to write code that provides the web server with the view's location and the ticket from Tableau Server. It will use this information to display the view. How you specify it depends on whether the view is embedded, and if Tableau Server is running multiple sites.

### Tableau Server View Examples

Here's an example of how to specify a view that users only access via Tableau Server (the view is not embedded):

```
http://<server_name>/trusted/<unique_ticket>/views/<workbook_name>/<view_name>
```

If Tableau Server is running **multiple sites** and the view is on a site other than the Default site, you need to add `t/<site_id>` to the path. For example:

```
http://<server_name>/trusted/<unique_ticket>/t/Sales/views/<workbook_name>/<view_name>
```

Use the same capitalisation that you see in the Tableau Server URL.

## Embedded View Examples

Here are some examples of how to specify embedded views. Because there are two approaches you can take with embed code, both ways are provided below. Regardless of which you use, there is some information unique to trusted authentication that you must provide. For more information, search for "Writing Embed Code" in the Tableau Server Help.

**Note:** The examples below use embed code parameters. For more information, see [Embed Code Parameters](#) in the Tableau Help.

## Script Tag Examples

This example uses the `ticket` object parameter:

```
<script type="text/javascript" src-
c="http://myserver/javascripts/api/viz_v1.js"></script>
<object class="tableauViz" width="800" height="600" style-
e="display:none;">
  <param name="name" value="MyCoSales/SalesScoreCard" />
  <param name="ticket" value-
e="9Dl0byqDQmSI0yQpKdy4Sw==:dg62gCsSE0QRARXNT0p6mlJ5" />
</object>
```

Here's what the above example looks like for a multi-site Tableau Server, where the view is published on the `Sales` site:

```
<script type="text/javascript" src-
c="http://myserver/javascripts/api/viz_v1.js"></script>
<object class="tableauViz" width="800" height="600" style-
e="display:none;">
  <param name="site_root" value="/t/Sales" />
  <param name="name" value="MyCoSales/SalesScoreCard" />
  <param name="ticket" value-
e="9Dl0byqDQmSI0yQpKdy4Sw==:dg62gCsSE0QRARXNT0p6mlJ5" />
</object>
```

## Tableau Server on Windows Help

Instead of using `ticket`, you can use the `path` parameter to state the full path of the view explicitly. When `path` is used, you do not also need the `name` parameter, which is usually a required parameter in Tableau JavaScript embed code:

```
<script type="text/javascript" src-  
c="http://myserver/javascripts/api/viz_v1.js"></script>  
<object class="tableauViz" width="900" height="700" style-  
e="display:none;">  
    <param name="path" value-  
="tru-  
sted/9D10byqDQmSIOyQpKdy4Sw-  
w==:dg62gCsSE0QRArXNTOp6mlJ5/views/MyCoSales/SalesScoreCard" />  
</object>
```

Here's the same example, but for a multi-site server. Note that `/t/<site_id>` is used here:

```
<script type="text/javascript" src-  
c="http://myserver/javascripts/api/viz_v1.js"></script>  
<object class="tableauViz" width="900" height="700" style-  
e="display:none;">  
    <param name="path" value-  
="tru-  
sted/9D10byqDQmSIOyQpKdy4Sw-  
w==:dg62gCsSE0QRArXNTOp6mlJ5/t/Sales/views/MyCoSales/SalesScoreCard"  
/>  
</object>
```

### Iframe Tag Example

```
<iframe src-  
="h-  
ttp://t-  
abserver-  
/trus-  
ted/9D10byqDQmSIOyQpKdy4Sw-  
w==:dg62gCsSE0QRArXNTOp6mlJ5/views/workbookQ4/SalesQ4?:embed=yes"  
width="800" height="600"></iframe>
```

### Optional: Configure Client IP Matching

By default, Tableau Server does not consider the client web browser IP address when it creates or redeems tickets. To change this, you need to do two things: specify an IP address using the `client_ip` parameter in the POST request that obtains the ticket, and follow the steps below to configure Tableau Server to enforce client IP address matching.

1. Open TSM CLI and type the following command:

```
tsm configuration set -k wgserver.extended_trusted_ip_checking  
-v true
```

Then type the following command:

```
tsm pending-changes apply
```

- 2.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Test Trusted Authentication

The steps below provide a method you can use to test retrieving a trusted ticket from your web server. This simple test can help evaluate connectivity between the web server and Tableau Server, and whether or not trusted authentication has been configured correctly.

**Important:** The test code provided in this topic runs client-side in the browser to provide a quick, visual validation that trusted authentication is configured correctly on Tableau Server. If the client browser loading the html page is not on the trusted web server, you may have to temporarily trust the client IP. In practice, you should never trust client IP addresses as part of your trusted authentication configuration. All trusted IP addresses

are able to request tickets as any user including your administrator. In a production environment, all trusted authentication flows should run server-side, between Tableau Server and the trusted web server(s) only.

Because the test is run on a client browser, the test isn't an exact replica of the communication path in a production environment. After successfully running the test, we recommend that you then test requesting tickets for your users with a server-side post request for final verification.

An alternative testing method is to run a trusted ticket generator to test your configuration. The following URL references a trusted ticket generator that is not supported by Tableau. However the generator has been used by many customers to test their trusted ticket configuration:

<https://github.com/mkannan-tsi/Trusted-Ticket-Generator>.

#### Step 1: Add a test user

Create a user on the Tableau Server that you can use to test trusted ticket functionality. See [Add Users to Tableau Server](#). Add that user to a site on the server, and set the user's site role to **Explorer**.

#### Step 2: Create a test HTML page

Paste the following code into a new .html file that you save on the Tableau Server machine where you're performing the test from. You can change the labels and style attributes as you prefer.

```
<html>
<head>
<title>Trusted Ticket Requester</title>
<script type="text/javascript">
    function submitForm() {
        document.getElementById('form1').action =
            document.getElementById('server').value + "/trusted";
    }
}
```

```

</script>
<style type="text/css">
    .style1 {width: 100%;}
    .style2 {width: 429px;}
    #server {width: 254px;}
</style>
</head>
<body>
<h3>Trusted Ticketer</h3>
<form method="POST" id="form1" onSubmit="submitForm()">
    <table class="style1">
        <tr>
            <td class="style2">Username</td>
            <td><input type="text" name="username" value="" /></td>
        </tr>
        <tr>
            <td class="style2">Server</td>
            <td><input type="text" id="server" name="server" value=
e="https://" /></td>
        </tr>
        <tr>
            <td class="style2">Client IP (optional)</td>
            <td><input type="text" id="client_ip" name="client_ip"
value="" /></td>
        </tr>
        <tr>
            <td class="style2">Site (leave blank for Default site; oth-
erwise enter the site name)</td>
            <td><input type="text" id="target_site" name="target_site"
value="" /></td>
        </tr>
    </table>
</form>

```



## Tableau Server on Windows Help

```
<tr>
  <td class="style2"><input type="submit" name="submittable"
value="Get Ticket" /></td>
  <td>&#160;</td>
</tr>
</table>
</form>
<h4>Be sure to add your IP as a Trusted IP address to the server-
</h4>
</body>
</html>
```

### Step 3: Retrieve a trusted ticket from Tableau Server

The following procedure will return a trusted ticket from Tableau Server.

1. Open the web page that you created in the previous step.

**Trusted Ticketer**

Username	<input type="text"/>
Server	<input type="text"/>
Client IP (optional)	<input type="text"/>
Site (leave blank for Default site; otherwise enter the site name)	<input type="text"/>

Get Ticket

**Be sure to add your IP as a Trusted IP address to the server**

This operation requires JavaScript, so the web browser might prompt you to allow scripts to run.

2. In the text boxes, enter the following:
  - **Username:** The test user that was created in Step 1.
  - **Server:** the address of your Tableau Server, e.g., `https://<server_name>`.
  - **Client IP (optional):** The IP address of the user's computer, if it's configured for

client trusted IP matching.

- **Site:** The name of the Tableau Server site that the test user is a member of.

3. Click **Get Ticket**. One of the following will be returned:

- **A unique ticket:** A trusted ticket is a string composed of a base64-encoded UUID and a 24-character random string, for example,  
9D101xmDQmSIOyQpKdy4Sw==:dg62gCsSE0QRARXNTOp6m1J5.
- **-1:** If the value, -1 is returned, the configuration contains an error. See Ticket Value of -1 Returned from Tableau Server.

#### Step 4: Test access with trusted ticket

Now that you have a ticket, you can use it to access content on Tableau Server.

Construct a URL with the unique ticket that you generated in the previous step to verify access with the trusted ticket. The URL syntax is different if you are accessing a Tableau Server with a single site vs a server that hosts multiple sites.

#### Default site server URL

```
https://<server_name>/trusted/<unique_ticket>/views/<workbook_
name>/<view_name>
```

#### Non-default site server url

```
https://<server_name>/trusted/<unique_ticket>/t/<site_name>/views/<-
workbook_name>/<view_name>
```

Variables in the URLs are indicated by angle brackets (< and >). All other syntax is literal.

#### Troubleshoot Trusted Authentication

This section includes some common issues and errors you might encounter when you're configuring trusted authentication.

A common source for trusted authentication errors are misconfiguration with a proxy server or load balancer. If your Tableau Server operates behind a reverse proxy server or a load bal-

ancer, see [Configure Tableau Server to work with a reverse proxy server and/or load balancer and Add a Load Balancer](#).

Trusted authentication information is written to `ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver\vizql-*.log`.

To increase the logging level from `info` to `debug`, run the following commands:

```
tsm configuration set -k vizqlserver.trustedticket.log_level -v
debug
tsm pending-changes apply
```

To test your trusted authentication deployment, see [Test Trusted Authentication](#).

## See also

For more troubleshooting information for specific errors, see the following topics accessible from the **Other articles in this section** below:

### Request for ticket by web server

- [Ticket Value of -1 Returned from Tableau Server](#)
- [HTTP 401 - Not Authorised](#)
- [HTTP 404 - File Not Found](#)
- [Invalid User \(SharePoint or C#\)](#)

### Viewer redeeming ticket

- [Attempting to Redeem the Ticket from the Wrong IP Address](#)
- [Cookie Restriction Error](#)

### Navigating between several embedded views

- [An error occurred communicating with the server \(403\)](#)

#### Ticket Value of -1 Returned from Tableau Server

Tableau Server returns -1 for the ticket value if it cannot issue the ticket as part of the trusted authentication process. Before troubleshooting this scenario, be sure to set the log level for trusted authentication to `debug` as specified in [Troubleshoot Trusted Authentication](#).

The exact reason for this message is written to the `vizqlserver_node*-* .log.*` files in the following folder:

```
ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver
```

Here are some things to confirm:

- **All web server host names or IP addresses are added to trusted hosts**

The log error, `'Invalid request host: <ip_address>'` may indicate that the IP address or host name for the computer sending the POST request is not in the list of trusted hosts on Tableau Server. See [Add Trusted IP Addresses or Host Names to Tableau Server](#) to learn how to add IP addresses or host names to this list.

- **IP addresses are IPv4**

If you are using IP addresses to specify trusted hosts, they must be in Internet Protocol version 4 (IPv4) format. An IPv4 address looks like this: 123.456.7.890. IPv6 addresses (for example, `fe12::3c4a:5eab:6789:01c%34`) are not supported as a way of inputting trusted hosts.

- **Username in POST request is a valid Tableau Server user**

The username you send in the POST request must be a licensed Tableau Server user. You can see a list of users by signing in to Tableau Server as an administrator.

The following log errors indicate a user POST issue:

- `"Missing username and/or client_ip"`
- `"Invalid user: <username>"`
- `"Unlicensed user is not allowed: <username>"`

**Username in POST request includes domain**

## Tableau Server on Windows Help

If Tableau Server is configured to use Local Authentication, the username that you send in the POST can be a simple string. However, if the server is configured for Active Directory you must include the domain name with the user name (domain\username). For example, the username parameter might be: `username=dev\jsmith`. A common error log for this scenario is `'Invalid user: <username>'`.

- **Content-Type is specified**

If you are designing an ASP.NET or C# application, you need to declare the content type in your HTTP request. For example:

```
http.setRequestHeader("Content-Type", "application/x-www-form-urlencoded; charset=UTF-8")
```

If you do not specify content type and Tableau Server returns a -1, the log files contain the error: `'missing username and/or client_ip'`.

### HTTP 401 - Not Authorised

If you receive a **401 - Not Authorized error**, it could be for one of the following reasons:

- You may have configured Tableau Server to use Active Directory with SSPI. If your web server uses SSPI, you do not need to set up trusted authentication. You can embed views and your users will have access to them as long as they are licensed Tableau server users and members of your Active Directory. For more information, see `tsm authentication sspi <commands>`.

**Note:** SSPI can only be configured on Tableau Server for Windows.

- Or a **302- Redirect error** after you have deployed Tableau Server, then it's likely the trusted ticket code you have written to construct the URL for the client has not been updated to account for the two-part ticket URL format. For more information, see [Get a Ticket from Tableau Server](#).

### HTTP 404 - File Not Found

You may receive this error if your program code references a Tableau Server URL that does not exist. For example, your web server may construct an invalid URL that cannot be found

when the webpage tries to retrieve it.

Another cause for this error is if you did not enter the trusted web servers as specified in Add Trusted IP Addresses or Host Names to Tableau Server. If you have already entered the trusted web servers, verify that the IP addresses or host names are correct.

#### Invalid User (SharePoint or C#)

You may encounter this error if you've configured Tableau Server for trusted authentication.

The example code for the SharePoint .dll references the following GET request:

```
SPContext.Current.Web.CurrentUser.Name
```

The above request will return the display name of the current Windows Active Directory user. If you want to use the login ID, then you will need to change the code to:

```
SPContext.Current.Web.CurrentUser.LoginName
```

After you make the change, recompile the SharePoint .dll.

#### Attempting to Redeem the Ticket from the Wrong IP Address

When you've configured Tableau Server for trusted authentication, you may encounter issues with redeeming the ticket.

This issue can occur when Tableau Server is configured to enforce client IP address matching. Because the client web browser IP address is not considered by default when redeeming the ticket, make sure that the client's web browser IP address that is sent in the POST request to Tableau Server is the same as when the browser tries to retrieve the embedded view.

For example, in the Trusted Authentication diagram, if the **POST request in step 3** sends the parameter `client_ip=74.125.19.147`, then the **GET request in step 5** must come from that same IP address.

For more information, see [Optional: Configure Client IP Matching](#) to learn how to configure Tableau Server to enforce client IP address matching.

### Cookie Restriction Error

When a user signs in to Tableau Server, a session cookie is stored in their local browser. The stored cookie is how Tableau Server maintains that the signed in user has been authenticated and can access the server. Because the cookie is set with the same domain or sub-domain as the browser's address bar, it is considered a first-party cookie. If a user's browser is configured to block first-party cookies, they will be unable to sign in to Tableau Server.

When a user signs in to Tableau Server via an embedded view, or in an environment where trusted authentication has been configured, the same thing happens: a cookie is stored. In this case, however, the browser treats the cookie as a third-party cookie. This is because the cookie is set with a domain that's different from the one shown in the browser's address bar. If a user's web browser is set to block third-party cookies, authentication to Tableau Server will fail. To prevent this from occurring, web browsers must be configured to allow third-party cookies.

An error occurred communicating with the server (403)

If Tableau Server is configured for trusted authentication, you may receive this error after opening a new view in a browser and attempting to navigate back to views you'd opened earlier.

Tableau Server provides protection against unauthorised reuse of VizQL sessions through the tsm configuration set Options `vizqlserver.protect_sessions`, which are set to `true` by default. Because Tableau Server is configured for trusted authentication, you might not need this level of protection. To disable this option, you can use tsm configuration set Options to change `vizqlserver.protect_sessions` to `false`.

### Personal Access Tokens

Personal access tokens (PATs) provide you and your Tableau Server users the ability to create long-lived authentication tokens. PATs enable you and your users to sign in to Tableau REST API without requiring hard-coded credentials (i.e. username and password) or interactive sign in. For more information about using PATs with Tableau REST API, see [Signing In and Out \(Authentication\)](#) in the Tableau REST API Help.

We recommend creating PATs for automated scripts and tasks that are created with the Tableau REST API:

- **Improve security:** Personal access tokens reduce risk in the event that credentials are compromised. In the case where Tableau Server uses Active Directory or LDAP as an identity store, you can reduce the impact of credential compromise by using a personal access token for automated tasks. If a token gets compromised or is used in automation that is failing or posing a risk, you can just revoke the token. You do not need to rotate or revoke the user's credentials.
- **Audit and track:** As an administrator, you can review Tableau Server logs to track when a token is used, what sessions are created from that token and the actions that are performed in those sessions. You can also determine if a session and the related tasks were performed from a session that was generated from a token or from an interactive sign-in.
- **Manage automation:** A token can be created for each script or task that is run. This allows you to silo and review automation tasks across your organization. Additionally, by using tokens, password resets or metadata changes (username, email, etc.) on user accounts will not disrupt automation as it would when credentials are hard-coded into the scripts.

#### Notes:

- To use PATs with tabcmd, install the compatible version of tabcmd from <https://tableau.github.io/tabcmd/>.
- PATs are not used for generic client access to the Tableau Server web UI or TSM.
- Configuring PATs expiration and disabling or limiting users access to PATs creation from the UI is available in Tableau Cloud only.
- PATs are automatically revoked when a **user's authentication method** is changed.

#### Understand personal access tokens

When a personal access token (PAT) is created, it is hashed then stored in the repository. After the PAT is hashed and stored, the PAT secret is shown once to the user and then no



longer accessible after the users dismisses the dialog. Therefore, users are instructed to copy the PAT to a safe place and to handle it as they would a password. When the PAT is used at run-time, Tableau Server compares the PAT presented by the user to the hashed value stored in the repository. If a match is made, then an authenticated session is started.

In the context of authorisation, the Tableau Server session that is authenticated with a PAT has the same access and privileges as the PAT owner.

**Note:** Users can't request concurrent Tableau Server sessions with a PAT. Signing in again with the same PAT, whether at the same site or a different site, will terminate the previous session and result in an authentication error.

### Server administrator impersonation

Beginning with version 2021.1, you can enable Tableau Server PAT impersonation. In this scenario, PATs that are created by server administrators can be used for [user impersonation](#) when using the Tableau REST API. Impersonation is useful in scenarios where you are embedding end-user-specific Tableau content within your application. Specifically, impersonation PATs allow you to build applications that query as a given user and retrieve content that the user is authorised for within Tableau Server, without hard-coding any credentials.

For more information, see [Impersonating a User](#) Tableau REST API Help.

Enable Tableau Server to accept personal access tokens during impersonation sign-in requests

By default, Tableau Server does not allow impersonation for server administrator PATs. You must enable the server-wide setting by running the following commands.

```
tsm authentication pat-impersonation enable [global options]
```

```
tsm pending-changes apply
```

**Important:** After you have run the commands, all PATs created by server administrators (including pre-existing PATs) can be used for impersonation. To bulk-revoke all existing server administrator PATs, you can post the `DELETE /api/{api-`

`version}/auth/serverAdminAccessTokens` URI. For more information, see [Imper-sonating a User](#) in the Tableau REST API Help.

### Create personal access tokens

Users must create their own PATs. Administrators cannot create PATs for users.

Users with accounts on Tableau Server can create, manage and revoke personal access tokens (PATs) on the **My Account Settings** page. See [Manage Your Account Settings](#) in the Tableau User Help for more information.

**Note:** A user can have up to 10 PATs.

### Change personal access tokens expiry

Personal access tokens (PATs) expire if they are not used after 15 consecutive days. If they are used more frequently than every 15 days, PATs expire after one year. After a year, new PATs must be created. Expired PATs will not display on the **My Account Settings** page.

You can change PATs expiration period by using the `refresh_token.absolute_expiry_in_seconds` option with the `tsm configuration set` command.

### Revoke a personal access token

As an administrator, you can also revoke a user's PAT. A user can also revoke their own personal access tokens (PATs) on the **My Account Settings** page using the procedure described in the [Manage Your Account](#) topic in the Tableau User Help.

1. Sign in to Tableau Server as a server or site administrator.
2. Locate the user whose PAT you want to revoke. For more information about navigating Server Admin pages and locating users, see [View, Manage or Remove Users](#).
3. Click the user's name to open their profile page.
4. On the user's profile page, click the **Settings** tab.

5. In the **Personal Access Tokens** section, identify the PAT that you want to revoke and then click **Revoke**.
6. In the dialog box, click **Delete**.

#### Track and monitor personal access token usage

All personal access token (PAT)-related actions are logged in the Tableau Server Application Server (vizportal) service. To locate PAT-related activities, filter log entries containing the string, `RefreshTokenService`.

A PAT is stored in this format `:Token Guid: <TokenID(Guid)>`, where the `TokenID` is a base64 encoded string. The secret value is not included in the logs.

For example:

```
Token Guid: 49P+CxmARY6A2GHxyvHHAA== (e3d3fe0b-1980-458e-80d8-61f1-caf1c700).
```

The following is an example snippet of two log entries. The first entry shows how a user is mapped to a PAT. The second entry shows a refresh event for the same PAT:

```
RefreshTokenService - Issued refresh token to the following user:  
jsmith. Token Guid: 49P+CxmARY6A2GHxyvHHAA== (e3d3fe0b-1980-458e-  
80d8-61f1caf1c700)  
RefreshTokenService - Redeemed refresh token. Token Guid:  
49P+CxmARY6A2GHxyvHHAA== (e3d3fe0b-1980-458e-80d8-61f1caf1c700)
```

To locate key operations, filter log entries containing the string, `OAuthController`.

## Use Tableau Connected Apps for Application Integration

Beginning with Tableau Server 2022.1, Tableau-connected apps enable a seamless and secure authentication experience by facilitating an explicit trust relationship between your Tableau Server site and external applications where Tableau content is embedded. , Tableau connected apps extended their capabilities to support REST API authorisation. And as of October 2023, REST API authorisation using connected apps is respected by the Tableau

Metadata API.

**Note:** Tableau-connected apps and Salesforce-connected apps are different and offer different functionality. Today, Tableau-connected apps are optimised for embedding Tableau views and metrics in external applications and used to authorise access to the Tableau REST API. (In October 2023, Tableau retired the ability to embed metrics in Tableau Cloud and Tableau Server version 2023.3.).

There are two types of connected apps you can configure: direct trust or OAuth 2.0 trust.

Direct trust

Using *direct trust*, you can:

- Restrict access to which content can be embedded and where that content can be embedded
- Provide users with the ability to access embedded content using single sign-on (SSO) without having to integrate with an identity provider (IdP)
- Provide users with the ability to authenticate directly from your external application
- Programmatically authorise access to the Tableau REST API and Tableau Metadata API (starting in Tableau Server October 2023) on users' behalf using JSON Web Token (JWT)
- Scope Tableau REST API capabilities users or applications can perform
- Enable additional features like:
  - Group assertions (beginning in Tableau Server 2024.2)

For more information about this connected app type, see [Configure Connected Apps with Direct Trust](#).

OAuth 2.0 trust

Using *OAuth 2.0 trust*, you can:

## Tableau Server on Windows Help

- Restrict access to which content can be embedded and where that content can be embedded
- Provide users the ability to access embedded content using single sign-on (SSO) through your identity provider (IdP)
- Provide access using standard OAuth 2.0 standard protocol
- Programmatically authorise access to Tableau REST API (and the Metadata API starting in Tableau Server 2023) on users' behalf
- Scope Tableau REST API capabilities users or applications can perform
- Enable additional features like:
  - Group assertions (beginning in Tableau Server 2024.2)

For more information about this connected app type, see [Configure Connected Apps with OAuth 2.0 Trust](#).

### Configure Connected Apps with Direct Trust

Beginning with Tableau Server version 2022.1, Tableau connected apps enable a seamless and secure authentication experience by facilitating an explicit trust relationship between your Tableau Server site and external applications.

#### Notes:

- Connected apps functionality, without UI, for Tableau Server became available in Tableau Server version 2021.4 through the [Connected App methods](#) in the Tableau REST API.
- To enable embedding through connected apps, Tableau Server must be configured to use SSL for HTTP traffic.
- In order for the session token to be valid, the clocks of the external application and the server that hosts the external application must be set to Coordinated Universal Time (UTC). If either clock uses a different standard, the connected app will not be trusted.

## How connected apps work

The trust relationship between your Tableau Server site and external application is established and verified through an authentication token in the JSON Web Token (JWT) standard, which uses a shared secret provided by the Tableau-connected app and signed by your external application.

## Key components of a connected app

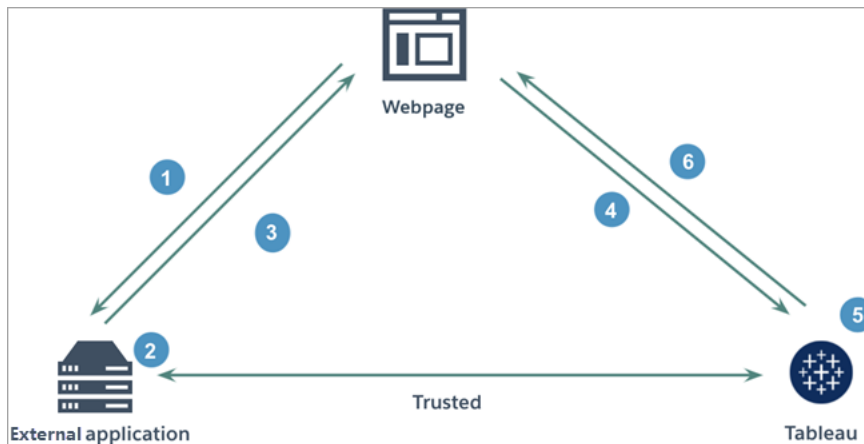
The following components of the connected work together with the JWT in your external application to authenticate users and display embedded content.

- **Secrets:** Secrets are keys shared by Tableau and your external application. They are used in signatures that form the JWT. A secret is required when using connected apps for embedding authentication or REST API authorisation. Secrets can be created in a connected app, do not expire and remain valid until deleted.
- **Domain allowlist (embedding workflows only):** You can specify a list of allowed domains in each connected app. Tableau content embedded through a connected app is only allowed under the specified domains. This helps ensure that content is exposed under the domains that are secured and approved by your business.
- **Access level (embedding workflows only):** You can specify what content can be embedded through a connected app by associating a connected app with one project or all projects. If you specify one project, only the content in the selected project can be embedded through the connected app. If you want to specify multiple projects, you must use the Tableau REST API.

## Connected app workflow

### Embedding workflows

The diagram below illustrates how authentication works between your external application (web server and web page) and connected app.



1. **User visits the web page:** When a user visits the embedded content on a web page, the web page sends a GET request to your external application to retrieve the HTML on that web page.
2. **External application constructs an authentication token:** The external application constructs a JWT, which contains a secret from the connected app (see Step 3 below for additional JWT requirements) and the scope of user access for the embedded content. The secret is signed by the external application and is used for verification of the trust relationship in a later step.
3. **External application responds with authentication token:** The external application responds to the page with the JWT in the embedded content's URL called by the web page.
4. **Webpage requests content from Tableau:** With the attempt to load the embedded content, the webpage calls the embedded content's URL, which sends a GET request to Tableau.
5. **Tableau validates the token:** Tableau receives the JWT and verifies the trust relationship with the external application by identifying the connected app and shared secret used in the JWT. Then Tableau creates a session for the user. The session not only respects the embedding scopes defined in the JWT, but also the restrictions specified in the connected app, including the allowed domains and allowed projects.
6. **Tableau returns the content based on the restricted embedding context:** The embedded content only loads when the page is under an allowed domain and the content is published to an allowed project (if applicable). The authenticated user can only interact with the embedded content by the scope defined in the JWT.

## Create a connected app

## Step 1: Create a connected app

Create a connected app from Tableau Server's Settings page.

1. As a server admin, sign in to Tableau Server.
2. From the left pane, select **Settings > Connected Apps**.
3. Click the New Connected App button drop-down arrow and select **Direct Trust**.

**Note:** If you're using Tableau Server 2023.3 or earlier, click the **New Connected App** button.

4. In the Create Connected App dialog box, do *one* of following:
  - For *REST API authorisation workflows (including Metadata API workflows that use the REST API for authentication)*, in the Connected app name text box, enter a name for the connected app and click the **Create** button.

**Note:** You can ignore **Access level** and **Domain allowlist** when configuring a connected app for REST API and Metadata API authorisation.
  - For *embedding workflows*, do the following:
    - i. In the Connected app name text box, enter a name for the connected app.
    - ii. From the Applies to drop-down menu, select **All project** or **Only one project** to control which views or metrics can be embedded. If you select the "Only one project" option, select the specific project to scope to. For more information about these two options, see Access level (embedding workflows only).

**Notes:**

- In Tableau Server 2023.3, Tableau retired the ability to embed metrics.



- Beginning with Tableau Server 2024.2, you can specify multiple projects using the Tableau REST API. For more information, see [Create Connected App](#) and [Update Connected App](#) methods in the REST API Help.
- iii. In the Domain allowlist, specify the domains using the rules described in Domain formatting below to control where views or metrics can be embedded.
- Important:** We recommend using the domain allowlist as a security best practice to ensure Tableau content is only embedded in locations that you allow.
- iv. When finished, click the **Create** button.

Create Connected App

Connected app name: MyCo

Access level: Applies to Only one project

Project name: MyCo

Domain allowlist: ☐ All domains ☒ Only specified domains: \*.myco.com

Buttons: Cancel, Create

5. Next to the connected app's name, click on the actions menu and select **Enable**. For security purposes, a connected app is set to disabled by default when created.



6. Make note of the connected app's ID, also known as the client ID, to use in Step 3 below.



## Step 2: Generate a secret

You can generate a total of two secrets for each connected app. The second secret can be used for secret rotation purposes to help protect against issues if a secret is compromised.

1. On the detail page of the connected app you created in Step 1, click the **Generate New Secret** button.
2. Make note of the secret ID and secret value to use in Step 3 below.



## Step 3: Configure the JWT

After you've generated a secret, you want to enable your external application to send a valid JWT. JWT is a standard used to securely transfer information between two parties. The JWT is signed by your external application to securely send information to Tableau Server. The

JWT references the connected app, the user that the session is being generated for and the level of access the user should have.

A valid JWT includes the following information:

- Connected app ID, also known as the client ID, from Step 1
- Secret ID and secret value generated in Step 2
- Registered claims and header:

Claim	Name	Description or required value
"kid"	Secret ID	Required (in header). The connected app's secret key identifier.
"iss"	Issuer	Required (in header). Unique issuer URI that identifies the trusted connect app and its signing key.
"alg"	Algorithm	Required (in header). JWT signing algorithm. Only HS256 is supported.
"sub"	Subject	Username of the authenticated Tableau Server user.
"aud"	Audience	Value must be: 'tableau'.
"exp"	Expiry Time	A valid JWT must not have expired. The expiration time (in UTC) of the JWT must be within the configured maximum validity period. The maximum validity period can be configured using the tsm viz-

		portal.oauth.connected_apps.max_expiration_period_in_minutes command.
"jti"	JWT ID	Required as a claim. The JWT ID claim provides a unique identifier for the JWT and is case sensitive.
"scp"  <b>Important:</b> Do not use "scope".	Scope	<p>For <i>embedding workflows</i>, supported values include:</p> <p>"tableau:views:embed"</p> <p>"tableau:views:embed_authoring" <b>Added in Tableau Server 2022.3</b></p> <p>"tableau:metrics:embed" <b>(Retired in Tableau Server 2023.3)</b></p> <p>"tableau:ask_data:embed" <b>(Added in Tableau Server 2023.1)</b></p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Values must be passed as a list type.</li> <li>• For tableau-views:embed and tableau-views:embed_authoring, the scope respects users' permissions already configured in Tableau Server and allows users</li> </ul>

		<p>to interact with the tools in the embedded view if available in the original view.</p> <ul style="list-style-type: none"> <li>• We recommend that the embed code excludes the toolbar parameter. For more information see Known issues (embedding workflows only) below.</li> </ul> <p>For <i>REST API authorisation workflows</i>, see REST API methods that support JWT authorisation.</p> <p>For <i>Metadata API workflows that use the REST API for authentication</i>, the only supported scope is <code>tableau-content:read</code>.</p>
<a href="https://tableau.com/groups">https://tableau.com/groups</a>		<p>For <i>embedding workflows</i> only.</p> <p>Value must match the name of one or more groups in Tableau Server. For more information, see the Dynamic group membership (embedding workflows only) section below.</p>

## Example JWTs

Here are example JWTs in both Java and Python languages. The Java and Python examples use the nimbus-jose-jwt library and the PyJWT library, respectively.

### Java

```
import com.nimbusds.jose.*;
import com.nimbusds.jose.crypto.*;
import com.nimbusds.jwt.*;

import java.util.*;

...

String secret = "secretvalue";
String kid = "connectedAppSecretId";
String clientId = "connectedAppClientId";
List<String> scopes = new
ArrayList<>(Arrays.asList("tableau:views:embed"));
String username = "username";
JWSSigner signer = new MACSigner(secret);
JWSHeader header = new
JWSHeader.Builder(JWSAlgorithm.HS256).keyID(kid).customParam("iss",
clientId).build();
JWTClaimsSet claimsSet = new JWTClaimsSet.Builder()
    .issuer(clientId)
    .expirationTime(new Date(new Date().getTime() + 60 * 1000)) //ex-
pires in 1 minute
    .jwtID(UUID.randomUUID().toString())
    .audience("tableau")
    .subject("username")
    .claim("scp", scopes)

    .build();
SignedJWT signedJWT = new SignedJWT(header, claimsSet);
```

## Tableau Server on Windows Help

```
signedJWT.sign(signer);  
model.addAttribute("token", signedJWT.serialize());
```

### Python

```
import jwt  
  
token = jwt.encode(  
    {  
        "iss": connectedAppClientId,  
        "exp": datetime.datetime.utcnow() + datetime.timedelta(minutes=5),  
        "jti": str(uuid.uuid4()),  
        "aud": "tableau",  
        "sub": user,  
        "scp": ["tableau:views:embed", "tableau:metrics:embed"]  
    },  
    connectedAppSecretKey,  
    algorithm = "HS256",  
    headers = {  
        'kid': connectedAppSecretId,  
        'iss': connectedAppClientId  
    }  
)
```

After you've configured the JWT, when the code is run by your external application, it will generate a token.

## Step 4: Next steps

### For embedding workflows

After the JWT has been configured, you must add embed code to your external application. Ensure that you include the valid JWT you configured in Step 3 above in the web component that your external application calls.

For more information about embedding Tableau content, see one or both of the following:

- Embed metrics, see [Embed Metrics into Webpages](#) topic in the Tableau Help. (In Tableau Server 2023.3, Tableau retired the ability to embed metrics.)
- Embed Tableau views and metrics using the [Tableau Embedding API v3](#).

**Note:** For users to successfully authenticate when they access embedded content, browsers must be configured to allow third-party cookies.

## For REST API authorisation workflows

After the JWT has been configured, you must add the valid JWT to the REST API Sign In request for authorised access. For more information, see [Access Scopes for Connected Apps](#).

## For Metadata API workflows

After the JWT has been configured, you must add the valid JWT to the REST API Sign In request. For more information, see [Access Scopes for Connected Apps](#).

### Manage a connected app

The Connected Apps page is where you can manage all the connected apps for your site. You can perform tasks such creating, deleting and disabling connected apps, and revoking or generating new secrets if existing secrets have been compromised.

1. As a server admin, sign in to Tableau Server.
2. From the left pane, select **Settings > Connected Apps**.
3. Tick the box next to the connected app you want to manage and do one or more of the following:
  - **Generate a new secret** according to the rotation timeline specified by your organisation's security policies. To generate an additional secret, click on the name of the connected app and then click the **Generate New Secret** button. A connected app can have a maximum of two secrets. Both secrets can be active at the same time, do not expire and remain valid until deleted.



- **Review the connected app details** by clicking the name of the connected app to see when the connected app was created, its ID, project and domain scopes, and its secrets.
- **Change the project scope or domain** by selecting **Edit** in the Actions menu. Make your changes and click **Update**.

**Note:** If you change the project or domain scopes and the embedded content doesn't exist in either the new project or new domain, the embedded view or metric is unable to display and users will see an error when accessing the embedded content.

- **Delete a secret** by clicking the connected app's name. On the connected app's page, click **Actions** next to the secret and select **Delete**. In the confirmation dialog box, select **Delete** again.

**Note:** If the connected app's secret is being used by an external application, the embedded view or metric is unable to display after the secret is deleted. For more information, see Effects of disabling or deleting a connected app, or deleting a secret below.

- **Disable a connected app** by selecting **Disable** in the Actions menu. If the connected app is being used by an external application, the embedded view or metric is unable to display after the connected app is disabled. For more information, see Effects of disabling or deleting a connected app, or deleting a secret below.


**MyCo ...**

Status **Enabled** Created **Dec 1, 2021**

**Secret**  
(Maximum of 2)


Generated on December 01, 2021


ID 9ada8675-97ad-4af3-95c8-7f2edfc3dfe3

Value \*\*\*\*\* 

Generated on December 01, 2021

ID 5f95545c-feb1-47de-aaf5-c328f6160823

Value \*\*\*\*\* 

 Delete a secret before generating a new one. Generate New Secret

Client ID

c1e941a9-9246-4759-bd8c-94e814711fb2

Copy Client Id

Access level

MyCo

Domain allowlist

\*.myco.com

## Effects of disabling or deleting a connected app, or deleting a secret

To display embedded content to your user or enable REST API access through a connected app, the connected app must be enabled and its secret generated. If the connect app is being used in your external application and is either disabled or deleted, or its secret deleted or replaced, users will get a 403 error.

To avoid this issue, ensure the connected app is enabled and the JWT is using the correct secret ID and value.

## Access level (embedding workflows only)

You can select one of two project types when configuring a connected app's access level. The access level controls which content can be embedded.

- **All projects:** This option enables the content in all projects to be embedded
- **Only one project:** This option enables only the content in the specified project to be embedded. If the specified project contains nested projects, embedding content in those nested projects is not enabled.

### About multiple projects

Starting in Tableau Server 2024.2 , you can enable the content in multiple projects for a connected app using the Tableau REST API only. To specify which projects, use the "project IDs" in either the [Create a Connected App](#) or [Update a Connected App](#) methods.

**Note:** When multiple projects are configured for your connected app, Tableau displays **Multiple projects** for the connected app's access level. If you select either **Only one project** or **All projects** and update the connected app, the "Multiple projects" option will no longer be visible. If you need to configure the connected app for multiple projects again, you must use the REST API.

## Domain allowlist rules (embedding workflows only)

The connected app's domain allowlist enables you to restrict access to embedded Tableau content to all domains or some domains, or to exclude some domains or block all domains.

**Important:** We recommend using the domain allowlist as a security best practice to ensure Tableau content is only embedded in locations that you allow.

### Domain options

You can select one of two options when configuring a connected app's domain allowlist:

- **All domains:** As the default option, this option enables unrestricted access to embedded content.

- **Only specific domains:** This option gives you the ability to scope down access to embedded content. If you use this option, follow the formatting rules specified in the following section, Domain formatting.

## Domain formatting

In the domain allowlist text box, you can enter one or more domains using the formatting examples below.

**Note:** Domain formatting rules also apply when using the [Connect App methods](#) in the Tableau REST API.

Here are some formatting examples based on common scenarios:

To specify...	Example	Embedding access
Range of domains	*.myco.com	Embedded content is accessible from all subdomains under myco.com.
All ports	myco.com:*	Embedded content is access from all ports in myco.com.
Specific port	myco.com:8080	Embedded content is accessible from port 8080 in myco.com only.
Multiple discrete domains	myco.com events.myco.com ops.myco.com	Embedded content is accessible from all three domains.  <b>Note:</b> When specifying multiple domains, type each domain on a new line or separate domains with a space. For the REST API, domains must be separated by a space.
Secure traffic only	https:	Embedded content is securely accessible regardless of domain.
Secure traffic to all ports for	https:*myco.com:*	Embedded content is securely accessible from all ports on all subdomains under

a range of domains		myco.com.
No domains	[no domains]	Access to embedded content is blocked.

## Dynamic group membership (embedding workflows only)

Beginning in Tableau Server 2024.2, if connected apps are configured and the capability's setting is enabled, you can dynamically control group membership through custom claims included in the JWT sent by the external application.

When configured, during user authentication, the external application sends the JWT that contains two custom claims for group membership: `group` (<https://tableau.com/groups>) and `group names` (for example, "Group1" and "Group2") to assert the user into. Tableau validates the JWT and then enables access to the groups and the content whose permissions are dependent on those groups.

For more information, see [Dynamic group membership using assertions](#).

## Known issues (embedding workflows only)

There are a couple of known issues when using connected apps that will be addressed in a future release.

- **Toolbar features:** When embedded content has the toolbar parameter defined, not all toolbar features will work. To work around this issue, we recommend you hide the toolbar parameter like in the example below.

```
<tableau-viz id='tab-viz' src='https://<your_server>/t/<your_
site>/...'
  toolbar='hidden'>
</tableau-viz>
```

- **Published data sources:** Published data sources set to **Prompt User** for database credentials will not display. To work around this issue, if possible, we recommend data source owners embed their database credentials instead.
- **Embedded views on multiple sites:** In Tableau Server 2023.1 and earlier, switching between views on different sites in the same browser causes error **1008: Could not fetch secret for connect app**. To work around this issue, upgrade to Tableau Server 2023.3 or later.
- **Ask Data objects in embedded dashboards:** Ask Data objects in embedded dashboards will not load. (In Tableau Server 2024.2 will retire Ask Data.)
- **Metrics and domain allowlists:** Embedded metrics views will be displayed despite access restrictions that might be specified in the connected apps' domain allowlists.  
**Note:** Metrics data accessed from toolbars of embedded views will work as expected. (In Tableau Server 2023.3, Tableau retired the ability to embed metrics.)

### Configure Connected Apps with OAuth 2.0 Trust

As a Tableau Server admin, you can register one or more external authorisation servers (EASs) to establish a trust relationship between your Tableau Server and the EAS using the OAuth 2.0 standard protocol.

When embedded Tableau content is loaded in your external application, a standard OAuth flow is used. After users successfully sign in to the IdP, they are then automatically signed in to Tableau Server. Follow the steps described below to register your EAS with Tableau Server.

### Important:

- Some of the procedures in this topic require configuration with third-party software and services. We've made a best effort to verify the procedures to enable the EAS feature on Tableau Server. However, third-party software and services might change or your organisation might differ. If you encounter issues, refer to your third-party documentation for authoritative configuration details and support.

- To enable embedding through EAS, Tableau Server must be configured to use SSL for HTTP traffic.
- In order for the session token to be valid, the clocks of the external application and the server that hosts the external application must be set to Coordinated Universal Time (UTC). If either clock uses a different standard, the connected app will not be trusted.

## Step 1: Before you begin

To register an EAS with Tableau Server, you must have an EAS already configured. In addition, the EAS must send a valid JSON Web Token (JWT) that contains the registered claims and header listed in the table below.

Claim	Name	Description or required value
"kid"	Key ID	Required (in header). A unique key identifier from the identity provider.
"iss"	Issuer	Required (in header or as a claim). Unique issuer URI that identifies the trusted connect app and its signing key.
"alg"	Algorithm	Required (in header). JWT signing algorithm. Supported algorithm names are listed in the <a href="#">Class JWSSAlgorithm</a> page in the javadoc.io documentation. The signing algorithm can be configured using the viz-portal.oauth.external_authorization_server.blocklisted_jws_algorithms command.
"sub"	Subject	Username of the authenticated Tableau Server user.

"aud"	Audience	Value must be: "tableau"
"exp"	Expiry Time	A valid JWT must not have expired. The expiry time (in UTC) of the JWT must be within the configured maximum validity period. Maximum validity period can be configured using vizportal.oauth.external_authorization_server.max_expiration_period_in_minutes command.
"jti"	JWT ID	The JWT ID claim provides a unique identifier for the JWT and is case sensitive.
"scp"	Scope	<p>For <i>embedding workflows</i>, supported values include:</p> <p>"tableau:views:embed"</p> <p>"tableau:views:embed_authoring" (Added in Tableau Server 2022.3)</p> <p>"tableau:metrics:embed" (Retired in Tableau Server 2023.3)</p> <p>"tableau:ask_data:embed"(Added in Tableau Server 2023.1. Will be retired in Tableau Server 2024.2)</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Values must be passed</li> </ul>



		<p>as a list type.</p> <ul style="list-style-type: none"> <li>• For <code>tableau-views:embed</code>, the scope respects users' permissions already configured in Tableau Server and allows users to interact with the tools in the embedded view if available in the original view.</li> <li>• We recommend that the embed code excludes the toolbar parameter. For more information see Known issues (embedding workflows only) below.</li> </ul> <p><i>For REST API authorisation workflows, see REST API methods that support JWT authorisation.</i></p> <p><i>For Metadata API workflows that use the REST API for authentication, the only supported scope is <code>tableau-content:read</code>.</i></p>
<code>https://tableau.com/groups</code>	Dynamic group membership	<p>For <i>embedding workflows</i> only.</p> <p>Value must match the name of one or more groups in Tableau Server. For more information,</p>

		see the Dynamic group membership (embedding workflows only) section below.
--	--	--

**Note:** The JWT claims above are documented in the [Registered Claim Names](#) section in the documentation distributed by the Internet Engineering Task Force (IETF) organisation.

## Step 2: Register your EAS with Tableau Server

By registering your EAS with Tableau Server, you establish a trust relationship between the EAS and Tableau Server. This means when users access Tableau content embedded in your external application, they are redirected to authenticate with the IdP. The EAS generates the authentication token, which is passed to Tableau Server for verification. After the trust relationship is verified, access to the embedded content is granted to users.

**Note:** Some EASs support the option to display a consent dialog that asks for users' approval for the application to access Tableau content. To ensure the best experience for your users, we recommend you configure your EAS to automatically consent to the external application's request on users' behalf.

### About site-level EAS

Beginning in Tableau Server 2024.2, you can configure site-level EAS. To register an EAS at the site-level, connected apps must be enabled in Tableau Server Manager (TSM).

#### Server-wide EAS

There are two ways you can register server-wide EAS: using the TSM web UI or using TSM CLI.

After registering the EAS, the established trust relationship applies to all sites on Tableau Server.

## Option 1: Using TSM web UI

1. As a Tableau Server admin, sign in to the Tableau Services Manager (TSM) web UI. For more information, see [Sign in to Tableau Services Manager Web UI](#).
2. Do *one* of the following:
  - In Tableau Server 2024.2 and later, navigate to the User Identity & Access page > **Connected Apps** tab.
  - In Tableau Server 2023.3 and earlier, navigate to the User Identity & Access page > **Authorisation Server** tab.
3. Do *one* of the following:
  - In Tableau Server 2024.2 and later:
    - a. Select the **Enable connected apps** tick box.
    - b. Select the second radio button, **Allow connected apps (configure at site level) and server-wide OAuth 2.0 trust (configure below)**.
    - c. In the **Issuer URL** text box, paste the issuer URL of the EAS.
    - d. Click the **Save Pending Changes** button.

The screenshot shows the 'User Identity & Access' configuration page in the Tableau TSM web UI. The 'Connected Apps' tab is selected. Under the 'Enable Connected Apps' section, the checkbox 'Enable connected apps' is checked. The second radio button, 'Allow connected apps (configure at site level) and server-wide OAuth 2.0 trust (configure below)', is selected. Below this, there is a text box for 'Issuer URL' containing the value 'https://dev-12345678.okta.com/oauth2/ausd0' and a text box for 'JWKS URI' with the value 'Optional'. At the bottom, there are 'Cancel' and 'Save Pending Changes' buttons.

- In Tableau Server 2023.3 and earlier:

- a. Select the **Enable OAuth access for embedded content** tick box.
- b. In the **Issuer URL** text box, paste the issuer URL of the EAS.
- c. Click the **Save Pending Changes** button.

**User Identity & Access**  
Configure user access to Tableau Server and manage user identities. [Learn more](#)

Identity Store   Authentication Method   Trusted Authentication   **Authorization Server**

**Register External Authorization Server**  
Establish trusted relationship with an external authorization server. [Learn more](#)

☒ Enable OAuth access for embedded content

☒ Server-wide trust

Enter information about the external authorization server that will generate the access token.

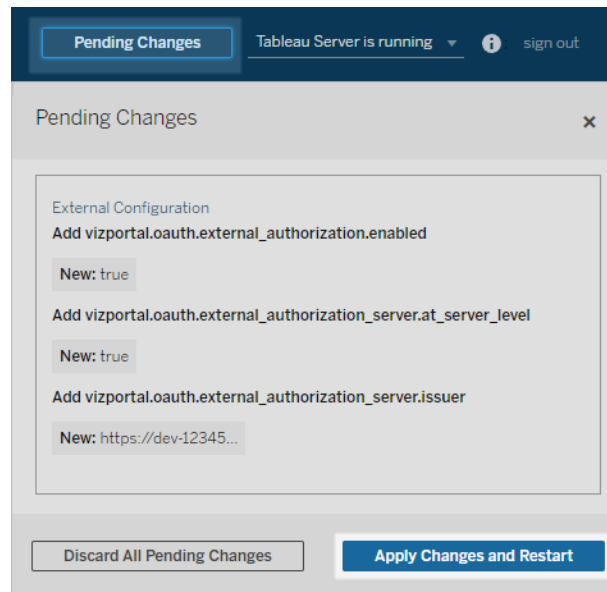
Issuer URL  

JWKS URI  

4. When finished, do the following:
  - a. In the upper-right corner of the page, click the **Pending Changes** button.
  - b. In the bottom-right corner of the page, click the **Apply Changes and Restart**

button to stop and restart Tableau Server.



## Option 2: Using TSM CLI

1. Open a command prompt as an admin on the initial node (where TSM is installed) in the cluster.
2. Run the following commands:

```
tsm configuration set -k vizportal.oauth.external_author-  
ization.enabled -v true  
tsm configuration set -k vizportal.oauth.external_author-  
ization_server.issuer -v "<issuer_url_of_EAS>"  
tsm restart
```

### Site-level EAS

Beginning in Tableau Server 2024.2, you can register one or more EAS's for a site. After registering the EAS at the site level, the established trust relationship applies to the site only.

**Note:** A prerequisite to configuring a site-level EAS is that connected apps are enabled in TSM.

## Step 1: Enable connected apps

1. As a Tableau Server admin, sign in to the Tableau Services Manager (TSM) web UI.  
For more information, see [Sign in to Tableau Services Manager Web UI](#).
2. Navigate to the User Identity & Access page > **Connected Apps** tab.
3. Select the **Enable connected apps** tick box.
4. Do *one* of the following:
  - Select the first radio button, **Allow connected apps (configure at site level)** to enable registering EAS's at the site-level only.

The screenshot shows the 'User Identity & Access' configuration page in the Tableau Services Manager. The 'Connected Apps' tab is active. Under the 'Enable Connected Apps' section, the 'Enable connected apps' checkbox is checked. The first radio button, 'Allow site-level connected apps', is selected. The second radio button, 'Allow site-level connected apps and server-wide connected apps with OAuth 2.0 trust (configure below)', is disabled. Below the radio buttons, there is a text prompt: 'Enter information about the external authorization server that will generate the access token.' followed by two input fields: 'Issuer URL' (labeled 'Required') and 'JWKS URI' (labeled 'Optional'). At the bottom of the form, there are 'Cancel' and 'Save Pending Changes' buttons.

- (Default) Select the second radio button, **Allow connected apps (configure at site level) and server-wide OAuth 2.0 trust (configure below)** to enable registering EAS's at both the site-level and server-wide. If you choose this option, ensure the issuer URL specified at the site-level is different from the

server-wide issuer URL.

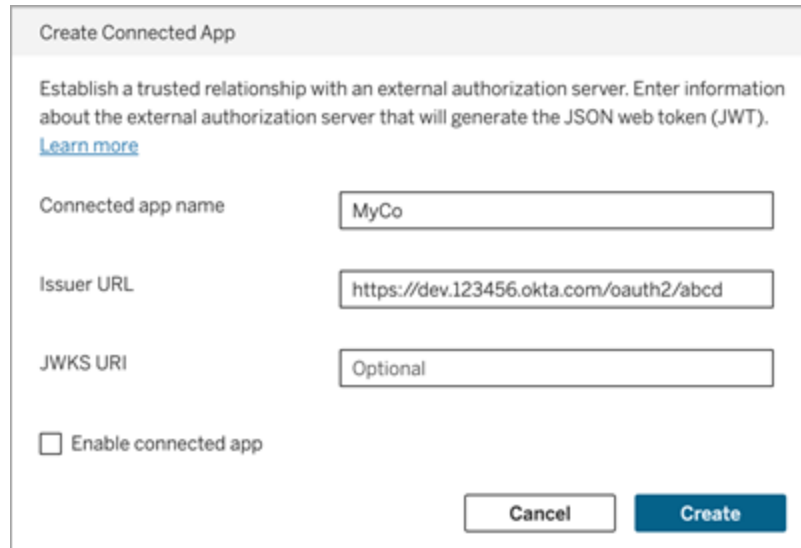
The screenshot shows the 'User Identity & Access' configuration page in Tableau Server. The 'CONFIGURATION' tab is selected, and the 'Connected Apps' sub-tab is active. Under 'Enable Connected Apps', the option 'Allow site-level connected apps and server-wide connected apps with OAuth 2.0 trust (configure below)' is selected. Below this, there are two input fields: 'Issuer URL' with a 'Required' label and 'JWKS URI' with an 'Optional' label. At the bottom, there are 'Cancel' and 'Save Pending Changes' buttons.

5. Click the **Save Pending Changes** button.
6. When finished, do the following:
  - a. In the upper-right corner of the page, click the **Pending Changes** button.
  - b. In the bottom-right corner of the page, click the **Apply Changes and Restart** button to stop and restart Tableau Server.

## Step 2: Register the EAS

1. As a Tableau Server admin, sign in to Tableau Server.
2. From the left pane, select **Settings > Connected Apps**.
3. Click the New Connected App button drop-down arrow and select **OAuth 2.0 Trust**.
4. In the Create Connected App dialog box, do the following:
  - a. In the **Name** text box, enter a name for the connected app.
  - b. In the **Issuer URL** text box, paste the issuer URL of the EAS.

- c. Select the **Enable connected app**. For security purposes, a connected app is set to disabled by default when created.
- d. When finished, click the **Create** button.



**Create Connected App**

Establish a trusted relationship with an external authorization server. Enter information about the external authorization server that will generate the JSON web token (JWT). [Learn more](#)

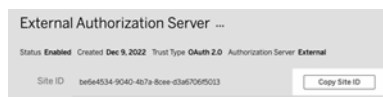
Connected app name:

Issuer URL:

JWKS URI:

☐ Enable connected app

5. After the connected app is created, copy the connected app's site ID. The site ID is used for the JWT's 'aud' (Audience) claim described in Step 1 above.



## Step 3: Next steps

### For embedding workflows

After configuring Tableau Server to use your EAS, you must add embed code to your external application. Ensure that you include the valid JWT generated by your EAS, as described in Step 1, in the web component that your external application calls.

For more information about embedding Tableau content, see one or both of the following:

- Embed metrics, see [Embed Metrics into Webpages](#) topic in the Tableau Help. (In Tableau Server 2023.3, Tableau retired the ability to embed metrics.)



- Embed Tableau views and metrics using the [Tableau Embedding API v3](#).

**Note:** For users to successfully authenticate when they access embedded content, browsers must be configured to allow third-party cookies.

Control where content can be embedded using domain allowlist for embedding

Starting in Tableau Server 2023.3, you and your users can control whether Tableau content can be embedded without restriction or restricted to certain domains using the Update Embedding Settings for Site method in Tableau REST API.

By default, the `unrestrictedEmbedding` site setting for embedding is set to `true` to allow unrestricted embedding. Alternatively, you and your users can set the setting to `false` and specify the domains where Tableau content in external applications can be embedded using the `allowList` parameter.

For more information, see one or both of the following:

- [Update Embedding Settings for Site](#) in the Tableau REST API Help
- [Tableau Site Setting for Embedding](#) in the Tableau Embedding API v3 Help.

## For REST API authorisation workflows

After the JWT has been configured, you must add the valid JWT to the REST API Sign In request for authorised access. For more information, see [Access Scopes for Connected Apps](#).

## For Metadata API workflows

After the JWT has been configured, you must add the valid JWT to the REST API Sign In request. For more information, see [Access Scopes for Connected Apps](#).

## Dynamic group membership (embedding workflows only)

Beginning in Tableau Server 2024.2, if connected apps are configured and the capability's setting is enabled, you can dynamically control group membership through custom claims included in the JWT sent by the external application.

When configured, during user authentication, the external application sends the JWT that contains two custom claims for group membership: `group` (<https://tableau.com/groups>) and group names (for example, "Group1" and "Group2") to assert the user into. Tableau validates the JWT and then enables access to the groups and the content whose permissions are dependent on those groups.

For more information, see [Dynamic group membership using assertions](#).

## Known issues (embedding workflows only)

There are a couple of known issues when using connected apps that will be addressed in a future release.

- **Toolbar features:** When embedded content has the toolbar parameter defined, not all toolbar features will work. To work around this issue, we recommend you hide the toolbar parameter like in the example below.

```
<tableau-viz id='tab-viz' src='https://<your_server>/t/<your_
site>/...'
      toolbar='hidden'>
</tableau-viz>
```

- **Published data sources:** Published data sources set to **Prompt User** for database credentials will not display. To work around this issue, if possible, we recommend data source owners embed their database credentials instead.
- **Embedded views on multiple sites:** In Tableau Server 2023.1 and earlier, switching between views on different sites in the same browser causes error **1008: Could not fetch secret for connect app**. To work around this issue, upgrade to Tableau Server 2023.3 or later.

## Troubleshoot

When embedded content fails to be displayed in your external application or Tableau REST API authorisation fails, you can use a browser's developer tools to inspect and identify error codes that might be associated with the EAS feature enabled on Tableau Server .

Refer to the table below to review the description of the error code and potential resolution.

Error code	Summary	Description	Potential resolution or explanation
5	SYSTEM_USER_NOT_FOUND	Tableau user could not be found	To resolve this issue, verify the 'sub' (Subject) claim value in the JWT is the 'username' for the authenticated Tableau Server. This value is case sensitive.
16	LOGIN_FAILED	Login failed	<p>This error is typically caused by one of the following claim issues in the JWT:</p> <ul style="list-style-type: none"> <li>The 'exp' (Expiry Time) exceeds the default maximum validity period. To resolve this issue, review <a href="#">registered claims</a> required for a valid JWT and ensure the correct value is used. To change the maximum validity period, you can use the vizportal.oauth.external_authorization_server.max_expiration_period_in_minutes command.</li> <li>The 'sub' (Subject) is calling an unknown user. To resolve this issue, verify the 'sub' claim is "username". This value is case sensitive.</li> </ul>

67	FEATURE_NOT_ENABLED	On-demand access is not supported	On-demand access is available through licensed Tableau Cloud sites only.
10081	COULD_NOT_RETRIEVE_IDP_METADATA	Missing EAS metadata endpoint	To resolve this issue, verify the EAS is configured correctly and the correct issuer is being called.
10082	AUTHORISATION_SERVER_ISSUER_NOT_SPECIFIED	Missing issuer	To resolve this issue, verify that the correct issuer is being called. To change the issuer URL, you can use the viz-portal.oauth.external_authorization_server.issuer command.
10083	BAD_JWT	JWT header contains issues	The 'kid' (Secret ID) or 'clientId' (Issuer) claims are missing from the JWT header. To resolve this issue, ensure this information is included.
10084	JWT_PARSE_ERROR	JWT contains issues	To resolve this issue, verify the following: <ul style="list-style-type: none"> <li>• The 'aud' (Audience) value referenced in the JWT uses the 'tableau' value. This value is case sensitive.</li> <li>• The 'aud' (Audience) and 'sub' (Subject) are included in the JWT.</li> </ul>
10085	COULD_NOT_FETCH_JWT_KEYS	JWT could not find keys	Could not find the secret.  To resolve this issue, verify that

			the correct issuer is being called. To change the issuer URL, you can use the viz-portal.oauth.external_authorization_server.issuer command.
10087	BLOCKLISTED_JWS_ALGORITHM_USED_TO_SIGN	Issue with the JWT signing algorithm	To resolve the issue, you can remove the signing algorithm. For more information, see viz-portal.oauth.external_authorization_server.blocklisted_jws_algorithms.
10088	RSA_KEY_SIZE_INVALID	Issue with JWT signing requirements	To resolve this issue, verify with the EAS or IdP that the JWT is being signed with an RSA key size of 2048.
10091	JTI_ALREADY_USED	Unique JWT required	The JWT has already been used in the authentication process. To resolve this issue, the EAS or IdP must generate a new JWT.
10092	NOT_IN_DOMAIN_ALLOW_LIST	Domain of the embedded content is not specified	To resolve this issue, ensure the <code>unrestrictedEmbedding</code> setting is set to <code>true</code> or <code>domainAllowlist</code> parameter includes the domains where Tableau content is embedded using the <a href="#">Update Embedding Settings for Site</a> method in the Tableau REST API.
10094	MISSING_	Missing	To resolve this issue, verify the

	REQUIRED_JTI	JWT ID	'jti' (JWT ID) is included in the JWT.
10096	JWT_EXPIRATION_EXCEEDS_CONFIGURED_EXPIRATION_PERIOD		The 'exp' (Expiry Time) exceeds the default maximum validity period. To resolve this issue, review <a href="#">registered claims</a> required for a valid JWT and ensure the correct value is used. To change the maximum validity period, you can use the vizportal.oauth.external_authorization_server.max_expiration_period_in_minutes command.
10097	SCOPES_MALFORMED	Issues with scopes claim	This error can occur when the 'scp' (Scope) claim is either missing from the JWT or not passed as a list type. To resolve this issue, verify 'scp' is included in the JWT and passed as a list type. For troubleshooting help with a JWT, see <a href="#">Debugger</a> on the auth0 site.
10098	JWT_UNSIGNED_OR_ENCRYPTED	JWT is unsigned or encrypted	Tableau does not support an unsigned or encrypted JWT.
10099	SCOPES_MISSING_IN_JWT	Missing scopes claim	The JWT is missing the required 'scp' (Scope) claim. To resolve this issue, verify 'scp' is included in the JWT. For troubleshooting help with a JWT, see <a href="#">Debugger</a> on the auth0 site.

10100	JTI_PERSISTENCE_FAILED	Unexpected JWT ID error	There was an unexpected error with the 'jti' (JWT ID). To resolve this issue, a new JWT with a new 'jti' must be generated.
10103	JWT_MAX_SIZE_EXCEEDED	JWT exceeds maximum size	This error can occur when JWT size exceeds 8000 bytes. To resolve this issue, make sure that only the necessary claims are being passed to Tableau Server.

### Access Scopes for Connected Apps

Starting with Tableau Server version 2022.3, using Tableau-connected apps, you can programmatically call and access the Tableau REST API through your custom application on behalf of Tableau Server users. Access to the REST API is enabled by a JSON Web Token (JWT) defined as part of the initial Sign In request. The JWT must contain scopes that define the REST API methods that are available to your custom application and its users through the connected app.

Authorise access to the REST API using connected apps to:

- Enhance security – using a JWT as a bearer token is inherently more secure than storing and managing admin user passwords through .env files in vaults
- Enhance efficiency – using a JWT as a bearer token enables a simplified impersonation with one request to the Sign In endpoint instead of two requests
- Extend and automate complex Tableau integrations and backend queries – such as dynamic content retrieval and advanced filtering

### Scope actions

Connected apps use scopes that grant access to content or administrative actions through the REST API methods that support JWT authorisation (below). A scope is a colon-separated string that starts with the namespace `tableau`, followed by the Tableau resource that access

is being granted to, such as `datasources`, and ends with the action that is allowed on the resource, such as `update`.

The action a scope can take includes:

- `create`
- `read`
- `run`
- `update`
- `download`
- `delete`

For example, a scope that allows your custom application to call the [Update Data Source](#) method looks like:

```
tableau:datasources:update
```

### Scope types

The type of scope you use depends on the content or administrative action that you want to enable. Scopes generally fall into one of the following types: content read, individual, wildcard and cross-category.

- **Content read scope:** The content read scope, `tableau:content:read`, enables supported GET methods for Tableau content. When you use this scope, you enable actions across REST API categories. More specifically, using this scope you enable GET methods for data sources, metrics, views, workbooks, projects and sites. Starting in Tableau Server 2023.3, you also specify this scope in a JWT that will be used to create a credentials token for use with the [Metadata API](#).

**Note:** To enable GET methods for administrative actions, like users and groups, you can use their individual scopes.

- **Individual scopes:** To enable supported content and administrative actions, you can use their individual scopes. An individual scope is generally associated with a single method and REST API category.



### Examples:

- To enable publish or update a data source action, you can use the individual `tableau:datasources:create` or `tableau:datasources:update` scope, respectively.
- For administrative actions like add or remove users, you can use the individual `tableau:users:create` or `tableau:users:delete` scope, respectively.

**Note:** There are some individual scopes that can enable actions across REST API categories. For example, `tableau:views:download` enables actions in the view data and workbooks REST API categories.

- **Wildcard (\*) scopes:** For certain scopes, you can replace the action with the wildcard character (\*) to enable supported actions within a specific REST API category.

### Examples:

- You can use the `tableau:projects:*` wildcard scope to enable the create, delete and update actions in the projects REST API category.
- You can use the `tableau:users:*` wildcard scope to enable the get/list, add, delete and update actions in the users REST API category.
- You can use the `tableau:tasks:*` wildcard scope to enable the get/list, add, delete, update and run actions of extract and subscriptions REST API categories. In addition, this scope enables update data source (if an extract) and update workbook.
- **Cross-category scopes:** In addition to the content read scope, there are a few additional scopes that, if used, enable supported actions across different REST API categories.

### Examples:

- If using the `tableau:tasks:run` scope, you enable actions in the data sources and workbooks REST API categories.
- Again, if using the `tableau:views:download` scope, you enable actions in the view data and workbook REST API categories.
- If using permissions scopes like `tableau:permissions:update` or `tableau:permissions:delete`, you enable actions in the data sources, workbooks and projects REST API categories.

## Summary of how to authorise REST API access

The following list summarises the steps to request access to the REST API through a JWT:

1. **Create a connected app** using one of the following methods:
  - Configure Connected Apps with Direct Trust
  - Configure Connected Apps with OAuth 2.0 Trust
2. **Generate a valid JWT** – at runtime your custom application will generate a valid JWT, configured with the scopes you have included
3. **Make a Sign In request** – your custom application will make a Sign In request using the JWT to return a Tableau credentials token and site ID (LUID)
4. **Use the Tableau access token in subsequent requests** – in subsequent REST API calls, use 1) the Tableau credentials token as the `X-Tableau-Auth` header value and 2) the site ID (LUID) in the request URI

## Example

For example, suppose you create a connected app using direct trust. Using direct trust, your custom application that calls the REST API generates a valid JWT using the client ID and client secret generated by the connected app.

### Scopes in the JWT

To successfully authorise access to the REST API, the JWT must also contain the scopes that define the REST API capabilities. For example, to enable various data source-related methods, you might include the following scopes in the JWT:

```
"tableau-
:con-
tent:read", "t-
ableau-
:data-
sources:cre-
ate", "t-
ableau-
```

## Tableau Server on Windows Help

```
:data-  
sources:update","tableau:datasources:download","tableau:tasks:run"
```

Or

```
"tableau:content:read","tableau:datasources:*","tableau:tasks:run"
```

**Note:** Scope values must be passed as a list type.

### Sign In Request URI

To make a call to the REST API, your custom application must first make a Sign In request to generate a Tableau credentials token.

```
POST https://myco/api/3.17/auth/signin
```

### Request body

To authorise REST API access using a JWT, the Sign In request body must contain the valid JWT like the example below.

```
<tsRequest>  
  <credentials jwt-  
="eyJ-  
pc3MiOiI4ZTFiNzE3Mi0zOWMzLTZhMzItODg3ZS1mYzJiNDExOWY1NmQiLCJh-  
bGciOiJIUzI1NiIsImt-  
pZCI6ImIwMTE1YmY5LTNhNGItNGM5MS1iMDA5LWNmMGxNzBiMWE1NiJ9.eyJh-  
dWQiOiJ0YWJsZWFlIi-  
wic3ViI-  
joicmlvaGFuQHRhYmxlYXUuY29tIi-  
wic2NwIjp-  
bInRhYmxlYXU6c2l0ZXM6cmVhZCJdLCJp-  
c3MiOiI4ZTFiNzE3Mi0zOWMzLTZhMzItODg3ZS1mYzJiNDExOWY1NmQiLCJleHAiOjE2-  
NDg2Njg0Mzk-  
sIm-  
p0aSI6IjY1ZWZmMmYxLTNmZTgtNDc5Ny1hZmRiLTMyODMzZDVmZGJkYSJ9.mUv2o4gtB-  
TrMVLEXY5XTpzDQTGvfE2LGi-3O2vdGfT8">  
  <site contentUrl="mycodotcom"/>
```

```

    </credentials>
</tsRequest>

```

## Response body

The Sign In request produces the following response body, which includes the Tableau credentials token.

```

<tsResponse>
  <credentials token="12ab34cd56ef78ab90cd12ef34ab56cd">
    <site id="9a8b7c6d5-e4f3-a2b1-c0d9-e8f7a6b5c4d" contentUrl="" />
    <user id="9f9e9d9c-8b8a-8f8e-7d7c-7b7a6f6d6e6d" />
  </credentials>
</tsResponse>

```

After the Tableau access token is generated, add the Tableau credentials token to the header of all subsequent REST API requests.

## Header

```
X-Tableau-Auth:12ab34cd56ef78ab90cd12ef34ab56cd
```

All subsequent REST API requests using the Tableau access token are then bounded by the scopes in the JWT.

REST API methods that support JWT authorisation

The following scopes can be associated with the connected app to define access and methods your custom application can have to the [REST API](#) on users' behalf.

## Notes:

- For other REST API capabilities not listed in the table below, you can use other authorisation mechanisms to access the methods. For more information, see [Authentication Methods](#) in the Tableau REST API Help.
- Both the [Sign In](#) and [Sign Out](#) methods are supported by JWT authorisation but do not require scopes to use beginning in Tableau Server 2023.3.

- For scopes supported by the Embedding API v3, see one of the following:
  - Configure Connected Apps with Direct Trust
  - Configure Connected Apps with OAuth 2.0 Trust

## Wildcard (\*) scopes

Wildcard scopes use the wildcard character (\*) instead of a specific action, to enable multiple supported actions within a specific REST API category. These include:

Scope	Methods enabled
<code>tableau:datasources:*</code>	Enables create, update and update connection data source methods.
<code>tableau:metrics:*</code>	Enables query, update and delete metrics actions.
<code>tableau:workbooks:*</code>	Enables publish, update, download and preview image workbook actions.
<code>tableau:groups:*</code>	Enables create, query, update and delete groups actions.
<code>tableau:projects:*</code>	Enables create, delete and update projects methods.
<code>tableau:users:*</code>	Enables get/list, add, delete and update users methods.
<code>tableau:tasks:*</code>  <b>Note:</b> This scope is also cross-category.	Enables get/list, add, delete update and run methods for extracts and subscription tasks.  Enables update methods for data sources for workbooks.

## Cross-category scopes

Cross-category scopes enable multiple supported actions across multiple REST API categories. These include:

Scope	Methods enabled
<code>tableau:content:read</code>	Enables read/list methods for Tableau content, including data sources, metrics, views, workbooks, projects and sites.
<code>tableau:tasks:run</code>	Enables run methods for data sources, workbooks and extracts.
<code>tableau:views:download</code>	Enables download methods for view data and workbooks.
<code>tableau:tasks:*</code>  <b>Note:</b> This scope is also wild-card.	Enables get/list, add, delete, update and run methods for extracts and subscription tasks.  Enables update methods for data sources for workbooks.

## Individual scopes

Method	Scope	Description
(Methods without scopes)	(None)	When no scopes are defined in the JWT, access to the REST API is denied.
Sign in	(No scope needed)	Signs you in as a user on the specified site on Tableau Server.
Sign out	(No scope needed)	Signs you out of the current session.

Method	Scope	Description
(Content read scope)	<code>tableau:content:read</code>	Enables read/list actions for Tableau content: data sources, metrics, views, workbooks and projects.
<b>Labels</b>		
Delete Label	<code>tableau:labels:delete</code>	Deletes a data label by its LUID.
Delete Labels	<code>tableau:labels:delete</code>	Deletes the data labels on one or more assets.
Get Label	<code>tableau:labels:read</code>	Gets a data label by its LUID.
Get Labels	<code>tableau:labels:read</code>	Displays information about the data labels on one or more assets.
Update Label	<code>tableau:labels:update</code>	Updates a label by its LUID.

Method	Scope	Description
Update Labels	<code>tableau:labels:update</code>	Creates or updates labels on one or more assets.
<b>Data sources</b>		
(All <code>tableau-datasources: methods</code> )	<code>tableau:datasources:*</code>	Enables create data source, update data source and update data source connection methods.
Publish data source	<code>tableau:datasources:create</code>	Publish a data source to a site or append data to an existing published data source.
Query data source	<code>tableau:content:read</code>	Get information about a published data source.
Query data sources	<code>tableau:content:read</code>	Get information about all published data sources on a site.



Method	Scope	Description
Query data source connections	<code>tableau:content:read</code>	Get server address, port, username or password information about a published data source.
Update data source	<code>tableau:datasources:update</code>	Update owner, project or certification status of the data source.
Update data source connection	<code>tableau:datasources:update</code>	Update server address, port, username or password of the data source connection.
Update data source now	<code>tableau:tasks:run</code>	Run extract refresh.
<b>Extracts</b>		
(All <code>tableau:tasks:</code> methods)	<code>tableau:tasks:*</code>	Enables create, delete, get, list, run and update refresh actions for extracts, sub-

Method	Scope	Description
		scriptions, update data source (for data sources with extracts), and update workbook methods.
List extract refresh tasks in site	tableau:tasks:read	List the extract refreshes tasks configured for in a site.
Run extract refresh task	tableau:tasks:run	Runs an extract refresh task.
Flows		
Publish flow	tableau:flows:create	Publish a flow.
<div><h2>Metrics</h2><h3>Retirement of the legacy metrics feature</h3><p>Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see <a href="#">Create Metrics with Tableau Pulse</a> to learn about the new experience and <a href="#">Create and Troubleshoot</a></p></div>		

Method	Scope	Description
<b>Metrics (Retired)</b> for the retired feature.		
(All <code>tableau:metrics:</code> methods)	<code>tableau:metrics:*</code>	Enables query, update and delete metrics actions.
(All <code>tableau:metrics:</code> methods)	<code>tableau:metrics:*</code>	Enables query, update and delete metrics actions.
Get metric	<code>tableau:content:read</code>	Get a metric.
Delete metric	<code>tableau:metrics:delete</code>	Delete a metric.
List metrics	<code>tableau:content:read</code>	Get list of metrics for a site.
Query metrics data	<code>tableau:metrics:download</code>	Get underlying data of a metric in comma-separated value (.csv) format.
Update metric	<code>tableau:metrics:update</code>	Update owner, project, suspend status and name of the metric.

Method	Scope	Description
<b>Subscriptions</b>		
(All <code>tableau:tasks:</code> methods)	<code>tableau:tasks:*</code>	Enables create, delete, get, list, run and update refresh actions for extracts, subscriptions, update data source (for data sources with extracts), and update workbook methods.
Create subscription	<code>tableau:tasks:create</code>	Create a subscription.
Delete subscription	<code>tableau:tasks:delete</code>	Delete a subscription.
Get subscription	<code>tableau:tasks:read</code>	Gets the details of a subscription.
List subscriptions	<code>tableau:tasks:read</code>	Lists subscriptions in a site.
Update subscription	<code>tableau:tasks:update</code>	Updates a subscription.
<b>Views</b>		

Method	Scope	Description
Delete custom view	<code>tableau:views:update</code>	Delete the specified custom view.
Get custom view	<code>tableau:content:read</code>	Get the details of a specified custom view.
Get custom view image	<code>tableau:views:download</code>	Download a .png format image file of a specified custom view.
Get view	<code>tableau:content:read</code>	Get details about a view.
Get view by path	<code>tableau:content:read</code>	Get details for all views on a site using the specified name.
List custom views	<code>tableau:content:read</code>	Get a list of custom views on a site.
Query view data	<code>tableau:views:download</code>	Get a view rendered in comma-separated value (.csv) format.
Query view PDF	<code>tableau:views:download</code>	Get a view as a PDF (.pdf) file.

Method	Scope	Description
Query view image	<code>tableau:views:download</code>	Get a view as an image (.png) file.
Query views for site	<code>tableau:content:read</code>	Get all views for a site.
Query views for workbook	<code>tableau:content:read</code>	Get all views for the specified workbook.
Query view preview image	<code>tableau:views:download</code>	Get the thumbnail image (.png) of the view.
Update custom view	<code>tableau:views:update</code>	Change the owner or name of an existing custom view.
<b>Workbooks</b>		
(All <code>tableau:workbooks: methods</code> )	<code>tableau:workbooks:*</code>	Enables publish, update, download and preview image workbook actions.
Publish workbook	<code>tableau:workbooks:create</code>	Publish a workbook (.twb or .twbx).

Method	Scope	Description
Query workbook	<code>tableau:content:read</code>	Get a specified workbook and its details.
Query workbook for site	<code>tableau:content:read</code>	Get a list of workbooks published to a site.
Query workbook preview image	<code>tableau:workbooks:download</code>	Get the thumbnail image (.png) of the workbook.
Update workbook	<code>tableau:workbooks:update</code>	Modify an existing workbook.
Update workbook connection	<code>tableau:workbooks:update</code>	Update the connection information.
Update workbook now	<code>tableau:tasks:run</code>	Initiate a workbook refresh outside of a scheduled task.
<b>Publish</b>		
Append to file upload	<code>tableau:file_uploads:create</code>	Upload a block of data and append it to the data that is already

Method	Scope	Description
		uploaded – to be used after an upload has been initiated using the "initiate file upload" method.
Initiate file upload	<code>tableau:file_upload-s:create</code>	Initiate the upload process of a file.
<b>Download</b>		
Download data source	<code>tableau-:datasources:download</code>	Download the data source (.tdsx).
Download view crosstab Excel	<code>tableau:views:download</code>	Download an Excel (.xlsx) file containing crosstab data from the view.
Download workbook	<code>tableau:workbooks:download</code>	Download a workbook (.twb or .twbx).
Download workbook revision	<code>tableau:workbooks:download</code>	Download a specific version of the workbook (.twb or .twbx).



Method	Scope	Description
Download workbook PDF	<code>tableau:views:download</code>	Download a PDF (.pdf) file containing images of the sheets in the workbook.
Download workbook PowerPoint	<code>tableau:views:download</code>	Download a PowerPoint (.pptx) file containing slides of the sheets in the workbook.
<b>Users</b>		
(All <code>tableau:users</code> methods)	<code>tableau:users:*</code>	Enables add, query, update and remove users actions.
Add user to group	<code>tableau:groups:update</code>	Add a user to a group.
Add user to site	<code>tableau:users:create</code>	Add a user and assign the user to a site.
Get users in group	<code>tableau:groups:read</code>	Get a list of users in a group.
Get users on site	<code>tableau:users:read</code>	Get all users on a site.

Method	Scope	Description
Query user on site	<code>tableau:users:read</code>	Get a user on a site.
Remove users from group	<code>tableau:groups:update</code>	Remove a user from a group.
Remove user from site	<code>tableau:users:delete</code>	Remove the user from a site.
<b>Groups</b>		
(All <code>tableau:groups:</code> methods)	<code>tableau:groups:*</code>	Enables create, query, update and delete groups actions.
Create group	<code>tableau:groups:create</code>	Create a group.
Delete group	<code>tableau:groups:delete</code>	Delete a group.
Get groups for user	<code>tableau:users:read</code>	Get a list of groups that a user belongs to.
Query groups	<code>tableau:groups:read</code>	Get a list of groups on a site.
Update group	<code>tableau:groups:update</code>	Update a group.

Method	Scope	Description
<b>Projects</b>		
(All tableau- :projects: methods)	tableau:projects:*	Enables create, update and delete projects actions.
Create project	tableau:projects:create	Create a project.
Delete project	tableau:projects:delete	Delete a project.
Query project	tableau:content:read	Get a list of projects.
Update project	tableau:projects:update	Update the name, description or project hierarchy of the project.
<b>Permissions</b>		
(All tableau- :permissions: methods)	tableau:permissions:*	Enables add, query, update and delete permissions actions.
Add data source permissions	tableau:permissions:update	Add permissions to a data source for a Tableau Server user or

Method	Scope	Description
		group.
Add default permissions	tableau:permissions:update	Add default permission capabilities to a user or group, for metric, flow, workbook, data source, data role or lens resources in a project.
Add project permissions	tableau:permissions:update	Add permissions to a project for a user or group
Add view permissions	tableau:permissions:update	Add permissions to a view for a user or group.
Add workbook permissions	tableau:permissions:update	Add permissions to a specified workbook for a user or group.
Delete data source permissions	tableau:permissions:delete	Delete default permission capabilities of a user or group, for met-

Method	Scope	Description
		ric, flow, work-book, data source, data role or lens resources in a project.
Delete default permissions	<code>tableau:permissions:delete</code>	Delete default permission capabilities of a user or group, for metric, flow, workbook, data source, data role or lens resources in a project.
Delete project permissions	<code>tableau:permissions:delete</code>	Delete the project permission for a user or group.
Delete view permissions	<code>tableau:permissions:delete</code>	Delete the view permission for a user or group.
Delete workbook permissions	<code>tableau:permissions:delete</code>	Delete the workbook permission for a user or group.
Query data source permissions	<code>tableau:permissions:read</code>	Get a list of permissions

Method	Scope	Description
		for the data source.
Query default permissions	<code>tableau:permissions:read</code>	Get default permission capabilities of users and groups for metrics, workbooks and data sources.
Query project permissions	<code>tableau:permissions:read</code>	Get a list of permissions for the project.
Query view permissions	<code>tableau:permissions:read</code>	Get a list of permissions for the view.
Query workbook permissions	<code>tableau:permissions:read</code>	Get a list of permissions for the workbook.
<b>Site</b>		
(All <code>tableau:sites:</code> methods)	<code>tableau:sites:*</code>	Enables create, query, update and delete sites actions.
Create site	<code>tableau:sites:create</code>	Create a site on Tableau Server.

Method	Scope	Description
Get recently viewed site	<code>tableau:content:read</code>	Get views and workbook details on the most recently created, updated or accessed by the signed in user.
Query sites	<code>tableau:sites:read</code>	List all sites on Tableau Server.
Query views for site	<code>tableau:content:read</code>	List all views on a site.
Update site	<code>tableau:sites:update</code>	Update a site.

Troubleshoot scopes

## 401001 - signin error

If you encounter error 401001, the **Sign In** response body is appended with one of the following additional connected apps-specific error codes: 16, 10084, or 10085.

For example, in the following response body, "10084" is the connected apps error code you can use to help troubleshoot issues with signing in to Tableau Server using a JWT for REST API authorisation.

```
<error code="401001">
  "summary": "Signin Error",
  "detail": "Error signing in to Tableau Cloud (10084)"
</error>
```

To help resolve the issue, refer to the description of the applicable error code and its potential causes.

- **16: Could not find user** – this error can occur because the incorrect "sub" (user name) was specified
- **10084: Could not parse access token** – this error can occur for the following reasons:
  - JWT is invalid or there was an unexpected problem
  - Incorrect "aud" (audience) was specified
  - For direct trust, there was a problem with signing the secret
- **10085: Could not fetch secret to verify signature for client ID** – this error can occur for the following reasons:
  - Incorrect client ID in "iss" specified
  - For direct trust, incorrect "kid" (secret ID) was specified
  - For EAS, unable to fetch keys from the JWKSSource

## 401002 - unauthorised access error

If you encounter error 401002 and have confirmed that you have the appropriate permissions to make the request, ensure the scope included in the JWT is correct and matches the request you're trying to make. For a list of endpoints and supported scopes, see the REST API methods that support JWT authorisation section above.

### Troubleshoot Connected Apps - Direct Trust

When embedded content fails to display in your custom application or Tableau REST API authorisation fails, you can use a browser's developer tools to inspect and identify error codes that might be associated with the Tableau connected app that's used to display the embedded content.

**Note:** In order for the session token to be valid, the clocks of the external application and the server that hosts the external application must be set to Coordinated Universal Time (UTC). If either clock uses a different standard, the connected app will not be trusted.



Refer to the table below to review the description of the error code and potential resolution.

Error code	Summary	Description	Potential resolution or explanation
5	SYSTEM_USER_NOT_FOUND	Tableau user could not be found	To resolve this issue, verify the 'sub' (Subject) claim value in the JWT is 'username' for Tableau Server. This value is case sensitive.
16	LOGIN_FAILED	Login failed	<p>This error is typically caused by one of the following claim issues in the JWT:</p> <ul style="list-style-type: none"> <li>The 'exp' (Expiry Time) exceeds the default maximum validity period. To resolve this issue, review <b>registered claims</b> required for a valid JWT and ensure the correct value is used. To change the maximum validity period, you can use the viz-portal.oauth.connected_apps.max_expiration_period_in_minutes command.</li> <li>The 'sub' (Subject) is calling an unknown user. To resolve this issue, verify that the 'sub' claim is "username". This value is case sensitive.</li> </ul>
67	FEATURE_NOT_ENABLED	On-demand access is not	On-demand access is available through licensed Tableau Cloud

		supported	sites only.
126	CONNECTED_APP_NOT_FOUND	The connected app could not be found	To resolve this issue, verify that the connected app is enabled and the correct client ID (also known as the connect app ID) is referenced in the JWT.
127	CONNECTED_APP_SECRET_NOT_FOUND	The connected app's secret could not be found	To resolve this issue, verify that the correct connected app's secret ID and secret value are referenced in the JWT.
128	CONNECTED_APP_SECRET_LIMIT_EXCEEDED	Maximum limit for secrets has been reached	<p>A maximum of two secrets are allowed for a connected app. This error can occur when there's an attempt to create a third secret.</p> <p>To resolve this issue, delete a secret from the connected app before creating a new one.</p>
133	INVALID_CONNECTED_APP_DOMAIN_SAFELIST	Domain allowlist contains one or more invalid characters	This error can occur when the domain allowlist contains one or more invalid characters.
10083	BAD_JWT	JWT header contains issues	The 'kid' (Secret ID) or 'clientId' (Issuer) claims are missing from the JWT header. To resolve this issue, ensure this information is included.
10084	JWT_PARSE_ERROR	JWT contains issues	<p>To resolve this issue, verify the following:</p> <ul style="list-style-type: none"> <li>The 'aud' (Audience) value referenced in the JWT uses</li> </ul>

			<p>the 'tableau' value. This value is case sensitive.</p> <ul style="list-style-type: none"> <li>• The 'aud' (Audience) and 'sub' (Subject) are included in the JWT.</li> <li>• Review IssueTime or expiration is the right format.</li> </ul>
10085	COULD_NOT_FETCH_JWT_KEYS	JWT could not find keys	<p>Could not find the secret.</p> <p>To resolve this issue, verify the correct 'kid' (Secret ID) is used in the JWT header.</p>
10087	BLOCKLISTED_JWS_ALGORITHM_USED_TO_SIGN	Issue with the JWT signing algorithm	<p>To resolve the issue, you can remove the signing algorithm. For more information, see viz-portal.oauth.external_authorization_server.blocklisted_jws_algorithms.</p>
10089	CONNECTED_APP_NOT_FOUND	Could not find connected app	<p>To resolve this issue, ensure the issuer is calling the correct connected app ID (also known as the client ID).</p>
10090	CONNECTED_APP_DISABLED	Connected app is disabled	<p>The connected app used to verify trust is disabled. To resolve this issue, enable the connected app.</p>
10091	JTI_ALREADY_USED	Unique JWT required	<p>The JWT has already been used in the authentication process. To resolve this issue, a new JWT must be generated.</p>
10092	NOT_IN_DOMAIN_ALLOW_LIST	Domain of the embedded content is not specified	<p>To resolve this issue, ensure the <code>unrestrictedEmbedding</code> setting is set to <code>true</code> or <code>domainAl-</code></p>

			<code>lowlist</code> parameter includes the domains where Tableau content is embedded using the <a href="#">Update Embedding Settings for Site</a> method in the Tableau REST API.
10094	MISSING_ REQUIRED_JTI	Missing JWT ID	To resolve this issue, verify the 'jti' (JWT ID) is included in the JWT.
10096	JWT_ EXPIRATION_ EXCEEDS_ CONFIGURED_ EXPIRATION_ PERIOD	Issue with expiry time	The 'exp' (Expiry Time) exceeds the default maximum validity period. To resolve this issue, review <a href="#">registered claims</a> required for a valid JWT and ensure the correct value is used. To change the maximum validity period, you can use the <code>vizportal.oauth.external_authorization_server.max_expiration_period_in_minutes</code> command.
10097	SCOPES_ MALFORMED	Issues with scopes claim	This error can occur when the 'scp' (Scope) claim is either missing from the JWT or not passed as a list type. To resolve this issue, verify 'scp' is included in the JWT and passed as a list type. For troubleshooting help with a JWT, see <a href="#">Debugger</a> on the auth0 site.
10098	JWT_ UNSIGNED_OR_ ENCRYPTED	JWT is unsigned or encrypted	Tableau does not support an unsigned or encrypted JWT.
10099	SCOPES_ MISSING_IN_ JWT	Missing scopes claim	The JWT is missing the required 'scp' (scope) claim. To resolve this issue, verify 'scp' is included

			in the JWT. For troubleshooting help with a JWT, see <a href="#">Debugger</a> on the auth0 site.
10100	JTI_PERSISTENCE_FAILED	Unexpected JWT ID error	There was an unexpected 'jti' (JWT ID) error. To resolve this issue, a new JWT with a new 'jti' must be generated.
10103	JWT_MAX_SIZE_EXCEEDED	JWT exceeds maximum size	This error can occur when JWT size exceeds 8000 bytes. To resolve this issue, make sure that only the necessary claims are being passed to Tableau Server.
10105	ORIGIN_HEADER_NOT_A_VALID_URI	Invalid Origin header	This error can occur because 1) a URL is specified in the domain allowlist and 2) the Origin header does not contain a valid URL.

## Data Connection Authentication

You can configure data connection authentication using Kerberos, OAuth and single sign-on.

More information

- [Setting an Oracle Connection to Use TNSNames.ora or LDAP.ora](#) (Tableau Support)

### Enable Kerberos Delegation

Kerberos delegation enables Tableau Server to use the Kerberos credentials of the viewer of a workbook or view to execute a query on behalf of the viewer. This is useful in the following situations:

- You need to know who is accessing the data (the viewer's name will appear in the access logs for the data source).

- Your data source has row-level security, where different users have access to different rows.

### Supported data sources

Tableau supports Kerberos delegation with the following data sources:

- Cloudera: Hive/Impala
- Denodo
- Hortonworks
- MSAS
- Oracle
- PostgreSQL
- Spark
- SQL Server
- Teradata
- Vertica
- TIBCO

### Requirements

Kerberos delegation requires Active Directory.

- The Tableau Server **identity store** must be configured to use Active Directory.
- The computer where Tableau Server is installed must be joined to the Active Directory domain.
- MIT Kerberos KDC is not supported.
- A domain account must be configured as the Run As service account on Tableau Server. See [Change the Run As Service Account](#). If your users are in a different Active Directory domain than Tableau Server and the data source, then domain trust must be configured. See [Domain Trust Requirements for Active Directory Deployments](#).
- Delegation configured. Grant delegation rights for the Run As service account to the target database Service Principal Names (SPNs). The Run As service account is delegated authority to access resources on behalf of the initiating source user.
- If you are configuring delegation on Tableau Server 2020.2 or later with an Oracle data source using a JDBC-based connector, see [Enable Kerberos Delegation for JDBC Connectors](#). Starting in Tableau 2020.2, the Oracle connector uses JDBC.

### Web authoring and user Kerberos authentication

When configuring Connect to Data for a given target, you may select Integrated or Windows authentication as the preferred authentication method. However, for web authoring scenarios, the default behaviour will be to use the Kerberos service account (“Run As” account) instead.

To enable user credentials in web authoring scenarios with Kerberos delegation, you must make an additional configuration using TSM. Run the following commands:

```
tsm configuration set -k native_api.WebAuthoringAuthModeKerberosDelegation -v true  
  
tsm pending-changes apply
```

After making this configuration, Kerberos Delegation becomes the default operation when selecting integrated authentication with web authoring. However, this setting will not prevent content creators from accessing the service account. Creators can still publish content that connects with the Run As service account, using Tableau Desktop or other methods.

For more information on Run As service account, see [Data Access with the Run As Service Account](#).

### Configuration process

This section provides an example of the process to enable Kerberos delegation. The scenario also includes example names to help describe the relationships between the configuration elements.

1. On all nodes in Tableau Server, configure the Run As User to act as part of the operating system. For more information, see [Enable Run As Service Account to Act as the Operating System](#).
2. Tableau Server will need a Kerberos service ticket to delegate on behalf of the user that is initiating the call to the database. You must create a domain account that will be used to delegate to the given database. This account is referred to as the Run As service account. In this topic, the example user configured as the delegation/Run As account is

tabsrv@example.com.

The account must be configured with Active Directory User and Computers on a Windows Server that is connected to the user domain:

- Open the **Properties** page for the Run As service account, click the **Delegation** tab and select **Trust this user for delegation to specified services only** and **Use any authentication protocol**.

3. Run the following TSM command to enable Kerberos delegation:

```
tsm configuration set -k wgserver.delegation.enabled -v true
```

4. Run the following TSM command apply the changes to Tableau Server:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

5. (Optional) Configure Tableau Server to use MIT Kerberos principal format.

By default, Tableau Server generates Kerberos principals using the Active Directory short name. For example, if Tableau Server performs Kerberos delegation for a user in `EXAMPLE.COM`, with a short name `EXAMPLE`, then the principal name will be: `user-@example`.

If your database is running on Linux, you may need to adjust the `auth_to_local` mapping in `krb5.conf`. For information about editing the `krb5.conf` file, see Kerberos delegation multi-domain configuration. Alternatively, you can configure Tableau Server to use the full domain name for Kerberos principals by running the following commands:



## Tableau Server on Windows Help

```
tsm configuration set -k native_api.protocol_transition_a_d_
short_domain -v false --force-keys
tsm configuration set -k native_api.protocol_transition_upper-
case_realm -v true --force-keys
tsm pending-changes apply
```

### 6. Enable delegation for data connections:

- **SQL Server** – See [Enabling Kerberos Delegation for SQL Server](#) in the Tableau Community.
- **MSAS** – See [Enabling Kerberos Delegation for MSAS](#) in the Tableau Community.
- **PostgreSQL** – See [Enabling Kerberos Delegation for PostgreSQL](#) in the Tableau Community.
- **Teradata** – See [Enabling Kerberos Delegation for Teradata](#) in the Tableau Community.
- **Oracle** – See [Enable Kerberos Delegation for Oracle](#) in the Tableau Community.
- **Cloudera** – See [Enable Kerberos Delegation for Hive/Impala](#) in the Tableau Community.
- **Vertica** – See [Enabling Kerberos Delegation for Vertica](#) in the Tableau Community.
- **TIBCO** – See [Section 4, Kerberos SSO Configuration for TDV on Windows](#) in the TIBCO Professional Services guide, *TDV Integration with Kerberos*.

See also

Troubleshoot Kerberos

Enable Kerberos Delegation for JDBC Connectors

As of version 2020.2, Tableau Server supports Kerberos delegation for JDBC connectors.

Kerberos delegation enables Tableau Server to use the Kerberos credentials of the viewer of a workbook or view to execute a query on behalf of the viewer. This is useful in the following situations:

- You need to know who is accessing the data (the viewer's name will appear in the access logs for the data source).
- Your data source has row-level security, where different users have access to different rows.

## Supported data sources

Tableau supports JDBC Kerberos RunAs authentication with the following data sources:

- Oracle
- PostgreSQL

If you are configuring delegation with an Oracle data source using a JDBC-based connector, then follow the procedure in this topic. Alternatively, if the connector you are running on Tableau Server uses a native driver, then follow the procedure in the help topic, [Enable Kerberos Delegation](#).

## Requirements

Kerberos delegation requires Active Directory.

- The Tableau Server information store must be configured to use LDAP - Active Directory.
- MIT KDC is not supported.

**Note:** You do not need to enable the Run As account to act as the operating system.

# Configuration process

This section provides an example of the process to enable Kerberos delegation.

1. Tableau Server will need a Kerberos service ticket to delegate on behalf of the user that is initiating the call to the database. You must create a domain account that will be used to delegate to the given database. This account is referred to as the Run As service account. In this topic, the example user configured as the Run As account is `tab-srv@EXAMPLE.COM`.

The account must be configured for delegation in Active Directory:

- a. On a Windows Server that is connected to the user domain, open Active Directory Users and Computers.
  - b. On the **Properties** page for the Run As service account, click the **Delegation** tab and select **Trust this user for delegation to specified services only** and **Use any authentication protocol**.
2. Create a keytab file for the Run As service account.

This following example uses the `ktab` tool that is provided with the JDK . You can download the tool at [AdoptOpenJDK](#). When using `ktab` to create the keytab, use a logon principal in UPN format (for example, `service@EXAMPLE.COM`), and not a service principal name (for example, `HTTP/service.example.com@EXAMPLE.COM`). You may also generate keytabs with the `ktpass` utility, in which case you can use either style of principal name.

```
<JDK_HOME>/bin/ktab -k E:/tmp/tabsrv.keytab -a tab-srv@EXAMPLE.COM
```

Tableau Server will use the Run As service account and the associated keytab to authenticate and make a direct connection to the database.

3. Copy the keytab into the Tableau Server data directory and verify that the Run As service account can access and read the keytab file. By default the Tableau Server data

directory is at `C:\ProgramData\Tableau`. If you are running Tableau Server in a distributed deployment, perform this step on each node in the cluster.

4. Create a `krb5.conf` file, and install in `C:\Windows` on all Tableau Server nodes.

If you already have a `krb5.ini` file deployed on computers in your organisation, copy that file and use it for Tableau Server. For more information, see the MIT Kerberos Documentation topic, [krb5.conf](#).

To change the location of Kerberos configuration file run the following TSM command:

```
tsm configuration set -k native_api.kerberos_config_path --
force-keys -v "C:\temp\krb5.ini"
```

The following is an example of a `krb5.conf` file. Tableau Support cannot assist with creating `krb5.conf`.

```
[libdefaults]
forwardable = true
default_realm = EXAMPLE.COM
default_tkt_enctypes = rc4-hmac
default_tgs_enctypes = rc4-hmac

[realms]
EXAMPLE.COM = {
kdc = kdc.example.com
admin_server = kdc.example.com
}

[domain_realm]
.example.com = EXAMPLE.COM
example.com = EXAMPLE.COM
```

5. Run the following TSM commands to enable Kerberos delegation, set the delegation service account, and associate the keytab file with the service account:

## Tableau Server on Windows Help

```
tsm configuration set -k wgserver.delegation.enabled -v true
tsm configuration set -k native_api.datasource_impersonation_
runas_principal -v tabsrv@EXAMPLE.COM
tsm configuration set -k native_api.datasource_impersonation_
runas_keytab_path -v <path-to-file>kerberos.keytab
tsm configuration set -k native_api.protocol_transition_a_d_
short_domain -v false
tsm configuration set -k native_api.protocol_transition_upper-
case_realm -v true
```

In some cases, TSM may return an error mentioning `--force-keys`. If you get this error, run the command again with the `--force-keys` parameter appended to the argument.

6. Run the following TSM command apply the changes to Tableau Server:

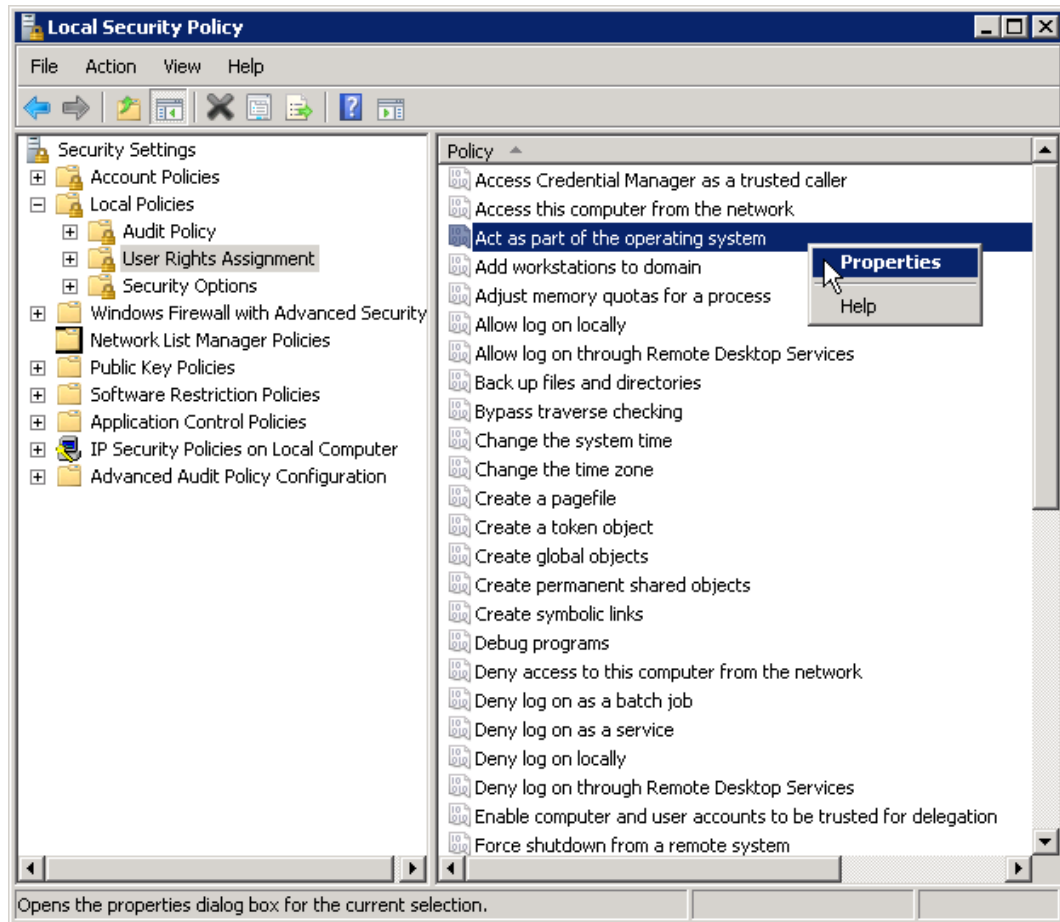
```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Enable Run As Service Account to Act as the Operating System

To use Kerberos delegation with Tableau Server, you must configure the Run As service account account to act as the operating system on each Tableau Server node.

1. On the computer that is running Tableau Server, select **Start > Control Panel > Administrative Tools > Local Security Policy**.
2. In the Local Security Settings window, expand **Local Policies**, click **User Rights Assignments**, and then right-click **Act as part of the operating system** and select **Properties**.



3. In the Act as part of the operating system Properties window, click **Add User or Group**.
4. Type the <domain>\<username> for the Tableau Server Run As service account (for example: MYCOMPANY\tableau\_server), and then click **Check Names**.
5. When the account resolves correctly, it is underlined. Click **OK**.
6. Click **OK** to close the Local Security Policy windows.

#### Enable Kerberos Run As Authentication for JDBC Connectors

As of version 2020.2, Tableau Server supports Kerberos authentication for JDBC connectors.

## Tableau Server on Windows Help

You can configure Tableau Server to use a Kerberos service account to access a database. In this scenario, Tableau Server connects to databases with a service account, also referred to as a "Run As service account". This scenario is referred to as "Run As authentication"

See [Run As Service Account](#).

To use Run As authentication on Tableau Server you must first create a workbook or data-source in Tableau Desktop that uses integrated authentication. When you publish to Tableau Server you will get the option to use Run As authentication. When creating a datasource with Web Authoring, Run As authentication is the default operation if you select integrated authentication.

### Supported data sources

Tableau supports JDBC Kerberos delegation with the following data sources:

- Oracle
- PostgreSQL

If you are configuring Run As authentication for an Oracle data source using a JDBC-based connector, then follow the procedure in this topic. Alternatively, if the connector you are running on Tableau Server uses a native driver, you do not have to follow the steps in this topic. Instead, follow the steps to create a Run As service account as documented in the topic, [Change the Run As Service Account](#).

### Requirements

Kerberos delegation requires Active Directory.

- The Tableau Server information store must be configured to use LDAP - Active Directory.
- MIT KDC is not supported.

### Configuration process

This section provides an example of the process to enable Kerberos RunAs authentication.

1. Create a keytab file for the Run As service account.

This following example uses the ktab tool that is provided with the JDK . You can download the tool at [AdoptOpenJDK](#). When using ktab to create the keytab, use a logon principal in UPN format (for example, `service@EXAMPLE.COM`), and not a service principal name (for example, `HTTP/service.example.com@EXAMPLE.COM`). You may also generate keytabs with the ktpass utility, in which case you can use either style of principal name.

```
<JDK_HOME>/bin/ktab -k E:/tmp/tabsrv.keytab -a tabsrv@EXAMPLE.COM
```

Tableau Server will use the Run As service account and the associated keytab to authenticate and make a direct connection to the database.

2. Copy the keytab into the Tableau Server data directory and verify that the Run As service account can access and read the keytab file. By default the Tableau Server data directory is at `C:\ProgramData\Tableau`. If you are running Tableau Server in a distributed deployment, perform this step on each node in the cluster.
3. Run the following TSM commands to set the Run As service account and the path to the keytab file:

```
tsm configuration set -k native_api.datasources_runas_principal
-v tabsrv@EXAMPLE.COM
tsm configuration set -k native_api.datasources_runas_keytab_path
-v <path-to-file>kerberos.keytab
```

In some cases, TSM may return an error mentioning `--force-keys`. If you get this error, run the command again with the `--force-keys` parameter appended to the argument.

4. Create a krb5.conf file, and install in `C:\Windows` on all Tableau Server nodes.



## Tableau Server on Windows Help

If you already have a `krb5.ini` file deployed on computers in your organisation, copy that file and use it for Tableau Server. For more information, see the MIT Kerberos Documentation topic, [krb5.conf](#).

To change the location of Kerberos configuration file run the following TSM command:

```
tsm configuration set -k native_api.kerberos_config_path --  
force-keys -v "C:\temp\krb5.ini"
```

The following is an example of a `krb5.conf` file. Tableau Support cannot assist with creating `krb5.conf`.

```
[libdefaults]  
forwardable = true  
default_realm = EXAMPLE.COM  
default_tkt_enctypes = rc4-hmac  
default_tgs_enctypes = rc4-hmac  
  
[realms]  
EXAMPLE.COM = {  
    kdc = kdc.example.com  
    admin_server = kdc.example.com  
}  
  
[domain_realm]  
.example.com = EXAMPLE.COM  
example.com = EXAMPLE.COM
```

5. Run the following TSM command apply the changes to Tableau Server:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart

behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## OAuth Connections

Tableau Server supports OAuth for a number of different connectors. In many cases, OAuth functionality doesn't require additional configuration on Tableau Server.

From Tableau, when users sign in to data with a connector that uses OAuth, users are redirected to the authentication provider's sign-in page. After users provide their credentials and authorise Tableau to access their data, the authentication provider sends Tableau an **access token** that uniquely identifies Tableau and the users. This access token is used to access data on users' behalf. For more information, see Overview of the OAuth process below.

Using OAuth-based connections provides the following benefits:

- **Security:** Your database credentials are never known to or stored in Tableau Server, and the access token can be used only by Tableau on behalf of users.
- **Convenience:** Instead of having to embed your data source ID and password in multiple places, you can use the token provided for a particular data provider for all published workbooks and data sources that access that data provider.

**Note:** For live connections to Google BigQuery data, each workbook viewer can have a unique access token that identifies the user, rather than sharing a single username and password credential.

## Overview of the OAuth process

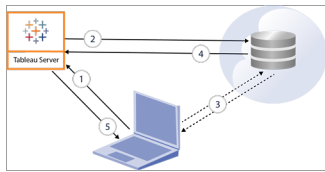
The following steps describe a workflow in the Tableau environment that calls the OAuth process.

1. A user takes an action that requires access to a cloud-based data source.

For example, you open a workbook that's published to Tableau Server.

## Tableau Server on Windows Help

2. Tableau directs the user to the cloud data provider's sign-in page. The information that is sent to the data provider identifies Tableau as the requesting site.
3. When the user signs in to the data, the provider prompts the user to confirm their authorisation for Tableau Server to access the data.
4. Upon the user's confirmation, the data provider sends an access token back to Tableau Server.
5. Tableau Server presents the workbook and data to the user.



The following user workflows can use the OAuth process:

- Creating a workbook and connecting to the data source from Tableau Desktop or from Tableau Server.
- Publishing a data source from Tableau Desktop.
- Signing in to Tableau Server from an approved *client*, such as Tableau Mobile or Tableau Desktop.

### Default saved credential connectors

*Saved credentials* refers to the functionality where Tableau Server stores user tokens for OAuth connections. This allows users to save their OAuth credentials to their user profile on Tableau Server. After they've saved the credentials, they won't be prompted when they subsequently publish, edit or refresh when accessing the connector.

**Note:** When editing Tableau Prep flows on the web, you may still be prompted to reauthenticate.

The following connectors use saved credentials by default and don't require additional configuration on Tableau Server.

- Anaplan
- Box
- Dropbox
- Esri ArcGIS Server
- Google Ads, Google Drive
- LinkedIn Sales Navigator
- Marketo
- OneDrive (Additional configuration is required starting with 2022.3)
- Oracle Eloqua
- ServiceNow ITSM
- Snowflake - To use "private link" requires additional configuration. For more information, see [Configure Snowflake OAuth for Partner Applications](#) on the Snowflake website and [Configure OAuth for Snowflake Connections](#).

The following connectors can use saved credentials with additional configuration by the server administrator.

- Azure Data Lake Storage Gen2, Azure Synapse, Azure SQL Database, Databricks  
  
For more information, see [Configure Azure AD for OAuth and Modern Authentication](#).
  - Dremio  
  
For more information, see [Set Up OAuth for Dremio](#).
  - Google Analytics, Google BigQuery, Google Sheets (deprecated in Tableau version 2022.1)  
  
For more information, see [Set up OAuth for Google](#).
  - Intuit QuickBooks Online  
  
For more information, see [Set Up OAuth for Intuit QuickBooks Online](#).
- OneDrive (Starting with 2022.3)

Tableau Server on Windows Help

For more information, see [Configure Custom OAuth for a site](#)

- Salesforce

For more information, see [Change Salesforce.com OAuth to Saved Credentials](#).

- Salesforce CDP

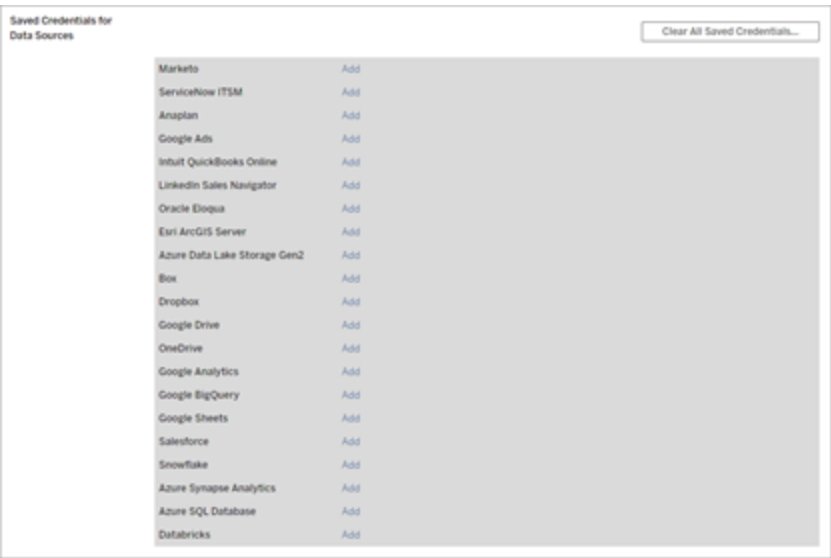
For more information, see [Connect Tableau Server to the Salesforce Data Cloud](#).

- Snowflake

Starting in version 2024.2, Snowflakes see [Change Snowflake OAuth to Saved Credentials](#).

**Note:** If Tableau Server isn't listed in the Accessed Apps list in the Google admin console, you can manually add a new app to the list using its client ID. To create a client ID, see [Change Google OAuth to Saved Credentials](#).

All supported connectors are listed under **Saved Credentials for Data Sources** on users' **My Account Settings** page on Tableau Server. Users manage their saved credentials for each connector.



## Access tokens for data connections

You can embed credentials based on access tokens with data connections, to enable direct access after the initial authentication process. An access token is valid until a Tableau Server user deletes it, or the data provider revokes it.

It's possible to exceed the number of access tokens your data source provider allows. If that's the case, when a user creates a token, the data provider uses the length of time since last access to decide which token to invalidate to make room for the new one.

## Access tokens for authentication from approved clients

By default, Tableau Server sites allow users to access their sites directly from approved Tableau clients, after users provide their credentials the first time they sign in. This type of authentication also uses OAuth access tokens to store the users' credentials securely.

For more information, see [Disable Automatic Client Authentication](#).

### Default-managed keychain connectors

*Managed keychain* refers to the functionality where OAuth tokens are generated for Tableau Server by the provider and shared by all users in the same site. When a user first publishes a data source, Tableau Server prompts the user for the data source credentials. Tableau Server submits the credentials to the data source provider, which returns OAuth tokens for Tableau Server to use on behalf of the user. On subsequent publishing operations, the OAuth token stored by Tableau Server for the same class and username is used so that the user isn't prompted for the OAuth credentials. Should the data source password change, then the preceding process is repeated and the old token is replaced by a new token on Tableau Server.

Additional OAuth configuration on Tableau Server isn't required for the default-managed keychain connectors:

- Google Analytics, Google BigQuery and Google Sheets (deprecated in Tableau version 2022.1)
- Salesforce

## Token limits and storage

Google has a 50-token limit per user per client application (in this scenario, Tableau Server is the client application). Because the OAuth token is stored on Tableau Server and reused by the user, the user is unlikely to exceed the token limit.

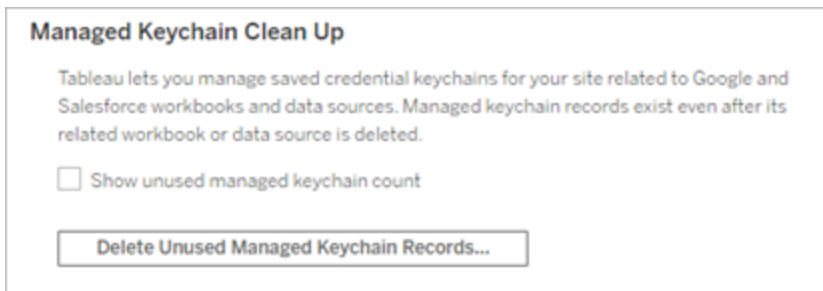
All user tokens are encrypted at rest when stored on Tableau Server. See [Manage Server Secrets](#) for more information.

## Removing unused keychain records

A managed keychain record contains connection attributes like dbClass, username and OAuth secret attributes. All managed keychain records for a given site are merged, encrypted and stored in PostgreSQL.

Records are persisted even for workbooks and data sources that have been removed. Over time, these records can grow to large sizes, which may cause issues.

We recommend purging the unused keychain records periodically as a regular maintenance task. You can view the number of records and unused records stored on each site. You can also delete unused records.



**Managed Keychain Clean Up**

Tableau lets you manage saved credential keychains for your site related to Google and Salesforce workbooks and data sources. Managed keychain records exist even after its related workbook or data source is deleted.

☐ Show unused managed keychain count

[Delete Unused Managed Keychain Records...](#)

To access **Managed Keychain Clean Up**, sign in to the Tableau Server admin pages, navigate to the site where you want to delete unused records, and click **Settings**.

## Scenario limitations with managed keychain

Three scenarios aren't supported when using managed keychain OAuth with Tableau Server:

- Prompting for OAuth credentials on live connections. Users must embed credentials on live connections with managed-keychain OAuth
- Editing the OAuth data source connection on Tableau Server
- Web authoring

## Convert managed keychain to saved credentials

You can convert the connectors that use managed keychain to use saved credentials by configuring Tableau Server with an OAuth client ID and secret for each connector. By converting these connectors to saved credentials, users are able to manage their credentials for each connector type on the **My Account Settings** page on Tableau Server. Additionally, live connection prompts, editing connections and web authoring are also supported.

Configure a custom OAuth for a site

For a subset of connectors, you can configure site-level OAuth by configuring custom OAuth clients. For more information, see one of the following topics:

- For Azure Data Lake Storage Gen2, Azure SQL Database, Azure Synapse and Databricks, see [Configure custom OAuth for a site](#).
- For Dremio, see [Set Up OAuth for Dremio](#).
- For Google Analytics, Google BigQuery and Google Sheets (deprecated in Tableau version 2022.1), see [Configure custom OAuth for a site](#).
- For Salesforce, see [Configure custom OAuth for a site](#).
- For Salesforce CDP, see [Connect Tableau Server to the Salesforce Data Cloud](#).



- For Snowflake, see Option 2: Configure OAuth with a site.

### Change Salesforce.com OAuth to Saved Credentials

By default, the Salesforce.com connector uses a managed keychain for OAuth tokens that are generated for Tableau Server by the data provider and shared by all users in the same site.

You can configure Tableau Server with saved client ID and client secret. There are three scenarios where you might want to do this:

- **Salesforce connector** – If you're using the Salesforce connector, you can configure Tableau Server with an OAuth client ID and secret, so the connector can use saved credentials.
- **Write to CRM Analytics** – If you're writing Tableau Prep flow data to Salesforce CRM Analytics (version 2022.3 and later), configure Tableau Server with an OAuth client ID and secret, so the flow can run in Tableau Server using saved credentials.
- **Einstein Discovery** – If you are integrating Einstein Discovery extensions with Tableau Server, you need to do this OAuth client ID and secret configuration. The ability to integrate Einstein Discovery and Tableau Server was added in version 2021.1.0. For more information, see [Configure Einstein Discovery Integration](#).

This topic describes how to set up your Salesforce.com data sources and Einstein Discovery extensions for OAuth saved credentials. Complete these steps for each Tableau Server instance.

For more information about managed keychain and saved credentials, see [OAuth Connections](#)

#### Notes:

- The Salesforce connector requires managed keychain (default), server-wide OAuth or site-specific OAuth.
- To use saved credentials for a site, server-wide OAuth must be configured first.
- Server-wide OAuth can be used whether site-wide OAuth is configured.
- If using site-specific OAuth, each site must be configured individually.
- To support live connection prompts, editing connections and web authoring, convert managed keychain to saved credentials to avoid errors.

## Summary of steps

Set up OAuth by following these general steps:

1. Create a Connected App in Salesforce.
2. Use the information you obtained in step 1 to configure Tableau Server.
3. (Optional) Configure site-specific OAuth.

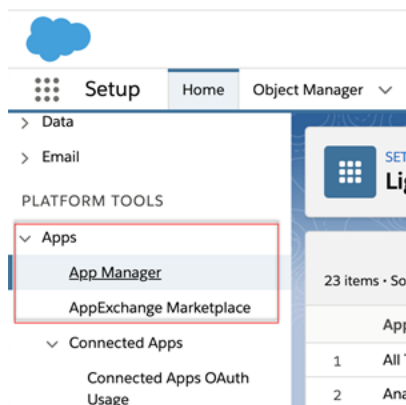
## Step 1: Create a Salesforce connected app

**Note:** This procedure documents the process in Salesforce Lightning. If you are using the traditional interface, the navigation may be different but the configuration is the same.

1. Sign in to your Salesforce.com developer account, click your username in the upper-right, and then select **Setup**.



2. In the left navigation column, under **Apps**, select **App Manager**.



3. In the Connected Apps section, click **New Connected App**.

## Tableau Server on Windows Help



4. In **Basic Information**, give the app a name, tab through the API field so it will self-populate in the correct format and enter a contact email for the app.
5. In the **API [Enable OAuth Settings]** section, select **Enable OAuth Settings**.
6. In the new OAuth settings that appear, for **Callback URL**, type the fully qualified domain name of your server, using the `https` protocol and append the following text to the URL: `auth/add_oauth_token`.

For example:

```
https://www.your_tableau_server.com/auth/add_oauth_token
```

7. Move the following items from **Available OAuth Scopes** to **Selected OAuth Scopes**:
  - **Access the identity URL service (ID, profile, email, address, phone)**
  - **Manage user data via APIs (api)**
  - **Perform requests any time (refresh\_token, offline access)**
8. Click **Save**.

After you save the app, Salesforce populates the API section with the following IDs that you will use to configure Tableau Server:

- **Consumer Key**
- **Consumer Secret**
- **Callback URL**



## Step 2: Configure Tableau Server for Salesforce.com OAuth

Once your connected app is created in Salesforce and you have the Customer Key, Customer Secret and the Callback URL, you can configure Tableau Server for Salesforce data connections and outputs and Einstein Discovery.

1. On the Tableau Server computer, at a command prompt, run the following commands:

```
tsm configuration set -k oauth.salesforce.client_id -v <your_customer_key>
```

```
tsm configuration set -k oauth.salesforce.client_secret -v <your_customer_secret>
```

```
tsm configuration set -k oauth.salesforce.redirect_uri -v <your_redirect_URL>
```

2. (Optional) To change the default login server, type the following command:

```
tsm configuration set -k oauth.salesforce.server_base_url -v <URL>
```

3. Enter the following command to apply changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

# Configure custom OAuth for a site

You can configure a custom Salesforce OAuth client for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

## Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector

OAuth Instance URL: Optional

Client ID:   
❌ Enter the client ID from your OAuth provider.

Client Secret:   
❌ Enter the client secret from your OAuth provider.

Redirect URL:   
❌ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.

## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.

## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in [Update saved credentials](#) to update their saved credentials.

## Manage access tokens

After you configure the server for OAuth, you can allow users to manage their own access tokens in their profile settings, or you can manage the tokens centrally. For more information, see [Allow Saved Access Tokens](#).

## Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

## Connect Tableau Server to the Salesforce Data Cloud

Note: Data Cloud was previously called Customer Data Platform.

# Tableau Server (version 2023.3 and later)

The Salesforce Data Cloud connector was released for Tableau Desktop and Tableau Prep in 2023.2, for Tableau Cloud in June 2023 and for Tableau Server in 2023.3. This connector seamlessly connects Tableau to Data Cloud, and is available for Tableau Desktop, Tableau Cloud, Tableau Server and Tableau Prep. Compared to the earlier Customer Data Platform connector, the Salesforce Data Cloud connector is simpler to set up, recognises Data Spaces, presents clearer object labels and is powered by accelerated queries. See the steps below.

Note: The Customer Data Platform connector was deprecated in Tableau Server 2023.3 and can't be used for new connections starting in Tableau Server 2024.2. Existing workbooks, data sources and other assets that use the Customer Data Platform connector will continue to work until the connector is completely removed, typically 1-2 releases after deprecation. To ensure that existing assets continue to function, Tableau strongly recommends customers modify existing assets to use the Salesforce Data Cloud connector.

## Step 1: Create a Salesforce connected app

The Salesforce Data Cloud connector requires you to create a connected app in Salesforce.

Both the Salesforce Data Cloud connector and the Salesforce connector can use the same connected app. Therefore, if you are already using the Salesforce connector, you only need to add the three Customer Data Platform scopes listed in step 7 to your existing connected app.

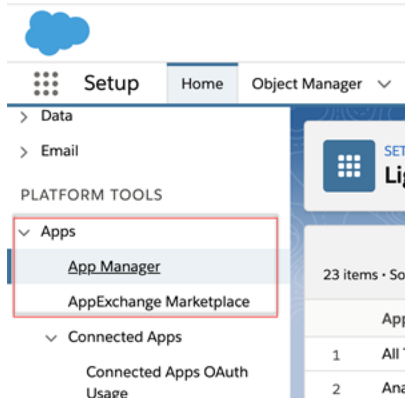


## Tableau Server on Windows Help

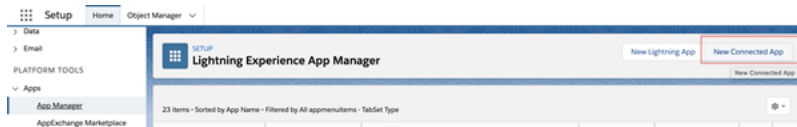
1. Sign in to your Salesforce.com developer account, click your username in the upper-right, and then select **Setup**.



2. In the left navigation column, under **Apps**, select **App Manager**.



3. In the Connected Apps section, click **New Connected App**.



4. In **Basic Information**, give the app a name, tab through the API field so it will auto-populate in the correct format, and enter a contact email for the app.
5. In the **API [Enable OAuth Settings]** section, select **Enable OAuth Settings**.
6. In the new OAuth settings that appear, for **Callback URL**, type the fully qualified domain name of your server, using the `https` protocol, and append the following text to the URL: `auth/add_oauth_token`.

For example:

`https://www.your_tableau_server.com/auth/add_oauth_token`

7. Move the following items from **Available OAuth Scopes** to **Selected OAuth Scopes**:
  - **Access the identity URL service (ID, profile, email, address, phone)**
  - **Manage user data via APIs (api)**
  - **Perform requests any time (refresh\_token, offline access)**
  - **Perform ANSI SQL queries on Customer Data Platform data (cdp\_query\_api)**
  - **Manage Customer Data Platform profile data (cdp\_profile\_api)**
  - **Manage Customer Data Platform Ingestion API data (cdp\_ingest\_api)**
8. Click **Save**.

After you save the app, Salesforce populates the API section with the following IDs that you will use to configure Tableau Server:

- **Consumer Key**
- **Consumer Secret**
- **Callback URL**



## Step 2: Configure Tableau Server for Salesforce.com OAuth

Once your connected app is created in Salesforce and you have the Customer Key, Customer Secret and the Callback URL, you can configure Tableau Server for Salesforce data connections and outputs and Einstein Discovery.

1. On the Tableau Server computer, at a command prompt, run the following commands:

```
tsm configuration set -k oauth.salesforce.client_id -v <your_customer_key>
tsm configuration set -k oauth.salesforce.client_secret -v <your_customer_secret>
tsm configuration set -k oauth.salesforce.redirect_uri -v <your_redirect_URL>
```

2. (Optional) To change the default login server, type the following command:

```
tsm configuration set -k oauth.salesforce.server_base_url -v <URL>
```

3. Enter the following command to apply changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the **pending-changes apply** command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

# Configure custom OAuth for a site

For setup instructions, see the OAuth Connections topic.

## Tableau Server (version 2023.1 and earlier)

**Warning:** The Customer Data Platform was deprecated in October 2023 and is unavailable in Tableau Server 2024.2 and later. To ensure that assets continue to function, Tableau recommends that customers modify existing assets to use the Salesforce Data Cloud connector.

This section describes how to connect from Tableau Server to the Salesforce Customer Data Platform through OAuth authentication.

The steps described in this section are required to use Salesforce Customer Data Platform data in Tableau Server.

### Step 1: Set up the connector

1. Download the latest Salesforce Customer Data Platform connector (Salesforce\_CDP.taco file) from the [Tableau Exchange Connectors](#) site.
2. Move the.taco file to the Tableau connector folder:
  - Windows: `C:\Users[Windows User]\Documents\My Tableau Repository\Connectors`
  - Linux: `/opt/tableau/connectors` OR `/var/opt/tableau_server-/data/tabsvc/vizqlserver/Connectors/`
3. Restart Tableau Server.

### Step 2: Install the Customer Data Platform JDBC driver

**Note:** Tableau version 2023.1 for Server is only compatible with JDBC driver version 18 and above.

1. Download the latest JDBC driver (Salesforce-CDP-jdbc-[version].jar file) from the Salesforce CDP GitHub site: <https://github.com/forcedotcom/Salesforce-CDP-jdbc/releases>
2. Move the downloaded Salesforce-CDP-jdbc-[version].jar file to the following location:
  - Windows: C:\Program Files\Tableau\Drivers
  - Linux: /opt/tableau/tableau\_driver/jdbc

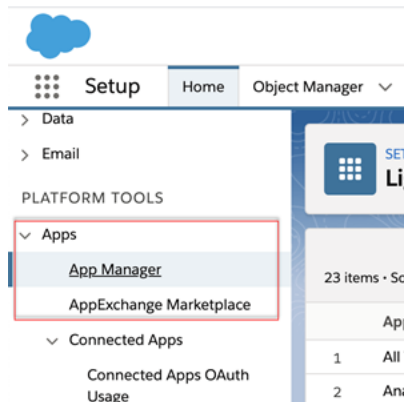
## Step 3: Create a Salesforce connected app

After creating the API scopes, use the following procedure to create a Salesforce-connected app to handle OAuth delegation from Tableau Server.

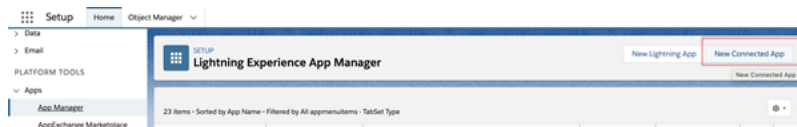
1. Sign in to your Salesforce Customer Data Platform account as an admin, click your username in the upper right and then select **Setup**.



2. In the left pane, under Apps, select **App Manager**.



3. In the Connected Apps section, click **New Connected App**.



4. In **Basic Information**, give your connected app a name (for example, Example.com), tab through the API field so it self-populates in the correct format, and enter a contact email address for the app.
5. In the **API [Enable OAuth Settings]** section, select **Enable OAuth Settings**, and then do the following:
  - a. In the new OAuth settings that appear, for **Callback URL**, type the fully qualified domain name (FQDN) of your Tableau Server, using the `https` protocol, and append the following text to the URL: `/auth/add_oauth_token`.

For example: `https://example.com/auth/add_oauth_token`

**API (Enable OAuth Settings)**

Enable OAuth Settings ☒

Enable for Device Flow ☐

Callback URL

Use digital signatures ☐

- b. Move the following items from **Available OAuth Scopes** to **Selected OAuth Scopes**:
  - **Manage user data via APIs (api)**
  - **Perform requests on your behalf at any time (refresh\_token, offline\_access)**
  - **Manage Customer Data Cloud profile data (cdp\_profile\_api)**
  - **Perform ANSI SQL queries on Customer Data Platform data (cdp\_query\_api)**

**Selected OAuth Scopes**

**Available OAuth Scopes**

Access Analytics REST API Charts Geodata resources (eclair\_api)  
 Access Analytics REST API resources (wave\_api)  
 Access Connect REST API resources (chatbot\_api)  
 Access Headless Forgot Password API (forgot\_password)  
 Access Lightning applications (lightning)  
 Access Visualforce applications (visualforce)  
 Access chatbot services (chatbot\_api)  
 Access content resources (content)  
 Access custom permissions (custom\_permissions)  
 Access the identity URL service (id, profile, email, address, phone)

**Selected OAuth Scopes**

Full access (full)  
 Manage Customer Data Platform profile data (cdp\_profile\_api)  
 Manage user data via APIs (api)  
 Perform ANSI SQL queries on Customer Data Platform data (cdp\_query\_api)  
 Perform requests at any time (refresh\_token, offline\_access)

6. When finished, click **Save**.

- Go to your **App Manager** list, navigate to your connected app, click on the drop-down arrow and then select **Manage**.

App Name	Developer Name	Description	Last Modified Date	App Type	Visible
21 Service	Service	Manage customer service with accounts, contacts, cases, and more	5/21/2021, 3:44 PM	Classic	✓
22 StreamPostmanTesting	StreamPostmanTesting		11/7/2021, 8:56 PM	Connected	✓
23 Example.com	Example.com		11/4/2021, 3:43 PM	Connected	✓
24 Your Account	OnlineSales	Add products and licenses, and review subscription details.	5/21/2021, 3:45 PM	Lightning	✓

After you save the app, the **API (Enable OAuth Settings)** section is populated with the following IDs that you'll use to configure Tableau Server:

- **Consumer Key**
- **Consumer Secret**
- **Callback URL**

**Note:** Save your Consumer Key, Secret, and Callback URL for use later.

Connected App Name: Example.com

Back to List: Custom Apps

Buttons: Edit, Delete, Manage

Version: 1.0

API Name: Example.com

Created Date: 10/18/2021, 5:37 PM

Contact Email: rly\_mach

Contact Phone: web\_page@example.com

Last Modified Date: 11/4/2021, 3:43 PM

By: Bcast

Description: Info URL

▼ API (Enable OAuth Settings)

Consumer Key: 3dVjG2SantY5DRb0BIC4WpR4\_n1HT1SAK7YnYaaUgFyYV3nqZKOG8g3BukdTHOX\_MTFp

Consumer Secret: Click to reveal

Selected OAuth Scopes: Manage user data via APIs (api), Perform requests at any time (refresh, token, offline\_access)

Enable for Device Flow: ☐

Require Secret for Refresh Token Flow: ☐

Token Valid for: 0 Hour(s)

Include Custom Permissions: ☐

Require Secret for Web Server Flow: ☐

Introspect All Tokens: ☐

Include Custom Attributes: ☐

Enable Single Logout: ☐

Single Logout disabled

## Use OAuth with the Customer Data Platform

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

After the connected app is created in Salesforce and you have the Consumer Key, Consumer Secret, and the Callback URL, you can configure Tableau Server for the Customer Data Platform OAuth connections. To get started, gather the following information.

- **Consumer Key:** The Consumer Key, also known as the client ID in Tableau, is generated from the procedure at the end of Step 4. Use this value for `[your_consumer_key]` in the following tsm command.
- **Consumer Secret:** The Consumer Secret, also known as the client secret in Tableau, is generated from the procedure at the end of Step 4. Use this value for `[your_consumer_secret]` in the following tsm command.
- **Callback URL:** The Callback URL, also known as the redirect URL in Tableau, is your Tableau Server URL `https://example.com` and `/auth/add_oauth_token` appended to it. Use this value for `[your_callback_url]` in the following tsm command.
- **Configuration ID:** The value for the `oauth.config.id` parameter you use in the following tsm: `customer_360_audience`

### Use TSM Commands for OAuth Setup

Run the following tsm commands to configure OAuth.

```
tsm configuration set -k oauth.config.clients -v "[{"oauth.config.id":"customer_360_audience", "oauth.config.client_id":"[your_consumer_key]", "oauth.config.client_secret":"[your_consumer_secret]", "oauth.config.redirect_uri":"[your_callback_url]"}]" --force-keys
```

```
tsm pending-changes apply
```

### Setting multiple connectors

If you have multiple connectors to set, you must include all of them in a single command. For example:

```
tsm configuration set -k oauth.config.clients -v "[{"oauth.config.id":"custom_360_audience", "oauth.config.client_id":"[your_consumer_key]", "oauth.config.client_secret":"
```

```
[your_consumer_secret]\", \"oauth.config.redirect_uri\":\"[your_
callback_url]\"}, {\"oauth.config.id\":\"dremio\", \"oau-
th.config.client_id\":\"[your_client_id]\", \"oauth.config.client_
secret\":\"[your_client_secret]\", \"oauth.config.redirect_uri\":\"[
your_server_url]/auth/add_oauth_token\"}, {\"oau-
th.config.id\":\"azure_sql_dw\", \"oauth.config.client_id\":\"
[your_client_id]\", \"oauth.config.client_secret\":\"[your_client_
secret]\", \"oauth.config.redirect_uri\":\"[your_server_url]/au-
th/add_oauth_token\"}, {\"oauth.config.id\":\"azure_sqldb\", \"oau-
th.config.client_id\":\"[your_client_id]\", \"oauth.config.client_
secret\":\"[your_client_secret]\", \"oauth.config.redirect_uri\":\"[
your_server_url]/auth/add_oauth_token\"}}]\" --force-keys
```

```
tsm pending-changes apply
```

## Step 1: Register OAuth client ID and client secret

Complete the following procedure to register the custom OAuth client to your site.

1. Sign in to Tableau Server using your site admin credentials and navigate to the **Settings** page.
2. Under **OAuth Clients Registry**, select the **Add OAuth Client** button.
3. For **Connection Type**, select Customer Data Platform.
4. For OAuth Provider, select **Custom IDP**.
5. Enter the **Client ID**.
6. Enter the **Client Secret**.
7. Enter the **Redirect URL**.
8. For Choose OAuth Config File, select the **Choose a file** button to upload the config file.
9. Select the **Add OAuth Client** button to complete the registration process.
10. Select the Save button at the bottom or top of the Settings page to save changes.



## Step 2: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete any previous saved credentials and add them again.

1. Navigate to your My Account Settings page.
2. Under **Saved Credentials for Data Sources**, select **Delete** next to the existing saved credentials.
3. Next to the same connector, select **Add**.
4. Follow the prompts to connect to the Customer Data Platform connector.
5. Select **Save**.

## Step 3: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the Customer Data Platform connector. Site users can use the procedure described in [Manage Saved Credentials for Data Connections](#) to update their saved credentials.

See also

- Salesforce Help: [Set Up Tableau in Customer Data Platform](#)
- Salesforce Help: [Enable Customer Data Platform in Tableau](#)
- Salesforce Help: [Using Customer Data Platform Data in Tableau](#)

Hyper Query Processing (Beta)

**Note:** Since Hyper Query Processing is a Beta release, the name can change before general release.

The Customer Data Platform (CDP) connector is now powered with the Hyper Query Processing Engine. It supports interactive analytics with fast data query processing and simplifies the connect-to-data experience for faster data exploration. The Hyper query processing engine speeds up query time when querying Customer Data Platform data from Tableau with live connections and Tableau data extracts.

**Beta Feature:** Hyper Query Processing beta feature offers extra functionality at no cost. You can opt to try this service at your sole discretion. Any use of the Beta Service is subject to the applicable Beta Services Terms provided at [Agreements and Terms](#).

## Enable Hyper Query Processing in Tableau Server

Complete the following steps to enable Hyper Query Processing.

1. Connect to Salesforce CDP.
2. Follow the directions on the screen to install the hyper JDBC driver.

`-Salesforce-cdp-hyper-beta-1.15.0.jar` or download the .jar file from [here](#).

3. Move the downloaded file to any of the following directory paths depending on your system.

Windows - `C:\Program Files\Tableau\Drivers`

macOS - `/Users/[user]/Library/Tableau/Drivers`

4. After you've moved the driver to the correct path, connect again. Your Customer Data Platform connector is ready to use in Tableau Server.

**Note:** The Hyper Query Processing support is a beta release. It's available for Tableau Server. Tableau Desktop and Tableau Online will be supported from December 2022. These dates are subject to change.

### See Also

- Tableau Help: [Connect Tableau Server to the Customer Data Platform](#)
- Salesforce Help: [Set Up Tableau in Customer Data Platform](#)
- Salesforce Help: [Enable Customer Data Platform in Tableau](#)
- Salesforce Help: [Using Customer Data Platform Data in Tableau](#)

### Set up OAuth for Google

By default, the Google Analytics, Google BigQuery and Google Sheets (deprecated in Tableau version 2022.1) connectors use a managed keychain for OAuth tokens that are generated for Tableau Server by the provider and shared by all users on the same site.

You can convert the connectors that use managed keychain to use saved credentials by configuring Tableau Server with an OAuth client ID and secret for each connector.

This topic describes how to set up your Google Analytics, Google BigQuery and Google Sheets connections for OAuth with saved credentials. Complete these steps for each Tableau Server instance.

**Note:** Google Drive connections use saved credentials by default and, starting in Tableau 2022.3, require Tableau Server to be set up with an OAuth client ID and secret for Google.

For more information about managed keychain and saved credentials, see [OAuth Connections](#)

#### Notes:

- All Google-based connectors require managed keychain (default), server-wide OAuth or site-specific OAuth.
- To use saved credentials for a site, server-wide OAuth must be configured first.
- Server-wide OAuth can be used whether site-wide OAuth is configured.
- If using site-specific OAuth, each site must be configured individually.
- To support live connection prompts, editing connections and web authoring, convert managed keychain to saved credentials to avoid errors.

## Summary of steps

Set up OAuth by following these general steps:

1. Enable API access and create an access token from Google.
2. Use the information you obtained in step 1 to configure Tableau Server.

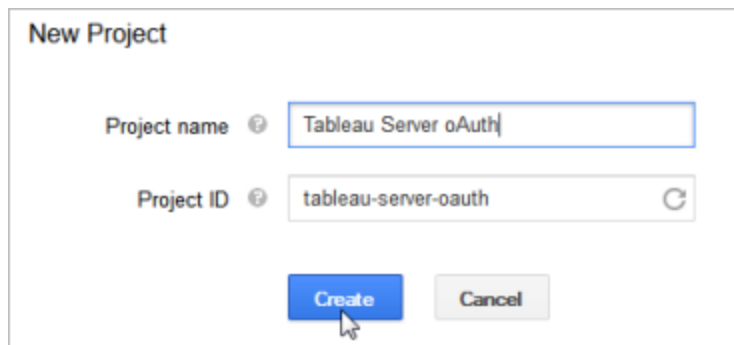
3. (Optional) Configure site-specific OAuth.
4. Create and edit a Google data source.

## Obtain a client ID and enable Google APIs

**Note** These steps reflect the settings in the Google Cloud Platform console at the time of this writing. For more information, see [Using OAuth 2.0 for Web Server Applications](#) in the Google Developers Console Help.

1. Sign in to [Google Cloud Platform](#), and then click **Go to my console**.
2. On the drop-down menu, **Select a Project** and select **Create project**.
3. In the new project form that appears, complete the following:
  - Give the project a meaningful name that reflects the Tableau Server instance for which you'll use this project.
  - Determine whether you want to change the project ID.

**Note** After you create the project, you won't be able to change the project ID. For more information, click the question mark icons.



The screenshot shows a 'New Project' dialog box. It contains two input fields: 'Project name' with the text 'Tableau Server OAuth' and 'Project ID' with the text 'tableau-server-oauth'. Below these fields are two buttons: 'Create' (highlighted in blue) and 'Cancel'. A mouse cursor is pointing at the 'Create' button.

4. Open the new project, navigate to **APIs & Services > OAuth consent screen**, and select the User Type.
5. Click the **OAuth consent screen** tab and then enter a meaningful name for the **Product name** shown to users.
6. Click **Credentials** and click the **Create Credentials** tab, then click **OAuth client ID**.
7. On the **Create OAuth client ID** screen, fill out the required fields. Follow the steps to authorise your OAuth tokens:
  - Select **Web Application**.
  - Enter a client **Name**.
  - For **Authorised JavaScript Origins**, click **ADD URI** and enter the Tableau Server domain name using HTTP or HTTPS.
  - For **Authorised redirect URIs**, click **ADD URI** and replace the example text with the internet address for your Tableau Server, and add the following text to the end of it: **auth/add\_oauth\_token**. For example:

```
https://your_server_url.com/auth/add_oauth_token
```
8. Copy the Authorised Redirect URI, and paste it in a location that you can access from your Tableau Server computer.
9. Click **Create**.
10. Copy the following values that Google returns, and paste them in a location that you can access from your Tableau Server computer:
  - Client ID
  - Client secret
11. In **APIs & services**, verify that **BigQuery API**, **Google Drive API** (to enable Google Sheets) or **Analytics API** is enabled. To enable APIs, click **ENABLE API** at the top of

the page.

**Note:** To establish a connection between Tableau Server and Google Analytics 4, you must enable both the Google Analytics Admin API and the Google Analytics Data API in the Google console. By adding these APIs, you can prevent any potential permissions errors that may arise during the process.

## Configure Tableau Server for Google OAuth

Using the information you obtained by completing the steps in Obtain a client ID and enable Google APIs, configure your Tableau Server:

- On the Tableau Server computer, open the shell and run the following commands to specify the access token and URI:

```
tsm configuration set -k oauth.google.client_id -v <your_client_ID>
```

```
tsm configuration set -k oauth.google.client_secret -v <your_client_secret>
```

```
tsm configuration set -k oauth.google.redirect_uri -v <your_authorized_redirect_URI>
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

# Configure custom OAuth for a site

You can configure a custom Google OAuth client for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

## Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector ▼

OAuth Instance URL: Optional

Client ID:   
❌ Enter the client ID from your OAuth provider.

Client Secret:   
❌ Enter the client secret from your OAuth provider.

Redirect URL:   
❌ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.



## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.

## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in [Update saved credentials](#) to update their saved credentials.

## Create and edit Google data source

Next, you must publish the Google data sources to the server. For example, see the Tableau Desktop topic, [Google BigQuery](#).

After you've published the data sources, the final step is to edit the data source connection to use the embedded access token that you configured earlier. See [Edit Connections on Tableau Server](#).

# Managing access tokens

After you configure the server for OAuth, you can allow users to manage their own access tokens in their profile settings, or you can manage the tokens centrally. For more information, see [Allow Saved Access Tokens](#).

## Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

Configure Azure AD for OAuth and Modern Authentication

The Azure Synapse, Azure SQL Database, Azure Databricks, Azure Data Lake Gen2, OneDrive and SharePoint Online, and SharePoint Lists (JDBC) connectors support authentication through Azure AD by configuring an OAuth client for Tableau Server.

**Note:** OAuth support for Azure AD is only supported with [Microsoft SQL Server driver 17.3](#) and later.

## Step 1: Register OAuth client for Azure

Follow the steps below to register and configure an OAuth application for Azure under a specific Azure tenant.

1. Sign in to the [Azure portal](#).
2. If you have access to multiple tenants, select the tenant in which you want to register an application.
3. Search for and select **Azure Active Directory**.
4. Under **Manage**, select **App registrations**, and then select **New registration**.
5. Enter "Tableau Server OAuth", or similar value as the **Name**.

6. Under the **Supported account types** field in the app registration page, select who can use this application.

**Note:** If you want to use the Client ID & Client Secret of your application for accounts under a different tenant, choose the second option (Multi-tenant).

7. Under **Redirect URI** (optional) field, choose **Web** and then enter the internet address of your server appended by the string, `/auth/add_oauth_token`.

For example: `https://your_server_url.com/auth/add_oauth_token`

8. Select **Register**. After the registration completes, the Azure portal displays the app registration's Overview pane, which includes its Application (client) ID. Also referred to as *Client ID*, this value uniquely identifies your application in the Microsoft identity platform.
9. Copy the value, it will be used as the `[your_client_id]` field in the following steps.
10. Select **Certificates & secrets** on the left bar, and then choose **New client secret**.
11. Add a description of the secret.
12. Select **Client secret lifetime**.
13. Choose **Add** and then copy the secret. The secret will be used as `[your_client_secret]` in the following steps.
14. Select **API permissions** on the left bar.
15. Choose **Add permissions**.
16. Select **Microsoft Graph**.
17. Choose **Delegated permissions**.
18. Under **Select permissions**, select all OpenId permissions (email, offline\_access, openid and profile).
19. Choose **Add permissions**.
20. Add additional permissions. Follow the steps below for the connector(s) that you are enabling:
  - Azure SQL database
    - a. Click **Add a permission**.
    - b. Select **My APIs**.
    - c. Click **Azure SQL Database** and then **Delegated permissions**.
    - d. Select **user\_impersonation** and then click **Add permissions**.
  - OneDrive and SharePoint Online

- a. Click **Add a permission**.
- b. Select **Microsoft Graph**.
- c. Click **Delegated permissions**.
- d. Under **Select permissions**, in the filter search box, enter and then add the following permissions:
  - Files.Read.All
  - Sites.Read.All
  - User.Read
- SharePoint lists (JDBC)
  - a. Click **Add a permission**.
  - b. Select **Microsoft Graph**.
  - c. Click **Delegated permissions**.
  - d. Under **Select permissions**, in the filter search box, enter and then add User.Read permission.
  - e. Click **Add a permission** again.
  - f. Select **SharePoint**.
  - g. Click **Delegated permissions**.
  - h. Expand the **AllSites** section and then select and add the AllSites.Manage permission.

## Step 2: Configure Tableau Server for Azure

Configuring Tableau Server requires running a Tableau Server Manager (TSM) command. Azure Data Lake Storage Gen2 requires a different set of commands than the common command that is run for Azure Synapse, Azure SQL Database or Databricks.

### Configure default OAuth client for Azure Data Lake Storage Gen2

To configure Tableau Server for Data Lake Storage Gen2, you must have the following configuration parameters:

- **Azure OAuth client ID:** The client ID is generated from the procedure in Step 1. Copy this value for `[your_client_id]` in the first tsm command.
- **Azure OAuth client secret:** The client secret is generated from the procedure in Step 1. Copy this value for `[your_client_secret]` in the second tsm command.

- **Tableau Server URL:** Enter your Tableau Server URL, such as `https://myco.com`. Copy this value for `[your_server_url]` in the third tsm command.

Run the following tsm commands to configure Tableau Server OAuth for Azure Data Lake Storage Gen2:

- `tsm configuration set -k oauth.azuredatalake_storage_gen2.client_id -v [your_client_id] --force-keys`
- `tsm configuration set -k oauth.azuredatalake_storage_gen2.client_secret -v [your_client_secret] --force-keys`
- `tsm configuration set -k oauth.azuredatalake_storage_gen2.redirect_uri -v http://[your_server_url]/auth/add_oauth_token --force-keys`
- `tsm pending-changes apply`

## Configure default client for Azure Synapse, Azure SQL Database or Databricks

To configure Tableau Server, you must have the following configuration parameters:

- **Azure OAuth client ID:** Generated from the procedure in Step 1. Copy this value for `[your_client_id]` in the tsm command.
- **Azure OAuthClient secret:** Generated from the procedure in Step 1. Copy this value for `[your_client_secret]` in the second tsm command.
- **Tableau Server URL:** This is your Tableau Server URL, such as `https://myserver.com`. Copy this value for `[your_server_url]` in the third tsm command.
- **Configuration ID:** The value for the `oauth.config.id` parameter in the following tsm command. Valid values:
  - Azure Synapse: `azure_sql_dw`
  - Azure SQL Database: `azure_sqldb`
  - Databricks: `databricks`

Run the following tsm commands to configure Azure AD for Azure Synapse, Azure SQL Database or Databricks. For example, to set up Azure Synapse:

```
tsm configuration set -k oauth.config.clients -v "[{\"oauth.config.id\":\"azure_sql_dw\", \"oauth.config.client_id\":\"[your_
```

```
client_id]", \"oauth.config.client_secret\": \"[your_client_secret]\", \"oauth.config.redirect_uri\": \"[your_server_url]/auth/add_oauth_token\"}]\" --force-keys
```

```
tsm pending-changes apply
```

## Configure a default OAuth client for OneDrive and SharePoint Online

To configure Tableau Server for OneDrive and SharePoint Online, you must have the following configuration parameters:

- **Azure OAuth client ID:** The client ID is generated from the procedure in Step 1. Copy this value for [your\_client\_id] in the first tsm command.
- **Azure OAuth client secret:** The client secret is generated from the procedure in Step 1. Copy this value for [your\_client\_secret] in the second tsm command.
- **Tableau Server URL:** This is your Tableau Server URL, such as <https://myco.com>. Copy this value for [your\_server\_url] in the third tsm command.

Run the following tsm commands to configure Tableau Server OAuth for OneDrive and SharePoint Online:

- `tsm configuration set -k oauth.onedrive_and_sharepoint_online.client_id -v [your_client_id] --force-keys`
- `tsm configuration set -k oauth.onedrive_and_sharepoint_online.client_secret -v [your_client_secret] --force-keys`
- `tsm configuration set -k oauth.onedrive_and_sharepoint_online.redirect_uri -v http://[your_server_url]/auth/add_oauth_token --force-keys`
- `tsm pending-changes apply`

## Configure a default OAuth client for SharePoint Lists (JDBC)

To configure Tableau Server for SharePoint Lists (JDBC), you must have the following configuration parameters:

- **Azure OAuth client ID:** The client ID is generated from the procedure in Step 1. Copy this value for [your\_client\_id] in the first tsm command.
- **Azure OAuth client secret:** The client secret is generated from the procedure in Step 1. Copy this value for [your\_client\_secret] in the first tsm command.
- **Tableau Server URL:** This is your Tableau Server URL, such as https://myco.com. Copy this value for [your\_server\_url] in the first tsm command.

Run the following tsm commands to configure Tableau Server OAuth SharePoint Lists (JDBC):

- `tsm configuration set -k oauth.config.clients -v "[{"oauth.config.id":"cdata_sharepoint", "oauth.config.client_id":"[your_client_id]", "oauth.config.client_secret":"[your_client_secret]", "oauth.config.redirect_uri":"[your_server_url]/auth/add_oauth_token"}]"--force-keys`
- `tsm pending-changes apply`

## Configure a default OAuth client for OneDrive (deprecated)

To configure Tableau Server for OneDrive (deprecated), you must have the following configuration parameters:

- **Azure OAuth client ID:** The client ID is generated from the procedure in Step 1. Copy this value for [your\_client\_id] in the first tsm command.
- **Azure OAuth client secret:** The client secret is generated from the procedure in Step 1. Copy this value for [your\_client\_secret] in the second tsm command.
- **Tableau Server URL:** This is your Tableau Server URL, such as https://myco.com. Copy this value for [your\_server\_url] in the third tsm command.

To continue run the following tsm commands to configure Tableau Server OAuth for OneDrive (deprecated):

- `tsm configuration set -k oauth.onedrive.client_id -v [your_client_id] --force-keys`
- `tsm configuration set -k oauth.onedrive.client_secret -v [your_client_secret] --force-keys`
- `tsm configuration set -k oauth.onedrive.redirect_uri -v http://`

- ```
[your_server_url]/auth/add_oauth_token --force-keys
```
- `tsm pending-changes apply`

## Server Restart Scenarios

After you configure a default OAuth client, the following scenarios can occur.

- A restart prompt appears if the pending changes require a server restart.
- You can suppress the prompt using the `--ignore-prompt` option, but this doesn't stop the restart.
- If the changes don't require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

## Setting multiple connectors

If you have multiple connectors to set, you must include all of them in a single command. For example:

```
tsm configuration set -k oauth.config.clients -v "[{"oauth-
th.config.id\":\"azure_sql_dw\", \"oauth.config.client_id\":\"
[your_client_id]\", \"oauth.config.client_secret\":\"[your_client_
secret]\", \"oauth.config.redirect_uri\":\"[your_server_url]/au-
th/add_oauth_token\"}, {\"oauth.config.id\":\"azure_sqldb\", \"oau-
th.config.client_id\":\"[your_client_id]\", \"oauth.config.client_
secret\":\"[your_client_secret]\", \"oauth.config.redirect_uri\":\"
[your_server_url]/auth/add_oauth_token\"}, {\"oau-
th.config.id\":\"databricks\", \"oauth.config.client_id\":\"[your_
client_id]\", \"oauth.config.client_secret\":\"[your_client_
secret]\", \"oauth.config.redirect_uri\":\"[your_server_url]/au-
th/add_oauth_token\"}]" --force-keys

tsm pending-changes apply
```



# Configure custom OAuth for a site

You can configure custom Azure Data Lake Storage Gen2, Azure Synapse, Azure SQL Database and Databricks OAuth clients for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

## Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector

OAuth Instance URL: Optional

Client ID:   
⊗ Enter the client ID from your OAuth provider.

Client Secret:   
⊗ Enter the client secret from your OAuth provider.

Redirect URL:   
⊗ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.

## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.

## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in Update saved credentials to update their saved credentials.

# Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

### Configure OAuth for Snowflake Connections

The Tableau Snowflake connector uses a managed keychain for OAuth tokens that are generated for Tableau Server by the provider and shared by all users in the same site. Starting with Tableau 2020.4–2024.1, you can optionally configure Tableau Server to use a new OAuth

service for Snowflake OAuth. In this scenario, you don't have to safelist the IP addresses to run the OAuth flow in AWS PrivateLink or Azure Private Link VPCs.

**Note:** From 2024.2 onwards, you must configure Tableau Server to use a new OAuth service for all Snowflake OAuth data sources.

## Step 1: Obtain a client ID with Snowflake

To register a custom OAuth client with Snowflake, follow the procedure at [Configure Snowflake OAuth for Custom Clients](#).

After you register, you'll use the following Snowflake parameters to configure Tableau Server:

- Account instance URL
- Client ID
- Client secret
- Redirect URL

## Option 1: Configure Tableau Server for Snowflake OAuth

**Note:** Start with step 1 if you're using version 2020.4–2024.1. If you're using 2024.2 and onwards, start at step 2 because step 1 is enabled by default for new versions.

1. On the Tableau Server computer, run the following command to enable the Snowflake OAuth service:

```
tsm configuration set -k native_api.enable_snowflake_privatelink_on_server -v true
```

2. Copy, paste, and customize the following command in a text editor:

**Note:** If you're making these configuration changes in Tableau Server 2021.1 and later, refer to Step 3: [Configure Tableau Server](#) because the format of `oauth.snowflake.clients` value has changed.

```
tсм configuration set -k oauth.snowflake.clients -v " [{\"oauth.snowflake.instance_url\": \"https://account.snowflakecomputing.com\", \"oauth.snowflake.client_id\": \"client_id_string\", \"oauth.snowflake.client_secret\": \"client_secret_string\", \"oauth.snowflake.redirect_uri\": \"http://your_server_url.com/auth/add_oauth_token\" } ]"
```

The `oauth.snowflake.clients` key takes an array of key pairs. Each element in the key pair must be encapsulated by double quotes. Double quotes must be escaped as `\`.

To specify multiple account instance URLs, separate each additional OAuth client wrapped in braces (`{}`) with a comma (`,`), as in this example:

```
tсм configuration set -k oauth.snowflake.clients -v " [{\"oauth.snowflake.instance_url1\": \"https://account.snowflakecomputing.com\", \"oauth.snowflake.client_id\": \"client_id_string\", \"oauth.snowflake.client_secret\": \"client_secret_string\", \"oauth.snowflake.redirect_uri\": \"http://your_server_url.com/auth/add_oauth_token\" } ]"
```

Replace the values for each key:

- Account instance URL: `oauth.snowflake.instance_url`
- Client ID: `oauth.snowflake.client_id`
- Client secret: `oauth.snowflake.client_secret`
- Redirect URL: `oauth.snowflake.redirect_uri`

**Note:** Before running the command, verify the syntax carefully. TSM won't validate this input.

Copy the command into TSM CLI and run the command.

3. Enter the following command to apply the changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Option 2: Configure OAuth with a site

You can configure a custom Snowflake OAuth client for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

## Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector

OAuth Instance URL: Optional

Client ID:   
 ⓧ Enter the client ID from your OAuth provider.

Client Secret:   
 ⓧ Enter the client secret from your OAuth provider.

Redirect URL:   
 ⓧ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.

## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.



## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in Update saved credentials to update their saved credentials.

# Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

## Set Up OAuth for Intuit QuickBooks Online

This topic describes how to set up your Intuit QuickBooks Online data sources for OAuth authentication. Complete these steps for each Tableau Server instance.

Setting up OAuth for QuickBooks Online consists of the following tasks:

1. Create a Connected App on the Intuit developer platform.
2. Use the information you get as part of the Connected App to configure your server.
3. (Optional) Configure site-specific OAuth.

## Step 1: Create an Intuit app

1. Sign in to your Intuit developer account, then click **My Apps**.
2. In the **Just start coding** section, click **Select APIs**.
3. Select **Accounting** and click **Create App**.
4. In the **Get your app ready for submission** section, click the link to get your production keys.

**Important:** You must use production keys rather than development keys.

5. Copy the app token, OAuth consumer key, and OAuth consumer secret.

## Step 2: Configure Tableau Server for Intuit QuickBooks Online

- On the Tableau Server computer, open the bash shell and run the following commands:

```
tsm configuration set -k oauth.quickbooks.oauth_callback_uri -v  
http://YOUR-SERVER/auth/add_oauth_token
```

```
tsm configuration set -k oauth.quickbooks.consumer_key -v  
<your_consumer_key>
```

```
tsm configuration set -k oauth.quickbooks.consumer_secret -v  
<your_consumer_secret>
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Managing access tokens

If you run an extract refresh job for your QuickBooks Online data source, Tableau Server attempts to renew access tokens for you. To help ensure that your access tokens do not expire, run your extract refresh jobs more than once a month. Otherwise, the access tokens

from QuickBooks Online expire and your extract refresh jobs fail. If your access tokens do expire, you can edit your saved credentials from the **Settings** page.

The saved credentials can be managed centrally or by your users. For more information, see [Allow Saved Access Tokens](#).

## Set Up OAuth for Dremio

This topic describes how to set up Dremio data sources for OAuth authentication. Complete these steps for each Tableau Server instance.

Setting up OAuth for Dremio consists of the following tasks:

1. Register an OAuth client with Dremio.
2. Use the information you obtained in Step 1 to configure Tableau Server for Dremio OAuth.
3. (Optional) Configure site-specific OAuth.

## Step 1: Register OAuth client in Dremio

Use the [Identity Providers](#) topic in the Dremio documentation to configure a Dremio-supported IdP to get the OAuth client ID and secret configuration parameters needed to configure Tableau Server for Dremio OAuth.

## Step 2: Configure Tableau Server for Dremio OAuth

To configure Tableau Server for Dremio OAuth, you will use the parameters listed below in the tsm command that follows.

- **Dremio client ID:** The client ID is generated from the registration process in Step 1. Copy this value for `[your_client_id]` in the tsm command.
- **Dremio client secret:** The client secret is generated from the procedure in Step 1. Copy this value for `[your_client_secret]` in the tsm command.

- **Tableau Server URL:** This is your Tableau Server URL, such as `https://-myco.com`. Copy this value for `[your_server_url]` in the `tsm` command.
- **Configuration ID:** This is the value for the `oauth.config.id` parameter you will use in the `tsm` command: `dremio`

Run the following `tsm` commands to configure OAuth for Dremio:

```
tsm configuration set -k oauth.config.clients -v "[{"oauth-
th.config.id":"dremio", "oauth.config.client_id":"[your_cli-
ent_id]", "oauth.config.client_secret":"[your_client_secret]",
"oauth.config.redirect_uri":"[your_server_url]/auth/add_oauth_
token"}]" --force-keys
```

```
tsm pending-changes apply
```

## Setting multiple connectors

If you have multiple connectors to set, you must include all of them in a single command. For example:

```
tsm configuration set -k oauth.config.clients -v "[{"oauth-
th.config.id":"dremio", "oauth.config.client_id":"[your_cli-
ent_id]", "oauth.config.client_secret":"[your_client_secret]",
"oauth.config.redirect_uri":"[your_server_url]/auth/add_oauth_
token"}, {"oauth.config.id":"customer_360_audience", "oau-
th.config.client_id":"[your_client_id]", "oauth.config.client_
secret":"[your_client_secret]", "oauth.config.redirect_uri":"[
your_server_url]/auth/add_oauth_token"}, {"oauth-
th.config.id":"azure_sql_dw", "oauth.config.client_id":"[
your_client_id]", "oauth.config.client_secret":"[your_client_
secret]", "oauth.config.redirect_uri":"[your_server_url]/au-
th/add_oauth_token"}, {"oauth.config.id":"azure_sqldb", "oau-
th.config.client_id":"[your_client_id]", "oauth.config.client_
```

```
secret\" :\"[your_client_secret]\", \"oauth.config.redirect_uri\" :\"[your_server_url]/auth/add_oauth_token\"}]\" --force-keys

tsm pending-changes apply
```

## Configure custom OAuth for a site

You can configure custom Dremio OAuth for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

### Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector

OAuth Instance URL: Optional

Client ID:   
⊗ Enter the client ID from your OAuth provider.

Client Secret:   
⊗ Enter the client secret from your OAuth provider.

Redirect URL:   
⊗ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.

## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.

## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in [Update saved credentials](#) to update their saved credentials.

## Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

## Set Up OAuth for Dropbox

This topic describes how to set up your Dropbox data sources for OAuth authentication. Complete the steps for each Tableau Server instance.

Setting up OAuth for Dropbox consists of the following tasks:

1. Create a new app in your Dropbox developer portal App console.
2. Use the information you get as part of creating the new app to configure your server.
3. (Optional) Configure site-specific OAuth.

## Step 1: Create a new app

1. Sign in to your Dropbox developer console, and then choose **App console**.
2. Click the **Create app** button.
3. Configure and name your app and choose the **Create app** button.
4. After the app is created, navigate to its Permissions tab and ensure that the files.-content.read permission is selected.
5. Navigate to the **Settings** tab and add a Redirect URI using the internet address for your Tableau Server.
6. Add the following text to the end of the URI: auth/add\_oauth\_token. For example:
7. https://your\_server\_url.com/auth/add\_oauth\_token
8. Copy the app key, app secret and redirect URI from the **Settings** tab.

## Step 2: Configure Tableau Server for Dropbox

On the Tableau Server computer, open the bash shell and run the following tsm commands:

```
tsm configuration set -k oauth.dropbox.redirect_uri -v <your_authorized_redirect_uri>
```

```
tsm configuration set -k oauth.dropbox.client_id -v <your_app_key>
```

```
tsm configuration set -k oauth.dropbox.client_secret -v <your_app_secret>
```

```
tsm pending-changes apply
```



If the pending changes require a server restart, the `pending-changes apply` command displays a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this doesn't change the restart behaviour. If the changes don't require a restart, the changes are applied without a prompt. For more information, see [tsm pending-changes apply](#).

## Configure custom OAuth for a site

You can configure custom Dropbox OAuth for a site.

Consider configuring a custom OAuth client to 1) override an OAuth client if configured for the server or 2) enable support for securely connecting to data that requires unique OAuth clients.

When a custom OAuth client is configured, the site-level configuration takes precedence over any server-side configuration and all new OAuth credentials created use the site-level OAuth client by default. No Tableau Server restart is required for the configurations to take effect.

**Important:** Existing OAuth credentials established before the custom OAuth client is configured are temporarily usable but both server administrators and users must update their saved credentials to help ensure uninterrupted data access.

### Step 1: Prepare the OAuth client ID, client secret and redirect URL

Before you can configure the custom OAuth client, you need the information listed below. After you have this information prepared, you can register the custom OAuth client for the site.

- **OAuth client ID and client secret:** First register the OAuth client with the data provider (connector) to retrieve the client ID and secret generated for Tableau Server.
- **Redirect URL:** Note the correct redirect URL. You will need this during the registration process in **Step 2** below.

`https://<your_server_name>.com/auth/add_oauth_token`

For example, `https://example.com/auth/add_oauth_token`

## Step 2: Register the OAuth client ID and client secret

Follow the procedure described below to register the custom OAuth client to the site.

1. Sign in to your Tableau Server site using your admin credentials and navigate to the **Settings** page.
2. Under OAuth Clients Registry, click the **Add OAuth Client** button.
3. Enter the required information, including the information from **Step 1** above:
  - a. For **Connection Type**, select the connector whose custom OAuth client you want to configure.
  - b. For **Client ID**, **Client Secret**, and **Redirect URL**, enter the information you prepared in **Step 1** above.
  - c. Click the **Add OAuth Client** button to complete the registration process.

**Create OAuth Client**

Connection Type: Choose existing connector

OAuth Instance URL: Optional

Client ID:   
 ⚠ Enter the client ID from your OAuth provider.

Client Secret:   
 ⚠ Enter the client secret from your OAuth provider.

Redirect URL:   
 ⚠ Enter a valid URL ending with "/auth/add\_oauth\_token". Domain name can only be "localhost" when using HTTP schema.

Close Add OAuth Client

4. (Optional) Repeat step 3 for all supported connectors.
5. Click the **Save** button at the bottom or top of the Settings page to save changes.

## Step 3: Validate and update saved credentials

To help ensure uninterrupted data access, you (and your site users) must delete the previous saved credentials and add it again to use the custom OAuth client for the site.

1. Navigate to your **My Account Settings** page.
2. Under **Saved Credentials for Data Sources**, do the following:
  1. Click **Delete** next to the existing saved credentials for the connector whose custom OAuth client you configured in **Step 2** above.
  2. Next to connector name, click **Add** and follow the prompts to 1) connect to the custom OAuth client configured in **Step 2** above and 2) save the latest credentials.

## Step 4: Notify users to update their saved credentials

Make sure you notify your site users to update their saved credentials for the connector whose custom OAuth client you configured in **Step 2** above. Site users can use the procedure described in [Update saved credentials](#) to update their saved credentials.

## Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

### Set Up Amazon Redshift IAM OAuth

Starting in Tableau 2023.3.2 for on premises (Tableau Desktop, Tableau Server and Tableau Prep), you can use OAuth 2.0/OIDC to federate identity from an external identity provider to Amazon Redshift.

**Note:** Due to Unicode issues on Linux, the Redshift ODBC 2.0 driver will not currently work with Linux if your identifiers (database names, table names, view names and column names) are not in English. We are waiting for an updated driver from Amazon.

These instructions are for the older AWS IAM service. For IAM IDC integration see [Set Up Amazon Redshift IAM Identity Centre OAuth](#).

Depending on the identity provider, there are different steps needed to configure the integration. This is a high-level overview. Tableau cannot provide detailed instructions for how to configure AWS or the IDP, but the general approach is described below.

## Configure the IDP

1. Create OAuth clients on the IDP for Tableau Desktop, and Tableau Server or Tableau Cloud. The Desktop client should enable PKCE and use `http://localhost` redirects.
2. Add custom claims to use for authorisation to roles. In particular, if you are using original IAM, you may want to add claims for `DbUser` and `DbGroups`. These can be used in your IAM policies later.
3. Create the Tableau OAuth config files. See documentation on [GitHub](#), and examples [here](#). We welcome examples for other IDPs.
  - a. Be sure to prefix the Tableau OAuth config IDs with “`custom_`”.
  - b. If your IDP supports dynamic localhost port then disable `OAuthCapFixedPortInCallbackUrl`. If your IDP does not support this, make sure to add several localhost callback URLs to the allowlist in the config file and on the IDP.
4. Install Tableau OAuth config files on desktop machines and Tableau Server or Tableau Cloud sites.

## Configure IDP on AWS

1. Create the IDP model on the AWS. See Amazon docs [Web Identity Federation](#) and [Create OIDC Identity Provider](#).
2. Create roles and policies specifically for the IDP. See [Create Role for OIDC](#) in the AWS docs.

## Configure Roles for Redshift Users

Attach the policies needed for Redshift. You may use custom claims from the token to authorise to roles. There are several examples with SAML in [the AWS documentation](#). These can be

easily adapted to OAuth. In the case of OAuth, the claims are just “DbUser”, “DbGroups”, etc.

Here is an example of the policy from the AWS documentation:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "redshift:GetClusterCredentials",
      "Resource": [
        "arn:aws:redshift:us-west-1:123456789012:db-
name:cluster-identifier/dev",
        "arn:aws:redshift:us-west-1:123456789012:d-
buser:cluster-identifier/${redshift:DbUser}",
        "arn:aws:redshift:us-west-1:123456789012:cluster-
:cluster-identifier"
      ],
      "Condition": {
        "StringEquals": {
          "aws:userid": "AROAJ2UCCR6DPCEXAMPLE:${red-
shift:DbUser}@example.com"
        }
      }
    },
    {
      "Effect": "Allow",
      "Action": "redshift:CreateClusterUser",
      "Resource": "arn:aws:redshift:us-west-1:12345:d-
buser:cluster-identifier/${redshift:DbUser}"
    },
    {
      "Effect": "Allow",
      "Action": "redshift:JoinGroup",
      "Resource": "arn:aws:redshift:us-west-1:12345:d-
bgroup:cluster-identifier/my_dbgroup"
    },
  ],
}
```

```
{
  "Effect": "Allow",
  "Action": [
    "redshift:DescribeClusters",
    "iam:ListRoles"
  ],
  "Resource": "*"
}
]
```

## Connect to Redshift

The user must specify the **role ARN** to assume, and select the OAuth config installed earlier.

Amazon Redshift

General

Initial SQL

Advanced

Server

myredshift.cluster

Port

5439

Database

TestV1

Authentication

OAuth

Federation Type

IAM Role

AWS Role ARN

arn:aws:iam::1234:role/fed-redshift

OAuth Provider

custom\_my\_okta

☒ Require SSL

Sign In

When properly configured, the user will be redirected to the IDP to authenticate and authorise tokens for Tableau. Tableau will receive openid and refresh tokens. AWS is able to validate the token and signature from the IDP, extract the claims from the token, look up the mapping



of claims to IAM role and either permit or block Tableau from assuming the role on the user's behalf. (in other words, [AssumeRoleWithWebIdentity](#)).

## Okta

If using Okta it's better to use a "custom authorisation server" rather than the "org authorisation server". The custom authorisation servers are more flexible. There is a custom authorisation server created by default, which is called "default". The authorisation URL should look like this:

```
https://${yourOktaDomain}/oauth2/{authServerName}/v1/authorize
```

Summary

Provider

dev[REDACTED].okta.com/oauth2/default

Provider Type

OpenID Connect

Audiences (1)

Also known as client ID, audience is a value that identifies the application that is registered with an OpenID Connect provider.

Actions ▼

< 1 >

Audience

[REDACTED]

## Update Driver

For Redshift OAuth using the original IAM service, you may use either:

- Redshift ODBC v1 driver starting with version 1.59, which can be downloaded from <https://docs.aws.amazon.com/redshift/latest/mgmt/configure-odbc-connection.html>.
- Redshift ODBC v2 driver starting with version 2.0.1.0, which can be downloaded from <https://github.com/aws/amazon-redshift-odbc-driver/tags>. Note there is no v2 driver for OSX.

# Troubleshooting

If you see an error message about invalid/expired token coming from the driver on the first connection (it will have a SQLState error code like [28000] or [08001] in the error message), then we successfully completed the OAuth flow, and failed in the driver. This means there is a misconfiguration on either the AWS side or the IDP side. There may also be permissions or authorisation errors returned from the driver, which is also out of our control.

The best way to diagnose these errors is to remove Tableau from the picture. You first need to get an ID token (the default) or access token (if customised) to send to the driver. Here is an example with Okta. Almost all IDPs have a way to do this which is quite similar. Note that to use this flow you need to have enabled resource owner password grant type. Substitute the IDP URL, client secret, client ID, username and password.

```
curl -X POST "https://OKTA_URL/v1/token" \
-H 'accept: application/json' \
-H "Authorization: Basic $(echo -n 'CLIENTID:CLIENTSECRET' |
base64)" \
-H "Content-Type: application/x-www-form-urlencoded" \
-d "grant_type=
e=password&username=USER&password=PASSWORD&scope=openid"
```

Once you have the token, you can use a DSN to test. Below is an example of using the ODBC driver manager on Windows. On Mac you can use the iODBC driver manager UI. On Linux you can use the isql command line tool that is included with Tableau Server in the customer-bin folder.

Amazon Redshift ODBC Driver DSN Setup

Connection Settings

Data Source Name:

redshift-test

Server:

my-redshift-server.acme.com

Port:

5439

Database:

dev

Authentication

Auth Type:

Identity Provider: JWT IAM Auth Plugin

User:

test

Password:

●●●●●●●●

Encrypt Password For:

☒ Current User Only

☐ All Users of This Machine

Cluster ID:

Region:

DbUser:

test

☐ User AutoCreate

DbGroups:

dev

☐ Force Lowercase

DbGroups Filter:

Endpoint URL:

STS Endpoint URL:

VPC Endpoint URL:

AuthProfile:

AccessKeyId:

SecretAccessKey:

Web Identity Token:

\*\*\*\*\*

Role ARN:

arn:aws:iam::1234:role/oauth-redshift

Role Session Name:

Duration:

## Set Up Amazon Redshift IAM Identity Centre OAuth

Starting in Tableau 2023.3.2 for on premises (Tableau Desktop, Tableau Server and Tableau Prep), you can use OAuth 2.0/OIDC to federate identity from an external identity provider to Amazon Redshift. This feature is not available for OSX because of driver limitations.

**Note:** Due to Unicode issues on Linux, the Redshift ODBC 2.0 driver will not currently work with Linux if your identifiers (database names, table names, view names and column names) are not in English. We are waiting for an updated driver from Amazon.

These instructions are for the newer AWS IAM IDC service. For original IAM integration, see [Set Up Amazon Redshift IAM OAuth](#).

Depending on the identity provider, there are different steps needed to configure the integration. This is a high-level overview. Tableau cannot provide detailed instructions for how to configure AWS or the IDP, but this is the general approach.

## Configure the IDP

1. Create OAuth clients on the IDP for Tableau Desktop and Tableau Server or Tableau Cloud. The Desktop client should enable `PKCE` and use `http://localhost` redirects.
2. Add any required custom claims to use for authorisation to roles.
3. Create the Tableau OAuth config files. See documentation on [GitHub](#), and [examples](#). We welcome examples for other IDPs.
  - a. Be sure to prefix the Tableau OAuth config IDs with `"custom_"`.
  - b. If your IDP supports dynamic localhost port then disable `OAUTH_CAP_FIXED_`

`PORT_IN_CALLBACK_URL`. If it does not, make sure to add several localhost callback URLs to the allowlist in the config file and on the IDP.

4. Install Tableau OAuth config files on desktop machines and Tableau Server or Tableau Cloud sites.

## Step 2: Configure IDP and Roles on AWS

See your AWS documentation for information on doing this.

## Step 3: Connect to Redshift

1. Connect to Redshift.
2. Select OAuth for **Authentication**.
3. Select Identity Centre for **Federation Type**.
4. (Optional) Specify the **Identity Centre Namespace** if necessary.

Amazon Redshift

General

Initial SQL

Advanced

Server

redshift.acme.com

Port

5439

Database

dev

Authentication

OAuth

Federation Type

Identity Center

Identity Center Namespace

Optional

OAuth Provider

custom\_my\_okta

☒ Require SSL

Sign In

When correctly configured, you will be redirected to the IDP to authenticate and authorise tokens for Tableau. Tableau will receive an access token and refresh tokens. It will send the access token to the driver for authentication.

# Okta

If you are using Okta, it's better to use a "custom authorisation server" instead of the "org authorisation server". The custom authorisation servers are more flexible. A custom authorisation server is created by default and called "default". The authorisation URL should look like this:

```
https://${yourOktaDomain}/oauth2/{authServerName}/v1/authorize
```

| Summary                                           |                                 |
|---------------------------------------------------|---------------------------------|
| Provider<br>dev[REDACTED].okta.com/oauth2/default | Provider Type<br>OpenID Connect |

| Audiences (1) <span>Actions ▾</span>                                                                                                             |  |          |                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--|----------|----------------------------------|
| Also known as client ID, audience is a value that identifies the application that is registered with an OpenID Connect provider.                 |  |          |                                  |
| <div>&lt; 1 &gt;</div> <table><thead><tr><th>Audience</th></tr></thead><tbody><tr><td><input type="radio"/> [REDACTED]</td></tr></tbody></table> |  | Audience | <input type="radio"/> [REDACTED] |
| Audience                                                                                                                                         |  |          |                                  |
| <input type="radio"/> [REDACTED]                                                                                                                 |  |          |                                  |

## Update the driver

For Redshift OAuth using IAM IDC service, you must use the Redshift ODBC driver starting with version 2.0.1.0, which can be downloaded from <https://github.com/aws/amazon-redshift-odbc-driver/tags>. Note there is no v2 driver for OSX.

## Troubleshooting Redshift IAM IDC OAuth

If you see an error message about invalid/expired token coming from the driver on the first connection (it will have a SQLState error code like [28000] or [08001] in the error message), then Tableau successfully completed the OAuth flow, and failed in the driver. This means there is a

misconfiguration on either the AWS side or the IDP side. There may also be permissions or authorisation errors returned from the driver, which is also out of Tableau's control.

The best way to diagnose these errors is to remove Tableau from the picture. You first need to get an access token (the default for IAM IDC) or refresh token (if customised) to send to the driver.

Here is an example with Okta. Almost all IDPs have a way to do this which is quite similar. Note that to use this flow you need to have enabled resource owner password grant type. Substitute the IDP URL, client secret, client ID, username and password.

```
curl -X POST "https://OKTA_URL/v1/token" \
-H 'accept: application/json' \
-H "Authorization: Basic $(echo -n 'CLIENTID:CLIENTSECRET' |
base64)" \
-H "Content-Type: application/x-www-form-urlencoded" \
-d "grant_type=
e=password&username=USER&password=PASSWORD&scope=openid"
```

Once you have the token, you can use a DSN to test. Below is an example of using the ODBC driver manager on Windows. On Mac you can use the iODBC driver manager UI. On Linux you can use the isql command line tool that is included with Tableau Server in the customer-bin folder.



Amazon Redshift ODBC Driver Setup v2.0.0.11(64 bit) ✕

Connection **SSL** Proxy Cursor Advanced

Data Source Name:

Description:

Server:

Port:

Database:

Authentication

Auth Type:

User Name:

Password:

Auth Profile:

Token:

Token Type:

Identity Namespace:

## Allow Saved Access Tokens

After you configure Tableau Server for OAuth, you can decide to allow users to manage their own OAuth credentials, or you want to manage them centrally. If you want users to manage their own, you need to enable user profile settings from the server.

**Note:** If you have not yet configured your server to enable OAuth data connections, see the related topics listed below.

1. Sign in to Tableau Server as a server administrator.

2. **Single-site:** Click **Settings > General**.

**Multisite:** In the site menu, click **Manage All Sites** and then click **Settings > General**.

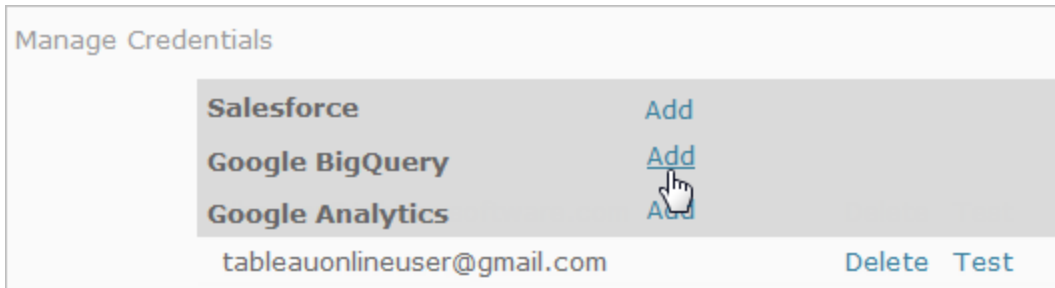
3. In the **Saved Credentials** section, select the following:

- **Allow users to save passwords for data sources** (allows users to save their individual credentials with data sources).
- **Allow users to save OAuth access tokens for data sources**

The screenshot shows the 'General' tab of the Tableau Server settings. At the top, there are tabs for 'General', 'Licenses', 'Extensions', and 'Add a Site'. Below these tabs are 'Revert' and 'Save' buttons. The 'Saved Credentials' section is expanded, showing two checkboxes that are both checked: 'Allow users to save passwords for data sources' and 'Allow users to save OAuth access tokens for data sources'. Below these checkboxes is a button labeled 'Clear All Saved Credentials...'. The text above the checkboxes explains that users can save passwords to connect to data sources without being prompted to authenticate, and that they can save OAuth access tokens to connect to cloud data sources like Salesforce and Google BigQuery without being prompted to authenticate.

4. Click **Save**.

After you tick these boxes, users will see a **Manage Credentials** section in their profile settings, where they can add access tokens for OAuth data connections.



## Managing credentials centrally

Server administrators alternatively can manage OAuth credentials centrally. This can work well, for example, if multiple users work from the same data, and you have a dedicated user account for your data provider.

To manage credentials centrally, you do the following:

- Clear the tick boxes described in the preceding procedure.
- Edit connection information as data sources are published.

When you edit the connection, you embed credentials that use an OAuth access token instead of an individual's user name and password.

When the settings for saving passwords and access tokens are not enabled, the Manage Credentials section is excluded from users' profile settings.

## Forward proxy for OAuth authentication

For more information about setting up a forward proxy with OAuth authentication for Tableau Server (Windows only), see [Configure a Forward Proxy for OAuth Authentication](#) in the Tableau Help.

## See also

Set up OAuth for Google

Change Salesforce.com OAuth to Saved Credentials

Configure OAuth for Snowflake Connections

Set Up OAuth for Intuit QuickBooks Online

Troubleshoot OAuth Connections

This topic provides information about resolving issues that can occur when you configure OAuth data connections.

## Conflict error

In some cases, users may receive an error when attempting to connect with OAuth. The first sentence of the error message is:

*The server encountered an internal error or misconfiguration and was unable to complete your request.*

This error indicates that the fully qualified domain name (FQDN) of the Tableau Server needs to be added to the allowlist redirect key on Tableau Server.

When users are accessing a Tableau Server by the local host name (<https://tableau>) and the OAuth data provider is responding to the public DNS name (<https://data.example.com>), Tableau Server must associate the external FQDN with the local server name. The local host name is the server name in the URL that users enter when accessing Tableau Server from the internal network.

To fix this error, run tsm configuration set with the `oauth.whitelisted.redirect_to_origin_host` key option. This key takes a value pair, `"internal_host,FQDN1,FQDN2"`.

## Tableau Server on Windows Help

For example, the following commands set the local host name to *tableau* and the FQDN to *tableau.example.com*:

```
tsm configuration set -k oauth.whitelisted.redirect_to_origin_host -  
v "tableau,tableau.example.com"  
  
tsm pending-changes apply
```

In the case where multiple public URLs are used to access the internal Tableau Server, add additional FQDNs to the command, separated by commas, for example:

```
tsm configuration set -k oauth.whitelisted.redirect_to_origin_host -  
v "tableau,tableau.example.com,tableau2.example.com"
```

If you need to edit an existing allowlist redirect configuration, you must enter the full mapping set. You cannot truncate or append existing configuration keys.

### Configure SAP HANA SSO

You can configure Tableau Server to use SAML delegation to provide a single sign-on (SSO) experience for SAP HANA. This scenario is not dependent on SAML authentication to Tableau Server. You do not need to use SAML sign on with Tableau Server in order to use HANA SAML delegation. You can sign in to Tableau Server using whatever method you choose.

With SAML delegation for SAP HANA, Tableau Server functions as an identity provider (IdP).

#### Before you begin

Configuring SAML delegation with SAP HANA requires configuration on both Tableau Server and on SAP HANA. This topic provides configuration information about configuring Tableau Server. Before you configure Tableau Server, you must complete the following:

- Acquire a SAML certificate and key file for Tableau Server.
  - The certificate file must be a PEM-encoded x509 certificate with the file extension .cert or .cert. This file is used by Tableau Server and must also be installed on HANA.

- The private key must be a DER-encoded private key file, in PKCS#8 format, that is not password protected and has the file extension `.der`. This file is only used by Tableau Server.
- Install the certificate in HANA. To avoid `libxmlsec` errors in HANA, we recommend configuring in-memory certificate store on SAP HANA. For more information, see this [SAP support topic](#).
- Install the latest version of SAP HANA driver (minimum version is 1.00.9) on Tableau Server.
- Configure network encryption from Tableau Server to SAP HANA (recommended).

For more information about generating the certificate/key pair, encrypting the SAML connection and configuring SAP HANA, see [How to Configure SAP HANA for SAML SSO with Tableau Server](#) in the Tableau Community.

### Configure Tableau Server SAML for SAP HANA

The following procedure describes how to configure SAML for SAP HANA on Tableau Server using `tsm data-access`. You can also configure SAML for SAP HANA using the `sapHanaSettings` Entity.

If you are running Tableau Server in a distributed deployment, run the following procedure on the initial node.

1. Place certificate files in a folder named `saml`. For example:

```
C:\Program Files\Tableau\Tableau Server\SAML
```

2. Run the following commands to specify the location of the certificate and key files:

```
tsm data-access set-saml-delegation configure --cert-key <cert-key> --cert-file <cert-file>
```

Where `<cert-key>` and `<cert-file>` are file paths to the private key and certificate file, respectively.

For example,

```
tsm data-access set-saml-delegation configure --cert-key  
"c:\Program Files\Tableau\Tableau Server\SAML\saml_key.der" --  
cert-file "c:\Program Files\Tableau\Tableau Server\SAML\saml_  
cert.crt"
```

You can specify other options. For example, you can specify user name format and how credentials are normalised. See `tsm data-access`.

3. Run the following commands to enable delegation:

```
tsm data-access set-saml-delegation enable  
  
tsm configuration set -k wgserver.sap_hana_sso.enabled -v true  
  
tsm configuration set -k wgserver.delegation.enabled -v true
```

4. When you have finished, run `tsm pending-changes apply`.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Enable Single Sign-On for SAP BW

Starting with Tableau 10.2, you can configure single sign-on (SSO) support from Tableau to SAP NetWeaver Business Warehouse (SAP BW). To use this feature, you must install and configure software on the computers that run Tableau Server and Tableau Desktop.

Configuring this feature is a challenge that includes strict version and environment requirements, as well as an SAP engineer to help you be successful.

Requirements and detailed instructions are available in [Configure Single Sign-On for SAP BW](#) on Tableau Community.

## SQL Server Impersonation

Impersonation in the context of Tableau Server means allowing one user account to act on behalf of another user account. You can configure Tableau and Microsoft SQL Server to perform database user impersonation, so that the SQL Server database account used by Tableau Server queries on behalf of SQL Server database users, who are also Tableau users.

The main benefit of this feature is it allows administrators to implement and control their data security policy in one place: their databases. When Tableau users access a view with a live connection to a SQL Server database, the view only displays what the users' database permissions authorise them to see. An additional benefit is that the users don't have to respond to a database sign-in prompt when they open the view. Also, workbook publishers don't have to rely on user-specific filters to restrict what's seen in views.

## Impersonation Requirements

Here's what you need to use feature:

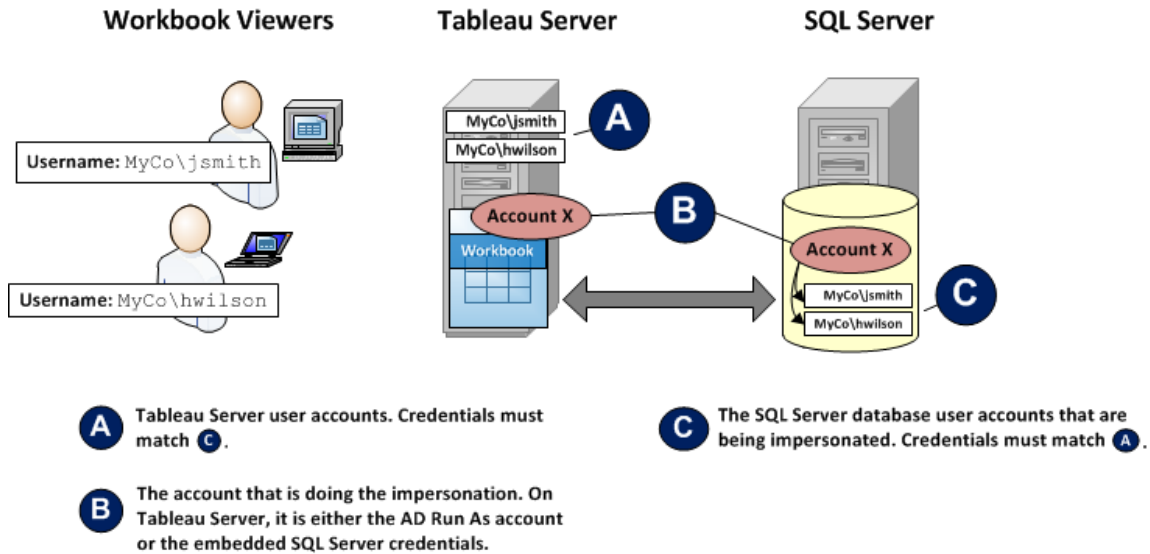
- **Live connections to SQL Server only:** Impersonation can only be used for views that have a live connection to a SQL Server database, version 2005 or newer.
- **Individual database accounts:** Each person who'll be accessing the view must have an explicit, individual account in the SQL Server database to which the view connects. Members of an Active Directory (AD) group cannot be impersonated. For example, if Jane Smith is a member of the AD group Sales, and her database administrator adds the Sales AD group to the SQL Server database, Jane cannot be impersonated.



- **Matching credentials and authentication type:** The credentials of each Tableau user's account and their Tableau user authentication type must match their credentials and authentication type in the SQL Server database. For example, if Jane Smith's Tableau Server user account is `MyCo\j.smith`, the username on the SQL Server database must also be `MyCo\j.smith`. SQL Server must be using Windows Integrated Authentication.
- **SQL Server prerequisites:** In SQL Server you should have a data security table, a view that enforces data security, and you should require that your database users use the view.
- **SQL IMPERSONATE account:** You need a SQL Server database account that has IMPERSONATE permission for the above database users. This is either an account with the sysadmin role or one that has been granted IMPERSONATE permission for each individual user account (see the [MSDN article on EXECUTE AS](#)). The SQL Server account must be one of the following:
  - The Tableau Server Run As service account. See Impersonate with a Run As Service Account.
  - The workbook publisher's account. See Impersonate with Embedded SQL Credentials.

### How Impersonation Works

Here's an illustration of how database user impersonation works:



In the above illustration, Jane Smith (`MyCo\jsmith`) is a West Coast sales representative and Henry Wilson (`MyCo\hwilson`) covers the East. In the SQL Server database, the account permissions for Jane's account, `MyCo\jsmith`, only give her access to West Coast data. Henry's account, `MyCo\hwilson`, can only access data for the East Coast.

A view has been created that displays data for the entire country. It has a live connection to a SQL Server database. Both users sign in to Tableau Server and click the view. Tableau Server connects to SQL Server using a database account with `IMPERSONATE` permission for each user's database account. This account acts on behalf of each user's database account.

When the view displays, it is restricted by each user's individual database permissions: Jane sees only the West Coast sales data, Henry sees only the East Coast data.

#### Impersonate with a Run As Service Account

Impersonating via a Run As service account is the recommended way to perform impersonation. The Run As service account is an Active Directory user account the Tableau Server service can run under on the machine hosting Tableau Server (see Run As Service Account). This same account must have `IMPERSONATE` permission for the database user accounts in

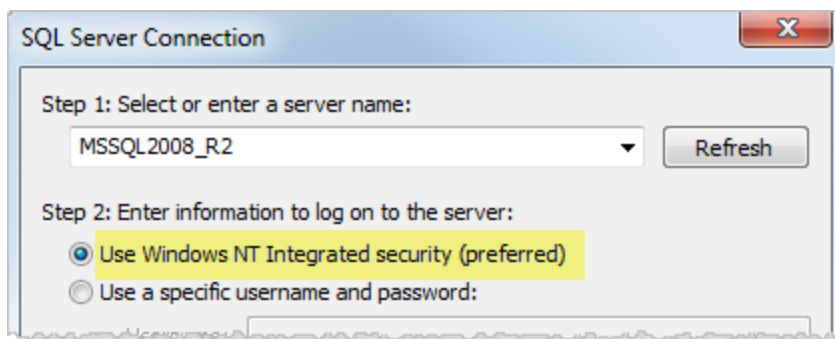
SQL Server. From a data security standpoint, using the Tableau Server Run As service account for impersonation gives the administrator the most control.

To set up impersonation with a Run As User account:

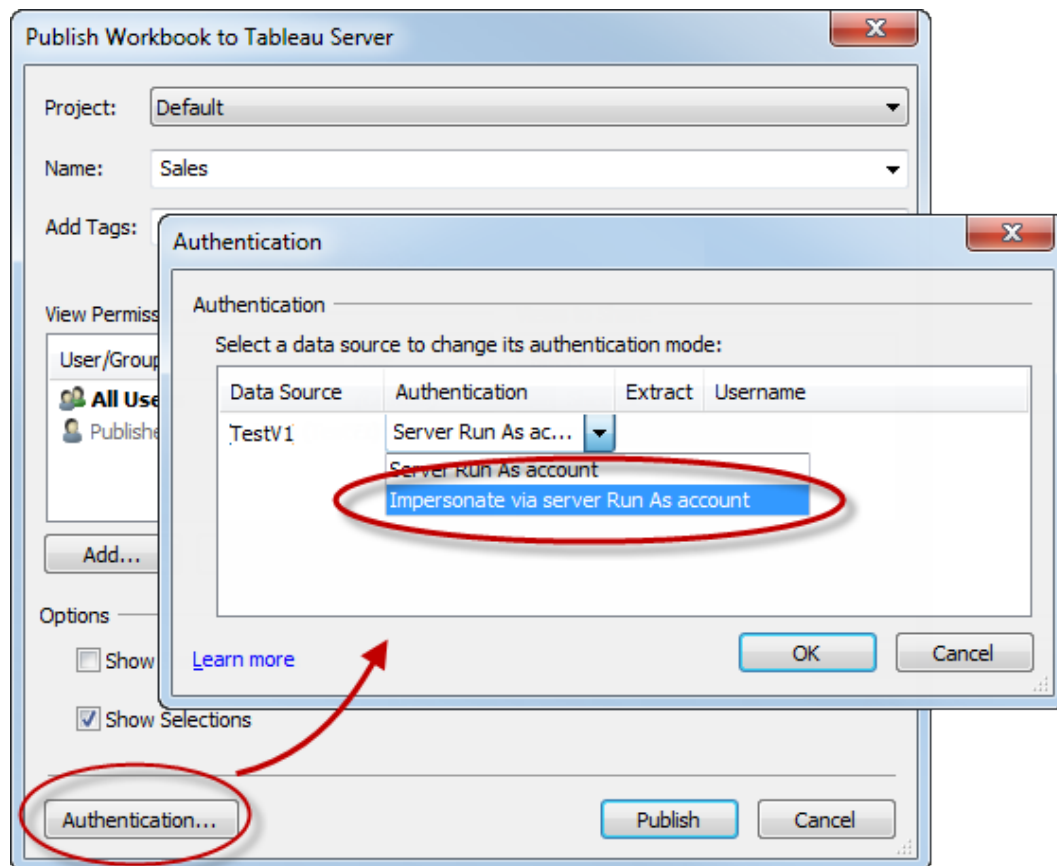
1. When you configure Tableau Server during installation, select Active Directory as the identity store and specify the user account with IMPERSONATE permission as the Run As service account. See [Configure Initial Node Settings](#).

If you installed Tableau Server with the identity store configured to use Active Directory, then you can set the Run As service account after you have installed. See [Change the Run As Service Account](#).

2. Create a workbook in Tableau Desktop. When you create the data connection, select **Use Windows NT Integrated security** for the workbook's live connection to a SQL Server database:



3. In Tableau Desktop, publish the workbook to Tableau Server (**Server > Publish Workbook**).
4. In the Publish dialog box, click Authentication, then in the Authentication dialog box, select **Impersonate via server Run As account** from the drop-down list:



5. Click **OK**.
6. Test the connection by signing into Tableau Server as a user. When you click a view, you should not be prompted for database credentials and you should only see the data the user is authorised to see.

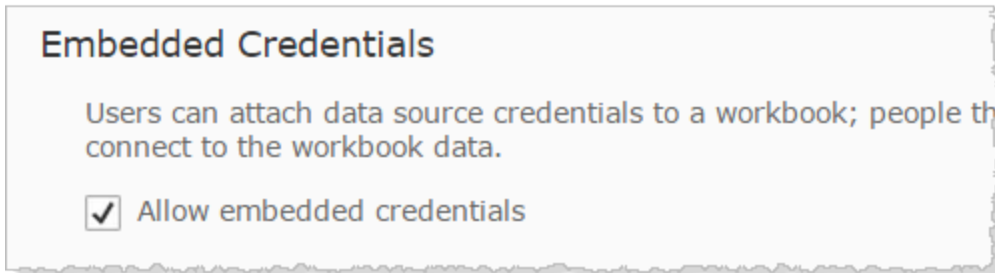
#### Impersonate with Embedded SQL Credentials

You can also perform impersonation by having the person who publishes a view embed their SQL Server account credentials in the view. Tableau Server can be running under any type of account, but it will use these credentials, supplied by the publisher, to connect to the database.

This may be the right choice for your site if the account that handles the impersonation cannot be an Active Directory (AD) account and if you're comfortable giving workbook publishers an account with a potentially high permission level on SQL Server.

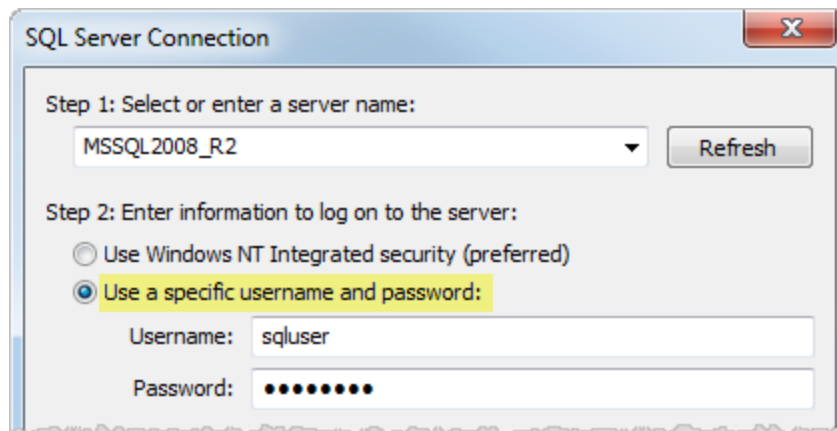
**Note:**

To use this approach, **Embedded Credentials** must be enabled on the server Settings page in Tableau Server:



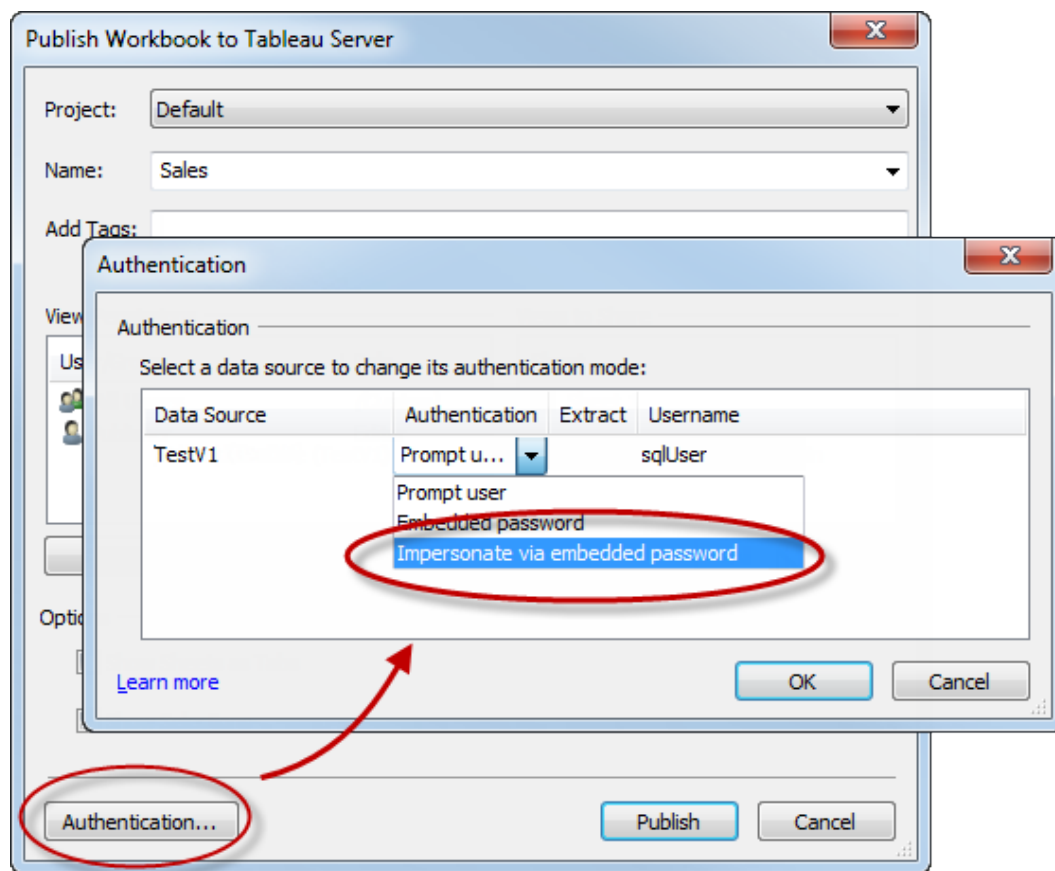
To impersonate with the workbook publisher's SQL account:

1. In Tableau Desktop, create a workbook. When you create the data connection, select Use a specific username and password for the workbook's live connection to a SQL Server database:



2. Publish the workbook to Tableau Server (**Server > Publish Workbook**).

3. In the Publish dialog box, click **Authentication**, then in the Authentication dialog box, select **Impersonate via embedded password** from the drop-down list:



4. Click **OK**.
5. Test the connection by signing in to Tableau Server as a user. When you click a view, you should not be prompted for database credentials and you should only see the data the user is authorised to see.

## Configure a Custom TSM Administration Group

This topic describes how to configure a custom TSM administration group.

By default, the user account used for TSM administration must be a member of the Administrators group on the computer running Tableau Server. In some organisations, security

policy requires separation between administrative roles. In these scenarios, the default TSM administration configuration is not allowed.

You can configure Tableau Server to use an arbitrary group as a custom TSM administration group. Once configured, any user that is a member of the custom group will be able to administer TSM.

Users in the default Windows Administrators group will still have full access to TSM.

### Step 1: Create the new group

You can create a local Windows group or a group in Active Directory. We recommend creating a group with default settings. Do not apply or remove permissions from the default group as created by Windows.

**Note:** The default TSM group name is `tsmadmin`. If you create the Windows group with the name, `tsmadmin`, then no further configuration on Tableau Server is required.

### Step 2: Configure Tableau Server

The custom TSM administration group name is stored in the `tsm.authorized.groups` configuration key. If you want to specify a group name (other than `tsmadmin`) then you will need to update the `tsm.authorized.groups` configuration key and then restart Tableau Server.

Use the `tsm configuration set` command to set the group name value. For example, to change the TSM administrative group name to `myadmingroup`, run the following commands:

```
tsm configuration set -k tsm.authorized.groups -v myadmingroup
tsm pending-changes apply
```

### Notes

- Setting the `tsm.authorized.groups` configuration key overwrites any existing value stored on that key.
- You can specify multiple groups by entering a comma-separated list of group names as the value.

### Step 3: Add users to the new group

After you finished setting `tsm.authorized.groups`, any user in the new group(s) that you have specified will have full TSM administrative rights on Tableau Server.

## Authorisation

*Authorisation* refers to how and what users can access on Tableau Server after authentication has been verified. Authorisation includes:

- What users are allowed to do with content hosted on Tableau Server, including projects, sites, workbooks, and views.
- What users are allowed to do with the data sources that are managed by Tableau Server.
- What tasks users are allowed to perform to administer Tableau Server, such as configuring server settings, running command line tools, creating sites, and other tasks.

Authorisation for these actions is managed by Tableau Server and determined by a combination of the user's site role and permissions associated with specific entities such as workbooks and data sources.

## Site roles

Site roles define who is an administrator. Administrators can be assigned at the site or server level. For non-admins, site roles indicate the maximum level of access a user can have on a given site, subject to permissions set on content assets. For example, if one user is assigned the Viewer site role, and another the CreatorCreator

For more information about site roles, see [Set Users' Site Roles](#).

## Permissions

Permissions determine whether a given user is allowed or denied to perform a specific action on a specific content asset.

As an administrator setting up Tableau Server, it's important that you understand how permissions are evaluated. Understanding the Tableau permissions process will enable you to



set up and configure permissions on sites, projects, and other assets so that you can control how content and data is shared, published, viewed, extracted, and imported.

Four important concepts to understand about permissions in Tableau are:

- **Permissions are asset-based.** Permissions are assigned to individual content assets (projects, data sources, workbooks) and are granted to users or groups.
- **Permissions are implicitly denied, and non-admin users must explicitly be allowed to access content.** The process by which Tableau Server determines the “allow” or “deny” permission is explained in detail in Permissions.
- **Permissions inheritance exists only in locked projects and in workbooks with tabbed views.** When content permissions are locked to the top-level project, workbooks, views, and data sources in the entire project hierarchy will use the default permissions set at the top-level project. In workbooks saved with the option **Show sheets as tabs**, views inside those workbooks use the workbook permissions. For more information, see Permissions.
- **In a project that is not locked, initial permissions are a one-time copy of the permissions of the container item.** A data source or workbook starts with the default permissions, but authorised users can subsequently edit permissions on those assets. For more information on default permissions and projects, see Permissions.

Tableau Server provides a flexible permissions infrastructure that allows you to manage access to all content for countless scenarios. For more detailed information, see Permissions.

## Data access and external authorisation

There are scenarios where Tableau Server and Desktop rely on external authorisation to enable access to data. For example:

- Users connecting to external data sources might require authorisation that is outside the scope of Tableau Server’s authority. If users publish an external data source, Tableau Server will manage access and capabilities of that data source. But if users embed an external data source in a workbook, it’s up to the user who publishes the workbook to determine how other users who open the workbook will authenticate with the underlying data that the workbook connects to.
- Running Tableau Server in an organisation with Active Directory, where Tableau has been configured with a Run As user account, results in a dependency on Active Directory and NTFS for authorisation. For example, if you configure Tableau Server to use

the Run As account to impersonate users connecting to SQL, then object-level authorisation is reliant on NTFS and Active Directory.

- How users authenticate and are authorised by specific database solutions can differ. As noted, Tableau Server can be configured to provide access authorisation when a data source is configured, but some databases will authorise access according to their own authentication scheme.

## Data Security

Tableau provides several ways for you to control which users can see which data. For data sources that connect to live databases, you can also control whether users are prompted to provide database credentials when they click a published view. The following three options work together to achieve different results:

- **Database login account:** When you create a data source that connects to a live database, you choose between authenticating to the database through Windows NT or through the database's built-in security mechanism.
- **Authentication mode:** When you publish a data source or a workbook with a live database connection, you can choose an **Authentication mode**. Which modes are available depends on what you choose above.
- **User filters:** You can set filters in a workbook or data source that control which data a person sees in a published view, based on their Tableau Server login account.

The table below outlines some dependencies with the above options:

| <b>Database Connection Options</b>                    |                                                                                                                    | <b>Data Security Questions</b>                                |                                                                             |                                           |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| <b>Database login account uses...</b>                 | <b>Authentication mode</b>                                                                                         | <b>Is database security possible per Tableau Server user?</b> | <b>Are user filters the only way to restrict which data each user sees?</b> | <b>Are web caches shared among users?</b> |
| Active Directory credentials (Windows Authentication) | Run As service account                                                                                             | No                                                            | Yes                                                                         | Yes                                       |
|                                                       | Impersonate via server Run As service account                                                                      | Yes                                                           | No*                                                                         | No                                        |
|                                                       | Viewer enters their credentials                                                                                    | Yes                                                           | No*                                                                         | No                                        |
| Username and password                                 | Prompt user: Viewers are prompted for their database credentials when they click a view. Credentials can be saved. | Yes                                                           | No                                                                          | No                                        |
|                                                       | Embedded credentials: The workbook or data source publisher can embed their database credentials.                  | No                                                            | Yes                                                                         | Yes                                       |
|                                                       | Impersonate via embedded password: Database cre-                                                                   | Yes                                                           | No*                                                                         | No                                        |

| <b><i>Database Connection Options</i></b> |                                                    | <b><i>Data Security Questions</i></b>                         |                                                                             |                                           |
|-------------------------------------------|----------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| <b>Database login account uses...</b>     | <b>Authentication mode</b>                         | <b>Is database security possible per Tableau Server user?</b> | <b>Are user filters the only way to restrict which data each user sees?</b> | <b>Are web caches shared among users?</b> |
|                                           | dentials with impersonate permission are embedded. |                                                               |                                                                             |                                           |

\* Because it can create unexpected results, Tableau recommends that you not use this authentication mode with user filters.

User filters, the embedded credentials option and the impersonation modes have similar effects – when users click a view, they are not prompted for database credentials and they see only the data that pertains to them. However, user filters are applied in the workbook by authors, and the impersonation authentication modes rely on security policies defined by administrators in the database itself.

## Overview of Row-Level Security Options in Tableau

Sometimes, you want to filter data based on the user that is requesting it. For example:

- You want regional salespeople to see sales figures only for their region.
- You want sales managers to see statistics only for salespeople that report to them.
- You want students to see visualisations based only on their own test scores.

An approach to filtering data this way is called row-level security (RLS). There are multiple methods to accomplish row-level security both inside and outside of Tableau, each with its own pros and cons.

### Create a user filter and map users to values manually

The simplest way to achieve row-level security in Tableau is through a user filter where you manually map users to values. For example, you could manually map a user named “Alice” to the value “East” so that she only sees rows in the data source where the “Region” column is “East”.

This method is convenient but high maintenance, and attention must be paid to security. It must be done per-workbook, and you must update the filter and republish the data source as your user base changes. When you publish an asset with this type of user filter, you need to set permissions so that users cannot save or download it and remove the filter, thereby gaining access to all of the data.

For more information, see [Create a user filter and map users to values manually](#) in the Tableau Desktop and Web Authoring help.

### Create a dynamic user filter using a security field in the data

Using this method, you create a calculated field that automates the process of mapping users to data values. This method requires that the underlying data include the security information you want to use for filtering. For example, using a calculated field, the USERNAME() function and a “Manager” column in the data source, you could determine if the user requesting the view is a manager and adjust the data in the view accordingly.

Because filtering is defined at the data level and automated by the calculated field, this method is less error prone than mapping users to data values manually. When you publish an asset with this type of user filter, you need to set permissions so that users cannot save or download it and remove the filter, thereby gaining access to all of the data.

For more information, see [Create a dynamic filter using a security field in the data](#) in the Tableau Desktop and Web Authoring help.

### Use a data policy

Starting in Tableau 2021.4, when Data Management is enabled in Tableau Server or Tableau Cloud, users with a Creator licence can implement row-level security through data policies on

virtual connections. Because virtual connections are centralised and reusable, you can manage row-level security for each connection in one place, safely and securely, across all content that uses that connection.

Unlike the above solutions for row-level security in Tableau, this method doesn't carry the same risk of exposing information if an author neglects to properly secure permissions on the workbook or data source, because the policy is enforced on the server for every query.

Row-level security through virtual connection data policies was developed to address shortcomings of other row-level security solutions. We recommend this solution in most situations where it's an option.

For more information on row-level security using data policies on virtual connections, see [About Virtual Connections and Data Policies](#).

#### Use existing RLS in the database

Many data sources have mechanisms for RLS built in. If your organisation has already put effort into building row-level security in a data source, you may be able to take advantage of your existing RLS.

It is not necessarily easier or better to implement a built-in RLS model vs building it with Tableau in mind; these techniques are generally leveraged when an organisation has already invested in these technologies and they want to take advantage of that investment, or when they need to apply the same security policies to other database clients in addition to Tableau.

The main benefit of using built-in RLS is that administrators can implement and control their data security policy in one place: their databases.

For more information, see [Row-Level Security in the Database](#).

#### Row-level security option comparison

| RLS option         | Useful when                                                                        | Pros                                                                     | Cons                                                               |
|--------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------|
| Manual user filter | <ul style="list-style-type: none"> <li>You are doing a proof of concept</li> </ul> | <ul style="list-style-type: none"> <li>Simple at small scales</li> </ul> | <ul style="list-style-type: none"> <li>High-maintenance</li> </ul> |

|                     |                                                                                                                                                                                                                                                                       |                                                                                                                                                                              |                                                                                                                                                                                                                                            |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <p>or testing user filtering functionality</p> <ul style="list-style-type: none"> <li>You are creating a static workbook to use with an unchanging group of users</li> <li>You understand the data security risk of having the permissions set incorrectly</li> </ul> | <ul style="list-style-type: none"> <li>Easy to understand mapping</li> <li>Good for testing</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>Need to update filter and republish as user base changes</li> <li>Permissions must be secured to prevent users from seeing unfiltered data</li> <li>Must be replicated in every workbook</li> </ul> |
| Dynamic user filter | <ul style="list-style-type: none"> <li>You don't have a Data Management licence</li> <li>The data contains information you can use to filter it</li> <li>You understand the data security risk of having the permissions set incorrectly</li> </ul>                   | <ul style="list-style-type: none"> <li>Relatively easy to set up</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>Permissions must be secured to prevent users from seeing unfiltered data</li> <li>Must be replicated in every workbook or data source</li> </ul>                                                    |
| Data policy         | <ul style="list-style-type: none"> <li>You have a Data Management licence</li> <li>The data contains information you can use to filter it</li> <li>Ease of data security is a significant concern</li> </ul>                                                          | <ul style="list-style-type: none"> <li>Centralised</li> <li>Secure</li> <li>Low-maintenance</li> <li>Responsibilities for security and analytics can be separated</li> </ul> | <ul style="list-style-type: none"> <li>Data Management licence required</li> </ul>                                                                                                                                                         |

|                     |                                                                                                                                                          |                                                                                                                                                                                     |                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| RLS in the database | <ul style="list-style-type: none"><li>• Your database has an existing RLS security built into the database</li><li>• You're not using extracts</li></ul> | <ul style="list-style-type: none"><li>• Might already be built into your organisation's database</li><li>• Policies can be applied to database clients other than Tableau</li></ul> | <ul style="list-style-type: none"><li>• Must use live queries</li><li>• Might have limitations or requirements. Your IT team can identify them</li></ul> |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

Which row-level security option should I use?

Does your organisation have a preferred RLS solution in the database that works for this project?

→ Yes  
→

See Row-Level Security in the Database

↓ No ↓

Do you have a Data Management licence?

→ Yes  
→

See About Virtual Connections and Data Policies

↓ No ↓

Is this a proof of concept, a basic user filter test or a static workbook with unchanging users?

→ Yes  
→

See [Use a manual user filter](#)

↓ No ↓

See [Use a dynamic user filter](#)

RLS Best Practices for Data Sources and Workbooks

Row-level security (RLS) in Tableau restricts the rows of data a certain user can see in a workbook. This differs from Tableau permissions, which control access to content and feature functionality. For example, permissions control whether a user can comment on or edit a



workbook, while row-level security enables two users viewing the same dashboard to see only the data each user is allowed to see.

There are several ways to implement RLS in Tableau. For example, you can set RLS at the data source or workbook level, or you can set RLS at the connection level using a virtual connection with a data policy (requires Data Management). See the Overview of Row-Level Security Options in Tableau for details about alternatives.

**Note:** This topic focuses on RLS best practices for data sources and workbooks. For more in-depth examples of the concepts outlined in this topic, refer to the whitepaper [Best Practices for Row Level Security with Entitlement Tables](#) or [How to Set Up Your Database for Row Level Security in Tableau](#) on the blog *Tableau and Behold*.

### RLS workflow

For live connections and multi-table extracts, the basic RLS workflow is:

1. The user is identified by logging in to Tableau Server or Tableau Cloud
  - This requires a distinct username per user and secure single sign-on (SSO)
  - Active Directory, LDAP or the Tableau REST API can be used to synchronise user names and establish permissions
2. The set of data entitlements for the user is retrieved from all possible data entitlements
  - This requires a data structure that can link entitlements to the Tableau username
3. The data is filtered by the entitlements for that user
  - This often requires using user functions in a calculated field
4. The published, filtered data is used to build content
  - Using a published (rather than embedded) data source with a data source filter ensures the RLS cannot be modified by downloading or web editing the workbook

How the joins, calculated fields and filters are set up depends on the structure of the data and how users are managed.

## Entitlement tables

Any unique combination of attributes that the data can be filtered on is an entitlement. Most commonly, there are separate tables for specifying the entitlements themselves and mapping those entitlements to users or user roles. Denormalising is recommended from a performance standpoint because joins are expensive operations.

The entitlements view, consisting of the entitlements mapped to users or roles, is joined with the data. A user-based data source filter is then applied, acting as a WHERE clause that brings in only the entitlements – and therefore the appropriate data rows – for the relevant user. (Query optimisation should ensure the filtering occurs before joining when the query is processed to minimise data duplication. For more information, see Performance and processing order of operations.)

## Entitlement table models

Generally, there are two models for representing entitlements:

### Full mapping to the deepest level of granularity

- Entitlements are defined fully for every column.
- There is one row in the mapping table for every possible entitlement the user has.
- This model requires fewer join clauses.

### Sparse entitlements

- Entitlements are defined for every level of hierarchy, with NULL used to represent an “all” state.
- There is a single row in the mapping table for a particular level in the entitlement hierarchy, which vastly reduces the number of entitlement rows for users at high levels in a hierarchy.
- This model requires more complex joins and filters.

## Users and roles

Combinations of entitlements are commonly represented as *roles*, which are then linked to users in a many-to-many mapping table. This allows for easily changing or removing a user from the role, while still maintaining a record of the role and its entitlements.

Alternatively, a many-to-many mapping table can be created that instead assigns users directly to entitlements as opposed to going through joining a role table. It will require managing the values more directly in the table but does eliminate a join.

**Note:** The user values associated with a role or entitlement need to match the username or full name on the Tableau site in order to take advantage of the user functions in Tableau Desktop.

### Joins

Regardless of the model used to represent the entitlements, it is advisable to join all entitlements and mapping tables together into a single denormalised entitlements view. While at first this will cause a “blowup” (highly duplicative) version of the entitlements, the data source filter on the user will reduce it back down. You will also want this view if you plan on using an extract.

The deepest granularity method can have a performance benefit when everything is hierarchical – you only need to do a single join on the deepest level of the hierarchy. This only works if all of the attributes at the lowest level are distinct. If there is a chance for duplication (for example, a Central sub-region in more than one region), then you’ll need to join on all the columns to achieve the effect of a distinct key value.

The actual details and their performance characteristics depend on the data system and require testing. For example, using a single key could potentially improve the performance because the join is then only executing on one column, but correctly indexing all of the columns may give equal performance when other factors are taken into consideration.

### Implement row-level security

#### Deepest granularity

After the denormalised view of mapped entitlements is created, an inner join is set up between the view and the data in the Tableau data connection dialog. The data can remain in a traditional star schema. Alternatively, the dimension and fact tables can be materialised together

into two views. Multi-table extracts will build extract tables to match the joins, so creating the two views will simplify the resulting extract. The SQL will follow this basic pattern:

```
SELECT *
FROM data d INNER JOIN entitlements e ON
d.attribute_a = e.attribute_a AND
d.attribute_b = e.attribute_b AND ...
WHERE e.username = USERNAME()
```

### Sparse entitlements

If your entitlements more closely resemble the sparse entitlements model, then the custom SQL to join the data to the entitlements would be a little more complex because of the NULL values. Conceptually, it would look like the following:

```
SELECT *
FROM data d
INNER JOIN entitlements e ON
(e.region_id = d.region_id OR ISNULL(e.region_id) AND
(e.sub_region_id = d.sub_region_id OR ISNULL(e.sub_region_id) AND
(e.country_id = d.country_id OR ISNULL(e.country_id)
```

Without using custom SQL, this can be done with a cross join and additional filters in Tableau Desktop. Create a join calculation on both sides of the join dialog that simply consists of the integer 1 and set them equal. This joins every row from the data table with every row in the entitlements table.

Then you need a calculation (or individual calculations) to account for the levels in the hierarchy. For example, you could have several calculations that follow this format: `[region_id] = [region_id (Entitlements View)] OR ISNULL([region_id (Entitlements View)])`

Or you could have a combined calculation for all levels in one:

```
([region_id] = [region_id (Entitlements View)] OR ISNULL([region_id
(Entitlements View)])
AND
```

## Tableau Server on Windows Help

```
([sub_region_id] = [sub_region_id (Entitlements View)] OR ISNULL  
([sub_region_id (Entitlements View)])  
AND  
([country_id] = [country_id (Entitlements View)] OR ISNULL([country_  
id (Entitlements View)])
```

The ISNULL function matches any entitlement column to all items in the other column. As always with RLS, these calculations should be added as data source filters.

### Data source filter

For both approaches, once the entitlements are correctly joined with the data, a filter needs to be set up to limit the data for a specific user. A calculated field should be created with a user function. For example, a simple Boolean comparison of whether the user listed in the Username field is the same as the username of the person logged into the Tableau site: `[Username] = USERNAME()`

This calculation should be used as a data source filter (with TRUE selected).

If the data source is embedded and a user has permissions to web edit or download the workbook, then the RLS is nonexistent since the filters enforcing it can be easily removed. The Tableau data source should be published separately as opposed to being left embedded in the workbook.

### All access with deepest granularity

There is also a common scenario in which there are two access levels within the organisation: people who can see everything (“all access”) or people with some reasonably definable subset of entitlements. This is most commonly seen for embedded applications – the organisation hosting the data can see everything, but each client can only see their own data. In this case, you need a way to return the full data for the “all access” users, while maintaining the deepest granularity joins for all other users.

For this technique, you will use Tableau groups to create an override using a calculation in the join condition.

1. Create a group for users who should see all the data (here called All Access)
2. From the fact view, create a left join with two join conditions
  - The first join condition should be on the column that represents the deepest level of granularity
  - The second join condition should be two calculations:
    - On the left side (the fact view), for the calculation, enter `True`
    - On the right side (the entitlements view), the calculation should be: `IF ISMEMBEROF('All Access') THEN False ELSE True END`
3. On a sheet, create a calculation structured as: `[Username] = USERNAME() OR ISMEMBEROF(['All Access'] ([Entitlements View]))`
4. Create a data source filter on the username calculation

If a user is a member of the All Access group, then the join becomes a left join on `True = False`. This means there are no matches at all in the entitlements view, so the entire fact view is returned with NULLs for the columns from the entitlements view (zero duplication). In the case where the user is not part of the All Access group, the `True = True` join condition doesn't change anything and the join will function as expected.

The user calculation used as a data source filter is true for all rows when the group override is working, or it will filter down to only the user's deepest granularity in the hierarchy.

### Performance and processing order of operations

When a visualisation is viewed in Tableau Desktop, Tableau Server or Tableau Cloud, Tableau sends an optimised query to the RDBMS which then processes the query and sends results back to Tableau to render the visualisation with the resulting data. The order of operations for when joins, calculations and filters are carried out depends on the query optimiser and how the query is executed.

### Live connections

When using a live connection to a data source in Tableau, the performance of the query execution is dependent on the query optimiser which translates the incoming SQL into an efficient plan for retrieving the data.

There are two ways the query can be processed:

1. Filter the entitlement rows to the user then join to the fact table
2. Join the entitlements to the fact table then filter to the user's rows

In an ideal situation, the query optimiser will ensure the database processes the query by *filtering then joining*. If a user is entitled to everything, this means the maximum number of rows processed will be the number of rows in the data table.

If the database processes the query by *joining then filtering*, there may be duplication of data. The maximum number of rows processed will be the number of users entitled to see that particular row times each row in the data table.

It will be clear if this second scenario happens: your queries take a long time to finish, you get errors or there is an indication of performance issues in the database. Your total data volume will expand exponentially, which could cause inordinate system strain on the backend.

## Extracts

When the data source in Tableau is a live connection, Tableau sends every query that is necessary to render a particular viz or dashboard to the RDBMS. When the data source is an extract, the process of querying data from the underlying data source only happens at extract creation and refresh. All of the individual queries for visualisations are answered by the extract engine from the extract file.

The same order of operations issue is present when building single table extracts. However, the “blowup” will happen both on the underlying data source and within the resulting extract itself.

### Considerations with extracts

Starting in Tableau 2018.3, the data engine can create a multi-table extract and RLS can be implemented as described above. Using multiple table extracts reduces the time it takes to generate an extract with many-to-many relationships by not materialising the join.

The extract should be built with a *data object* and an *entitlements object*. This is the simplest storage in the extract and results in the best performance.

- The *data object* is the table, view or custom SQL query that represents the denormalised combination of the fact and necessary dimension tables
- The *entitlements object* is a denormalised table, view or custom SQL query of whatever entitlements are necessary to filter the data at the most granular level, which requires:
  - A column for username matching the exact usernames in Tableau Server or Tableau Cloud
  - A row for each of the most granular entitlements to the data object

This format is laid out in the deepest granularity method above. Multi-table extracts use the same method, with the caveat that only two data objects are being joined and any field-specific filtering is already applied within the object.

Because multiple table extracts have extract filters disabled, you can filter either in the views or tables you connect to in the data source, or define the filters in custom SQL objects in the Tableau data connection dialog.

**Note:** As with live connections, if the data source is embedded and a user has permissions to web edit or download the workbook, then the RLS is nonexistent since the filters enforcing it can be easily removed. The extract should be published separately as opposed to being left embedded in the workbook.

### Single table extracts

The following method is only recommended when using a version of Tableau prior to 2018.3 – multiple table extracts are preferable if available.

Single table extracts materialise any joins you build when constructing the Tableau data source and stores everything as a single table through one query, the results of which are transformed in a single table in the extract file. This denormalisation carries the risk of causing massive data duplication, as every row that was allocated to more than one entitlement or user would be duplicated as a result of the many-to-many relationship.

To prevent this duplication:



1. Create a Security Users Field that contains the usernames for that entitlement
  - for example, a value may be “bhowell|mosterheld|rdugger”
2. Use the CONTAINS() function within Tableau to correctly identify individual users
  - For example, `CONTAINS([Security Users Field], USERNAME())`

This method obviously has some caveats. It requires that you go from your entitlements in rows to a single column separated correctly using SQL, and that column can only contain so many characters. Partial matches can be trouble, and you need to use separators that will never be valid in the IDs themselves. Although it is performant within the Tableau Data Engine, as a string calculation it will be very slow for most databases. This limits your ability to switch back to a live connection.

Alternatively, you can take different extracts per “role” or entitlement level, so that only the data appropriate to that person or level is contained within the extract, but this will require processes to appropriately permission and leverage template publication within Tableau Server, generally via the APIs.

### Use built-in row-level security in a database

Many databases have mechanisms for RLS built in. If your organisation has already put effort into building row-level security in a database, you might be able to take advantage of your existing RLS. It's not necessarily easier or better to implement a built-in RLS model vs. building it with Tableau in mind; these techniques are generally leveraged when an organisation has already invested in these technologies and they want to take advantage of the investment. The main benefit of using built-in RLS is that administrators can implement and control their data security policy in one place: their databases. For more information, see [Row-Level Security in the Database](#).

## Row-Level Security in the Database

If your organisation has already put effort into building out row-level security (RLS) in a database, you might be able to use one of the following techniques to take advantage of your existing RLS. In order to leverage the database's security models, live connections are required. Additionally, these techniques are likely not available in Tableau Cloud; the Tableau username

for Tableau Cloud is a unique email address that is not typically the user identity on the database side.

It is not necessarily easier or better to implement a built-in RLS model vs building it with Tableau in mind; these techniques are generally leveraged when an organisation has already invested in these technologies and they want to take advantage of the investment.

**Note:** For information on the alternatives you can use to implement row-level security in Tableau, see an [Overview of Row-Level Security Options in Tableau](#).

### Impersonation (Microsoft SQL Server)

Microsoft SQL Server (and a few related systems) can be configured so that users of the database only have access to views with RLS filters built in, either using Security Junction Tables or views built by the DBA. Tableau can take advantage of this using a concept called “impersonation”.

When publishing a Tableau data source containing an MS SQL Server connection to Tableau Server, there are two authentication options available to take advantage of impersonation. The menu you see will depend on whether you logged into the SQL Server using network authentication or by entering username/password credentials.

To enable RLS filtering for any user who can access the published data source in Tableau Server, either the AD Run-As Account or the embedded SQL server credentials must have permission to EXECUTE AS for all the Tableau users in the database that will be accessing the dashboard or data source. All Tableau users must exist in the database server as users, with SELECT rights for the Views you are trying to connect to (and have RLS applied to). See [Impersonation Requirements](#) for the comprehensive list of requirements.

### Kerberos and constrained delegation

Constrained delegation within Tableau Server using Kerberos operates similarly to impersonation in that it allows Tableau Server to use the Kerberos credentials of the view of a work-

book or view to execute a query on behalf of the viewer, so if RLS is set up on the database, the viewer of the workbook will see only their data.

To see the comprehensive list of databases where Kerberos delegation is supported, see [Enable Kerberos Delegation](#). Active Directory is required; the computer where Tableau Server is installed must be joined to the Active Directory domain. The [authentication method](#) specified when publishing the data source must be **viewer credentials**.

Note that Kerberos can be leveraged for RLS when using Microsoft Analysis Services.

### OLAP Cubes

OLAP Cube connections in Tableau do not have the equivalent of a data source filter, which is required for the entitlements table-based RLS method in Tableau, or access to the `USERNAME()` function. For these reasons, Kerberos and constrained delegation is a recommended approach to RLS with OLAP databases, which allows Tableau to leverage user filtering that has already been implemented on the OLAP Server side.

If the users viewing the dashboard will not be part of the domain, then the manual approach to creating user filters is possible. However, because the User Filter Set generated cannot be added as a data source filter, and will instead exist on the filters shelf, it is important that Web Editing and Download Workbook functionality is not permissible for any published views using this method.

### SAML delegation and SAP HANA

If Tableau Server is configured to use [Configure SAP HANA SSO](#) to provide a single sign-on experience, the viewer credentials are used to execute the query as that user, which will operate within whatever security is applied on the user level. The [authentication method](#) specified when publishing the data source must be **viewer credentials**.

### Initial SQL to force a user-specific session (Oracle VPD)

Initial SQL enables you to specify an SQL command that is run when the connection is made to the database for the purpose of setting up temporary tables to use during the session or to set up a custom data environment.

For Oracle VPD, you can set up a session specific to a user by running a particular stored procedure or function to set the context of the database connection to match the Tableau user's username:

```
begin
DBMS_SESSION.SET_IDENTIFIER([TableauServerUser]);
end;
```

The same high-level requirements hold true for using this for RLS as with impersonation; the DBA must set up VPD and all of the associated users to exist on the database.

On MS SQL Server, you could force an EXECUTE as command (however, this is similar to what Tableau does with impersonation already) :

```
EXECUTE AS USER = [TableauServerUser] WITH NO REVERT;
```

**Note:** If the data source is embedded and a user has permissions to web edit or download the workbook, then the RLS is nonexistent since the initial SQL enforcing it can be easily removed. The data source should be published separately instead of being embedded in the workbook.

#### Comparison matrix for row-level security methods

| Method                              | Useful when                                                                                                                                                                                  | Pros                                                                                                                                                                | Cons                                                                                                                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Entitlements table<br>(Recommended) | <ul style="list-style-type: none"> <li>There is an existing concept of entitlements in the database</li> <li>The organisation is setting up Row Level Security for the first time</li> </ul> | <ul style="list-style-type: none"> <li>Easy to test, update, maintain and scale</li> <li>Works for both live connections and extracts in version 2018.3+</li> </ul> | <ul style="list-style-type: none"> <li>Requires creating and maintaining entitlements table</li> <li>Could require selecting and creating appropriate keys to optimise for performance</li> </ul> |

## CONTAINS() with extracts

- Implementing RLS in extracts prior to version 2018.3
- Allows you to take advantage of extract efficiencies
- Requires mapping all users to a single column
- Difficult to switch back to live connections because of string calculation

## Impersonation

- Every user accessing the data will exist as a user in your SQL server (Usually, internal deployments)
- Security is handled and maintained in one place – the database
- Requires every person accessing the view to exist as a user within your SQL Server
- Only works for Microsoft SQL Server

## Kerberos

- All necessary databases are set up for Kerberos delegation, and RLS is set up on the database (usually internal deployments)
- The viewer's name appears on the access logs for the database
- Security is handled and maintained in the database
- Tableau must be configured to use LDAP - Active Directory
- Tableau Server must be joined to the AD domain
- Every user must exist within your AD

|             |                                                                                                                               |                                                                                                                                                                                                                                                      |                                                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |                                                                                                                               |                                                                                                                                                                                                                                                      | domain                                                                                                                                                                      |
| Initial SQL | <ul style="list-style-type: none"> <li>• The database supports initial SQL, and RLS is set up on the database side</li> </ul> | <ul style="list-style-type: none"> <li>• Allows the passing of Tableau parameters at load time</li> <li>• Dedicated connection that can't be shared with other users</li> <li>• Users must exist within database to execute query as user</li> </ul> | <ul style="list-style-type: none"> <li>• Not all databases support initial SQL</li> <li>• Potential performance implications because of restricted cache sharing</li> </ul> |

## Manage Server Secrets

Tableau Server needs to store a number of secrets that it uses to perform various functions, typically securing internal communication, communicating with other applications or the operating system or providing secure communication with clients. In this context, the term *secret* may refer to a password, a token, or other string that is used to authenticate one entity to another.

There are two categories of secrets that are required to run Tableau Server. They differ according to how the secrets are generated:

- **Secrets that are generated by administrators.** These include credentials and associated secrets for the Run As User account and the SMTP credentials used by Tableau Server.
- **Secrets that are automatically generated by various processes in the system.** For example, a secret is required to protect communication between the Cluster Controller and ZooKeeper processes. And a number of different passwords are required for each service and programmatic user that communicates with Postgres.

Most secrets are encrypted while at rest. When a secret is needed, it is decrypted at run time.

This topic describes how secrets storage works and what you need to do to properly manage storage of secrets on Tableau Server.

### Understanding how secrets storage works

During installation Tableau Server generates and stores a master key in a Java keystore. The master key is used to encrypt a configuration encryption key that is used across the system.

Whenever a new secret is created or updated, the secret is encrypted with the configuration encryption key. The encrypted value is then stored with its corresponding configuration parameter in a YAML file on the server. Parameters that hold an encrypted value use the format, `ENC(<encrypted string>)`, where `<encrypted string>` is a Base64-encoded encrypted string.

At run time, when a given secret needs to be accessed, the encrypted values are read into memory and decrypted with the configuration encryption key.

In the case of pending changes, where secrets are entered during a configuration change, the entire transaction is encrypted. In this scenario, after you enter a secret and save the pending change, the secret is transmitted to the Coordination Service (over encrypted SSL). The Coordination Service encrypts the secret and stores it until the pending changes are applied. When changes are applied, the secret (still encrypted) is promoted to the current configuration version.

Tableau Server encrypts secrets using 256-bit AES in GCM mode. The keys used for secure storage are different than the asset keys that are used to encrypt embedded database credentials before they are stored in the repository.

### Who has access to the master key?

In a default installation, the Java key store for Tableau Server is installed in `\ProgramData\Tableau\Tableau Server\data\tabsvc\crypto\keystores\` folder. If you have installed Tableau on a non-system drive, then the path is `<install drive>:\Tableau\Tableau Server\data\tabsvc\crypto\keystores\`. By default, the

following accounts have access to this directory:

- Run As User account (if configured)
- NetworkService predefined local Windows account
- LocalSystem predefined local Windows account
- Members of the computer Administrators group

### Import and export configuration information

Tableau Services Manager introduces the capability to import and export configuration information using tsm settings export.

**Note:** This version of Tableau Server does not support restoring configuration information from a backup. Instead, we recommend using the export and import configuration commands to backup and restore configuration information.

While configuration secrets are encrypted when stored on disk internally, when the configuration is exported to a file, secrets are written into the file in plain text. It is up to the administrator to take measures to protect this file. There are a variety of options available:

- Write the file to an encrypted file system.
- Write the file to a directory that is restricted to specific users or groups by file system permissions.
- Encrypt the output file.

### Securing secrets for import and export operations

Use a third-party toolset, such as OpenSSL, to encrypt the backup output.

### Cluster nodes

When adding a new node to your Tableau Server cluster, you will first need to generate the node configuration file (tsm topology). The node configuration file contains a copy of the master keystore file used for encrypting the configuration secrets.



**Important:** We strongly recommend that you take additional measures to secure the node configuration file when exporting a configuration file with secrets.

When **installing and configuring Tableau Server on the new node**, you will need to provide the node configuration file to the `initialize-tsm` command.

### Secrets storage event logging

The following events related to secrets storage are logged:

- Generating new encryption keys
- Encryption key is rolled or changed
- Encrypting a new value in the configuration file

For more information about log files and where they are stored, see [Work with Log Files](#).

### Managing secrets

As a Tableau Server administrator the most important task related to secrets storage is to periodically update secrets. In some cases (server troubleshooting or auditing), you may need to retrieve a password.

For other operations, such as upgrading versions, backing up and restoring, or adding new nodes to a cluster – as noted above – Tableau Server manages secrets storage and related processes automatically.

### Updating secrets

You should update secrets periodically, according to your company's security policy.

To update the master key and automatically generated secrets, run `tsm security regenerate-internal-tokens`.

### Retrieving passwords

In some cases, you may need to retrieve a password for troubleshooting or other operations. For example, you may need the Postgres read only user credentials that are generated and

encrypted by Tableau Server. In these cases, you can run a `tsm` command that will retrieve and decrypt the password for you.

To retrieve a password, open Command Prompt and issue a `tsm configuration get` command for one of the parameters listed in the table below.

For example, to retrieve a password for the Postgres read only user, type the following command:

```
tsm configuration get -k pgsql.readonly_password
```

The command will return the password in clear text:

```
$ tsm configuration get -k pgsql.readonly_password
```

```
password
```

| Configuration Parameter                       | Description                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| clustercontroller.zookeeper.password          | Password for cluster controller to connect to zookeeper.                                                                                                 |
| indexandsearchserver.client.password          | Password for logging into Index and Search Server.                                                                                                       |
| indexandsearchserver.ssl.admin.cert.bytes     | Admin certificate that is used for administrative access to the Index and Search Server. The admin certificate is used to generate the node certificate. |
| indexandsearchserver.ssl.admin.key.file_bytes | Certificate key for administrative access to the Index and Search Server.                                                                                |
| indexandsearchserver.ssl.node.cert.bytes      | Certificate that is used for Index and Search Server node-to-node communication.                                                                         |
| indexandsearchserver.ssl.node.key.file_bytes  | Certificate key that is used for Index and Search Server node-to-node com-                                                                               |

|                                              |                                                                                                                                                                       |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | munication.                                                                                                                                                           |
| indexandsearchserver.ssl.root.cert.bytes     | Certificate that is used to sign the admin and node certificates . This certificate is used by TSM for health check and by NLP to connect to Index and Search Server. |
| indexandsearchserver.ssl.root.key.file_bytes | Certificate key for root certificate.                                                                                                                                 |
| filestore.zookeeper.password                 | Password for filestore to connect to zookeeper.                                                                                                                       |
| hyper.connection.init_password               | Password used to initialize the Hyper database for user <code>tableau_internal_user</code> and is then used for connecting to Hyper.                                  |
| jdbc.password                                | Password for the rails Postgres user.                                                                                                                                 |
| kms.persistent_store                         | A collection of master encryption keys (MEKs) used by the Key Management System.                                                                                      |
| maestro.rserve.password                      | Password for connecting to an external Rserve instance used by Tableau Prep Conductor for running flows that have nodes with R scripts.                               |
| maestro.tabpy.password                       | Password for connecting to an external TabPy (Python server) instance used by Tableau Prep Conductor for running flows that have nodes with Python scripts.           |
| oauth.google.client_secret                   | Client secret of the Google Cloud Platform account.                                                                                                                   |
| oauth.quickbooks.consumer_secret             | Consumer secret of the Intuit developer account.                                                                                                                      |

|                                         |                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| oauth.salesforce.client_secret          | Client secret of the Salesforce developer account.                                                                                                                                                                                                                                                                                               |
| pgsql.adminpassword                     | Password for the tblwgadmin Postgres user.<br><br><div> <b>Note:</b> Although the configuration parameter is encrypted in Tableau's configuration files (tabsvc.yml, workgroup.yml), this password is stored in plain text in files used by SAML.         </div>                                                                                 |
| pgsql.readonly_password                 | Password for the readonly Postgres user.                                                                                                                                                                                                                                                                                                         |
| pgsql.remote_password                   | Password for the tableau Postgres user.                                                                                                                                                                                                                                                                                                          |
| redis.password                          | Password for Redis.<br><br><div> <b>Note:</b> Although the configuration parameter is encrypted in Tableau's configuration files (tabsvc.yml, workgroup.yml), the configuration will still be in plain text in the redis.conf file that is consumed by the Redis application. Redis does not support encrypted/secured passwords.         </div> |
| servercrashupload.proxy_server_password | Password for custom proxy server used to upload crash reports.                                                                                                                                                                                                                                                                                   |
| service.runas.password                  | Password of the Run As users. Stored temporarily.                                                                                                                                                                                                                                                                                                |

|                                       |                                                                                                                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ssl.cert.file_bytes                   | The content of one of the three SSL certificate files uploaded by the administrator. The certificate files are required to enable secure external connections to Tableau Server. |
| ssl.chain.file_bytes                  | The chain file(s) for the certificates uploaded by the administrator for external SSL.                                                                                           |
| ssl.key.file_bytes                    | Key file(s) for the certificates uploaded by the administrator for external SSL.                                                                                                 |
| ssl.key.passphrase                    | Optional passphrase used to protect the external SSL key.                                                                                                                        |
| svcmonitor.notification.smtp.password | SMTP Server password supplied by the administrator through TabConfig.exe.                                                                                                        |
| tabadminservice.password              | Password for the service that allows server admins to download log files through the web interface.                                                                              |
| vizportal.openid.client_secret        | This is the password ("provider client secret") used for OpenID Connect SSO.                                                                                                     |
| vizqlserver.external_proxy_password   | Password used to authenticate to an external proxy.                                                                                                                              |
| wgserver.domain.password              | Password used to bind to Active Directory.                                                                                                                                       |
| wgserver.saml.key.passphrase          | Passphrase used to access the PKCS#8 SAML key file.                                                                                                                              |
| zookeeper.tsm.password                | Password that TSM uses to connect to Zookeeper coordination service                                                                                                              |

## Extension Security - Best Practices for Deployment

The following information is for IT officers and administrators, Tableau server and site administrators, and anyone who is interested in managing dashboard and viz extensions and the security of their data and business. The suggestions for deployment are intended for companies that have a mix of users who are on Tableau Desktop and Tableau Server or Tableau Cloud.

### Security for extensions in Tableau

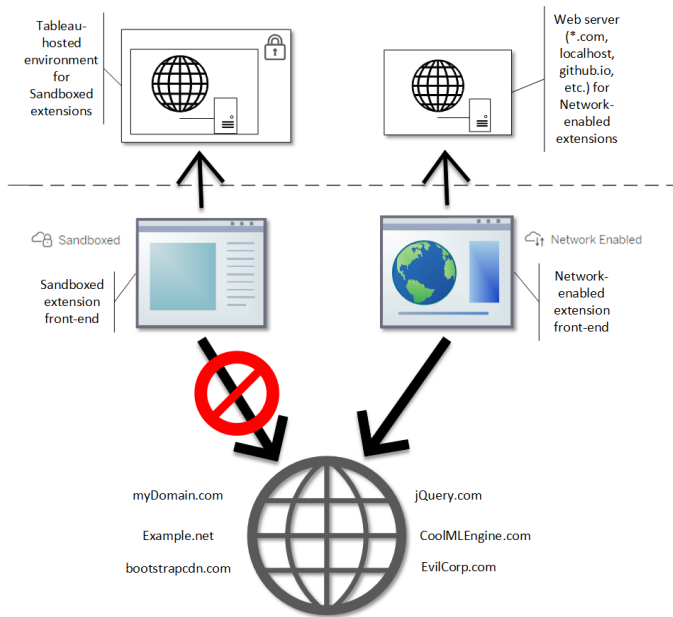
Extensions are web applications that could be hosted inside your network, or outside on a third-party server, or in a secure sandboxed environment hosted by Tableau. Extensions can interact with other components in the dashboard and potentially have access to the visible and underlying data in the workbook (through a well-defined API). Tableau supports two types of extensions:

#### Network-enabled extensions

Network-enabled extensions are hosted on web servers that are located inside or outside of your local network and have full access to the web. Network-enabled extensions can connect with other applications and services. Network-enabled extensions offer new capabilities to Tableau, such as new types of data visualisations, natural language generation and support for write-back scenarios. Network-enabled extensions have full access to the web, which means that while they can offer rich features and experiences by being able to connect to outside resources, they should be evaluated before deploying or adopting.

#### Sandboxed extensions

Sandboxed extensions run in a protected environment without access to any other resource or service on the web. Sandboxed extensions are hosted by Tableau and provide the most security and eliminate the risk of data exfiltration. To safeguard against cyber-attacks, the Sandboxed extensions environment and hosting service has undergone extensive penetration testing by a 3rd-party consultant.



You can use Sandboxed and Network-enabled extensions in Tableau Desktop, Tableau Server and Tableau Cloud. Tableau Server and Tableau Cloud provide the most control over the extensions your users can run.

### Potential security risks with Network-enabled extensions

Because extensions are web applications, there's the potential that a Network-enabled extension could be vulnerable to certain types of malicious attacks, which in turn could present a risk to your computer or data. The [Open Web Application Security Project \(OWASP\)](#) annually identifies the most critical web application security risks. These risks include the following:

- SQL injection
- Cross-site scripting (XSS)
- Sensitive data exposure

These risks could compromise the extension if the developers of the extension don't properly validate and handle user inputs, or if they generate dynamic queries to access sensitive databases. As you evaluate the extensions that you want to allow in Tableau, be sure to consider how they manage authentication, data access or user input, and how they mitigate security risks.

## Mitigating the security threats with Network-enabled extensions

Understanding what an extension does is a first step to identifying the risks for your enterprise. Often, a dashboard or viz extension doesn't access underlying data in the workbook and all the JavaScript code runs in the context of the browser running on the user's computer. In these cases, no data leaves the computer even though the extension might be hosted on a third-party site outside of your domain. Some extensions allow you to connect Tableau with other applications you have already deployed in your domain.

Tableau provides security measures and security requirements for extensions. These requirements are enabled for Tableau Desktop, Tableau Server and Tableau Cloud.

- All extensions must use the HTTP Secure (HTTPS) protocol.
- By default, anyone using a dashboard with a Network-enabled extension will be prompted and asked to allow the extension permission to run. The extension must request permission if it accesses underlying data.
- To run on Tableau Server or Tableau Cloud, the URL of the Network-enabled extension must be added to a safe list. The server administrator manages this list for Tableau Server; the site administrator manages this list for Tableau Cloud.
- On Tableau Server and Tableau Cloud, the server or site administrator (respectively) can control whether the prompt appears for each Network-enabled extension.

For more information, see [Manage Dashboard and Viz Extensions in Tableau Server](#).

## Manage extensions using Tableau

Extensions provide a way to add unique features to dashboards and new visualisations to worksheets. You can use extensions to directly integrate the dashboard with applications outside of Tableau. While extensions open up a world of possibilities, there are instances where you need or want to maintain control of how extensions are deployed in your company or enterprise. In this respect, extensions are no different from any other software that you intend to use. Before you deploy software applications in your company you should thoroughly test and verify that the software works as expected and is secure. The same is true for extensions.

First, determine what level of access your users should have, and identify the extensions you want to use (or conversely, the extensions you don't want to use). Then use the controls and



## Tableau Server on Windows Help

features within Tableau to restrict and curate the dashboard and viz extensions users have access to.

- Do you need to restrict who can add or use extensions in Tableau Desktop? See [Recommendations for Tableau Desktop](#)
- Do you need to restrict or control the extensions your users have access to? See [Recommendations for Tableau Server and Tableau Cloud](#).

### Recommendations for Tableau Desktop

You have a range of options for deploying Tableau Desktop in your company. You can allow unrestricted access to Sandboxed and Network-enabled extensions, or you can put limits and restrictions on who has access to extensions and under what circumstances.

By default, Tableau Desktop users have unrestricted access to Sandboxed and Network-enabled extensions. You can use two options during installation to change the default settings.

- Turn off all extensions (`DISABLEEXTENSIONS`)
- Turn off Network-enabled extensions (`DISABLENETWORKEXTENSIONS`).

**Note:** You can change these settings after Tableau Desktop installation by editing the Registry (Windows) or running a script (Mac) on each Desktop. See [Turn off dashboard extensions](#).

### Deployment scenarios

Using the installation settings, you can deploy Tableau Desktop in several ways.

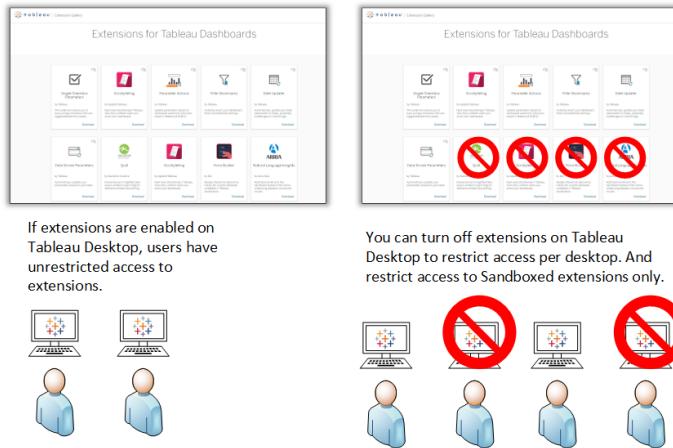
- **Allow all extensions** - In this deployment scenario, you choose to trust Tableau authors to select the Sandboxed and Network-enabled extensions they want to use. If you want to empower your Tableau Desktop users with the greatest flexibility, use the default installation settings. Using the default settings, Tableau Desktop users have unrestricted access to Sandboxed and Network-enabled extensions. The default settings are: `DISABLEEXTENSIONS=0` and `DISABLENETWORKEXTENSIONS=0`. See [Install Tableau Desktop from the Command Line](#).

- **Only allow Sandboxed extensions** – In this scenario, you know that Sandboxed extensions are safe and you want to allow them, but you aren't sure about Network-enabled extensions and want to prevent their use. To turn off support for Network-enabled extensions, set the `DISABLENETWORKEXTENSIONS` property (`DISABLENETWORKEXTENSIONS=1`). Keep the default setting for enabling extensions (`DISABLEEXTENSIONS=0`). See [Install Tableau Desktop from the Command Line](#).
- **No extensions allowed** – In this scenario, you don't want to allow users to use extensions of either type, Network-enabled or Sandboxed. In this case, turn support for all extensions off by using the `DISABLEEXTENSIONS` property (`DISABLEEXTENSIONS=1`). See [Install Tableau Desktop from the Command Line](#).

**Use a combination of settings** – You might have some users who need and should have unrestricted access to all extensions, and others for whom access to Sandboxed extensions is sufficient, and then finally a set of users who need no access to extensions at all. Because the extension options are set per desktop, you can configure your deployment for specific users and their use cases.

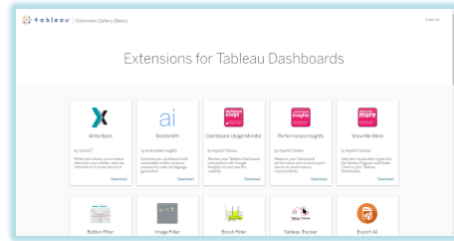
**Web authoring** - If Tableau Server or Tableau Cloud are available for your users, they can use web authoring to access extensions. In web authoring, the server or site settings for extensions apply. In this scenario, the server and site administrators can determine which extensions to allow users access to. Administrators can use the server and site settings to restrict access to Sandboxed extensions only, or to restrict access to Sandboxed extensions and the Network-enabled extensions that have been added to a safe list.

## Tableau Server on Windows Help

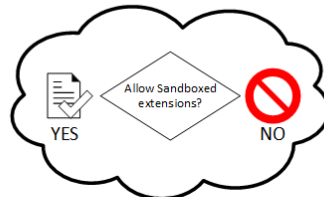


### Recommendations for Tableau Server and Tableau Cloud

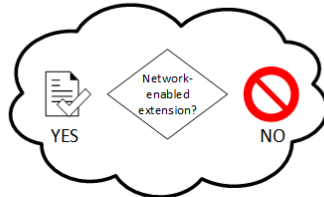
If your users have access to Tableau Server or Tableau Cloud, you can use the built-in security controls to put limits and restrictions on the extensions that can be used and under what circumstances. If you've turned off extensions on Tableau Desktop, you can still allow users to add extensions in web authoring, but you can limit the number of extensions that can be used to just ones you approve of.



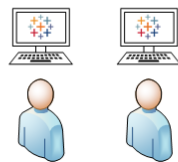
Use Tableau Server/Online settings to control access to Sandboxed extensions per site.



Use Tableau Server/Online settings to control access to Network-enabled extensions that you approve.



Creators can use web authoring to add Sandboxed extensions and approved Network-enabled extensions. All users can view and use Sandboxed and approved Network-enabled extensions.



Trust Sandboxed extensions and the Network-enabled extensions on the safe list

Starting with Tableau 2019.4, only Sandboxed extensions are allowed to run by default. Network-enabled extensions aren't allowed unless they've been added to the safe list. Administrators can add Network-enabled extensions to the settings page for the site (**Settings > Extensions > Enable specific Extensions**).

**Note:** To make the safe list the default behaviour for extensions in Tableau 2018.2 and Tableau 2018.3, you must change the settings for the site. On the Extensions settings page, under **Default behaviour for Extensions**, clear the **Enable unknown extensions...** option. In Tableau Server 2019.1, Tableau 2019.2 and Tableau 2019.3, by default, no extensions are allowed to run unless they've been added to the safe list.

## Checklist for the safe list:

- Does the extension come from a source that you know and trust?
- Check the URL of the extension. Does the URL look suspicious or contain dubious domain names?
- Does the extension require access to full (underlying data) or summary data? See [Understand data access](#).
- Test the extensions before allowing broad use. See [Test extensions for security](#). See [Test Network-enabled extensions for security](#).

## Add extensions to the safe list:

- See [Add extensions to the safe list and configure user prompts](#).

## Block specific extensions from running on Tableau Server

On Tableau Server, you can block specific extensions by adding their URL to the block list. This is useful if you have multiple sites that are configured differently for extensions. For example, if you have a test site where you want to be able to test internal or third-party extensions, you might have enabled the default behaviour for extensions, where unlisted extensions are allowed to run provided they do not access the underlying data in the workbook. Adding an extension to the block list prevents it from inadvertently being used on the test site.

- Add the URL of the extensions that you don't want to allow to the block list. This option is only available on Tableau Server. See [Block specific extensions](#).

## Turn off extensions for a site

By default, extensions are enabled on Tableau Server and Tableau Cloud. On Tableau Server, the server administrator can turn off extensions for a site. On Tableau Cloud, the site administrator can turn off extensions for the site. On Tableau Server, the server administrator can turn off extensions completely, which overrides the site settings. You should not have to change this setting on the server or for the site, as you can control the Network-enabled extensions that you want to allow on the safe list. You can also control the settings for Sandboxed extensions, which are allowed by default.

- To disable extensions on a site (Tableau Server, Tableau Cloud), change the site settings that enables users to run extensions on the site. See [Control extensions and](#)

access to data.

#### Show or hide user prompts to run Network-enabled extensions

When you add a Network-enabled extension to the safe list, you can configure whether users see prompts by default when they are adding the extension to a dashboard, or when they are interacting with a view that has the extension. The prompt tells users details about the Network-enabled extension and whether the extension has access to full data. The prompt gives users the ability to allow or deny the extension from running. You can hide this prompt from users, allowing the extension to run immediately. When enabled for a site, Sandboxed extensions are allowed by default and do not prompt users.

#### Turn off Sandboxed extensions

Starting in Tableau 2019.4, Sandboxed extensions are enabled for Tableau Server and Tableau Cloud by default. Sandboxed extensions run in a protected environment and are hosted by Tableau. Administrators can control whether to let users run Sandboxed extensions on a site. Sandboxed extensions don't need to be added to the safe list. When Sandboxed extensions are allowed, users are able to freely add Sandboxed extensions to dashboards and are able to open and use dashboards that contain Sandboxed-extensions. If you need to block a Sandboxed extension, a server administrator can add the Sandboxed extension to a global block list. If you need to turn off Sandboxed extensions completely, you can change the default setting for the site. If you change the default setting for Sandboxed extensions, only the extensions (including Sandboxed extensions) that are on the safe list are allowed to run.

## Tableau Server Key Management System

Tableau Server has three Key Management System (KMS) options that allow you to enable encryption at rest. One is a local option that is available with all installations of Tableau Server. Two additional options require Advanced Management (formerly Server Management add-on), but allow you to use a different KMS.

Beginning in version 2019.3, Tableau Server added these KMS options:

## Tableau Server on Windows Help

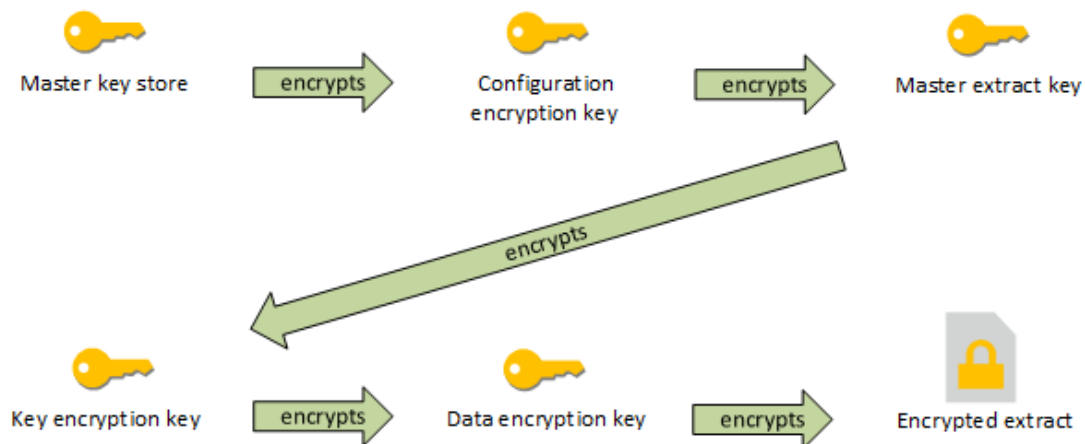
- A local KMS that is available with all installations. This is described below.
- An AWS-based KMS that comes as part of Advanced Management. For details, see AWS Key Management System.

Beginning in version 2021.1, Tableau Server added another KMS option:

- An Azure-based KMS that comes as part of Advanced Management. For details, see Azure Key Vault.

### Tableau Server local KMS

The Tableau Server local KMS uses the secret storage capability described in Manage Server Secrets to encrypt and store the master extract key. In this scenario, the Java keystore serves as the root of the key hierarchy. The Java keystore is installed with Tableau Server. Access to the master key is managed by native file system authorisation mechanisms by the operating system. In the default configuration, the Tableau Server local KMS is used for encrypted extracts. The key hierarchy for local KMS and encrypted extracts is illustrated here:



### Troubleshoot configuration

#### Multi-node misconfiguration

In a multi-node setup for AWS KMS, the `tsm security kms status` command may report healthy (OK) status, even if another node in the cluster is misconfigured. The KMS status

check only reports on the node where the Tableau Server Administration Controller process is running and does not report on the other nodes in the cluster. By default the Tableau Server Administration Controller process runs on the initial node in the cluster.

Therefore, if another node is misconfigured such that Tableau Server is unable to access the AWS CMK, those nodes may report Error states for various services, which will fail to start.

If some services fail to start after you have set KMS to the AWS mode, then run the following command to revert to local mode: `tsm security kms set-mode local`.

### Regenerate RMK and MEK on Tableau Server

To regenerate the root master key and the master encryption keys on Tableau Server, run the `tsm security regenerate-internal-tokens` command.

## Extract Encryption at Rest

Extract encryption at rest is a data security feature that allows you to encrypt .hyper extracts while they are stored on Tableau Server.

Tableau Server administrators can enforce encryption of all extracts on their site or allow users to specify to encrypt all extracts associated with particular published workbooks or data sources.

### Limitations

Before they can be encrypted, older .tde file extracts must be upgraded to .hyper file extracts. This happens automatically as a part of the encryption job. For more information about the impacts of extract upgrade, see [Extract Upgrade to .hyper Format](#).

Temporary files and cache files are not encrypted at rest with this feature.

Workbooks (.twb) and data source files (.tds) are not encrypted with this feature. These files will contain metadata such as database table column names and formatting instructions. In certain cases, they may contain some row-level data if it is included in filters.



Other data files, such as Excel or JSON files, are not encrypted with this feature unless they are converted to extracts before being published.

When extracts are downloaded from the server they are decrypted.

### Performance Overview

#### Increase in Backgrounder Load

You may see a slight to moderate increase in backgrounder load when you turn on encryption at rest. Encryption and decryption are computationally intensive operations. Encryption at rest alters existing backgrounder jobs and introduces new jobs to run on backgrounder. The overall increase in backgrounder load depends on the number and size of affected extracts and how often the scenarios below apply.

- **Initial publishing:** When publishing workbooks or data sources using extracts that should be encrypted, the encryption happens on the server's backgrounders.
- **Extract refreshes from Tableau Server:** Full and incremental refreshes of encrypted extracts on Tableau Server will consume slightly more CPU.
- **Extract refreshes from Tableau Bridge and third-party applications (e.g. Informatica, Alteryx):** These flows will require new encryption jobs, scheduled on the backgrounders for any refreshed extract, resulting in a slight to moderate increase in backgrounder load.
- **Encrypting and decrypting extracts in already published workbooks and data sources:** If the site setting for encryption at rest is set to **Enable**, users might choose to encrypt or decrypt extracts in already published workbooks and data sources on Tableau server. Depending on the number and size of extracts, this will add slight to moderate load on the backgrounders.
- **Changing a site's encryption mode:** When switching a site's setting for encryption at rest to **Disable** or **Enforce**, the backgrounder will, respectively, decrypt or encrypt all existing extracts on the site. Depending on the number and size of extracts, this may significantly increase the load on backgrounders until all extracts are unencrypted or encrypted.

- **Rotating encryption keys:** Rotating encryption keys results in the backgrounders re-encrypting all existing extracts published on that site, using fresh encryption keys. Depending on the number and size of extracts, this may significantly increase the load on backgrounders until all extracts are re-encrypted.

If running at or over capacity, consider:

- Adding additional backgrounder processes and resources.
- Letting users encrypt individual workbooks and data sources instead of enforcing encryption for the whole site or disable encryption at rest for sites where it isn't necessary. Note that scheduled and ad hoc extract refreshes will take precedence over encryption and decryption jobs.

#### Increase in Viz Load Time and Worker Load

Query performance, for example, when loading or interacting with a viz or dashboard, will require the data being decrypted once, when loaded from disk to memory. This will result in a slight increase in viz load time and CPU consumption on worker nodes for the first user loading a workbook. This will not affect other users accessing those workbooks at the same time because the data will already be decrypted in memory.

#### Impact on Backup and Restore

Encrypted extracts in backups remain encrypted. The size of backup files (.tbks) may increase up to 50-100% due to the ineffectiveness of compression on encrypted extracts. The size increase depends, among other factors, on the number of extracts that are encrypted. The time to restore a backup that contains encrypted extracts might increase slightly due to the time to exchange encryption keys.

If your Tableau Server installation has mostly or only encrypted extracts, consider disabling compression during backups to significantly improve the time backups take. To learn more about TSM backup, see [tsm maintenance backup](#).

#### Enforce Encryption at Rest on a Site

Tableau Server administrators can enforce encryption of all extracts on their site.

## Tableau Server on Windows Help

1. In a web browser, sign in to Tableau Server as a server administrator.
2. Go to the site you want to configure.
3. Click **Settings**.
4. Scroll down to the Extract Encryption at Rest section.

Click **Enforce** to encrypt all extracts that are published and stored on the site.

Encrypting all existing extracts stored on the site may take a while.

5. Click **Save**

### Enable Encryption at Rest on a Site

Tableau Server administrators can allow users to specify to encrypt all extracts associated with particular published workbooks or data sources.

1. In a web browser, sign in to Tableau Server as a server administrator.
2. Go to the site you want to configure.
3. Click **Settings**.
4. Scroll down to the Extract Encryption at Rest section.
5. Click **Enable** to allow users to optionally encrypt extracts on the site.

Changing to Enable will cancel pending decryption jobs and pending encryption jobs.

No encryption jobs are created.

6. Click **Save**

### Disable Encryption at Rest on a Site

1. In a web browser, sign in to Tableau Server as a server administrator.
2. Go to the site you want to configure.
3. Click **Settings**.
4. Scroll down to the Extract Encryption at Rest section.
5. Click **Disable** to not allow encrypted extracts on the site.

Changing to Disable will decrypt all existing encrypted extracts. Decrypting all extracts stored on the site may take a while.

6. Click **Save**

## View Extract Encryption Mode for All Sites

1. On a multi-site server, click **Manage all sites** on the site menu.

**Note:** The **Manage all sites** option only displays when you are signed in as a server administrator.

2. Click **Sites**.
3. The encryption mode of each site is displayed in the **Extract encryption at rest** column.

## Encrypt or Decrypt Extracts for a Published Workbook or Data Source

**Note:** The option to encrypt or decrypt the extracts associated with particular published workbook or data source is only available when the site setting for encryption at rest is set to **Enable**. When a site is set to Disable, all content is not encrypted. When a site is set to Enforce, all content is encrypted.

**Note:** You must be the owner or administrator.

1. Go to the published workbook or published data source page.
2. Click the dropdown menu that says **Encrypted Extract** or **Unencrypted Extract**.
3. Select **Unencrypted**.

You will see a message that says, "Decrypting extract."

-or-

Select **Encrypted**.

An encryption job is started.

Alternatively, you can encrypt or decrypt extracts on the card view action menu, list view action menu and action menu in the header section.

## Encrypt or Decrypt Multiple Items

1. Go to the Data Sources page.
2. Tick the box beside one or more data sources.
3. In the upper-left of the Data Sources page, click **Actions**.
4. Click **Encrypt** or **Decrypt**.

### View Encryption Status for a Single Item

1. Sign in to the site.
2. Go to a single data source page.  
-or-  
Go to a single workbook page for a workbook containing embedded data sources.
3. The encryption status is displayed on the page.

### Filter Data Sources by Encryption Status

1. In the site, click **Explore**.
2. At the top-right, click the Explore: Top-level Projects dropdown menu and select **All Data Sources**.
3. Click the filter icon.
4. Scroll down to the “Live or extract” section and select a filtering option: All, Live, Extracts, Unencrypted Extracts, Encrypted Extracts, Currently Encrypting or Currently Decrypting.
5. Tick the box beside “Include .tde and .hyper files” if you want to include “Live to .tde file” and “Live to .hyper file” connections in your filter results.

### Filter Workbooks by Encryption Status

1. In the site, click **Explore**.
2. At the top-right, click the Explore: Top-level Projects dropdown menu and select **All Workbooks**.
3. Click the filter icon.
4. Scroll down to the “Live or extract” section and select a filtering option: All, Live, Extracts, Published, Unencrypted Extracts, Encrypted Extracts, Currently Encrypting or Currently Decrypting.
5. Tick the box beside “Include .tde and .hyper files” if you want to include “Live to .tde file” and “Live to .hyper file” connections in your filter results.  
Any workbooks that have at least one connection that matches the filter selection will be displayed.

### View Status of Encrypt or Decrypt Extracts Background Tasks

1. In the site, click **Site Status**.
2. Click **Background Tasks for Non Extracts** to see completed and pending background task details.

Note: **Background Tasks for Non Extracts** includes all tasks not related to extract refreshes, so it includes encryption jobs.

3. In the Task menu, select **Encrypt Extracts** or **Decrypt Extracts** and click **Apply**.
4. In the Time Range menu, select a range.

You see "Encrypt Extracts" or "Decrypt Extracts" background tasks for all of your extract-based published data sources and workbooks.

### The tabcmd Utility

The tabcmd command-line utility has commands and options to control extract encryption. For more information, see the tabcmd documentation.

Specify the extract encryption mode when you create a site

```
tabcmd createsite <site-name> --extract-encryption-mode [enforced |
enabled | disabled]
```

Specify the extract encryption mode when you edit a site

```
tabcmd editsite <site-name> --extract-encryption-mode [enforced |
enabled | disabled]
```

Get the extract encryption mode when you list sites

```
tabcmd listsites --get-extract-encryption-mode
```

Encrypt extracts when you publish a workbook, data source, or extract to the server

```
tabcmd publish "filename.hyper" --encrypt-extracts
```

Decrypt all extracts on a site

**Note:** Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

```
tabcmd decryptextracts <site-name>
```

## Tableau Server on Windows Help

### Encrypt all extracts on a site

**Note:** Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

```
tabcmd encryptextracts <site-name>
```

### Reencrypt all extracts on a site with new encryption keys

You must specify a site.

**Note:** Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

```
tabcmd reencryptextracts <site-name>
```

For more information, see `reencryptextracts`.

## Tableau Server Rest API

With the Tableau Server REST API you can manage Tableau Server resources programmatically. You can use this access to create your own custom applications or to script interactions with Tableau Server resources.

To learn more, see [Extract Encryption Methods](#).

## Network Security

There are three main network interfaces in Tableau Server:

- **Client to Tableau Server:** The client can be a web browser, Tableau Mobile, Tableau Desktop, or the tabcmd utility.
- **Tableau Server to your database(s):** To refresh data extracts or handle live database connections, Tableau Server needs to communicate with your database(s).
- **Server component communication:** This applies to distributed deployments only.

In most organisations, Tableau Server is also configured to communicate with the internet and with a SMTP server.

## Client to Tableau Server

A Tableau Server client can be a web browser, a device running Tableau Mobile, Tableau Desktop, or tabcmd commands. Communications between Tableau Server and its clients use standard HTTP requests and responses. We recommend configuring Tableau Server for HTTPS for all communications. When Tableau Server is configured for SSL, all content and communications between clients are encrypted using SSL, and the HTTPS protocol is used for requests and responses.

By default, passwords are communicated from browsers and tabcmd to Tableau Server using 1024-bit public/private key encryption. This level of encryption is not considered robust enough for secure communications. Additionally, this method, where a public key is sent to the recipient in the clear and without network layer authentication is susceptible to man-in-the-middle attacks.

To adequately secure network traffic from clients to Tableau Server, you must configure SSL with a certificate from a trusted certificate authority.

See [Configure SSL for External HTTP Traffic to and from Tableau Server](#).

### Client access from the Internet

We recommend a gateway proxy server to enable secure client access from the internet to your Tableau Server. We do not recommend running Tableau Server in a DMZ or otherwise outside your protected, internal network.



Configure a reverse proxy server, with SSL enabled, to handle all inbound traffic from the internet. In this scenario, the reverse proxy is the only external IP address (or range of addresses if multiple reverse proxies are load-balancing inbound requests) that Tableau Server will communicate with. Reverse proxies are transparent to requesting clients, thereby obfuscating Tableau Server network information and simplifying client configuration.

For configuration information, see [Configuring Proxies and Load Balancers for Tableau Server](#).

### Clickjack Protection

By default, Tableau Server has *clickjack protection* enabled. This helps prevent certain types of attacks in which the attacker overlays a transparent version of a page on top of an innocuous-looking page in order to lure a user into clicking links or entering information. With clickjack protection enabled, Tableau Server imposes certain restrictions on embedding views. For more information, see [Clickjack Protection](#).

## Tableau Server to your database

Tableau Server makes dynamic connections to databases to process result sets and refresh extracts. It uses native drivers to connect to databases whenever possible and relies on a generic ODBC adapter when native drivers are unavailable. All communications to the database are routed through these drivers. As such, configuring the driver to communicate on non-standard ports or provide transport encryption is part of the native driver installation. This type of configuration is transparent to Tableau.

When a user stores credentials for external data sources on Tableau Server, they are stored encrypted in Tableau Server's internal database. When a process uses those credentials to query the external data source, the process retrieves the encrypted credentials from the internal database and decrypts them in process.

## Tableau Server to the internet

In some cases, where users connect to external data sources, such as the Tableau map servers, then Tableau Server will need to connect to the internet. We recommend that you run all

components of Tableau inside your protected network. Therefore, connections to the internet may require that you configure Tableau Server to use a forward proxy.

## Tableau Server to a SMTP server

You can configure Tableau Server to send event notifications to administrators and users. As of version 2019.4, Tableau Server supports TLS for the SMTP connection. See [Configure SMTP Setup](#).

## Communication with the repository

You can configure Tableau Server to use Secure Sockets Layer (SSL) for encrypted communications on all traffic that is exchange with the Postgres repository to and from other server components. By default, SSL is disabled for communications between server components and the repository.

For more information, see [Configure SSL for Internal Postgres Communication](#).

For more information, see `tsm security repository-ssl enable`

## Server component communication in a cluster

There are two aspects to communication between Tableau Server components in a distributed server installation: trust and transmission. Each server in a Tableau cluster uses a stringent trust model to ensure that it is receiving valid requests from other servers in the cluster. Computers in the cluster running a gateway process accept requests from third parties (clients), unless they are fronted by a load balancer, in which case the load balancer receives the requests. Servers not running a gateway process only accept requests from other trusted members of the cluster. Trust is established by an allowlist of IP address, port, and protocol. If any of these are invalid, the request is ignored. All members of the cluster can communicate with each other.

When a user stores credentials for external data sources on Tableau Server, they are stored encrypted in Tableau Server's internal database. When a process uses those credentials to

query the external data source, the process retrieves the encrypted credentials from the internal database and decrypts them in process.

## Clickjack Protection

Tableau Server includes protection against clickjack attacks. *Clickjacking* is a type of attack against web pages in which the attacker tries to lure users into clicking or entering content by displaying the page to attack in a transparent layer over an unrelated page. In the context of Tableau Server, an attacker might try to use a clickjack attack to capture user credentials or to get an authenticated user to change settings on your server. For more information about clickjack attacks, see [Clickjacking](#) on the Open Web Application Security Project website.

**Note:** Clickjack protection was available in previous versions of Tableau Server, but was disabled by default. New installations of Tableau Server 9.1 and later will always have clickjack protection on unless you explicitly disable it.

### Effects of clickjack protection

When clickjack protection is enabled on Tableau Server, the behaviour of pages loaded from Tableau Server changes in the following ways:

- Tableau Server adds the `X-Frame-Options: SAMEORIGIN` header to certain responses from the server. In the current versions of most browsers, this header prevents the content from being loaded into an `<iframe>` element, which helps prevent clickjacking attacks.
- The top-level page from Tableau Server cannot be loaded in `<iframe>` elements. This includes the sign-in page. One consequence is that you cannot host Tableau Server pages in an application that you create.
- Only views can be embedded.

- If an embedded view requires data source credentials, a message is displayed in the **<iframe>** element with a link to open the view in a secure window where the user can safely enter credentials. Users should always verify the address of the opened window before entering credentials.
- Views can be loaded only if they include the `:embed=y` parameter in the query string, as in this example:

```
http://<server>/views/Sales/CommissionModel?:embed=y
```

**Note:** When clickjack protection is enabled, embedded views that use the URL copied from the browser address bar might not load. These view URLs usually contain the hash symbol (#) after the server name (for example, `http://myserver-/#/views/Sales/CommissionModel?:embed=y`) are blocked when clickjack protection is enabled on Tableau Server.

### Disabling clickjack protection

You should leave clickjack protection enabled unless it is affecting how your users work with Tableau Server. If you want to disable clickjack protection, use the following `tsm` commands:

1. 

```
tsm configuration set -k wgserver.clickjack_defense.enabled -v false
```

```
tsm pending-changes apply
```
- 2.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## HTTP Response Headers

Tableau Server supports some of the response headers specified in the [OWASP Secure Headers Project](#).

This topic describes how to configure the following response headers for Tableau Server:

- HTTP Strict Transport Security (HSTS)
- Referrer-Policy
- X-Content-Type-Options
- X-XSS-Protection

Tableau Server also supports the Content Security Policy (CSP) standard. CSP configuration is not covered in this topic. See [Content Security Policy](#).

### Configuring response headers

All response headers are configured with the `tsm configuration set` command.

When you are finished configuring response headers, run `tsm pending-changes apply`.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### HTTP Strict Transport Security (HSTS)

HSTS forces clients connecting to Tableau Server to connect with HTTPS. For more information see the OWASP entry, [HTTP Strict Transport Security \(HSTS\)](#).

#### Options

`gateway.http.hsts`

Default value: `false`

The HTTP Strict Transport Security (HSTS) header forces browsers to use HTTPS on the domain where it is enabled.

gateway.http.hsts\_options

Default value: "max-age=31536000"

By default, HSTS policy is set for one year (31536000 seconds). This time period specifies the amount of time in which the browser will access the server over HTTPS.

### Referrer-Policy

Beginning in 2019.2, Tableau Server includes the ability to configure Referrer-Policy HTTP header behaviour. This policy is enabled with a default behaviour that will include the origin URL for all "secure as" connections (policy `no-referrer-when-downgrade`). In previous versions, the Referrer-Policy header was not included in responses sent by Tableau Server. For more information about the various policy options that Referrer-Policy supports, see the OWASP entry, [Referrer-Policy](#).

### Options

gateway.http.referrer\_policy\_enabled

Default value: `true`

To exclude the Referrer-Policy header from responses sent by Tableau Server, set this value to `false`.

gateway.http.referrer\_policy

Default value: `no-referrer-when-downgrade`

This option defines the referrer policy for Tableau Server. You may specify any of the policy value strings listed in the [Referrer-Policy](#) table on the OWASP page.

## X-Content-Type-Options

The X-Content-Type-Options response HTTP header specifies that the MIME type in the Content-Type header should not be changed by the browser. In some cases, where MIME type is not specified, a browser may attempt to determine the MIME type by evaluating the characteristics of the payload. The browser will then display the content accordingly. This process is referred to as "sniffing". Misinterpreting the MIME type can lead to security vulnerabilities.

For more information see the OWASP entry, [X-Content-Type-Options](#).

### Option

gateway.http.x\_content\_type\_nosniff

Default value: `true`

The X-Content-Type-Options HTTP header is set to 'nosniff' by default with this option.

## X-XSS-Protection

The HTTP X-XSS-Protection response header is sent to the browser to enable cross-site scripting (XSS) protection. The X-XSS-Protection response header overrides configurations in cases where users have disabled XSS protection in the browser.

For more information see the OWASP entry, [X-XSS-Protection](#).

### Option

gateway.http.x\_xss\_protection

Default value: `true`

The X-XSS-Protection response header is enabled by default with this option.

## Content Security Policy

Tableau Server supports the Content Security Policy (CSP) standard. CSP is intended to be an additional layer of security against cross-site scripting and other malicious web-based

attacks. CSP is implemented as a HTTP response header that allows you to specify where external resources, such as scripts and images, can be safely loaded from.

See the [Mozilla website](#) for more information about CSP.

### Configure and enable CSP

CSP is configured and enabled using the tsm configuration set Options command. If you are running Tableau Server in a distributed deployment, run these commands on the initial node in the cluster. The configuration will be applied across the cluster after you run tsm pending-changes apply.

## Step 1: Set default directives

Tableau Server includes the set of default directives in the table below.

To set a directive, use the following tsm syntax:

```
tsm configuration set -k content_security_policy.-
directive.<directive_name> -v "<value>"
```

For example, to set the `connect_src` directive, run the following command:

```
tsm configuration set -k content_security_policy.directive.connect_
src -v "*" unsafe-inline"
```

| Option                                             | Default value | Description                                                                                      |
|----------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------|
| content_security_policy.-<br>directive.default_src | 'none'        | Serves as a fallback for the other fetch directives.<br><br><b>Valid values for default_src.</b> |
| content_security_policy.-<br>directive.connect_src | *             | Restricts the URLs which can be loaded using script interfaces.                                  |



|                                                           |                   |                                                                                                                                                            |
|-----------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           |                   | Valid values for <code>connect_src</code> .                                                                                                                |
| <code>content_security_policy.directive.script_src</code> | *                 | Specifies valid sources for JavaScript.<br><br>Valid values for <code>script_src</code> .                                                                  |
| <code>content_security_policy.directive.style_src</code>  | * 'unsafe-inline' | Specifies valid sources for stylesheets.<br><br>Valid values for <code>style_src</code> .                                                                  |
| <code>content_security_policy.directive.img_src</code>    | * data:           | Specifies valid sources of images and favicons.<br><br>Valid values for <code>img_src</code> .                                                             |
| <code>content_security_policy.directive.font_src</code>   | * data:           | Specifies valid sources for fonts loaded using @font-face.<br><br>Valid values for <code>font_src</code> .                                                 |
| <code>content_security_policy.directive.frame_src</code>  | * data:           | Specifies valid sources for nested browsing contexts loading using elements such as <frame> and <iframe>.<br><br>Valid values for <code>frame_src</code> . |

|                                                   |                   |                                                                                                                                                                                                                         |
|---------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| content_security_policy.-<br>directive.object_src | data:             | Specifies valid sources for the <object>, <embed>, and <applet> elements.<br><br>Valid values for <code>object_src</code> .                                                                                             |
| content_security_policy.-<br>directive.report_uri | /vizql/csp-report | Instructs the user agent to report attempts to violate the CSP. These violation reports consist of JSON documents sent via an HTTP POST request to the specified URI.<br><br>Valid values for <code>report_uri</code> . |

## Step 2: Add additional directives (optional)

The default directives included with Tableau Server are a subset of directives that are supported by CSP.

For a full list of supported CSP directives, go to <https://developer.mozilla.org/en-gb/docs/Web/HTTP/Headers/Content-Security-Policy>.

You can add directives to the existing default set, by using adding the new directive in the `content_security_policy.directive` namespace. You must include the `--force-keys` parameter when adding new directives. The syntax is as follows:

```
tсм configuration set -k content_security_policy.directive.<new_directive_name> -v "<value>" --force-keys
```

For example, to add the `worker-src` directive, run the following command:

```
tsm configuration set -k content_security_policy.directive.worker-  
src -v "none" --force-keys
```

### Step 3: Specify report-only directives (optional)

You can configure CPS to report some directives and to enforce others. When you set `content_security_policy.enforce_enabled` to `true`, then all directives are enforced (even if `content_security_policy.report_only_enable` is also set to `true`).

To specify directives as "report-only" and not enforced, add the directives to the `report_only_directive` namespace. You must include the `--force-keys` parameter when adding new directives. The syntax is as follows:

```
tsm configuration set -k content_security_policy.report_only_dir-  
ective.<directive_name> -v "<value>" --force-keys
```

For example, to report only on the `script_src` directive, run the following command:

```
tsm configuration set -k content_security_policy.report_only_dir-  
ective.script_src -v " http://*.example.com" --force-keys
```

### Step 4: Enable CSP on Tableau Server

After you have configured directives, enable CSP on Tableau Server.

The following options are used to enable enforcement or report only mode for the directives you have set.

| Option                                               | Default value | Description                                                                              |
|------------------------------------------------------|---------------|------------------------------------------------------------------------------------------|
| <code>content_security_policy.enforce_enabled</code> | false         | Adds a CSP header to all requests so that any violation will be enforced by the browser. |
| <code>content_security_policy.report_only_</code>    | true          | Adds a CSP header to all                                                                 |

|         |  |                                                                                                                    |
|---------|--|--------------------------------------------------------------------------------------------------------------------|
| enabled |  | requests so that any violation will be recorded in our vizql-client logs, but will not be enforced by the browser. |
|---------|--|--------------------------------------------------------------------------------------------------------------------|

To enable enforcement of the CSP directives that you've specified, run the following command

```
tsm configuration set -k content_security_policy.enforce_enabled -v true
```

## Step 5: Run tsm pending-changes apply

When you are finished configuring CSP, run `tsm pending-changes apply`.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### View CSP report

To view CSP violations for a given viz, load the viz in a browser that includes developer tools. This example uses the Chrome browser.

1. Load a test viz with violations that is hosted on the Tableau Server deployment where you configured CSP.
2. Enter `CTRL+Shift+I` to open the developer tools in Chrome.
3. Click the **Network** tab.
4. In the **Filter** field, enter `csp-report`, and then click **Find All**.

- If there are no violations then the search will not return any CSP reports.
- If there are violations, click the Headers tab in the results pane and scroll to the bottom to view **Request Payload**.

## SSL

SSL (Secure Sockets Layer) is a standard security technology that establishes an encrypted link between a web server and clients. To use SSL, you need to install an SSL certificate on Tableau Server.

You can configure Tableau Server to use SSL in the following ways:

- Use SSL for external HTTP traffic.
- Use mutual (two-way) SSL between clients (Tableau Desktop, web browsers, and tabcmd.exe) and Tableau Server.
- Use SSL for all HTTP traffic between internal server components and the repository.

If you are using mutual SSL, each client also needs a certificate.

**Note:** Tableau Server uses SSL for user authentication. SSL is not used to handle permissions and authorisation to content (data sources and workbooks) hosted on Tableau Server.

### Configure SSL for External HTTP Traffic to and from Tableau Server

You can configure Tableau Server to use Secure Sockets Layer (SSL) encrypted communications on all external HTTP traffic. Setting up SSL ensures that access to Tableau Server is secure and that sensitive information passed between the server and Tableau clients – such as Tableau Desktop, the REST API, analytics extensions and so on – is protected. Steps on how to configure the server for SSL are described this topic; however, you must first acquire a certificate from a trusted authority, and then import the certificate files into Tableau Server.

Mutual SSL authentication is not supported on Tableau Mobile.

### SSL certificate requirements

Acquire an Apache SSL certificate from a trusted authority (for example, Verisign, Thawte, Comodo, GoDaddy). You can also use an internal certificate issued by your company. Wild-card certificates, which allow you to use SSL with many host names within the same domain, are also supported.

When you acquire an SSL certificate for external communication to and from Tableau Server, follow these guidelines and requirements:

- All certificate files must be valid PEM-encoded X509 certificates with the extension `.crt`.
- Use a SHA-2 (256 or 512 bit) SSL certificate. Most browsers no longer connect to a server that presents an SHA-1 certificate.
- In addition to the certificate file, you must also acquire a corresponding SSL certificate key file. The key file must be a valid RSA or DSA private key file (with the extension `.key` by convention).

You can choose to passphrase-protect the key file. The passphrase you enter during configuration will be encrypted while at rest. However, if you want to use the same certificate for SSL and SAML, you must use a key file that is *not* passphrase protected.

**Important:** If your key file is passphrase protected, you must verify that the related cryptographic algorithm is supported by the version of Tableau Server you are running. Tableau Server uses OpenSSL to open password-protected key files. As of August 2023, the latest releases of Tableau Server (2021.3.26, 2021.4.21, 2022.1.17, 2022.3.9, 2023.1.5 and newer) run OpenSSL 3.1. Previous versions of Tableau Server ran OpenSSL 1.1. A number of cryptographic algorithms have been retired and are no longer supported in OpenSSL 3.1. If you are using a passphrase-protected key file on an older version of Tableau Server that is still running OpenSSL 1.1, review the

following Knowledge Base article before you upgrade to the latest version of Tableau Server: [Gateway and Prep Conductor failed to start when using External SSL with passphrase to protect the key file after upgrade to Tableau Server 2022.1.17](#).

- **SSL certificate chain file:** A certificate chain file is required for Tableau Desktop on the Mac and for Tableau Prep Builder on the Mac and Tableau Prep Builder on Windows. The chain file is also required for the Tableau Mobile app if the certificate chain for Tableau Server is not trusted by the iOS or Android operating system on the mobile device.

The chain file is a concatenation of all of the certificates that form the certificate chain for the server certificate. All certificates in the file must be x509 PEM-encoded and the file must have a `.crt` extension (not `.pem`).

- For multiple sub-domains, Tableau Server supports wildcard certificates.
- Verify that the domain, host name, or IP address that clients use to connect to Tableau Server is included in the Subject Alternative Names (SAN) field. Many clients (Tableau Prep, Chrome and Firefox browsers, etc) require valid entry in the SAN field to establish a secure connection.

**Note:** If you plan to configure Tableau Server for single-sign on using SAML, see [Using SSL certificate and key files for SAML](#) in the SAML requirements to help determine whether to use the same certificate files for both SSL and SAML.

### Configuring SSL for a Cluster

You can configure a Tableau Server cluster to use SSL. If the initial node is the only one running the gateway process (which it does by default), you need to configure SSL only on that node, using the steps described in this topic.

## SSL with multiple gateways

A highly available Tableau Server cluster can include multiple gateways, fronted by a load balancer. If you are configuring this type of cluster for SSL, you have the following choices:

- **Configure the load balancer for SSL:** Traffic is encrypted from the client web browsers to the load balancer. Traffic from the load balancer to the Tableau Server gateway processes is not encrypted. No SSL configuration in Tableau Server is required by you. It's all handled by the load balancer.
- **Configure Tableau Server for SSL:** Traffic is encrypted from the client web browsers to the load balancer, and from the load balancer to the Tableau Server gateway processes. For more information, continue to the following section.

## Additional configuration information for Tableau Server cluster environments

When you want to use SSL on all Tableau Server nodes that run a gateway process, you complete the following steps.

1. Configure the external load balancer for SSL passthrough.

Or if you want to use a port other than 443, you can configure the external load balancer to terminate the non-standard port from the client. In this scenario, you would then configure the load balancer to connect to Tableau Server over port 443. For assistance, refer to the documentation provided for the load balancer.

2. Make sure the SSL certificate is issued for the load balancer's host name.
3. Configure the initial Tableau Server node for SSL.
4. If you are using mutual SSL, upload the SSL CA certificate file. See `tsm authentication mutual-ssl <commands>`.

SSL certificate and key files will be distributed to each node as part of the configuration process.



## Tableau Server on Windows Help

### Prepare the environment

When you get the certificate files from the CA, save them to a location accessible by Tableau Server, and note the names of the certificate .crt and .key files and the location where you save them. You will need to provide this information to Tableau Server when you enable SSL.

### Configure SSL on Tableau Server

Use the method you're most comfortable with.

#### Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. On the **Configuration** tab, select **Security > External SSL**.

**Note:** If you are updating or changing an existing configuration, click **Reset** to clear the existing settings before proceeding.

3. Under **External web server SSL**, select **Enable SSL for server communication**.
4. Upload the certificate and key files, and if required for your environment, upload the chain file and enter the passphrase key:

**External web server SSL**  
 Configure SSL for secure communication between Tableau Server and web clients. [Learn more about external web server SSL.](#)

☐ Enable SSL for server communication

SSL certificate file (Required)

SSL certificate key file (Required)

SSL certificate key passphrase

SSL certificate chain file

If you are using SSL for server communication and want to configure SSL communication between Tableau Server and clients using certificates on both the server and clients, you must first enable mutual SSL. [Click here to configure the mutual SSL authentication method.](#)

If you are running Tableau Server in a distributed deployment, then these files will be automatically distributed to each appropriate node in the cluster.

5. Click **Save Pending Changes**.
6. Click **Pending Changes** at the top of the page:



7. Click **Apply Changes and Restart**.

### Use the TSM CLI

After you have copied the certificate files to the local computer, run the following commands:

```
tsm security external-ssl enable --cert-file <path-to-file.crt> --
key-file <path-to-file.key>
```

```
tsm pending-changes apply
```

See the command reference at `tsm security external-ssl enable` to determine whether you want to include additional options for `external-ssl enable`. Tableau has specific recommendations for the `--protocols` option.

The `external-ssl enable` command imports the information from the `.crt` and `.key` files. If you run this command on a node in a Tableau Server cluster, it also distributes the information to any other gateway node.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Port redirection and logging

After the server has been configured for SSL, it accepts requests to the non-SSL port (default is port 80) and automatically redirects to the SSL port 443.

**Note:** Tableau Server supports only port 443 as the secure port. It cannot run on a computer where another application is using port 443.

SSL errors are logged in the at the following location. Use this log to troubleshoot validation and encryption issues:

```
\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\httpd\error.log
```

### Change or update SSL certificate

After you have configured SSL, you may need to periodically update the certificate. In some cases, you may need change the certificate for operational changes in your IT environment. In either case, you must use TSM to replace the SSL certificate that has already been configured for external SSL.

Do not copy a new certificate to the file directory on the operating system. Rather, when you add the certificate with either the TSM web UI or the `tsm security external-ssl`

`enable` command, the certificate file is copied to the appropriate certificate store. In a distributed deployment, the certificate is also copied across the nodes in the cluster.

To change or update the SSL certificate (and the corresponding key file if required), follow the steps in the previous section of this topic, [Configure SSL on Tableau Server](#).

After you change the certificate, you must run `tsm pending-changes apply` to restart Tableau Server services. We also recommend restarting any other services on the computer that use the SSL certificate. If you are changing a root certificate on the operating system, you must reboot the computer.

#### Example: SSL Certificate - Generate a Key and CSR

**Important:** This example is intended to provide general guidance to IT professionals who are experienced with SSL requirements and configuration. The procedure described in this article is just one of many available methods you can use to generate the required files. The process described here should be treated as an example and not as a recommendation.

---

When you configure Tableau Server to use Secure Sockets Layer (SSL) encryption, this helps ensure that access to the server is secure and that data sent between Tableau Server and Tableau Desktop is protected.

Looking for Tableau Server on Linux? See [Example: SSL Certificate - Generate a Key and CSR](#).

Tableau Server uses Apache, which includes [OpenSSL](#). You can use the OpenSSL toolkit to generate a key file and Certificate Signing Request (CSR) which can then be used to obtain a signed SSL certificate.

**Note:** Beginning in Tableau Server versions 2021.3.26, 2021.4.21, 2022.1.17, 2022.3.9, 2023.1.5 and, later, Tableau Server runs OpenSSL 3.1.

## Steps to generate a key and CSR

To configure Tableau Server to use SSL, you must have an SSL certificate. To obtain the SSL certificate, complete the steps:

1. [Set the OpenSSL configuration environment variable \(optional\).](#)
2. [Generate a key file.](#)
3. [Create a Certificate Signing Request \(CSR\).](#)
4. [Send the CSR to a certificate authority \(CA\) to obtain an SSL certificate.](#)
5. [Use the key and certificate to configure Tableau Server to use SSL.](#)

You can find additional information on the [SSL FAQ page](#) on the Apache Software Foundation website.

## Configure a certificate for multiple domain names

Tableau Server allows SSL for multiple domains. To set up this environment, you need to modify the OpenSSL configuration file, `openssl.conf`, and configure a Subject Alternative Name (SAN) certificate on Tableau Server. See [For SAN certificates: modify the OpenSSL configuration file](#) below.

## Set the OpenSSL configuration environment variable (optional)

To avoid using the `-config` argument with every use of `openssl.exe`, you can use the `OPENSSL_CONF` environment variable to ensure that the correct configuration file is used and all configuration changes made in subsequent procedures in this article produce expected results (for example, you must set the environment variable to add a SAN to your certificate).

Open the Command Prompt as an administrator, and run the following command:

```
set OPENSSL_CONF=c:\Program Files\Tableau\Tableau Server-  
\packages\apache.<version_code>\conf\openssl.cnf
```

**Note:** When setting the Open SSL configuration environment variable, do not enclose the file path with quotation marks.

## Generate a key

Generate a key file that you will use to generate a certificate signing request.

1. Open the Command Prompt as an administrator, and navigate to the **Apache** directory for Tableau Server. For example, run the following command:

```
cd C:\Program Files\Tableau\Tableau Server-  
\packages\apache.<version_code>\bin
```

2. Run the following command to create the key file:

```
openssl.exe genrsa -out <yourcertname>.key 4096
```

### Notes:

- This command uses a 4096-bit length for the key. You should choose a bit length that is at least 2048 bits because communication encrypted with a shorter bit length is less secure. If a value is not provided, 512 bits is used.
- To create PKCS#1 RSA keys with Tableau Server versions 2021.3.26, 2021.4.21, 2022.1.17, 2022.3.9, 2023.1.5 and later, you must use the additional option `-traditional` when running `openssl genrsa` command based on the OpenSSL 3.1. For more information about the option, see <https://www.openssl.org/docs/man3.1/man1/openssl-rsa.html>.

## Create a certificate signing request to send to a certificate authority

Use the key file you created in the procedure above to generate the certificate signing request (CSR). You send the CSR to a certificate authority (CA) to obtain a signed certificate.

**Important:** If you want to configure a SAN certificate to use SSL for multiple domains, first complete the steps in [For SAN certificates: modify the OpenSSL configuration file](#) below, and then return to here to generate a CSR.

1. Run the following command to create a certificate signing request (CSR) file:

```
openssl.exe req -new -key yourcertname.key -out yourcert-  
name.csr
```

If you did not set the OpenSSL configuration environment variable, `OPENSSL_CONF`, you might see either of the following messages:

- An error message about the config information being unable to load. In this case, retype the command above with the following parameter: `-config ..\conf\openssl.cnf`.
- A warning that the `/usr/local/ssl` directory cannot be found. This directory does not exist on Windows, and you can simply ignore this message. The file is created successfully.

To set an OpenSSL configuration environment variable, see [Set the OpenSSL configuration environment variable \(optional\)](#) section in this article.

2. When prompted, enter the required information.

**Note:** For **Common Name**, type the Tableau Server name. The Tableau Server name is the URL that will be used to reach the Tableau Server. For example, if you reach Tableau Server by typing `tableau.example.com` in the address bar of your browser, then `tableau.example.com` is the common name. If the common name does not resolve to the server name, errors will occur when a browser or Tableau Desktop tries to connect to Tableau Server.

## Send the CSR to a certificate authority to obtain an SSL certificate

Send the CSR to a commercial certificate authority (CA) to request the digital certificate. For information, see the Wikipedia article [Certificate authority](#) and any related articles that help you decide which CA to use.

## Use the key and certificate to configure Tableau Server

When you have both the key and the certificate from the CA, you can configure Tableau Server to use SSL. For the steps, see [Configure External SSL](#).

For SAN certificates: modify the OpenSSL configuration file

In a standard installation of OpenSSL, some features are not enabled by default. To use SSL with multiple domain names, before you generate the CSR, complete these steps to modify the **openssl.cnf** file.

1. Open Windows Explorer and browse to the Apache **conf** folder for Tableau Server.

For example: `C:\Program Files\Tableau\Tableau Server-  
\packages\apache.<version_code>\conf`

2. Open **openssl.cnf** in a text editor, and find the following line: `req_extensions = v3_req`

This line might be commented out with a hash sign (#) at the beginning of the line.

```
UTF8Strings
# so use this option with caution!
string_mask = nombstr

# req_extensions = v3_req # The extensions to add to a
certificate request

[ req_distinguished_name ]
countryName             = Country Name (2 letter code)
```



If the line is commented out, uncomment it by removing the **#** and **space** characters from the beginning of the line.

3. Move to the **[ v3\_req ]** section of the file. The first few lines contain the following text:

```
# Extensions to add to a certificate request
basicConstraints = CA:FALSE
keyUsage = nonRepudiation, digitalSignature, keyEncipherment
```

After the **keyUsage** line, insert the following line:

```
subjectAltName = @alt_names
```

If you're creating a self-signed SAN certificate, do the following to give the certificate permission to sign the certificate:

- a. Add the **cRLSign** and **keyCertSign** to the **keyUsage** line so it looks like the following: `keyUsage = nonRepudiation, digitalSignature, keyEncipherment, cRLSign, keyCertSign`
  - b. After the **keyUsage** line, add the following line: `subjectAltName = @alt_names`
4. In the **[alt\_names]** section, provide the domain names you want to use with SSL.

```
DNS.1 = [domain1]
DNS.2 = [domain2]
DNS.3 = [etc]
```

The following image shows the results highlighted, with placeholder text that you would replace with your domain names.

```
[ v3_req ]

# Extensions to add to a certificate request

basicConstraints = CA:FALSE
keyUsage = nonRepudiation, digitalSignature, keyEncipherment
subjectAltName = @alt_names

[alt_names]
DNS.1 = domain1
DNS.2 = domain2
DNS.3 = etc
```

5. Save and close the file.
6. Complete the steps in [Create a certificate signing request to send to a certificate authority](#) section, above.

#### Additional information

If you prefer to use a different version of OpenSSL, you can download it from [Open SSL for Windows](#).

#### Configure SSL for Internal Postgres Communication

You can configure Tableau Server to use SSL (TLS) for encrypted communication between the Postgres repository and other server components. By default, communication that is internal to Tableau Server components is not encrypted.

While you enable support for internal SSL, you can also configure support for direct connections to the repository from Tableau clients, such as Tableau Desktop, Tableau Mobile, REST API, web browsers.

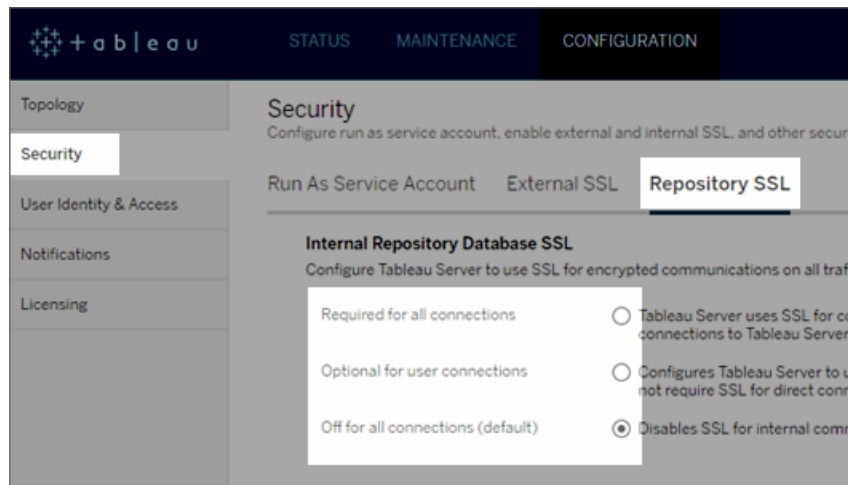
#### Use the TSM web interface

1. As a server administrator, open TSM in a browser:

`https://<tsm-computer-name>:8850`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. On the **Configuration** tab, select **Security > Repository SSL**.



3. Select one of the options for using repository SSL.
  - **Required for all connections** – uses SSL for internal Tableau Server communication, and requires SSL for Tableau clients and any external (non-Tableau) clients that connect directly to the postgres repository, including those using the **tableau** or **readonly** user.

**Important:** Unless you complete the steps in Configure Postgres SSL to Allow Direct Connections from Clients, to place the certificate files in the correct location on the client computers, Tableau clients and external postgres clients will not be able to validate the identity of the Tableau repository by comparing certificates on the client computers with the SSL certificate from the repository computer.

- **Optional for user connections** – When enabled, Tableau uses SSL for internal Tableau Server communication, and supports but does not require SSL for direct connections to the server from Tableau clients and external clients.

- **Off for all connections (default)** – Internal server communication is not encrypted, and SSL is not required for direct connections from clients.

4. Click **OK**.

The first two options generate the server's certificate files, **server.crt** and **server.key**, and place them in the following location.

```
C:/ProgramData/Tableau/Tableau Server-  
/data/tabsvc/config/pgsql<version>/security
```

Use this .crt file if you need to configure clients for direct connections.

Use the TSM CLI

To enable SSL for internal traffic among the server components, run the following commands:

```
tsm security repository-ssl enable  
  
tsm pending-changes apply
```

## What the command does

`repository-ssl enable` generates the server's certificate files, which it places in the following location:

```
C:/ProgramData/Tableau/Tableau Server-  
/data/tabsvc/config/pgsql<version>/security
```

By default, this command sets Tableau Server to require SSL for traffic between the repository and other server components, as well as for direct connections from Tableau clients (including for connections through the **tableau** or **readonly** users).

To complete the configuration, you must also do the steps described in [Configure Postgres SSL to Allow Direct Connections from Clients](#), to place the certificate files in the correct location on the client computers.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Option for repository-ssl enable

If you want to require SSL only for internal Tableau Server communication, and not for direct connections from client apps, use the following option with the `repository-ssl enable` command:

```
--internal-only
```

## Cluster environments

If you run `repository-ssl enable` on a node in a cluster, it copies the required certificate file to the same location on each other node.

For more information about downloading the public certificate for direct connections, see [Configure Postgres SSL to Allow Direct Connections from Clients](#).

### Configure Custom SSL Certificate for TSM Controller

The Tableau Server Administration Controller (aka, Controller) is the management component for administration changes to the Tableau Server cluster. By default the Controller runs on the initial (first) node of a Tableau Server cluster. Although it is technically possible to run multiple Controllers in a single Tableau cluster deployment, this is not a recommended practice.

The Controller includes an API that can be managed by various clients: TSM CLI, TSM Web Client, REST clients (curl, postman), etc. Using these clients, Tableau Server administrators can make configuration changes to the server cluster. The Controller, along with Zookeeper, manages and performs the configuration changes across the nodes.

## Default TSM SSL functionality

**Note** As is convention, the term “SSL” is used here when referring to using TLS to secure HTTPS traffic.

By default, the client connection is encrypted with SSL by means of a self-signed certificate that is created by Tableau Server during setup and renewed by the Controller. In addition to encryption, the identity (hostname or IP) of the Controller host machine is validated against the subject name presented in the certificate during the SSL handshake. However, because the certificate is self-signed, the trustworthiness of the certificate is not absolute.

In the case of CLI connection to the Controller, the inability to absolutely trust the certificate is not a huge security risk, since a man in the middle attack would generally require a malicious user access to the Tableau Server cluster in a private network. If a malicious user can spoof the certificate for the controller in CLI scenario then the malicious user already has “the keys to the kingdom”.

However, in the scenario where administrators are connecting to the Controller over TSM Web UI from outside the internal network, the lack of host validation via trusted certificate authority presents more of a security risk.

Until recently, customers running TSM Web UI on a Windows machine could place the Tableau Server CA certificate in a Windows trusted root store. Most browsers would validate the trust of the certificate by virtue of this configuration. Today, Chrome no longer validates (trusts) self-signed certificates that are placed in the OS trust store. Now, Chrome (and most major browsers) will only trust certificates that chain back to a trusted third-party root CA.

## Tableau Server v2023.1 SSL custom certificate

The custom SSL TSM certificate feature closes the trust gap by allowing administrators to configure the TSM Controller with an identity certificate that chains back to a trusted third-party root CA.

There are a number of important details to understand:

## Tableau Server on Windows Help

- Trust for the TSM custom SSL certificate is validated when connecting with TSM Web UI.
- Trust validation is not attempted for TSM CLI scenario. As described previously, a “man-in-the-middle” attack on the CLI scenario does not present a credible risk.
- Certificate chain may be included in the configuration. The chain may present all certificates signed by intermediate CAs. The chain can end at any point, and any certificates missing from the chain are presumed to be installed in the operating system trust store.

### Configuration

You must use TSM CLI to configure (or update) SSL custom certificate for TSM.

See `tsm security custom-tsm-ssl enable`.

### Configure Postgres SSL to Allow Direct Connections from Clients

When Tableau Server is configured to use SSL for internal communication with the postgres repository, you can also require Tableau clients and external postgres clients that connect directly to the repository to verify the identity of the Tableau postgres repository by comparing the SSL certificate presented by the internal postgres instance with the certificate distributed to the Tableau or external postgres client.

Direct connections include those using the **tableau** user or the **readonly** user. Examples of Tableau clients include Tableau Desktop, Tableau Mobile, REST API, web browsers.

1. Enable internal SSL for the repository by running the following commands:

```
tsm security repository-ssl enable
```

```
tsm pending-changes apply
```

This enables internal SSL support and generates new server certificate and key files, and requires all Tableau clients to use SSL to connect to the repository. For additional repository-ssl commands and options, see `tsm security`.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays

even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

2. (Optional) If you have configured your client computer to validate Postgres SSL connections, then you must import the certificate that is generated by Tableau Server onto the computers running Tableau Desktop. For each client computer that will connect directly to the repository, do the following:

- Copy the **server.crt** file to the client computer. You can find this file in the following directory:

```
C:/ProgramData/Tableau/Tableau Server-  
/data/tabsvc/config/pgsql_0.<version_code>/security
```

**Note:** Do not copy **server.key** to the client computer. This file should reside only on the server.

- Import the certificate into the computer's certificate store.

For information, use the documentation from the operating system manufacturer.

3. (Optional) Configure any external (non-Tableau) postgres clients (PgAdmin or Dbeaver for example) to verify the identity of the Tableau Server postgres repository. Do this in the postgresql JDBC driver the client is using to connect by setting the "sslmode" directive to "verify-ca" or "verify-full". The options available may be different depending on the version of the postgres driver being used. For more information, see the driver documentation about SSL support.



### Configure Mutual SSL Authentication

Using mutual SSL, you can provide users of Tableau Desktop, Tableau Mobile, and other approved Tableau clients a secure, direct-access experience to Tableau Server. With mutual SSL, when a client with a valid SSL certificate connects to Tableau Server, Tableau Server confirms the existence of the client certificate and authenticates the user, based on the user name in the client certificate. If the client does not have a valid SSL certificate, Tableau Server can refuse the connection.

You can also configure Tableau Server to fall back to username/password authentication if mutual SSL fails. Additionally, a user can log in using the REST API with a username and password (if one exists) whether or not fallback authentication is configured.

### User authentication session time limits

When users log in with mutual SSL, the authentication session is governed by the same method that governs the Tableau Server global authentication session configuration.

For clients that connect to Tableau Server using a web browser, configuration of the global authentication session is described in the *Security Hardening Checklist*, see 10. Verify session lifetime configuration.

Sessions for connected clients (Tableau Desktop, Tableau Mobile, Tableau Prep Builder and Bridge) use OAuth tokens to keep users logged in by re-establishing a session. By default, OAuth client tokens reset after a year. If a client token has not been used in 14 days, then it will expire. You can change these values by setting the `refresh_token.absolute_expiry_in_seconds` and `refresh_token.idle_expiry_in_seconds` options. See [tsm configuration set Options](#).

### Certificate usage

Before you enable and configure mutual SSL, you must configure external SSL. External SSL authenticates Tableau Server to the client and encrypts the session using the certificate and key that is required when you configure external SSL.

For mutual SSL, an additional certificate file is required. The file is a concatenation of CA certificate files. The file type must be `.cert`. A "CA" is a *certificate authority* that issues certificates to the client computers that will connect to Tableau Server. The action of uploading the CA certificate file establishes a trust, which enables Tableau Server to authenticate the individual certificates that are presented by the client computers.

As part of your disaster recovery plan, we recommend keeping a backup of the certificate and revocation (if applicable) files in a safe location off of the Tableau Server. The certificate and revocation files that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the files are not stored in a recoverable format. See Tableau Server Client File Service.

### **RSA key and ECDSA curve sizes**

The CA certificate used for mutual SSL must either have an RSA key strength of 2048, or ECDSA curve size of 256.

.You can configure Tableau Server to accept the less secure sizes by setting the respective configuration keys:

- `ssl.client_certificate_login.min_allowed.rsa_key_size`
- `ssl.client_certificate_login.min_allowed.elliptic_curve_size`

See tsm configuration set Options.

## **Client certificate requirements**

Users authenticating to Tableau Server with mutual SSL must present a client certificate that meets minimum security requirements.

### **Signing algorithm**

Client certificates must use a SHA-256 or greater signing algorithm.

Tableau Server configured for mutual SSL authentication will block authentication of users with client certificates that use the SHA-1 signing algorithm.

Users who attempt to log in with SHA-1 client certificates encounter an "Unable to sign in" error, and the following error will be visible in the VizPortal logs:

```
Unsupported client certificate signature detected: [certificate Signature Algorithm name]
```

You can configure Tableau Server to accept the less secure SHA-1 signing algorithm by setting the `ssl.client_certificate_login.blocklisted_signature_algorithms` tsm configuration option.

### **RSA key and ECDSA curve sizes**

The client certificate used for mutual SSL must either have an RSA key strength of 2048, or ECDSA curve size of 256.

Tableau Server will fail mutual authentication requests from client certificates that do not meet these requirements. You can configure Tableau Server to accept the less-secure sizes by setting the respective configuration keys:

- `ssl.client_certificate_login.min_allowed.rsa_key_size`
- `ssl.client_certificate_login.min_allowed.elliptic_curve_size`

See tsm configuration set Options.

Use the TSM web interface

1. Configure SSL for External HTTP Traffic to and from Tableau Server.
2. Open TSM in a browser:  
  
`https://<tsm-computer-name>:8850`. For more information, see Sign in to Tableau Services Manager Web UI.
3. On the **Configuration** tab, select **User Identity & Access > Authentication Method**.
4. Under **Authentication Method**, select **Mutual SSL** in the drop-down menu.
5. Under Mutual SSL, select **Use mutual SSL and automatic sign in with client certificates**.

- Click **Select File** and upload your certificate authority (CA) certificate file to the server.

The file (.crt) is an all-in-one file that includes certificates of CAs that are used for client authentication. The file you upload must be a concatenation of the various PEM-encoded certificate files, in order of preference.

- Enter remaining SSL configuration information for your organisation.

**Username format:** When Tableau Server is configured for mutual SSL, the server gets the user name from the client certificate, so it can establish a direct sign-in for the client user. The name that Tableau Server uses depends on how Tableau Server is configured for user authentication:

- Local Authentication – Tableau Server uses the UPN (User Principal Name) from the certificate.
- Active Directory (AD) – Tableau Server uses LDAP (Lightweight Directory Access Protocol) to get the user name.

Alternatively, you can set Tableau Server to use the CN (Common Name) from the client certificate.

**Authentication Method**

Specify how Active Directory manages user authentication and access to Tableau Server.

Mutual SSL

**Mutual SSL**

Use mutual SSL for secure communication between Tableau Server and web clients and for automatic sign-in across all Tableau Server components. [Learn more](#)

☐ Use mutual SSL and automatic sign in with client certificates

SSL CA certificate file

☐ Use username and password if SSL authentication fails

Specify a method for retrieving the username from the certificate.

Username retrieval method

☐ LDAP (Lightweight Directory Access Protocol)
☒ UPN (User Principal Name)
☐ CN (Common Name)

- Click **Save Pending Changes** after you've entered your configuration information.
- Click **Pending Changes** at the top of the page:



10. Click **Apply Changes and Restart**.

Use the TSM CLI

## Step 1: Require SSL for external server communication

To configure Tableau Server to use SSL for external communication between Tableau Server and web clients, run the `external-ssl enable` command as follows, providing the names for the server certificate's `.crt` and `.key` files:

```
tsm security external-ssl enable --cert-file <file.crt> --key-file <file.key>
```

- For `--cert-file` and `--key-file`, specify the location and file name where you saved the server's CA-issued SSL certificate (`.crt`) and key (`.key`) files.
- The above command assumes the you are signed in as a user that has the **Server Administrator** site role on Tableau Server. You can instead use the `-u` and `-p` parameters to specify an administrator user and password.
- If the certificate key file requires a passphrase, include the `--passphrase` parameter and value.

## Step 2: Configure and enable mutual SSL

Add mutual authentication between the server and each client, and allow for Tableau client users to be authenticated directly after the first time they provide their credentials.

1. Run the following command:

```
tsm authentication mutual-ssl configure --ca-cert <certificate-file.crt>
```

For `--ca-cert`, specify the location and file name of the certificate authority (CA) certificate file.

The file (.crt) is an all-in-one file that includes certificates of CAs that are used for client authentication. The file you upload must be a concatenation of the various PEM-encoded certificate files, in order of preference.

2. Run the following commands to enable mutual SSL and apply the changes:

```
tsm authentication mutual-ssl enable
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Additional options for mutual SSL

You can use `mutual-ssl configure` to configure Tableau Server to support the following options.

For more information, see [tsm authentication mutual-ssl <commands>](#).

## Fallback authentication

When Tableau Server is configured for mutual SSL, authentication is automatic and clients must have a valid certificate. You can configure Tableau Server to allow a fallback option, to accept user name and password authentication.

```
tsm authentication mutual-ssl configure -fb true
```

Tableau Server accepts username and password authentication from REST API clients, even if the above option is set to `false`.

## User name mapping

When Tableau Server is configured for mutual SSL, the server authenticates the user directly by getting the user name from their client certificate. The name that Tableau Server uses depends on how the server is configured for user authentication:

- **Local Authentication** – uses the UPN (User Principal Name) from the certificate.
- **Active Directory (AD)** – uses LDAP (Lightweight Directory Access Protocol) to get the user name.

You can override either of these defaults to set Tableau Server to use the common name.

```
tsm authentication mutual-ssl configure -m cn
```

For more information, see [Mapping a Client Certificate to a User During Mutual Authentication](#)

## Certificate Revocation List (CRL)

You might need to specify a CRL if you suspect that a private key has been compromised, or if a certificate authority (CA) did not issue a certificate properly.

```
tsm authentication mutual-ssl configure -rf <revoke-file.pem>
```

### Mapping a Client Certificate to a User During Mutual Authentication

When you use mutual (two-way) SSL authentication, the client presents its certificate to Tableau Server as part of the authentication process. Tableau Server then maps user information in the client certificate to a known user identity. The strategy that Tableau Server uses to perform client mapping depends on the content of your organisation's client certificates.

This topic discusses the ways information in a client certificate can map to a user identity, and how to change the way Tableau Server performs that mapping. To understand how the map-

ping happens and whether you need to change it, you must know how client certificates are structured in your organisation.

- [User-name mapping options](#)
- [Change the certificate mapping](#)
- [Address user-name ambiguity in multi-domain organisations](#)

### User-name mapping options

Tableau Server uses one of the following approaches to map a client certificate to a user identity:

- **Active Directory.** If Tableau Server is configured to use Active Directory for user authentication, when Tableau Server receives a client certificate, it passes the certificate to Active Directory, which maps the certificate to an Active Directory identity. Any explicit user name information in the certificate is ignored.

**Note:** This approach requires client certificates to be published for the user accounts in Active Directory.

- **User principal name (UPN).** A client certificate can be configured to store the user name in the user principal name field. Tableau Server reads the UPN value and maps it to a user in Active Directory or to a local user.
- **Common name (CN).** A client certificate can be configured to store the user name in the common name field of the certificate. Tableau Server reads the CN value and maps it to a user in Active Directory or to a local user.

If you configure the server for Active Directory authentication and UPN or CN user-name mapping, put the user name in one of the following formats:

`username, domain/username` **or** `username@domain`.

**For example:** `jsmith, example.org/jsmith` **or** `jsmith@example.org`.



If the server uses local authentication, the format of the name in the UPN or CN fields is not predetermined, but the name in the field must match a user name on the server.

### Change the certificate mapping

You use the `tsm authentication mutual-ssl <commands>` commands to map a client certificate to a user identity in Tableau Server:

```
tsm authentication mutual-ssl configure -m <value>
```

Possible values are `ldap` for Active Directory mapping, `upn` for UPN mapping, or `cn` for CN mapping.

When you first install and configure Tableau Server, the server sets the default user-name mapping to match the server's authentication type:

- If the server is configured to use Active Directory, it also uses Active Directory to map the certificate to the user identity.
- If the server is configured to use local authentication, the server gets the user-name value from the UPN field in the certificate.

If the default behaviour for how Tableau Server maps a user name to an identity is not correct for your server configuration, run the following set of commands to change the mapping to use the CN value:

```
tsm authentication mutual-ssl configure -m cn
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Address user-name mapping ambiguity in multi-domain organisations

In some circumstances, the user name in a certificate's UPN or CN field can be ambiguous. This ambiguity can lead to unexpected results when the user name is mapped to a user identity on the server.

For example, if Tableau Server is presented with a user name that does not include a domain, the server maps the user name to an identity using the default domain. This can cause an incorrect user-name mapping, potentially assigning a user a different user's identity and permissions.

This can occur particularly in environments where the following conditions apply:

- Your organisation supports multiple Active Directory domains.
- The server is configured to use Active Directory authentication.
- The server is configured to use UPN or CN mapping.
- Some users have the same user name but different domains. For example, `jsmith@example.org` and `jsmith@example.com`.
- The user name in the certificate's UPN or CN fields does not include the domain as part of the user name – for example, it shows `jsmith`.

To avoid incorrect user-name mapping, make sure the client certificates include fully qualified user names with the domain, using the format `jsmith@example.org` or `example.org/jsmith`.

## Configure Encrypted Channel to LDAP External Identity Store

Tableau Server that is configured to connect to an external LDAP identity store must query the LDAP directory and establish a session. The process of establishing a session is called *binding*. There are multiple ways to bind. Tableau Server supports two methods of binding to an LDAP directory:

- **Simple bind:** Establishes a session by authenticating with a username and password. By default, LDAP with simple bind is not encrypted. If you are configuring LDAP with simple bind, we strongly recommend that you enable LDAP over SSL/TLS.
- **GSSAPI bind:** GSSAPI uses Kerberos to authenticate. When configured with a keytab file, authentication is secure during GSSAPI bind. However, subsequent traffic to the LDAP server is not encrypted. We recommend configuring LDAP over SSL/TLS .

If you are running Tableau Server on Windows on a computer that is joined to an Active Directory domain, then you do not need to configure GSAPI. Tableau Server GUI Setup will detect and configure the Active Directory connection for you using Kerberos. See [Configure Initial Node Settings](#). Do not run LDAP with simple bind for Active Directory communications.

This topic describes how to encrypt the channel for simple LDAP bind for communications between Tableau Server and LDAP directory servers.

#### Certificate requirements

- You must have a valid PEM-encoded x509 SSL/TLS certificate that can be used for encryption. The certificate file must have an extension .crt.
- Self-signed certificates are not supported.
- The certificate you install must include `Key Encipherment` in the key usage field to be used for SSL/TLS. Tableau Server will only use this certificate for encrypting the channel to the LDAP server. The expiry, trust and CRL and other attributes are not validated.
- If you are running Tableau Server in a distributed deployment, then you must manually copy the SSL certificate to each node in the cluster. Copy the certificate only to those nodes where the Tableau Server Application Server process is configured. Unlike other shared files in a cluster environment, the SSL certificate used for LDAP will not be automatically distributed by the Client File Service.

- If you are using a PKI or non-3rd party certificate, upload the CA root certificate to the Java trust store.

#### Import certificate into the Tableau keystore

If you do not have certificates already in place on your computer that are configured for the LDAP server then you must obtain a SSL certificate for the LDAP server and import it into the Tableau system keystore.

Use the "keytool" Java tool to import certificates. In a default installation, this tool is installed with Tableau Server at `C:\Program Files\Tableau\Tableau Server-\packages\repository.<version>\jre\bin\keytool.exe`.

Run the following command as administrator to import the certificate (you must replace the `<variables>` for your environment):

```
"C:\Program Files\Tableau\Tableau Server-
\packages\repository.<version>\jre\bin\keytool.exe" -importcert -
file "C:\Program Files\Tableau\Tableau Server\<LDAP-certificate-
file>.crt" -alias "<ldapserver.name>" -keystore "C:\Pro-
gramData\Tableau\Tableau Server\tableauserVICESmanagerca.jks" -
storepass changeit -noprompt
```

The password for the Java keystore is `changeit`. (Do not change the password for the Java keystore).

#### LDAPS encryption method

Tableau Server supports LDAPS for encrypting the LDAP channel for simple bind.

Secure LDAP, or LDAPS, is a standard encrypted channel that requires configuration. Specifically, in addition to a TLS certificate on Tableau Server, you must set the host name and the secure LDAP port for the target LDAP server.

## Configure encrypted channel for simple bind

If your organisation uses an LDAP directory other than Active Directory, then follow the procedures here for configuring an encrypted channel for LDAP simple bind.

This section describes how to configure Tableau Server to use an encrypted channel for LDAP simple bind.

### When to configure

You must configure Tableau Server to use an encrypted channel for LDAP simple bind before Tableau Server is initialised or as part of configuring the initial node, as mentioned in the “Use the TSM CLI” tab in Configure Initial Node Settings.

### For new installations of Tableau Server

If your organisation uses an LDAP directory other than Active Directory, then you cannot use the TSM GUI Setup to configure the identity store as part of Tableau Server installation. Instead, you must use JSON entity files to configure the LDAP identity store. See [identityStore Entity](#).

Before you configure the identityStore entity, import a valid SSL/TLS certificate into the Tableau key store as documented earlier in this topic.

Configuring LDAPS requires setting the hostname and sslPort options in the identityStore JSON file.

## Security Hardening Checklist

The following list provides recommendations for improving the security ('hardening') of your Tableau Server installation.

Looking for Tableau Server on Linux? See [Security Hardening Checklist](#)

## Installing security updates

Security updates are included in the latest versions and maintenance releases (MR) of Tableau Server. You cannot install security updates as patches. Rather, you must upgrade to a current version or MR to update Tableau Server with the latest security fixes.

Always reference the most current version of this topic after upgrading. The current version includes `/current/` in the topic URL.

For example, the US version URL is: [https://help.tableau.com/current/server/en-gb/security\\_harden.htm](https://help.tableau.com/current/server/en-gb/security_harden.htm).

### 1. Update to the current version

We recommend that you always run the latest version of Tableau Server. Additionally, Tableau periodically publishes maintenance releases of Tableau Server that include fixes for known security vulnerabilities. (Information regarding known security vulnerabilities can be found on the Tableau [Security Bulletins](#) page and the [Salesforce Security Advisories](#) page.) We recommend that you review maintenance release notifications to determine whether you should install them.

To get the latest version or maintenance release of Tableau Server, visit the [Customer Portal](#) page.

### 2. Configure SSL/TLS with a valid, trusted certificate

Secure Sockets Layer (SSL/TLS) is essential for helping to protect the security of communications with Tableau Server. Configure Tableau Server with a valid, trusted certificate (not a self-signed certificate) so that Tableau Desktop, mobile devices and web clients can connect to the server over a secured connection. For more information, see [SSL](#).

### 3. Disable older versions of TLS

Tableau Server uses TLS to authenticate and encrypt many connections between components and with external clients. External clients, such as browsers, Tableau Desktop and

Tableau Mobile connect to Tableau using TLS over HTTPS. Transport layer security (TLS) is an improved version of SSL. In fact, older versions of SSL (SSL v2 and SSL v3) are no longer considered to be adequately secure communication standards. As a result, Tableau Server does not allow external clients to use SSL v2 or SSL v3 protocols to connect.

We recommend that you allow external clients to connect to Tableau Server with TLS v1.3 and TLS v1.2.

TLS v1.2 is still regarded as a secure protocol and many clients (including Tableau Desktop) do not yet support TLS v1.3.

TLS v1.3 capable clients will negotiate TLS v1.3 even if TLS v1.2 is supported by the server.

The following tsm command enables TLS v1.2 and v1.3 (using the "all" parameter) and disables SSL v2, SSL v3, TLS v1 and TLS v1.1 (by prepending the minus [-] character to a given protocol). TLS v1.3 is not yet supported by all components of Tableau Server.

```
tsm configuration set -k ssl.protocols -v "all -SSLv2 -SSLv3 -TLSv1  
-TLSv1.1"
```

```
tsm pending-changes apply
```

To modify the protocols that govern SSL for the Tableau Server PostgreSQL repository, see `pgsql.ssl.ciphersuite`.

You can also modify the default list of cipher suites that Tableau Server uses for SSL/TLS sessions. For more information see the `ssl.ciphersuite` section at `tsm configuration set Options`.

## 4. Configure SSL encryption for internal traffic

Configure Tableau Server to use SSL to encrypt all traffic between the Postgres repository and other server components. By default, SSL is disabled for communications between server components and the repository. We recommend enabling internal SSL for all instances of Tableau Server, even single-server installations. Enabling internal SSL is especially important for multi-node deployments. See [Configure SSL for Internal Postgres Communication](#).

## 5. Enable firewall protection

Tableau Server was designed to operate inside a protected internal network.

**Important:** Do not run Tableau Server, or any components of Tableau Server on the internet or in a DMZ. Tableau Server must be run within the corporate network protected by an internet firewall. We recommend configuring a reverse proxy solution for internet clients that need to connect to Tableau Server. See [Configuring Proxies and Load Balancers for Tableau Server](#).

A local firewall should be enabled on the operating system to protect Tableau Server in single and multi-node deployments. In a distributed (multi-node) installation of Tableau Server, communication between nodes does not use secure communication. Therefore, you should enable firewalls on the computers that host Tableau Server.

To prevent a passive attacker from observing communications between nodes, configure a segregated virtual LAN or other network layer security solution.

See [Tableau Services Manager Ports](#) to understand which ports and services Tableau Server requires.

## 6. Restrict access to the server computer and to important directories

Tableau Server configuration files and log files can contain information that is valuable to an attacker. Therefore, restrict physical access to the machine that is running Tableau Server. In addition, make sure that only authorised and trusted users have access to the Tableau Server files in the `C:\ProgramData\Tableau\directory`.

## 7. Update the Tableau Server Run As User account

By default, Tableau Server runs under the predefined Network Services (NT Authority\Network Service) Windows account. Using the default account is acceptable in scenarios where Tableau Server does not need to connect to external data sources that require



Windows authentication. However, if your users require access to data sources that are authenticated by Active Directory, update the Run As User to a domain account. It's important to minimise the rights of the account that you use for the Run As User. For more information, see [Run As Service Account](#).

## 8. Generate fresh secrets and tokens

Any Tableau Server service that communicates with repository or the cache server must first authenticate with a secret token. The secret token is generated during Tableau Server setup. The encryption key that internal SSL uses to encrypt traffic to Postgres repository is also generated at during setup.

We recommend that after you install Tableau Server, you generate new encryption keys for your deployment.

These security assets can be regenerated with the `tsm security regenerate-internal-tokens` command.

Run the following commands:

```
tsm security regenerate-internal-tokens
```

```
tsm pending-changes apply
```

## 9. Disable services that you're not using

To minimise the attack surface of the Tableau Server, disable any connection points that are not needed.

### JMX Service

JMX is disabled by default. If it's enabled but you're not using it, you should disable it by using the following:

```
tsm configuration set -k service.jmx_enabled -v false
```

```
tsm pending-changes apply
```

## 10. Verify session lifetime configuration

By default, Tableau Server does not have an absolute session timeout. This means that browser-based client (Web authoring) sessions can remain open indefinitely if the Tableau Server inactivity timeout is not exceeded. The default inactivity timeout is 240 minutes.

If your security policy requires it, you can set an absolute session timeout. Be sure to set your absolute session timeout in a range that allows the longest-running extract uploads or workbook publishing operations in your organisation. Setting the session timeout too low may result in extract and publishing failures for long-running operations.

To set the session timeout run the following commands:

```
tsm configuration set -k wgserver.session.apply_lifetime_limit -v true
```

```
tsm configuration set -k wgserver.session.lifetime_limit -v value,
```

where *value* is the number of minutes. The default is 1440, which is 24 hours.

```
tsm configuration set -k wgserver.session.idle_limit -v value, where
```

*value* is the number of minutes. The default is 240.

```
tsm pending-changes apply
```

Sessions for connected clients (Tableau Desktop, Tableau Mobile, Tableau Prep Builder, Bridge and personal access tokens) use OAuth tokens to keep users logged in by re-establishing a session. You can disable this behaviour if you want all Tableau client sessions to be solely governed by the browser-based session limits controlled by the commands above. See [Disable Automatic Client Authentication](#).

## 11. Configure a server allowlist for file-based data sources

As of October 2023 Tableau Server releases, default file-based access behaviour has changed. Previously, Tableau Server allowed authorised Tableau Server users to build workbooks that use files on the server as file-based data sources (such as spreadsheets). With the

October 2023 releases, access to files stored on Tableau or on remote shares must be specifically configured on Tableau Server using the setting described here.

This setting allows you to limit access by the Run As Service Account only to those directories that you specify.

To configure access to shared files, you must configure allowlist functionality. This lets you limit the Run As service account to just the local directory paths, or shared directories where you host data files.

1. On the computer running Tableau Server, identify the directories where you will host data source files.

**Important** Make sure the file paths you specify in this setting exist and are accessible by the service account.

2. Run the following commands:

`tsm configuration set -k native_api.allowed_paths -v "path"`,  
where *path* is the directory to add to the allowlist. All subdirectories of the specified path will be added to the allowlist. You must add a trailing backslash to the specified path. If you want to specify multiple paths, separate them with a semicolon, as in this example:

```
tsm configuration set -k native_api.allowed_paths -v "c:\data-  
sources;\\HR\data\"
```

```
tsm pending-changes apply
```

## 12. Enable HTTP Strict Transport Security for web browser clients

HTTP Strict Transport Security (HSTS) is a policy configured on web application services, such as Tableau Server. When a conforming browser encounters a web application running HSTS, then all communications with the service must be over a secured (HTTPS) connection. HSTS is supported by major browsers.

For more information about how HSTS works and the browsers that support it, see The Open Web Application Security Project web page, [HTTP Strict Transport Security Cheat Sheet](#).

To enable HSTS, run the following commands on Tableau Server:

```
tsm configuration set -k gateway.http.hsts -v true
```

By default, HSTS policy is set for one year (31536000 seconds). This time period specifies the amount of time in which the browser will access the server over HTTPS. You should consider setting a short max-age during initial roll-out of HSTS. To change this time period, run

```
tsm configuration set -k gateway.http.hsts_options -v max-age=  
e=<seconds>. For example, to set HSTS policy time period to 30 days, enter tsm con-  
figuration set -k gateway.http.hsts_options -v max-age=2592000.
```

```
tsm pending-changes apply
```

## 13. Disable Guest access

Core-based licences of Tableau Server include a Guest user option, which allows any user in your organisation to see and interact with Tableau views embedded in web pages.

Guest user access is enabled by default on Tableau Servers deployed with core-based licensing.

Guest access allows users to see embedded views. The Guest user cannot browse the Tableau Server interface or see server interface elements in the view, such as user name, account settings, comments and so on.

If your organisation has deployed Tableau Server with core licensing and Guest access is not required, then disable Guest access.

You can disable Guest access at the server or site level.

You must be a server administrator to disable the Guest account at either the server or the site level.

**To disable Guest access at the server level:**

1. In the site menu, click **Manage All Sites** and then click **Settings > General**.
2. For **Guest Access**, clear the **Enable Guest account** check box.
3. Click **Save**.

**To disable Guest access for a site:**

1. In the site menu, select a site.
2. Click **Settings**, and on the Settings page, untick the **Enable Guest account** box.

For more information, see Guest User.

## 14. Set referrer-policy HTTP header to 'same-origin'

Beginning in 2019.2, Tableau Server includes the ability to configure Referrer-Policy HTTP header behaviour. This policy is enabled with a default behaviour that will include the origin URL for all "secure as" connections (`no-referrer-when-downgrade`), which sends origin referrer information only to like connections (HTTP to HTTP) or those that are more secure (HTTP to HTTPS).

However, we recommend setting this value to `same-origin`, which only sends referrer information to same-site origins. Requests from outside the site will not receive referrer information.

To update the referrer-policy to `same-origin`, run the following commands:

```
tsm configuration set -k gateway.http.referrer_policy -v same-origin  
  
tsm pending-changes apply
```

For more information about configuring additional headers to improve security, see HTTP Response Headers.

## 15. Configure TLS for SMTP connection

Beginning in 2019.4, Tableau Server includes the ability to configure TLS for the SMTP connection. Tableau Server only supports STARTTLS (Opportunistic or Explicit TLS).

Tableau Server can be optionally configured to connect to a mail server. After configuring SMTP, Tableau Server can be configured to email server administrators about system failures, and email server users about subscribed views and data-driven alerts.

To configure TLS for SMTP:

1. Upload a compatible certificate to Tableau Server. See `tsm security custom-cert add`.
2. Configure TLS connection using TSM CLI.

Run the following TSM commands to enable and force TLS connections to the SMTP server and to enable certificate verification.

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_
enabled -v true
```

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_
required -v true
```

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_
check_server_identity -v true
```

By default, Tableau Server will support TLS versions 1, 1.1 and 1.2, but we recommend that you specify the highest TLS version that the SMTP server supports.

Run the following command to set the version. Valid values are `SSLv2Hello`, `SSLv3`, `TLSv1`, `TLSv1.1`, and `TLSv1.2`. The following example sets the TLS version to version 1.2.:

```
tsm configuration set -k svcmonitor.notification.smtp.ssl_ver-
sions -v "TLSv1.2"
```

For more information about other TLS configuration options, see [Configure SMTP Setup](#).

3. Restart Tableau Server to apply changes. Run the following command:

```
tsm pending-changes apply
```

## 16. Configure SSL for LDAP

If your Tableau Server deployment is configured to use a generic LDAP external identity store, we recommend configuring SSL to protect authentication between Tableau Server and your LDAP server. See [Configure Encrypted Channel to LDAP External Identity Store](#).

If your Tableau Server deployment is configured to use Active Directory, we recommend enabling Kerberos to protect authentication traffic. See [Kerberos](#).

## 17. Scope permissions for non-default installation locations

If you install Tableau Server on Windows to a non-default location then we recommend manually scoping the permissions on the custom installation directory to reduce access.

By default, Tableau Server will install on the system drive. The drive where Windows is installed is the system drive. In most cases, the system drive is the C:\ drive. In this default case, Tableau Server will install into the following directories:

- C:\Program Files\Tableau\Tableau Server\packages
- C:\ProgramData\Tableau\Tableau Server

However, many customers install onto a non-system drive or into a different directory. If you selected a different installation drive or directory location during Setup, then the data directory for Tableau Server will install into the same path.

To scope permissions on the custom installation directory, only the following accounts should have the corresponding permissions on the installation folder and all subfolders:

| Set permissions for this account: | Permissions required |
|-----------------------------------|----------------------|
|-----------------------------------|----------------------|

|                                                                     |                |
|---------------------------------------------------------------------|----------------|
| The user account that is used to install and upgrade Tableau Server | Full control   |
| The user account that is used to run TSM commands                   | Full control   |
| System account                                                      | Full control   |
| Run As service account, Network Service and Local Service           | Read & execute |

A procedure for setting these permissions can be found at [Installing in a non-default location](#).

## Change List

| Date          | Change                                                                                                                                                                                                   |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| May 2018      | Added clarification: Do not disable REST API in organizations that are running Tableau Prep.                                                                                                             |
| May 2019      | Added recommendation for referrer-policy HTTP header.                                                                                                                                                    |
| June 2019     | Removed recommendation to disable Triple-DES. As of version 2019.3, Triple-DES is no longer a default supported cipher for SSL. See <a href="#">What's Changed - Things to Know Before You Upgrade</a> . |
| January 2020  | Added recommendation to configure TLS for SMTP.                                                                                                                                                          |
| February 2020 | Added recommendation to configure SSL for LDAP server.                                                                                                                                                   |
| May 2020      | Added TLS v1.3 to the disabled list of TLS ciphers. Added clarification to introduction about topic versioning.                                                                                          |
| August 2020   | Added scoped permissions for non-default installations on Windows                                                                                                                                        |
| October 2020  | Added TLS v1.3 as a default supported cipher.                                                                                                                                                            |



|               |                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------|
| January 2021  | Added clarification: All products enabled by the Data Management license require REST API.                                             |
| February 2021 | Removed recommendation to disable REST API. The API is now used internally by Tableau Server and disabling it may limit functionality. |

## Manage Licences

You can manage your Tableau Server licences and view licence usage.

### Licensing Overview

An important administrative role in a Tableau Server deployment is the Tableau portal administrator. The portal administrator manages licensing and the associated keys for the Tableau deployment. As the portal administrator, your first step is to purchase licences on the [Tableau Customer Portal](#). When you purchase licences, the portal will return corresponding product keys. To renew your licence, visit the [Tableau renewal](#) web page.

Tableau has a number of products (Desktop, Server, Prep Builder and more). Each of the Tableau products require that you activate licences by updating the Tableau software with the product keys that are purchased and stored on the Tableau Customer Portal. As the administrator who is tasked with activating Tableau licences, it is important that you understand the relationship between licences and keys. See [Understanding Licence Models and Product Keys](#).

### Activation

Activation is the process of uploading and saving Tableau product keys to Tableau Server. This operation is done with Tableau Services Manager (TSM). TSM is a tool that makes changes to the local operating system and file system and therefore requires administrative access to the local computer. A TSM administrator requires different permissions and access than a Tableau Server administrator, which is the administrative role for day-to-day operation

of Tableau Server tasks, such as adding users, sites, managing projects and permissions, etc. See [Administrative roles](#) for more information about various Tableau Server administrative roles.

The following topics describe how to connect to TSM:

- [Sign in to Tableau Services Manager Web UI](#)
- [tsm Command Line Reference](#)

### Online activation

If your Tableau Server installation is able to communicate with the internet, then we recommend using the default online activation method.

- To understand how to activate during the installation process, see [Activate and Register Tableau Server](#).
- To understand how to activate product keys after you have refreshed your subscription, see [Refresh Expiration Date and Attributes for the Product Key](#).
- To understand how to activate product keys after you have added purchased new features or user licences, see [Add Capacity to Tableau Server](#).

### Offline activation

If Tableau Server is running in an offline environment, where it is not possible to access the Tableau licence servers on the internet, then you must activate licences according to the Tableau offline activation process:

- To understand how to activate offline, see [Activate Tableau Server Offline](#).
- To understand how to deactivate a product key that you activated using offline activation, see [Deactivate Tableau Server Offline](#).

### Lost activation

In some cases licence activations can fail after the licence has been activated. These failures can occur due to connection failures with local processes or when a change has occurred with the VM or hardware configuration. For example, proxy changes, port blocking, network changes or altering a machine hardware can cause the licensing activation to fail. If Tableau

## Tableau Server on Windows Help

Server is unable to verify the licence, operation may be interrupted and the server will be in an “unlicensed” state.

To view the product keys and the Tableau Server licence state, run `tsm licenses list` and `tsm status -v`.

Depending on the product key that is unverified, Tableau Server may operate in a degraded state until the product key is in a valid state. See [Troubleshoot Licensing](#).

### Deactivate

You can activate the same Tableau Server product key on up to three environments. This allows you to test Tableau Server (in a sandbox or QA environments, for example), as well as use Tableau in production. To maximise your activations, you should deactivate your product key when you remove Tableau Server from a computer or close down a VM, unless you will be reinstalling Tableau on the same computer. Doing this gives you the opportunity to use the activation on a different computer. For example, if you move Tableau Server from one computer to another, deactivate the product key, then remove Tableau from the original computer. When you install Tableau on the new computer, you can activate the key there without any conflict. If you are removing Tableau Server to reinstall it on the same computer, you don't need to deactivate the key. Tableau will use the key when reinstalled unless an obliterate command was performed with the “-l” option

See [Deactivate Product Key](#).

### Tableau Server licensing and virtual machines (VMs)

If you run Tableau Server on VMs, either locally or in the cloud, be aware of the potential for complications related to licensing. If you are simply upgrading Tableau Server on the VM, you do not need to take any extra action related to licensing. If you plan to clone the VM to create either a new production or test environment to upgrade, you need to deactivate any Tableau Server licences before cloning. If you do not do this, the new VM environment will end up with untrusted licences, and any attempts to upgrade or start Tableau Server will fail. You may also end up hitting the maximum number of activations for the licences when trying to activate the product keys on the new VM.

To avoid issues with licensing on VMs, deactivate all Tableau licences before cloning a VM or allowing it to be permanently shut down.

## Login-based Licence Management

Login-based licence management helps you manage licensing for users with Creator roles on Tableau Server and Tableau Cloud. Users with Explorer or Viewer roles cannot use this feature. If you're using Role-Based Subscriptions with Tableau Server or Tableau Cloud, you can simplify your licence management using login-based licence management to eliminate separate Tableau Desktop and Tableau Prep Builder product keys. You only need to manage one or more product keys for on-premises Tableau Server, or in the case of Tableau Cloud, you don't need to manage any product keys at all.

See [Login-based Licence Management](#).

## Adding users

Each user who accesses resources on Tableau Server must be licensed.

- To understand user roles and licensing, see [Understanding Licence Models and Product Keys](#).
- To understand how to add users, see [Add Users to Tableau Server](#).
- To understand how to activate product keys after you have added purchased new user licences, see [Add Capacity to Tableau Server](#).

## Understanding Licence Models and Product Keys

This topic describes the different licensing models and the product keys or subscriptions that may be associated with them. A useful visual of how product keys are represented in Tableau Server can be found in [tsm licences list](#). The [Tableau Customer Portal](#) will also display product key information including type and seat count.

When viewing product keys using [tsm licences list](#) (Tableau Server), or in the [Tableau Customer Portal](#) (Tableau Desktop and Tableau Prep Builder), note the product specific prefixes.

| Product | Description |
|---------|-------------|
|---------|-------------|

| Key Prefix |                                                                                                                                                               |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TC         | Tableau Creator product key, can be used to activate or deactivate Tableau Desktop and Tableau Prep Builder.                                                  |
| TD         | Tableau Desktop product key, can be used to activate or deactivate Tableau Desktop only. This is a legacy product key that is no longer sold or provided.     |
| TS         | Tableau Server product key, can be used to activate or deactivate Tableau Server. Tableau Server product keys can be role-based, core-based or feature-based. |

## Term licensing models

Tableau's term "licence model" is defined by the metric that permits use of Tableau Server. Term licences are also called subscription licences. Tableau currently sells access to Tableau Server with subscription licences. In the subscription licence model, customers pay a yearly subscription fee. If the subscription expires, the software will stop working.

Subscription licences are either role-based or core-based subscriptions. A single license key can be purchased with all roles and features and this license is called an Updatable Subscription License (USL). Only one key needs to be activated on Tableau Server to represent the entire purchase.

Previous subscription licences (non-USL) were provided with one role type per key and the licences were "stacked" and activated together to obtain the purchased configuration on Tableau Server.

- A *role-based licence* allows you to deploy Tableau Server on a single computer or on multiple computers in a cluster. Each user that accesses Tableau Server must be licensed and assigned a role. Administrators can add users based on available licences of each type.
- A *core-based licence* imposes no constraints on the number of user accounts in Tableau Server. Instead, the licence specifies the maximum number of computer cores

on which you can run Tableau Server. You can install Tableau Server on a single computer or across multiple computers as a multi-node cluster, as long as the total number of cores in all the computers does not exceed the total number that the licence allows.

Not all processes installed with Tableau Server impact the calculation of total number of cores used. A subset of processes is considered "licensed processes". Core licensing is calculated only on computers running licensed processes. If a computer has one or more licensed processes installed on it, the cores on that computer count toward the total cores used. For more information about licensed processes, see [Licensed processes](#).

- An *updatable subscription licence*, enables you to consolidate licences and update your Tableau Servers using a single product key. You can add new features, adjust capacity, and apply licence renewals to a single existing Tableau Server licence. You no longer need to add new licences or replace existing ones. USL:
  - Simplifies key management by reducing the number of product keys that you must manage for ease of maintenance.
  - Minimises service interruptions because you don't have to restart Tableau Server after renewing a licence, adjusting capacity or adding new features.

For Updatable Subscription Licences (USL), your product key in the Tableau Customer Portal does not change even when updated with new features or changes to role counts. With the non-USL subscription licence model, you get a new key in your Customer Portal after each licence renewal. A new product key will appear in the TSM web UI after the previous product key expires when viewing a non-USL subscription product key. For Updatable Subscription Licences (USL), your product key does not change in the UI or Tableau Customer Portal. In the Tableau Customer Portal, USL licences display a selected **Is USL Key** tick box on the **Licence Detail** page or by **true** in the **Is USL Key** column on the **Licences** tab.

In the output returned by `tsm licences list`, the `TYPE` field describes the user licence metric. In the Tableau Services Manager Web UI, hover over the `Type` field (or column) to verify if the key is an Updatable Subscription Licence (USL) product key.

### Role-based licence model

Tableau offers role-based term licences that grant a range of capabilities at various price points. Four types of role-based term licences are available: Display, Viewer, Explorer and Creator.

- *Display licences* let users share and display Tableau content with a broad, internal audience of users who consume dashboards via shared displays with no interaction. There is no separate site role for Display licences; when using a Display licence, administrators create a dedicated login account for each licensed Display location, which is not the same as an individual user's login account, and assign the maximum site role of Viewer.
- *Viewer licences* let users view and interact with workbooks in Tableau Server. Viewer licences also let users access Tableau Mobile, add comments to workbooks, export visuals in various formats, download workbook summary data, create subscriptions for themselves and receive data-driven alerts.
- *Explorer licences* are similar to the user-based licences available in previous Tableau Server releases, and include the capabilities provided with Viewer licences and additional capabilities. An Explorer licence allows access to workbook authoring capabilities using a web browser, as well as a full set of collaboration features.
- *Creator licences* permit a wide range of capabilities when using Tableau Server, and also grant use of Tableau Desktop and Tableau Prep Builder. A Creator licence allows all the capabilities available under the Explorer licence, as well as the following capabilities when using Tableau Server:
  - Create and publish new workbooks from a new data source.
  - Edit embedded data sources in the Data pane.
  - Create and publish new data connections.
  - Use login-based licence management activation on Tableau Desktop and Tableau Prep Builder.

**Note:** Tableau Server Administrators will always consume the highest role available. If you activate a product key that contains the Creator role, the Tableau Server Administrator(s) will take this role. If the highest role available on Tableau Server is an Explorer, the Server Administrator will take the Explorer role. If a Creator role is added to a server

where no Creators are currently activated, any existing Server Administrator accounts using Explorer licences will automatically convert to use Creator licences.

TSM administrator accounts do not require licences.

For non-USL licences, product keys are used to activate and add licences to Tableau Server. When an update to capacity or functionality is purchased with a non-USL product key, the Tableau Server Administrator can activate these additional product keys. For USL product key(s), one product key is activated that contains all roles and features. If a USL licence has been updated to change functionality, features or role counts, no additional product keys will be issues or need to be activated.

For Updatable Subscription Licence (USL) product key(s), when a key has been updated with a new subscription term, feature or role count change, the Server ATR service automatically obtains these updates and no additional key(s) need to be activated. USL licences and Server ATR activations do not require refreshes to obtain these changes. Everything will be handled by the Server ATR service. For a USL product key using the non-Server ATR activation method, refreshes need to occur to obtain the update to the USL product key. For non-USL product keys, when an update to capacity or functionality is purchased, additional product keys are provided in the Tableau Customer Portal that you need to activate on Tableau Server.

If you're using non-USL product keys, select a Tableau Server Creator product key from the Tableau Customer Portal to ensure that you can create a Tableau Server Administrator. Explorer and Viewer product keys can then be activated to add additional licences. Once the product keys have been activated, administrators can add users and assign them site roles, which automatically consume available licences.

In the output returned by `tsm licences list`, the `CREATOR`, `EXPLORER`, `VIEWER` fields display the number of licences for each role licence type. For non-USL product keys, each role is governed by its own product key. Therefore, if your organisation has purchased licences for



all three roles, then you must activate three product keys. For USL product key(s), one key has all roles and features which is reflected in TSM.

### Core-based licence model

In a core licensing model, the licence defines the number of total computer cores the server can run on, instead of how many users can be added. This means the server can support virtually unlimited users (as Explorers or Viewers; the legacy term for these types of roles was "interactors"). Core-based licence also allows a Guest User account, which is not possible with role-based licensing.

However, core licensing on its own does not include Creator seats on the server (those site roles will be greyed out when adding users).

New data sources can only be added to the server by publishing from Tableau Desktop or via a browser by a user with a Creator site role on the server. Therefore, there must either be (a) a user with a Creator site role on the server, or (b) a licensed Tableau Desktop and a user with Explorer (can publish) site role. For route (b), there are two ways to licence Tableau Desktop in a core-based server organisation:

- At least one role-based Creator licence (which includes Tableau Desktop and Tableau Prep Builder), or
- At least one licensed Tableau Desktop that uses a legacy Tableau Desktop product key.

Note that if a Creator licence is stacked on a server with core-based licensing, that role-based Creator licence will be consumed by an admin. The only way to give a Creator site role to a non-admin user is to first ensure that all admins have Creator licences. Only then can additional Creator licenses be used to assign a Creator site role to non-admin users.

In the output returned by `tsm licences list`, the `TYPE` field will display the number of cores that are licensed. Additionally, the `GUEST ACCESS` field will display `true`.

### Embedded Analytics usage-based model

Tableau's Embedded Analytics offering is a usage-based licence for Tableau Server that's made available to customers who want to embed Tableau Server functionality into an external facing solution to provide Tableau content and insights to clients outside of their organisation.

**Note:** Embedded Analytics licences cannot be used in the same environment as full-use licences. To change to an Embedded Analytics licence, first deactivate your existing full-use licences and then activate the Embedded Analytics licence.

For example, consider an organisation that runs a service where they analyse consumer data and generate reports on behavioural patterns regarding different consumer demographics. In this scenario, Tableau Server acts in support of a specific proprietary application titled 'Demographics Analyser' and connects with exported TXT files and an SQL database. The organisation makes visualisations available to its clients in a secure portal, where clients log in to manage their account and view the results. End users are uniquely identified by the account they use to access the portal. This determines the number of User-Based Embedded Analytics Server licences.

The Embedded Analytics licence is not displayed in the output returned by tsm licences list. To verify the licence contact [Customer Success](#).

## Perpetual licence model (legacy)

In the past, Tableau sold access to Tableau Server with perpetual licences. Although these licences are no longer available, some customers use this licensing arrangement.

In the perpetual licence model, customers paid a maintenance subscription that was renewed annually. If maintenance expires, the software continues to work, but the customer loses access to technical support and software upgrades. Purchasing annual maintenance for perpetual licences is no longer possible.

Perpetual licences were either sold for a specific number of users, called interactors, or for a specific number of cores:

- Interactor licensing is a named-user model where customers purchased licences by the seat, similar to current role-based licensing. However, unlike role-based licensing, where different access roles are priced accordingly, in interactor licensing, licences

were unbound by role. Licensed users could be Server admins, Site admins, Publishers, Interactors or Viewers. User roles were set by the administrator only as a means to manage access to content and server configuration.

If you activate a valid Server Interactor key on version 2020.4 or later, the Interactor count is mapped to the Explorer role.

Interactor perpetual core licences cannot use login-based license management. You must purchase a Creator term licence, also called a Creator subscription licence, in order to use login-based licence management with Tableau Desktop or Tableau Prep Builder.

- Perpetual core licensing has the same model as subscription core licensing, it specifies the number of computer cores the software can be run on and supports unlimited users and a guest account.

In the output returned by `tsm licences list`, the `TYPE` field displays `Perpetual`. Note also that the `MAINT EXP` date is also displayed.

## Licence editions

Licence editions include a suite of features and functionality to which users are entitled.

Licence editions cannot be mixed within a deployment, meaning all users on a deployment must be on the same licence edition. Consider the needs of your entire deployment when selecting your licence edition.

### Tableau licence edition

Tableau licence edition is the standard Tableau Server edition. It provides Tableau Server access for each licensed user, governance, collaboration, data prep and visual analytics functionality.

### Tableau Enterprise licence edition

Enterprise edition is designed for sophisticated business environments on Tableau Server. It is ideal for organisations that require advanced administration, security and data management

functionality to scale to more users in more complex data environments and meet Enterprise standards.

For more information and a list of features included with Tableau Enterprise, see [About Tableau Enterprise](#).

**Note:** The Tableau+ licence edition is available exclusively for Tableau Cloud. For more information and a list of features included with Tableau+, see [About Tableau+](#) in the Tableau Cloud Help.

## Feature licences

Feature licences are sold differently than other licences. Features with independent licences must be licensed for every user (or all cores) in the deployment. A deployment includes a licensed production Tableau Server installation and licensed non-production Tableau Server installations that support the production installation.

These features are licensed annually, and in the context of licensing, the availability of these features to the user base are “all or none”.

- Data Management
- Advanced Management
- Login-based Licence Management

**Note:** Updatable subscription licences include both features and roles in one licence. You no longer need to activate multiple licences and product key(s) for different features and their associated roles.

### Data Management

The Data Management licence includes Tableau Catalog and Tableau Prep Conductor for a single Tableau Server deployment, which may be role-based or core-based. For more information, see [About Data Management](#).

Data Management may require resource cores, which specifies the computing power that is used to run flows for Prep Conductor. Servers with core-based licensing are required to purchase at least four Resource Cores. See [Licence Data Management](#).

In the output returned by `tsm licences list`, a single product key for Data Management is indicated by the `DATA MANAGEMENT` field, which displays `true` under the appropriate licence.

### Advanced Management

Tableau Server Advanced Management is licensed on a per-deployment basis, which may be role-based or core-based. For more information on Advanced Management and the features included, see [About Tableau Advanced Management on Tableau Server](#).

In the output returned by `tsm licences list`, a single product key for Advanced Management is indicated by the `SERVER MANAGEMENT ADD-ON` field, which displays `true` under the appropriate licence.

### Login-based Licence Management

Login-based licence management (LBLM) simplifies licensing for Tableau Desktop and Tableau Prep Builder. Instead of using product keys, these products are activated when a user with a Creator's licence authenticates with Tableau Server. If a customer is using Tableau Desktop or Tableau Prep Builder without Tableau Server, LBLM cannot be used.

**Note:** As of Tableau Server version 2023.1, LBLM is supported in offline deployments. To deploy Tableau Server with LBLM enabled, you must configure Tableau Server to use Authorisation-To-Run (ATR) Service. For more information, see [Activate Tableau Server Offline](#).

For more information, see [Login-based Licence Management](#).

In the output returned by `tsm licences list`, a single product key for login-based licensed management is indicated by the `LBLM` field, which displays `true` under the appropriate licence.

## Updateable Subscription Licensing (USL)

Updateable Subscription Licensing (USL) is the latest improvement to Tableau's licence activation and server administration experience.

### Understanding the Basics of USL

Updateable Subscription Licensing simplifies the requirements of licence management for Tableau Server by eliminating the need to manage multiple separate Product Keys for various product types, capacities or subscription periods. Instead, all licensed features and attributes of your Tableau Deployment (its "Licence Entitlement") are provisioned as a single unified Product Key.

Additionally, USL consolidates the delivery of subsequent licence renewals, add-ons and entitlement changes into updates which are made to that single, updateable Product Key over time, so it consistently reflects the complete Licence Entitlement for its designated Deployment. You can think of each update like adding a layer of new attributes (depicted as rings within the graphic below) to your existing Product Key; these layered updates each have a unique corresponding Activation ID. When you sync your Server installation with Tableau's licensing service (by activating or refreshing your Product Key), the latest Activation ID is pulled down to your local Server installation in order to reflect your Deployment's updated Licence Entitlement.

The process required to pull down your Product Key's latest Activation ID differs depending on your Deployment's internet connectivity.

### Activating USL in Online/Connected Environments

In online/connected environments, the USL Product Key used to activate and unlock the Licence Entitlement for your Deployment remains constant over time.

- By simply activating or refreshing the original USL Product Key (reflected as the "Key Name" in the Tableau Customer Portal), a connected environment will automatically pull down the latest current Activation ID available for your Licence Entitlement,

facilitated by the live communication with Tableau's hosted licensing services.

- For Server installations configured to use Tableau's Authorisation to Run (ATR) licensing service, these updates are downloaded silently in the background during periodic Server check-ins with the ATR service; no additional action needed!

## Activating USL in Offline or Disconnected Environments

In offline or disconnected environments, there is no direct communication between Server and Tableau's hosted licensing services, so the USL Product Key cannot be used to automatically retrieve new Activation ID updates.

- Instead, administrators must directly activate the latest Activation ID through Tableau's Offline Activation process to reflect updates to the Deployment's Licence Entitlement.
- Once a new Activation ID is added to your Licence Entitlement, no prior Activation ID can be used for activation; they become functionally obsolete.
- For this purpose, the latest current Activation ID is always reflected in the Tableau Customer Portal as the "Offline Activation ID" visible in the Licence Detail view for your USL Product Key.
- Because new Activation IDs are generated for any update to your Licence Entitlement, the Offline Activation ID will change repeatedly over time. Refer to the figure below depicting the layering of new Offline Activation IDs over time.

**Important:** Offline activation of Tableau requires that customers use the most current Offline Activation ID to activate any new installation of the Software.

### Managing licence entitlement updates in offline environments

Given the requirement to leverage the most current Offline Activation ID when activating your USL Product Key in a disconnected environment, it's important to get your current Offline Activation ID from the Tableau Customer Portal before attempting to activate any new or existing installation of Tableau Server. This may not match the one you last used.

Salesforce's provisioning systems periodically synchronise to ensure complete and accurate fulfilment, and this can generate a new Offline Activation ID for your Licence Entitlement unrelated to any specific purchase or subscription renewal. Be sure to check the Customer Portal *before* any change to the active licensing in your Deployment, including prior to deploying any new installations of Server Software, to confirm the current Offline Activation ID and ensure successful activation.

The following are some key points related to the Offline Activation ID life cycle:

- Successful activation *will always require*
  - a. Deactivation of the earlier Offline Activation ID, and
  - b. Activation of the current Offline Activation ID.

For Server installations configured to use ATR (offline), deactivation of the earlier Offline Activation ID is handled automatically.

- The issuance of a new Offline Activation ID *will prevent new* activations using any prior Offline Activation ID.

For this reason, be sure to consult the Customer Portal before any licensing update in your deployment.

- The issuance of a new Offline Activation ID *will not impact* any Server environment where you have previously activated your USL Product Key.
  - These installations won't reflect your updated Licence Entitlement until the new Offline Activation ID is directly applied.

## USL Offline Activation Instructions

To activate USL in an offline or disconnected environment:

1. Identify the current Offline Activation ID for your Tableau Server Deployment.

You can find the Offline Activation ID in the Tableau Customer Portal by navigating to the **Licences** pane and clicking on your USL Product Key to open the Licence Details



## Tableau Server on Windows Help

view. The 20-digit string is labeled "Offline Activation ID". For further detail, see the Knowledge Base article [Find the Correct Key to Offline Activate on Tableau Server](#)

### 2. Activate the Offline Activation ID on Tableau Server.

With the Offline Activation ID accessible, follow the steps outlined in the Tableau Help to activate Tableau Server offline (applicable to both USL and pre-USL Product Keys).

#### Activate Tableau Server Offline

#### USL offline licence entitlement updates

The steps required for changes in your licence entitlement in an offline environment depend on your method of activation (ATR or legacy FNO) and your Tableau Server version.

- ATR *and* version 2023.1.0 or higher:

If you activated with ATR and have version 2023.1+, use the new Offline Activation ID from your Customer Portal to update your licence entitlement changes. The ATR service handles any other necessary actions.

- Legacy FNO activation *or* any version before 2023.1.0:

#### 1. Obtain Current Offline Activation ID from the Customer Portal

#### 2. Stop Tableau Server:

```
tsm stop
```

#### 3. Initiate an offline deactivation of the existing, activated key on Server. This Offline Activation ID is now obsolete in your environment. The offline deactivation creates a return request file. Save this file. You need it for a future step.

#### 4. Initiate an offline activation request for the current Offline Activation ID. This generates an activation request. Save this file for the next step.

5. Transfer both the return request file and the activation request files to a computer that has internet access.
6. Navigate to the [Offline Activation page](#) and initiate two requests in this order:
  - a. Upload the return request file and download the response file; save and continue.
  - b. Upload the activation request file and download the response file; save and continue.
7. Transfer both the return response file and the activation response file to the disconnected Tableau Server computer.
8. Apply the return response file.
9. Apply the activate response file.
10. Start Tableau Server:

```
tsm start
```

## View Server Licences

Server administrators can view the licence and product key information for Tableau Server.

### Viewing licences from the Tableau Server web UI

How you navigate to the Licences page in Tableau Server depends on whether you have a single site or multiple sites.

- On a server with a single site, click **Settings** and **Licences**:
- On a multi-site server, click **Manage all sites** on the site menu, **Settings**, and **Licences**:

**Note:** The **Manage all sites** option only displays when you are signed in as a server administrator.

This page displays information for any licences that have been activated on your server, including any user-based (term) or core-based licences.

## Use the TSM web interface

1. Open TSM in a browser:

`http://<tsm-computer-name>:8850`

2. Click **Configuration** , and then click **Licensing** :

The table displays the product key, expiration date and expiration of maintenance.

**Note:** The TSM Web UI provides a limited amount of licensing information. Use the TSM CLI or the Tableau Server Web UI to see additional licensing information, including the number of each type of user-based licence (Creator, Explorer and Viewer).

## Use the TSM CLI

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm licenses list
```

The command lists licences that are activated on the Tableau Server deployment.

For example, a server with five Creator licences, five Explorer licenses, 100 Viewer licences and Data Management would provide command output similar to the following:

```
C:\Windows\system32>tsm licenses list
Number of product keys: 4
The following license keys will expire soon. Access renewal resources including information on how to renew your software or change your billing preferences here https://www.tableau.com/support/renew
TS9D-86C2-8F78-89CA-38EC TS9R-3861-8888-9C5A-C7D0 TS4D-176C-E848-3410-5E15 TSQJ-8888-5CF8-F066-2DAF
KEY TYPE CREATOR EXPLORER VIEWER DATA MANAGEMENT ADD-ON GUEST ACCESS LIC EXP MAINT EXP UPDATABLE LBLN SERVER MANAGEMENT ADD-ON
TS9D-86C2-8F78-89CA-38EC Term 0 0 100 false false 11/30/20 N/A false false false
TS9R-3861-8888-9C5A-C7D0 Term 0 0 0 true false 11/30/20 N/A false false false
TS4D-176C-E848-3410-5E15 Term 0 5 0 false false 11/30/20 N/A false false false
TSQJ-8888-5CF8-F066-2DAF Term 5 0 0 false false 11/30/20 N/A false false false
```

The following fields are returned:

- **KEY:** A globally unique 16-character string that identifies the licence.
- **TYPE:** Describes the type of licence
  - **Term:** Term licences map to a subscription schedule and must be renewed. The expiration date is listed under the LIC EXP field.
  - **Perpetual:** Perpetual licences are purchased once and do not need to be renewed but must be refreshed to update the MAINT EXP or maintenance expiration date.
  - **Cores:** Core licences are licences that map to the number of cores on the computers running specific Tableau Server services. Core licensing allows for a guest user access to views on the server or embedded on other web servers. Core licences also allow for unlimited Explorer and Viewer users.
- **CREATOR:** The number of Creator licences issued to the Tableau Server deployment.
- **EXPLORER:** The number of Explorer licences issued to the Tableau Server deployment.
- **VIEWER:** The number of Viewer licences issued to the Tableau Server deployment.
- **DATA MANAGEMENT:** Tableau Server is licensed with Data Management (True/False). See About Data Management.
- **GUEST ACCESS:** Tableau Server is licensed for a Guest User. See Guest User. The ability to leverage a Guest User requires Core licensing. See TYPE field.
- **LIC EXP:** The date that the licence expires and Tableau Server will stop working. Term licences expire. See TYPE field. Visit the Tableau [Customer Portal](#) to refresh licences.
- **MAINT EXP:** Applies only to legacy perpetual licences (TYPE = Perpetual). For Term licences, this field will output N/A. MAINT EXP displays the date that the maintenance contract for the Tableau Server deployment expires. To update the licence maintenance key see Refresh Expiration Date and Attributes for the Product Key. Visit the Tableau [Customer Portal](#) to view maintenance purchase history and to purchase additional maintenance.

- **UPDATABLE:** Specifies whether the licence is an updatable subscription licence (`True/False`).
- **LBLM:** Specifies if login-based licence management (LBLM) is enabled for the Tableau Server deployment (`True/False`). When enabled, LBLM allows users to log into Tableau Server to licence their instance of Tableau Desktop or Prep, rather than entering a product key. For more information about LBLM, see [Login-based Licence Management](#).
- **SERVER MANAGEMENT:** Tableau Server is licensed for Advanced Management (formerly Server Management Add-on) (`True/False`). For more information about Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

**Note:** The licence terms for Creator, Explorer and Viewer users are set according to the terms of the user-based licence (term licence), if present. So, a server with only a core-based licence will have unlimited Explorer and Viewer users and guest access, but no Creator users. To learn more, see [Use role-based licences on a server with core-based licensing](#).

## Refresh Expiration Date and Attributes for the Product Key

When using Server ATR and Updatable Subscription Licensing (USL), you don't need to refresh your product key(s) when you purchase a new subscription term, or add roles and/or features to your deployment. That's because USL product keys can be updated to reflect changes to your Tableau Server licence capacity, feature and subscription term over time, and Server ATR automatically refreshes product key(s) for you as a background process.

**Note:** If you were recently enabled for USL alongside your subscription renewal, you cannot refresh your licensing as outlined here. Instead, refer to the [Tableau Customer Portal](#) for the new USL-compatible product key, which must be activated within your deployment; see [Activate and Register Tableau Server](#). Your original product keys have not been renewed and should no longer be used in your deployment.

If you aren't using Server ATR, you can refresh your product key(s) manually. If you refresh a subscription (term) product key before the expiration date occurs, the product key will not change but the expiration date will. This can create a mismatch between the product keys listed in the Tableau Customer Portal and those listed in the Tableau Server TSM product key list. The product key will change when the expiration date occurs or shortly thereafter. If a subscription (term) product key is not refreshed and has expired, Tableau will stop working and you will have to activate a new product key from the Tableau Customer Portal to relicense your Tableau Server installation, regardless of whether you are using Server ATR or manual activation methods.

On the other hand, if the product key is perpetual (legacy) and its maintenance has expired, Tableau will continue to operate but you will not have access to upgrades until the maintenance is renewed. After renewing the maintenance, if you aren't using Server ATR, you must refresh the existing product key to update its maintenance expiry date. The product key will never change. For more information about different product key types and associated licences, see [tsm licences list](#).

**Note:** This topic describes how to refresh the expiration date for Tableau Server, Advanced Management and Data Management. For information about refreshing the maintenance date on Tableau Desktop see [Refresh the product key](#) in the Tableau Desktop and Tableau Prep Deployment Guide.

## Before you begin

Verify the expiration date of your licence(s). You can view the expiration date by following the TSM web interface procedure below, or by running `tsm licences list` in the CLI.

- Compare the date with the date displayed in the [Tableau Customer Portal](#).
- If the portal does not display the date that you expect, contact [Customer Success](#).
- To renew your licence, visit the [Tableau renewal](#) web page.

If the TSM date does not match the date displayed in the Tableau Customer Portal and the following refresh operation fails, contact [Tableau Support](#).

**Note:** To refresh your product key in an offline environment, visit the Tableau Customer Portal to obtain the Offline Activation ID for your latest renewal, and then activate it. For more information about offline activation, see [Activate Tableau Server Offline](#). Activate all product keys before starting Tableau Server. Otherwise some users might become unlicensed.

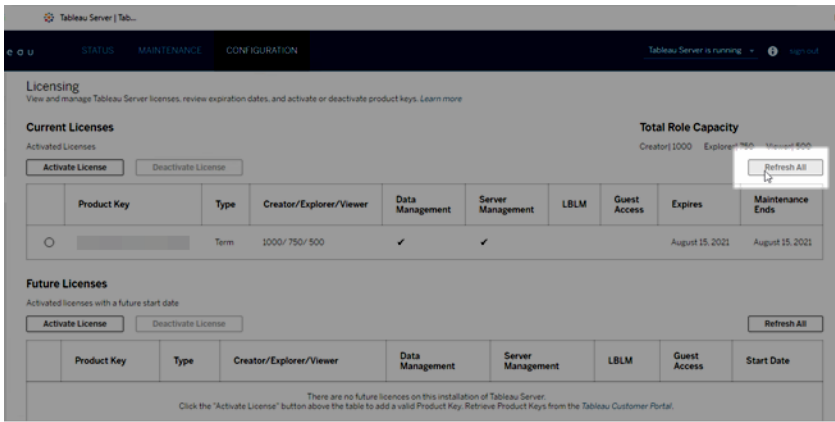
## Use the TSM web interface

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.

2. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

3. Click **Configuration** and **Licensing** and click **Refresh All**:



## Use the TSM CLI

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).

2. Run the following command:

```
tsm licenses refresh
```

## Add Capacity to Tableau Server

You may need to add capacity to your Tableau Server installation to allow you to increase the number of users (if you have a user-based licence) or the number of cores (if you have a core-based licence).

Tableau will provide you with a new product key that adds capacity to your existing Tableau Server installation. You need to activate this key and use it together with your existing product key(s) to get the combined capacity you are licensed for. Each feature (e.g. "Data Management") and licence type (e.g. "Explorer") requires a key. For more information about the relationship between keys and licences, see [tsm licences list](#).

Follow the steps below to add a product key to Tableau Server.

If your Tableau Server is not connected to the internet, then you must perform an offline activation. See [Activate Tableau Server Offline](#).

**Note:** If you have upgraded to Tableau Server version 2021.1 or later, you no longer need to restart Tableau Server when you add capacity. For more information, see [Zero Downtime Licensing](#).



## Use the TSM web interface

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. Open TSM in a browser:

```
https://<tsm-computer-name>:8850
```



3. Click **Licensing** on the **Configuration** tab and click **Activate Licence**:

| Product Key                                                                                                                                                         | Seat Licenses | Expires          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
|   | 15            | May 1, 2018      |
| trial                                                                                                                                                               | 10            | January 22, 2018 |

Access Tableau Server product keys in the [Customer Portal](#). View [Desktop License Usage](#) for more information about

4. Enter or paste your new product key and click **Activate**:

**Activate License**

Enter a 20-digit Tableau Server Product Key

0000-0000-0000-0000-0000

[I can't find my product key.](#)

5. After activating the licence, you may be prompted to register with Tableau. On the Register page, enter your information into the fields and click **Register**.



Register with Tableau. All fields are required.

**Contact Information**

|                      |                      |
|----------------------|----------------------|
| First Name           | Last Name            |
| <input type="text"/> | <input type="text"/> |
| Phone Number         | Email                |
| <input type="text"/> | <input type="text"/> |

**Company Information**

|                      |                      |
|----------------------|----------------------|
| Organization         |                      |
| <input type="text"/> |                      |
| Industry             | Company Size         |
| <input type="text"/> | <input type="text"/> |
| Department           | Job Role             |
| <input type="text"/> | <input type="text"/> |

**Region Information**

|                      |                      |
|----------------------|----------------------|
| City                 | Postal Code          |
| <input type="text"/> | <input type="text"/> |
| Country/Region       | State/Province       |
| <input type="text"/> | <input type="text"/> |

## Use the TSM CLI

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. Copy the product key to your computer.
3. Run the following command:

```
tsm licenses activate --license-key <license key>
```

4. After activating the licence, you may need to register Tableau Server. To do this, create a registration file and then pass it as an option with the `tsm register` command.

- a. Generate a template that you can edit by running the following command:

```
tsm register --template > /path/to/<registration_file>.json
```

- b. Edit the template file to create your completed registration file.

Here is an example of a registration file in the required format:

```
{
  "zip" : "97403",
  "country" : "USA",
  "city" : "Springfield",
  "last_name" : "Simpson",
  "industry" : "Energy",
  "eula" : "yes",
  "title" : "Safety Inspection Engineer",
  "phone" : "5558675309",
  "company" : "Example",
  "state" : "OR",
  "department" : "Engineering",
  "first_name" : "Homer",
```

```
"email" : "homer@example.com"
}
```

- c. After saving changes to the file, pass it with the `--file` option to register Tableau Server:

```
tsm register --file /path/to/<registration_file>.json
```

For example:

```
tsm register --file C:\Users\mwatson\Documents\tableau-  
reg-file.json
```

## Activate Tableau Server Offline

When you install Tableau Server, you have to activate at least one product key, but we recommend that you activate all Tableau Server licences found in the Tableau Customer Portal. Doing this activates the server, and specifies the number of licence levels you can assign to users. For offline activations, you should activate the product key listed in the **Offline Activation ID** field in the Tableau Customer Portal. For information about finding the right key, see the [Find the Correct Key to Activate on Tableau Server](#) Knowledge Article.

There are also times you may need to activate licences after Tableau Server is installed, for example, if you add capacity to your server, or get a new product key. If you don't have your product key, you can get it from the [Tableau Customer Account Centre](#).

**Note:** Activating any product key after Tableau Server has already started will require a Tableau Server restart for the changes to take effect.

In most cases, you can activate your key directly from Tableau Server, either during installation, or later, using the Tableau Services Manager (TSM) Licences page, but there are some circumstances that don't allow you to do this. If your computer is not connected to the internet for example, or has a firewall that restricts access outside your intranet. In these cases you need to do an offline activation.

### Offline activation and login-based licence management (LBLM)

Beginning in Tableau Server version 2023.1.0, offline activation is supported for LBLM when your server is configured to use the Authorisation-to-Run (ATR) service. You can only configure Tableau Server to use the ATR service during a new installation. Upgrading customers with existing server installations need to install a new instance of Tableau Server version 2023.1.0 or later and restore a backup of their existing installation to that new instance. For information on this process, see [Using a Blue/Green approach for upgrading Tableau Server](#). For more information about ATR service, see [Activate Tableau Server Using the Authorisation-To-Run \(ATR\) Service](#).

### Offline activation and updateable subscription licences (USL)

Offline activation of updateable subscription licences requires special steps. For details, see [Activating USL in Offline or Disconnected Environments](#).

There are two scenarios in which you may need to do an offline activation:

- Offline activation during installation – To complete an offline activation when you are installing Tableau Server.
- Offline activation of licences after install – To complete an offline activation after your server is installed and running.

## Offline activation overview

Offline activation of Tableau Server involves the following steps:

1. Generate an offline activation request file.
2. Copy the offline activation request file to a computer with internet access.
3. Upload the offline activation request file to the [Tableau activation website](#).
4. Download the resulting offline activation response file from the website. You'll use this file to activate Tableau Server

## Offline activation file name changes

Beginning in Tableau Server version 2023.1, the Tableau licensing system supports two underlying licensing technologies. From an administrative perspective, the only configuration difference between the two systems is the file types that are generated and consumed for off-line activation. The licensing technology is determined during the initial installation of Tableau Server and cannot be changed after installation.

We refer to the legacy (and still supported) version of licensing technology as FlexNet. The latest version of the technology is referred to as Server ATR. For more information, see [Activate Tableau Server Using the Authorisation-To-Run \(ATR\) Service](#). The following table describes the file naming nomenclature for each technology. The table also includes the generic reference.

| Generic file name          | Server ATR file names                              | FlexNet file names                   |
|----------------------------|----------------------------------------------------|--------------------------------------|
| Off-lineActivationRequest  | Off-lineActivationRequestFile_YYYYMMdd.hhmmss.json | Tableau-OfflineActivationRequest.tlq |
| Off-lineActivationResponse | Off-lineActivationLicensingAtrs.zip                | activation.tlf                       |

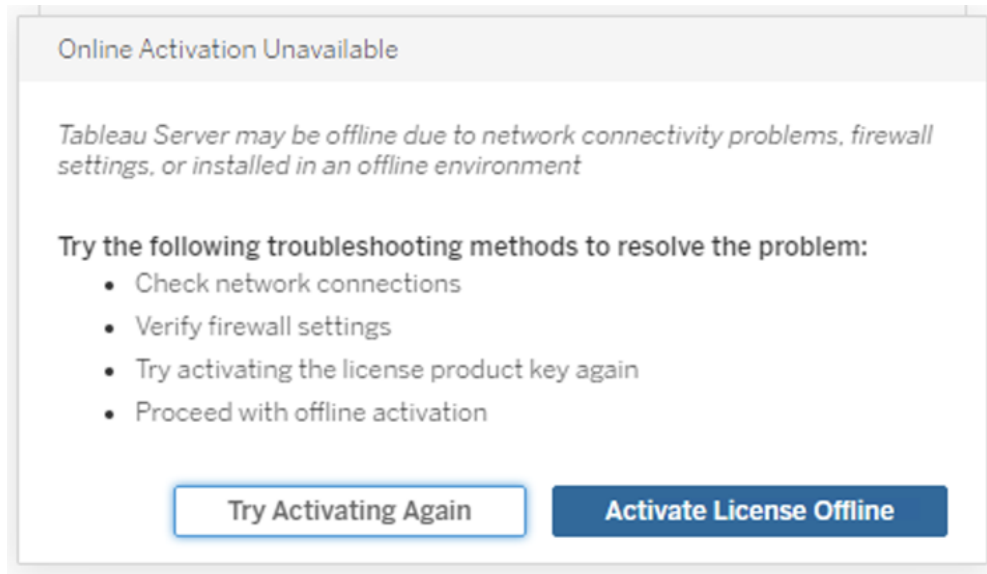
**Note:** Since this documentation supports multiple versions of Tableau Server, we will use the generic file name references (OfflineActivationRequest and Off-lineActivationResponse) for the rest of this topic. You can identify the licensing technology your Tableau Server installation uses according to the file type generated in the steps that follow.

## Use the TSM web interface

If you attempt to activate your product key from the TSM licences page and see a dialog that says online activation is unavailable, you can activate the key offline. The offline activation

process must be completed once for each product key.

1. Click **Activate Licence Offline**.



2. Create an offline activation request file (OfflineActivationRequest) for the product key.

Create an OfflineActivationRequest file you will upload to the Tableau activation web-site. If your product key is not pre-filled in the form, enter your key and click **Create Offline File** to generate an OfflineActivationRequest file on the local computer.

A screenshot of a web form titled "Step 1: Create, Upload, and Submit an Offline File". The text says: "Enter a product key then create, save, and move the Tableau Offline Activation Request file to a computer connected to the Internet. You will then need to upload and submit the offline file to Tableau (Step 2).". Below this, it says "The key has 20 characters" followed by a text input field. To the right of the input field is a button labeled "Create Offline File". At the bottom, there is a note: "Access a computer connected to the Internet and go to <http://www.tableau.com/support/activation>. Upload and submit the Tableau Offline Activation Request file created above. This will generate the first Offline Activation file to upload in Step 2."

Copy the OfflineActivationRequest file to a computer with internet access. You need to upload this file to the Tableau activation website to generate an activation response file.

3. Upload and submit the OfflineActivationRequest file.

You will upload and submit the OfflineActivationRequest file to the Tableau activation website. This automatically generates an activation response file (OfflineActivationResponse) that you can download and copy back to the Tableau Server computer.

- a. On the computer where you copied the OfflineActivationRequest file, open a browser and go to <http://www.tableau.com/en-gb/support/activation> to open the Tableau Support Activation page.
- b. On the Offline Activation page, click **Choose File** to select the OfflineActivationRequest file.
- c. Click **Upload Activation File** to submit the file to the Tableau activation website.
- d. Click the [here](#) link to download the OfflineActivationResponse file to your computer.

## Offline Activation

The activation was successful. Please click [here](#) to download your activation file.

For help creating the offline activation file, see [Activate Tableau Desktop Offline](#) or Activate Tableau Server Offline. ([Linux](#))

- e. Copy the OfflineActivationResponse file to the computer where Tableau Server is installed.

4. Upload the OfflineActivationResponse file.



## Tableau Server on Windows Help

On the Tableau Server computer, click **Upload Activation File** to upload the OfflineActivationResponse file to Tableau Server. When you do this successfully, the **Activate Product Key** button is enabled.

The screenshot shows a web-based activation wizard. The title is "Step 2: Upload Activation File". Below the title, there is a paragraph of text: "Upload the Offline Activation file you downloaded from <http://www.tableau.com/support/activation> to activate your server and desktop client offline." To the right of this text is a button labeled "Upload Activation File". Below the text, there is another paragraph: "After activating product key, you can go back to Step 1 to enter another product key." At the bottom of the wizard, there are three buttons: "Cancel Offline Activation", "Activate Product Key" (which is highlighted in grey), and "Next".

5. Click **Activate Product Key** to complete the offline activation.
6. (Skip this step if you are installing Tableau Server for the first time.)

Restart Tableau Server for licensing changes to take effect.

## Use the TSM CLI

### Step 1. Log in to Tableau Services Manager

Before you can proceed you must log in to Tableau Services Manager (TSM). To log in to TSM, run the following command:

```
tsm login -u <username>
```

What if I can't log in?

Verify that the account you are using is a member of the Local Administrators group on the Windows computer where you are installing Tableau Server.

**Step 2. Generate an offline activation request file**

1. On the initial node, open a command prompt as administrator.
2. Type this command to get your offline activation file:

```
tsm licenses get-offline-activation-file -k <product-key> -o  
<target-directory>
```

You can get your product key from the [Tableau Customer Portal](#). The target directory must already exist.

3. Copy the offline activation file (OfflineActivationRequest) from the target directory to a computer that has internet access.

**Step 3. Upload the offline activation request to the Tableau activation website**

1. On the computer that has internet access, go to the Tableau [Product Activations](#) page.
2. Complete the instructions to upload your OfflineActivationRequest file.

This creates an activation response file (OfflineActivationResponse).

3. Download the OfflineActivationResponse file from the Tableau activation website.

**Step 4. Initialise or activate your licence**

1. Copy the OfflineActivationResponse file to a location accessible from the Tableau Server computer.
2. Run the following command:

```
tsm licenses activate -f <path-and-activation-file>
```

**Note:** When using ATR to activate Tableau Server, <path-and-activation-file> should point to the packaged OfflineActivationResponse .zip file. Do not unzip the OfflineActivationResponse file prior to running this command.

3. (Skip this step if you are installing Tableau Server for the first time.)

## Tableau Server on Windows Help

Restart Tableau Server for licensing changes to take effect:

```
tsm restart
```

4. (Optional) To verify that all licences are activated, you can run this command:

```
tsm licenses list
```

If you have completed the steps above, you should see a success message:

```
Activation successful.
```

Tableau Server is activated. If you need additional assistance, contact [Tableau Technical Support](#).

## Deactivate Product Key

There are some scenarios where you must deactivate a product key:

- Changing a hardware configuration
- Changing product keys
- Moving a product key to a new installation

### Before you begin

Verify that you are removing the correct product key(s). You can view licence details by running `tsm licences list` in the CLI.

### Use the TSM web interface

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. Open TSM in a browser:  

```
https://<tsm-computer-name>:8850
```
3. Click **Configuration** and **Licensing**.



Licensing

View and manage Tableau Server licenses, review expiration dates, and activate or deactivate product keys. [Learn more](#)

Activate License

Deactivate License

Refresh All

|                                                                                                                                                                                        | Product Key | Data Management Add-on | Server Management Add-on | Expires     | Maintenance Ends |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------|--------------------------|-------------|------------------|
|   <b>Product Key</b> | ✓           | ✓                      | May 1, 2020              | May 1, 2020 |                  |

Your Tableau license will expire soon. Access renewal resources including information on how to renew your software or change your billing preferences [here](#). [Learn more](#)

Access Tableau Server product keys in the Customer Portal. View Desktop License Usage for more information about Tableau Desktop Licenses.

4. Select the product key that you want to deactivate, and then click **Deactivate Licence**.
5. After the key is deactivated, restart Tableau Server.

**Note:** If no other product keys remain activated before restarting, Tableau Server will not restart in a useable state. If this occurs, you will not be able to use Tableau Server until you activate a new product key in TSM.

## Use the TSM CLI

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following commands:

```
tsm licenses deactivate --license-key <product-key>
```

```
tsm restart
```

## Deactivate Tableau Server Offline

If Tableau Server does not have Internet access, you can use the instructions in this topic to deactivate Tableau Server. You will need to use a second computer that is able to access the Internet to complete this activation process.

**Note:** At this time, you cannot deactivate Tableau Server if the ATR Service is enabled on your Tableau Server deployment.

1. On the Tableau Server initial node, create a directory to store the offline deactivation file that is created in the next step.
2. Log in to TSM using a Tableau Administrator account, and then run the following command:

```
tsm licenses get-offline-deactivation-file -k <productkey> -o  
<deactivation-file-directory>
```

3. Move the `TableauOfflineDeactivationRequest.tlq` file from the deactivation file directory that you specified in the previous command to a trusted computer that has Internet access.
4. On the trusted computer that has Internet access, open a web browser and visit the Tableau [Product Activations](#) page. Follow the instructions on that page to submit your `TableauOfflineDeactivationRequest.tlq` file.

**Important:** This process will not work with Microsoft Edge browser.

5. When prompted, save the product key return file (`return.tlr`) from the **Product Activations** page.
6. Move the product key return file (`return.tlr`) from the trusted computer that has Internet access to the Tableau Server initial node that runs the Licensing Server service.
7. Log in to TSM using a Tableau Administrator account, and then run the following command:

```
tsm licenses deactivate -f <path-to-license-key-return-file>
```

## Automate Licensing Tasks

Several command line options allow you to perform common licensing tasks for Tableau Server using automated scripts.

If you want to perform these licensing tasks for Tableau Desktop using automated scripts, see [Deploy Tableau Desktop](#) in the Desktop Deployment Guide.

### Command Line Tool Options and Better Script Automation

You can use a utility called `tabinstallck.exe` to script the activation, refresh and deactivation of server product keys. `tabinstallck.exe` is installed in the Tableau Server `\bin` directory on the initial node. By default, this is:

```
C:\Program Files\Tableau\Tableau Server\packages\bin.<version_code>
```

You can also use `tsm licenses` to perform licensing tasks such as activating or deactivating a Tableau Server product key on- or off-line, and getting associated files for offline activation or deactivation. However, Tableau Server must already be deployed and configured. You can automate these licensing tasks using the [Tableau Services Manager API](#). In addition, `tabinstallck.exe` provides a way to script the licensing step for a new Tableau Server installation that is not completely configured.

To use `tabinstallck.exe`, you need to run the commands or script as an administrator on the primary Tableau Server node.

**Note:** `tabinstallck.exe` does not support offline activation and deactivation. To learn more, see [Activate Tableau Server Offline](#).

### Product key operations with forward proxy servers

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key](#)

Operations with Forward Proxy, before attempting to activate, refresh or deactivate product keys.

### Activate

Activate a Tableau Server licence using the `-activate` option:

```
start/wait tabinstallck.exe -activate <product_key>
```

### Refresh

Refresh a Tableau Server licence using the `-refresh` option:

```
start/wait tabinstallck.exe -refresh <product_key>
```

### Deactivate

Deactivate a Tableau Server licence using the `-return` option:

```
start/wait tabinstallck.exe -return <product_key>
```

### Example

An example of a script to activate Tableau Server might look like this:

```
@echo off
start/wait tabinstallck.exe -activate <product_key>
if %errorlevel% EQU 0 (ECHO SUCCESS) ELSE (ECHO FAILED)
```

### Error Handling

When you use `tabinstallck.exe` to automate Tableau Server licensing tasks, status information is returned as an exit code in the `ERRORLEVEL` environment variable. If activation was successful, the exit code is 0 (zero). The table below lists exit codes from the activation process and what they mean. You can also find error information in the `tabinstallck.log` file. This log file is located in the Tableau Server `\logs` folder, by default:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\
```

The ProgramData folder is hidden by default.

This example script shows how to activate Tableau Server and check for specific errors, such as an invalid product key (536871018) and general licensing issues (536871012).

```
@echo off
start/wait tabinstallck.exe -activate <product_key>
if %errorlevel% EQU 536871018 (ECHO TABLEAU_ERROR_LICENSING_
INVALID_KEY)
if %errorlevel% EQU 536871012 (ECHO TABLEAU_ERROR_LICENSING_
GENERAL)
if %errorlevel% EQU 0 (ECHO SUCCESS)
```

| Exit Code | Message                                        | Value                                                              |
|-----------|------------------------------------------------|--------------------------------------------------------------------|
| 536871012 | TABLEAU_ERROR_LICENSING_GENERAL                | An unknown error occurred during the licensing operation.          |
| 536871013 | TABLEAU_ERROR_LICENSING_INTERNAL               | The product is unable to start due to an internal licensing error. |
| 536871014 | TABLEAU_ERROR_LICENSING_SETUP                  | The product is unable to start due to an internal licensing error. |
| 536871015 | TABLEAU_ERROR_LICENSING_CONNECT                | An error occurred contacting the Tableau licence server.           |
| 536871017 | TABLEAU_ERROR_LICENSING_ACTIVATION_ASR         | An error occurred while activating the ASR.                        |
| 536871016 | TABLEAU_ERROR_LICENSING_ACTIVATION_GENERAL     | Activation failed, please try again.                               |
| 536871018 | TABLEAU_ERROR_LICENSING_ACTIVATION_INVALID_KEY | Invalid product key.                                               |
| 536871019 | TABLEAU_ERROR_LICENSING_ACTIVATION_            | Unable to complete offline activation.                             |



## Tableau Server on Windows Help

|           |                                                                  |                                                                                                        |
|-----------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|           | OFFLINE                                                          |                                                                                                        |
| 536871020 | TABLEAU_ERROR_<br>LICENSING_ACTIVATION_<br>INVALID_MODEL         | An error was returned from the licence server. Check the Tableau log file for more information.        |
| 536871021 | TABLEAU_ERROR_<br>LICENSING_ACTIVATION_<br>MAX_REHOSTS           | Failed to deactivate the licence because you have reached the limit of deactivations for this licence. |
| 536871033 | TABLEAU_ERROR_<br>LICENSING_ACTIVATION_<br>MAX_EXTRA_ACTIVATIONS | Failed to activate the licence because you have reached the limit of activations for this licence.     |
| 536871022 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>GENERAL               | An unknown error occurred during the unlicensing operation. Check your product key or contact support. |
| 536871023 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>NONE_FOUND            | No licences found.                                                                                     |
| 536871024 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>EXPIRED               | Only expired product keys were found.                                                                  |
| 536871025 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>EXPIRED_TRIAL         | Your trial for this version has ended.                                                                 |
| 536871026 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>EXPIRED_SUBSCRIPTION  | The product key is expired.                                                                            |
| 536871027 | TABLEAU_ERROR_<br>LICENSING_UNLICENSED_<br>EXPIRED_MAINTENANCE   | Maintenance has expired.                                                                               |

|           |                                                      |                                                             |
|-----------|------------------------------------------------------|-------------------------------------------------------------|
| 536871028 | TABLEAU_ERROR_<br>LICENSING_RESYNC_<br>GENERAL       | Your product keys could not be synchronised.                |
| 536871029 | TABLEAU_ERROR_<br>LICENSING_<br>REGISTRATION_GENERAL | An error occurred during product registration.              |
| 536871030 | TABLEAU_ERROR_<br>LICENSING_SERVICE_<br>INSTALL      | An unknown error occurred during licensing operations.      |
| 536871031 | TABLEAU_ERROR_<br>LICENSING_SERVICE_<br>UNINSTALL    | An unknown error occurred during licensing operations.      |
| 536871032 | TABLEAU_ERROR_<br>LICENSING_SERVICE_<br>NOT_PRESENT  | The FLEXnet licensing service is not present on the system. |

## Troubleshoot Licensing

This topic includes instructions for troubleshooting issues related to Tableau Server licensing.

### Product key failure with forward proxy servers

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before attempting to activate, refresh or deactivate product keys.

### Handle an unlicensed server

Tableau offers two licensing models: role-based and core-based. To learn more about role-based and core-based licensing, see [Licensing Overview](#).

role-based licensing requires each active user account to be covered by a licence. role-based licences have a defined capacity, or number of users that they allow. Each user is assigned a unique user name on the server and is required to identify themselves when connecting to the server.

Core-based licensing has no constraints on the number of user accounts in the system, but it does restrict the maximum number of processor cores that Tableau Server can use. You can install Tableau Server on one or more machines to create a cluster, with the restriction that the total number of cores in all the machines does not exceed the number of cores you have licensed and that all of the cores on a particular machine are covered by the licence.

### Unlicensed role-based server

The most common reason for a server that has role-based licensing to be unlicensed is an expired product key or an expired maintenance contract.

### Unlicensed core-based server

A core-based server can become unlicensed for a variety of reasons, such as an expired product key or when Tableau Server nodes running licensed processes cannot contact the Tableau Server node running the Licence Manager service. To learn more about licensed processes, see [Tableau Server Processes](#).

When the server is unlicensed you may not be able to start or administer the server. You can, however, manage your licences using the `tsm licences` command.

### Unlicensed server administrator

All Tableau Server administrators require a user licence. Tableau Server administrators will always consume the highest role available. If a Creator product key is activated, the Tableau Server Administrator(s) will take this role. If the highest role available on Tableau Server is an Explorer, the Server Administrator will take the Explorer role. If Creator licences are added to the server, any existing Server Administrator accounts using Explorer licences will automatically convert to use Creator licences.

TSM administrator accounts do not require licences.

If the licence that the server administrator is using expires, then the account will become unlicensed and will be unable to sign in.

Verify the expiration date of your licence(s) for the administrators on the server:

- Run `tsm licences list`.
- Compare the date with the date displayed in the [Tableau Customer Portal](#).
- If the portal does not display the date that you expect, contact [Customer Success](#).
- To renew your licence, visit the [Tableau renewal](#) web page.
- Run the `tsm licences activate` command to activate a new licence for the administrator account(s).

If the TSM date matches the portal date and the following refresh operation fails, contact [Tableau Support](#).

If the licence for your administrator account has expired or will expire soon, you will need to activate a new licence for the account. Alternatively, you can unlicense a non-administrator user to free a licence for the server administrator account.

If a Tableau Server administrator is using a Creator, Explorer or Viewer licence and their licence expires, they will use another licence of the same type, if available. If no licence seats are available the user will become “unlicensed”.

**Important:** Do not restart Tableau Server until you have activated a new licence or transferred a site role for the server administrator account.

## Troubleshoot role-based licensing

This section provides information about resolving issues that can occur when adding the role-based Viewer, Explorer and Creator licences to Tableau Server or Tableau Cloud, or when these licences expire. The highest available licence type is Creator, followed by Explorer, and finally Viewer. To learn more about role-based licensing, see [Licensing Overview](#).

A user or administrator is unlicensed due to licence expiry

To avoid having users unexpectedly become unlicensed or move to another site role, you should always do one of the following before the licence that they are currently using expires:

- Renew and activate a replacement licence. If a user occupies a Creator, Explorer or viewer licence and their licence expires, they will use another licence of the same type, if available.
- Change the site role of those users to allow the use of a licence that is not due to expire.

To learn how site roles can be changed to require a different licence, see [Set Users' Site Roles](#).

The reassignment of users to new licences is governed by the following logic:

- When a Server Administrator user occupies a Creator licence and their licence expires (with no replacement licences available), they are reassigned to an Explorer licence if any Explorer licences are available. This licence reassignment occurs in order of most recent login. Server Administrators displace other users who might be currently using an Explorer licence. If no Creator or Explorer licences are available a Server Administrator becomes unlicensed.
- When a non-Server Administrator user occupies a Creator licence and their licence expires (with no replacement licences available), they become unlicensed. To avoid having these users become unlicensed, change their site role before the licence expires. This is especially important for users in the Site Administrator Creator site role, who must move to the Site Administrator Explorer site role before their Creator licence expires to avoid losing Site Administrator capabilities.
- When a non-Server Administrator user occupies an Explorer or Viewer licence and their licence expires (with no replacement licences available), they are upgraded to a higher licence type, if licences of that type are available. Specifically, the following occurs when a licence expires:
  - Users who occupy an Explorer licence will move to a Creator licence, if available (with no change to site role).
  - Users who occupy a Viewer licence will move to an Explorer licence, if available. If no Explorer licences are available, these users will move to a Creator licence, if available (with no change to site role).

- If no licences are available at the higher licence types, those users are moved to Unlicensed.

Users are reassigned to a new licence as described above in order of most recent login, with lower licence types reassigned first (first Viewer, then Explorer, and then Creator).

For example: Two users with a Viewer licence, a user with the Creator licence, and two Server Administrators with a Creator licence all have their licences expire. Four unexpired Explorer licences are available for these users. In this situation, the following occurs in the order shown below:

1. The user with a Viewer licence who logged in most recently is reassigned to an Explorer licence.
2. The second user with a Viewer licence is reassigned to an Explorer licence.
3. The Server Administrator user with a Creator licence who logged in most recently is reassigned to an Explorer licence, and then the second Server Administrator with a Creator licence is reassigned to the remaining Explorer licence.
4. The user with the Creator licence becomes unlicensed.

Server Administrator site role is unchanged when using a Creator licence

Server Administrators gain Creator capabilities if Creator licences are available in Tableau Server, with no change to their site role name. All other Tableau Server and Tableau Cloud users gain Creator licences only if assigned to a site role that includes Creator in its name.

Licences are not immediately available

When you add a role-based licence to Tableau Server, those licences become available to all users when you restart Tableau Server.

A user with a Viewer licence cannot open Tableau Server or Tableau Cloud workbooks from Tableau Desktop

A user with a Viewer licence who also has a separate Tableau Desktop licence will be unable to open workbooks on Tableau Server or Tableau Cloud using Tableau Desktop. To open workbooks using Tableau Desktop, that user will need an Explorer or Creator licence on Tableau Server or Tableau Cloud.

## Migrate from Core-Based to Role-Based Licensing

You can migrate Tableau Server from a core-based licence metric (which counts the processor cores on which you have Tableau Server installed) to a role-based licence metric (which counts named users). To learn more about licensing metrics, see [Licensing Overview](#).

### Prepare for migration to role-based licensing

Core-based licences allow an unlimited number of users, including view-only guest accounts. Every user has a site role when they are added to Tableau Server, and these users and site roles persist when licensing is changed. Because role-based licences limit the number of users, you should ensure that your new role-based licences accommodate the number of users who are currently connecting to Tableau Server, including the users currently using guest accounts.

**Important:** If your new role-based licences don't accommodate the full number of users, some users will move to the **Unlicensed** site role, which can be very CPU intensive. If you have a large number of users, your application server processes may become unavailable until all the users are processed. This operation could take hours to complete, so plan accordingly.

Before you migrate, verify that you have user licences and corresponding product keys to allow all users to access Tableau Server after the migration is complete:

- Sign in to the [Tableau Customer Portal](#) to verify licences and to copy the corresponding product key(s).
- To learn more about site roles, see [Set Users' Site Roles](#).
- To count the number of users in your Tableau Server installation, export a list of users to count them with a tool such as Microsoft Excel. To learn how to export a list of users, see [Export a User List](#).

### Migrate to role-based licensing

To migrate to role-based licensing you must stop Tableau Server, deactivate the core-based product key, activate the role-based product key(s) and then start Tableau Server. Because this process will result in a restart of Tableau Server and cause downtime for Tableau Server users, you should migrate licensing during a period of low usage.

1. Stop Tableau Server:

Use the `tsm stop` command.

2. Deactivate the core-based product key(s):

Use the `tsm licenses deactivate` command with the core-based product key(s).

3. Activate the role-based product key(s):

Use the `tsm licenses activate` command with the role-based product key(s).

4. Start Tableau Server:

Use the `tsm start` command.

## Use role-based licences on a server with core-based licensing

The 2018.1 release of Tableau Server allows you to add Creator role-based licences to Tableau Server installations with existing core-based licensing.

**Note:** If you upgrade a Tableau Server installation to 2018.1 without activating role-based licences, Tableau Server will continue to operate as it did previously, with no changes to Tableau Server UI or permissions except that the legacy **Viewer** site role is renamed to **Read Only**. In version 2018.2, the **Read Only** site role was deprecated and once again became the **Viewer** site role.

When **Creator** licences are introduced to Tableau Server, all Server Administrator users are required to have **Creator** licence roles, which may require additional licences. Administrators can activate additional **Creator** licences using the `tsm licenses activate` command in Tableau Server to increase licensed user capacity. Activating these role-based licences gives you a combination of the capabilities granted by role-based Creator licences and the capabilities granted by your core-based licence. To learn more about the different types of role-based licences, see [role-based licences](#).



**Note:** The unlimited number of users who have access to Tableau Server under core-based licensing have equivalent capabilities to users with an **Explorer** licence under role-based licensing. **Creator** functionality is limited to the defined user licence model(s).

For example, if a Tableau Server installation has a 16 core licence that includes guest access, and you added an Updatable Subscription Licence (USL) product key(s) with 10 Creator licences, that server would have the following capabilities:

- A limit of 16 processor cores on hardware that runs Tableau Server
- Guest access
- Unlimited Explorer/Viewer licences (from the unlimited user licences that come with a core licence)
- 10 Creator licences

Example of completing a migration from core-based licensing

To extend the example above: If the core-based licence was then deactivated, the following capabilities would be available:

- No limits on server hardware
- No guest access
- 10 Creator licences

If you then added 50 Explorer licences and 200 Viewer licences, after deactivating your core-based licence, the following capabilities would be available:

- No limits on server hardware
- No guest access
- 10 Creator licences
- 50 Explorer licences
- 200 Viewer licences

## Quick Start: Use Login-based Licence Management with Tableau Server

You can use the following steps to get up and running quickly with login-based licence management.

### Step 1: Install Tableau Server

To use login-based licence management to activate Tableau, you must install Tableau Server version 2021.1 or later, and activate it with a product key that is enabled for login-based licence management. Login-based licence management enables Tableau Creator users to sign-in and activate Tableau Desktop or Tableau Prep Builder.

**Note:** If your Tableau Server product key is not enabled for login-based licence management in the Tableau Customer Portal, contact your Tableau account representative.

The following topics provide additional information about installing Tableau Server and using login-based licence management to activate Tableau Desktop and Tableau Prep Builder:

- [Install and Configure Tableau Server](#)

To change login-based licence management configuration settings, or to disable login-based licence management on Tableau Server, see [Change login-based licence management settings](#).

### Step 2: Add authorised users to Tableau Server

After you activate Tableau Server, you can [add authorised users](#). When adding users, you'll need to select the site role for that user, for example Creator, Explorer or Site Administrator. Users who will activate Tableau Desktop or Tableau Prep Builder must be assigned to a Creator site role (Creator or Site Administrator Creator). For more information on site roles, see [Set Users' Site Roles](#).

### Step 3: Activate Tableau Desktop or Tableau Prep Builder

A Creator user must download and install Tableau Desktop and/or Tableau Prep Builder on their computer before they can be activated using login-based licence management. For more information, see "Install Tableau Desktop or Tableau Prep Builder from the User Interface" in the Tableau Desktop and Tableau Prep Deployment Guide.

1. Launch Tableau Desktop or Tableau Prep Builder.

If this is the first time you've launched Tableau Desktop or Tableau Prep Builder, you have the option of starting a 14-day free trial or activating Tableau.

2. Click **Activate Tableau** to skip the free trial.
3. On the **Activate Tableau** screen, click **Activate by signing in to a server**, to sign in and activate Tableau using login-based licence management.
4. When prompted, specify the URL for Tableau Server to sign in using your credentials.
5. After you are authenticated by Tableau Server, Tableau Desktop and/or Tableau Prep Builder are activated and ready to use.

## Login-based Licence Management

Login-based licence management helps you manage licensing for users with Creator roles on Tableau Server and Tableau Cloud. Users with Explorer or Viewer roles cannot use this feature. If you're using Role Based Subscriptions with Tableau Server or Tableau Cloud, you can simplify your licence management using login-based licence management to eliminate separate Tableau Desktop and Tableau Prep Builder product keys. You only need to manage one or more product keys for on-premises Tableau Server, or in the case of Tableau Cloud, you don't need to manage any product keys at all.

You only need one Tableau Server or Tableau Cloud site to authorise an individual Tableau Desktop or Tableau Prep Builder. Login-based licence management is enabled per production instance of your Tableau Server deployment. You can assign Creator roles to users who use Tableau Server, Tableau Desktop, and Tableau Prep Builder for licence activation and

centralised licence management. In addition, login-based licence management gives you more visibility into licence usage.

You can use administrative views on Tableau Server and Tableau Cloud to see the assignment and use of Creator seats in one place. Administrative views provide information about who is using your Creator licences, and shows the most recent licence lease and version of both Tableau Desktop and Tableau Prep Builder, which helps you to monitor your Tableau deployments.

The following Tableau products support login-based licence management:

- Tableau Cloud
- Tableau Server 2020.1+
- Tableau Desktop 2020.1+
- Tableau Prep Builder 2020.1.3+

If your Tableau Server is not enabled for login-based licence management, contact your Tableau sales representative to obtain a special login-based licence management-enabled product key.

## How login-based licence management works

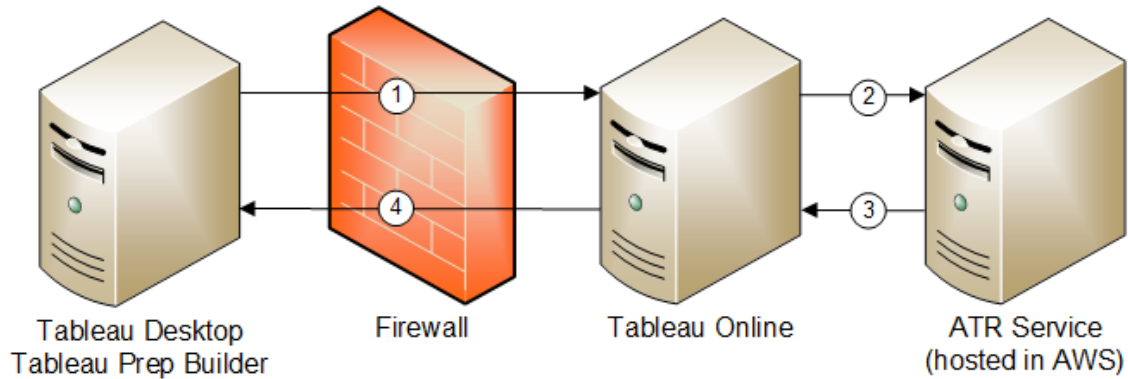
When login-based licence management is in use, Tableau Desktop or Tableau Prep Builder periodically contacts Tableau Server or Tableau Cloud in order to verify that the user is a Creator and to obtain an authorisation to run. Tableau Server or Tableau Cloud contacts the Tableau-hosted authorization-to-run (ATR) service to verify that the Tableau Desktop client is allowed activation. The ATR service, hosted on AWS, verifies and manages the licence and the length of the authorisation window. The diagrams below show the communication process between the client, Tableau Server or Tableau Cloud, and the licensing service.

Tableau uses common ports (80 and 443) to make internet requests. In most cases, the computer where Tableau Desktop or Tableau Prep Builder is installed and the network it is run-

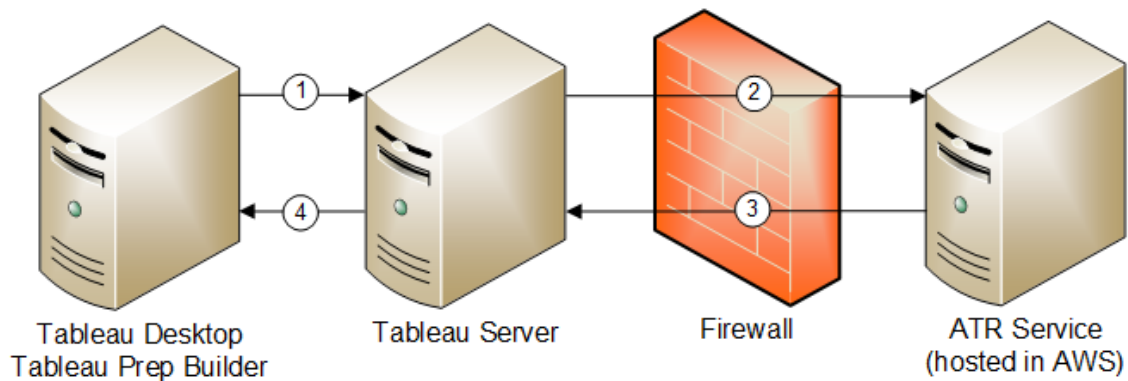
## Tableau Server on Windows Help

ning on are already configured to allow the necessary access. For more information about the ports used by Tableau, see [Tableau Services Manager Ports](#).

### Login-based licence management with Tableau Cloud



### Login-based licence management with Tableau Server



1. You install Tableau Desktop or Tableau Prep Builder and select **Activate with your credentials**. You sign into your Tableau Cloud or Tableau Server site.
2. Tableau Cloud or Tableau Server verifies that you are a Creator. If not, you get an error. If yes, Tableau Cloud or Tableau Server communicates with the ATR service.
3. The ATR service returns an ATR lease to Tableau Cloud or Tableau Server.

4. Tableau Cloud or Tableau Server provides an ATR lease to Tableau Desktop or Tableau Prep Builder to finalise activation.

## Use login-based licence management

To use login-based licence management, you either need to use Tableau Cloud or you need to install Tableau Server and activate it with a login-based licence management-enabled product key. The end user needs to be assigned the Creator role on either Tableau Cloud or Tableau Server and that user will need to install Tableau Desktop. Although the user can activate Tableau Desktop on up to two machines, only one Creator seat needs to be allocated.

**Note:** As of Tableau Server version 2023.1, LBLM is supported in offline deployments. To deploy Tableau Server with LBLM enabled, you must configure Tableau Server to use Authorisation-To-Run (ATR) Service. For more information, see [Activate Tableau Server Offline](#).

### Step 1: Install Tableau Server

If you already have Tableau Server installed, skip to (Optional) Step 2: Change login-based licence management settings. Otherwise, you'll need to install Tableau Server:

1. Refer to the Deploy chapter to install Tableau Server.
2. During activation, you must enter a Tableau Server product key that supports role-based subscription and login-based licence management.
3. Add users to your Tableau Server and set them to one of the three Creator roles: Server Administrator, Site Administrator Creator or Creator. This assigns a Creator licence to these users on Tableau Server. For more information, see [Set User's Site Roles](#).

**Important:** If you're using connected clients and login-based licence management, do not [disable automatic client authentication](#). In addition, do not sign out of Tableau Server using the

connected desktop user interface after enabling login-based licence management. Otherwise, login-based licence management cannot automatically refresh the licence activation or provide current data to the LBLM Usage report on Tableau Server or Tableau Cloud. For more information about connected desktop, see [Automatically keep Tableau Desktop connected to Tableau Server or Online](#).

### (Optional) Step 2: Change login-based licence management settings

Login-based licence management is enabled by default for Tableau Cloud, Tableau Server, and Tableau Desktop starting with version 2020.1. You can, however, change some login-based licence management settings.

## Disable login-based licence management on Tableau Server

Although login-based licence management is the preferred method of activation for Tableau Desktop and Tableau Prep Builder, you may have Tableau Server installations in your organisation used for testing that don't need to use login-based licence management. On Tableau Server, you use the Tableau Services Manager (TSM) command line utility to turn off login-based licence management.

To turn off login-based licence management at a command prompt, type:

```
tsm configuration set -k licensing.login_based_license_management.enabled -v false

tsm pending-changes apply
```

## Change login-based licence management settings on Tableau Desktop or Tableau Prep Builder at install

To change login-based licence management settings at the command line, you can run the installer .exe file from your computer's command line as an administrator. If you need to extract

the .msi files, follow the instructions to [Extract and run the Windows \(MSI\) installer](#).

To use a duration length other than the default of 14 days/1209600 seconds, include the `ATRREQUESTEDDURATIONSECONDS` switch. For example:

```
tableauDesktop-64bit-2020-1-0.exe /quiet /norestart ACCEPTTEULA=1
ATRREQUESTEDDURATIONSECONDS=43200
```

You must run the command from the directory where the .exe file is located or specify a full path to the location of the .exe file on the computer. Do not run the setup program from a shared directory on your network. Instead, download the .exe file to a directory on the computer where you're installing.

The following example shows the Windows installer command that disables login-based licence management:

```
tableauDesktop-64bit-2020-1-0.exe /quiet /norestart ACCEPTTEULA=1
LBLM=disabled
```

or

```
tableauPrepBuilder-64bit-2020-1-0.exe /quiet /norestart
ACCEPTTEULA=1 LBLM=disabled
```

To set the default URL for the Tableau Server you want users to use for activation when using login-based licence management, add the `ACTIVATIONSERVER` or `WorkGroupServer` option.

To update the exe:

```
tableauDesktop-64bit-2021-4-0.exe /quiet /norestart ACCEPTTEULA=1
ACTIVATIONSERVER=http://<tableau_server_url>
```

To update the registry:

```
reg.exe add HKEY_LOCAL_MACHINE\SOFTWARE\Tableau\Tableau 2021.4\Set-
tings /f /v WorkGroupServer /d https://<tableau_server_url>
```



**Note:** The `ACTIVATIONSERVER` option is only intended for first time activation. If you have previously signed in to this version of Tableau, you use the `WorkGroupServer` (Windows) or `WorkgroupServer` (macOS) option. For example, if you are using Tableau Desktop version 2021.1 on Windows and have previously signed in successfully, you would use the `WorkGroupServer` option to specify an activation server. On Tableau Desktop on macOS, you would use the `WorkgroupServer` option. On macOS, this option is case sensitive and uses a lowercase "g".

## Change login-based licence management settings on Tableau Desktop by editing the registry

If Tableau Desktop is already installed, you can change login-based licence management settings by editing the Windows registry.

To turn off login-based licence management:

```
reg.exe add HKEY_LOCAL_MACHINE\SOFTWARE\Tableau\ATR /f /v LBLM /d  
disabled
```

To make login-based licence management the only login option:

```
reg.exe add HKEY_LOCAL_MACHINE\SOFTWARE\Tableau\ATR /f /v LBLM /d  
required
```

Or, you can enable, disable or require login-based licence management by editing the registry directly:

1. As an administrator on the computer running Tableau Desktop, make a backup of the registry file before you make any changes to it.

2. Edit the registry, and in `HKEY_LOCAL_MACHINE\SOFTWARE\Tableau`, find the hive named ATR and modify the LBLM value to reflect the desired setting:
  - a. Name: LBLM.
  - b. Data: enabled, disabled or required.
3. Restart Tableau so the changes take effect.

## Change login-based licence management settings on Tableau Desktop on macOS

To change login-based licence management settings on macOS, run the following commands in a terminal window to update the preferences file, and then install or restart Tableau Desktop.

To turn off login-based licence management:

```
sudo defaults write /Library/Preferences/com.tableau.ATR LBLM "disabled"
```

To make login-based licence management the only login option:

```
sudo defaults write /Library/Preferences/com.tableau.ATR LBLM "required"
```

To set the default URL for the Tableau Server you want the user to use for activation when using login-based licence management on macOS.

First-time activation:

```
sudo defaults write /Library/Preferences/com.tableau.ATR LBLM "required"
```

Subsequent activations:

Tableau Server on Windows Help

```
sudo defaults write /Library/Preferences/com.tableau.Tableau-<ver-  
sion> Settings.WorkgroupServer "https://<tableau_server_url>"
```

**Note:** On Tableau Desktop on macOS, you would use the WorkgroupServer option. On macOS, this option is case sensitive and uses a lowercase "g".

Login-based licence management settings

You use the following settings to change login-based licence management, set the ATR duration, and set the activation server URL.

| Setting | Value                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LBLM    | enabled, disabled or required | <p>Set to <code>enabled</code> (the default), the licensing screens will present the two options for activation (product key, or credentials).</p> <p>Set to <code>disabled</code>, login-based licence management will not appear on the licensing screens.</p> <p>Set to <code>required</code>, login-based licence management is the only way to activate the Tableau Desktop (when the licensing screen appears, it will offer only the credentials option for activation).</p> <div><b>Note:</b> When <code>LBLM</code> is set to</div> |

|                                                      |                             |                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                      |                             | <p>enabled or required, reporting is also enabled.</p>                                                                                                                                                                                                                                                    |
| ATRREQUESTEDDURATIONSECONDS                          | 1209600                     | <p>Sets the authorisation to run (ATR) duration (in seconds), which is the length of time that an instance of Tableau Desktop and Tableau Prep Builder is authorised to run. The default is 1209600 seconds (14 days). Do not use commas as separators in the value.</p>                                  |
| ACTIVATIONSERVER                                     | http://<tableau_server_url> | <p>For first-time activation, sets the default URL for the Tableau Server you want users to use for activation.</p>                                                                                                                                                                                       |
| WorkGroupServer (Windows)<br>WorkgroupServer (macOS) | http://<tableau_server_url> | <p>For updates to the Windows registry or macOS plist, sets the default URL for the Tableau Server you want users to use for activation.</p> <p><b>Note:</b> On Tableau Desktop on macOS, you would use the WorkgroupServer option. On macOS, this option is case sensitive and uses a lowercase "g".</p> |

|                           |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REPORTINGFREQUENCYSECONDS | 3600 | <p>Sets the default (in seconds) for how often the login-based licence management report is sent to Tableau Server or Tableau Cloud. The minimum setting is 60 seconds, and the default is 3600 seconds (one hour). Change this setting to reduce the load on Tableau Server or to reduce network traffic. No matter what the authorisation-to-run (ATR) lease duration is set to,</p> <p>REPORTINGFREQUENCYSECONDS sets the time interval that the Tableau Desktop or Tableau Prep Builder client report login-based licence management activations back to Tableau Server or Tableau Cloud.</p> |
|---------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Additional configuration for virtual deployments

Tableau Desktop and Tableau Prep Builder periodically contact Tableau Cloud or Tableau Server to verify that Tableau is authorised to run, based on its licence. Tableau Cloud or Tableau Server then contacts the ATR service to verify the licence and the length of the authorisation window.

When configuring a virtual (non-persistent) deployment of Tableau Desktop or Tableau Prep Builder, the duration time should be set to one of the lower values such as 4 or 8 hours in order to avoid an over-use activation error message. After the virtual machine (VM) is returned, the ATR service will handle the activation monitoring.

The following flags should be used on a source image prior to publishing Tableau Desktop to end users. Each end user will be activating the software by logging into Tableau Server or Tableau Cloud with each new VM delivered. No product keys need to be entered if the end user is a Tableau Creator on Tableau Server or Tableau Cloud.

If you are using login-based licence management for Tableau Desktop or Tableau Prep Builder on a VM, you may get an error message that your licence information has changed whenever you launch a new VM for Tableau Desktop or Tableau Prep Builder. This error forces a restart, which then asks you to register Tableau Desktop again. This error occurs because the ATR service sends a new token that doesn't match the licence cache.

#### Microsoft Windows

To prevent the error from occurring on Microsoft Windows, you can use the `SYNCHRONOUSLICENSECHECK` and `SILENTLYREGISTERUSER` options with the Windows installer. For example:

```
tableau-setup-std-tableau-2020 SYNCHRONOUSLICENSECHECK="true"
SILENTLYREGISTERUSER="true" ATRREQUESTEDDURATIONSECONDS=14400
```

or

```
tableauDesktop-64bit-2020-1-0.exe /quiet /norestart ACCEPTEULA=1
ATRREQUESTEDDURATIONSECONDS=14400 ACTIVATIONSERVER=http://<tableau_
server_url> SYNCHRONOUSLICENSECHECK="true" SILENTLYREGISTERUSER-
R="true"
```

If Tableau Prep Builder and Tableau Desktop are being delivered on one Virtual Desktop, `ATRREQUESTEDDURATIONSECONDS` only needs to be set during Tableau Desktop installation. However, if you plan to install Tableau Prep Builder as a stand-alone, you'll need to set `ATRREQUESTEDDURATIONSECONDS` during Tableau Prep Builder installation.

Or, you can edit the following registry keys on the source image:

```
Reg key path: HKLM\SOFTWARE\Tableau\<Tableau version>\Settings\
```

## Tableau Server on Windows Help

Reg key (String value, need to set to true to make that feature enabled)

SynchronousLicenseCheck

SilentlyRegisterUser

### macOS

To prevent the error from occurring on macOS, run the following command to set the `LicenseCache.Desktop` flag to 'false'.

```
sudo defaults write ~/Library/Preferences/com.tableau.Tableau-<version>.plist LicenseCache.Desktop false
```

### (Optional) Step 3: Change the authorisation to run (ATR) duration

The login-based licence management default settings for the authorisation to run (ATR) duration are appropriate for most environments, but you can change these default settings if needed. Login-based licence management uses the default authorisation to run (ATR) duration of 1209600 seconds (14 days), which is the length of time that an instance of Tableau Desktop and Tableau Prep Builder is authorised to run. This means that after the initial authorisation, you could use Tableau without any network connection for 14 days before the activation expired.

The default duration value for login-based licence management is not appropriate for delivering a non-persistent VM delivery solution to end users. The ATR duration should be lowered to 4 or 12 hours depending on VM use. When a new VM is delivered to an end user, a new authority to run token will be created. When the VM is returned, this token is also returned and is able to be used on the new VM authorisation to run request.

**Note:** Login-based licence management uses the following hierarchy when determining ATR duration.

1. **ATR Service** – Establishes the minimum (4 hours/14400 seconds) and maximum (90 days/7776000 seconds) ATR durations applicable to all users/installations. It specifies

the default ATR duration (14 days/1209600 seconds) if nothing is specified by Tableau Server or Tableau Desktop.

2. **Tableau Server** – Can optionally specify a maximum or default ATR duration (`licensing.login_based_license_management.max_requested_duration_seconds` or `licensing.login_based_license_management.default_requested_duration_seconds`) for all Tableau Desktop installations. Using these ATR duration settings, you can globally set the default ATR duration and maximum ATR duration for all Tableau Desktop clients, which eliminates the need to individually sign in to each Tableau Desktop client to set the ATR duration. The ATR Service maximum setting can be between the minimum of 4 hours (14400 seconds) and maximum of 90 days (7776000 seconds).
3. **Tableau Desktop** – Can optionally specify the ATR duration (`ATRREQUESTEDDURATIONSECONDS`) for the computer on which it is installed. If necessary, you can change the default ATR duration (14 days/1209600 seconds) to a setting within the ATR Service minimum (4 hours/14400 seconds) and maximum (90 days/7776000 seconds). This local ATR duration overrides any durations set by the ATR Service or Tableau Server. However, this default ATR duration cannot be more than the maximum ATR duration set on Tableau Server.

## Change the ATR duration for Tableau Desktop or Tableau Prep Builder using Tableau Server

On Tableau Server, you use the Tableau Services Manager (TSM) command line utility to set the ATR duration.

To set the ATR duration, at a command prompt, type:

```
tsm configuration set -k licensing.login_based_license_management.default_requested_duration_seconds -v <value in seconds>

tsm pending-changes apply
```

To set the ATR maximum duration, at a command prompt, type:



## Tableau Server on Windows Help

```
tsm configuration set -k licensing.login_based_license_management.max_requested_duration_seconds -v <value in seconds>
```

```
tsm pending-changes apply
```

## Change the ATR duration on Tableau Desktop by editing the registry

To use a duration length other than the default of 14 days/1209600 seconds, update the `ATRRequestedDurationSeconds` registry setting. For example:

1. As an administrator on the computer running Tableau Desktop, make a backup of the registry file before you make any changes to it.
2. Edit the registry, and in `HKEY_LOCAL_MACHINE\SOFTWARE\Tableau\ATR`, update the `ATRRequestedDurationSeconds` as follows (0 uses the default setting):
  - a. Name: Find the string value named `ATRRequestedDurationSeconds`.
  - b. Data: Update the number of seconds the duration should last. For example, add 43200 to set a duration of 12 hours.
3. Restart Tableau so that the changes take effect.

## Change the ATR duration on Tableau Desktop on macOS

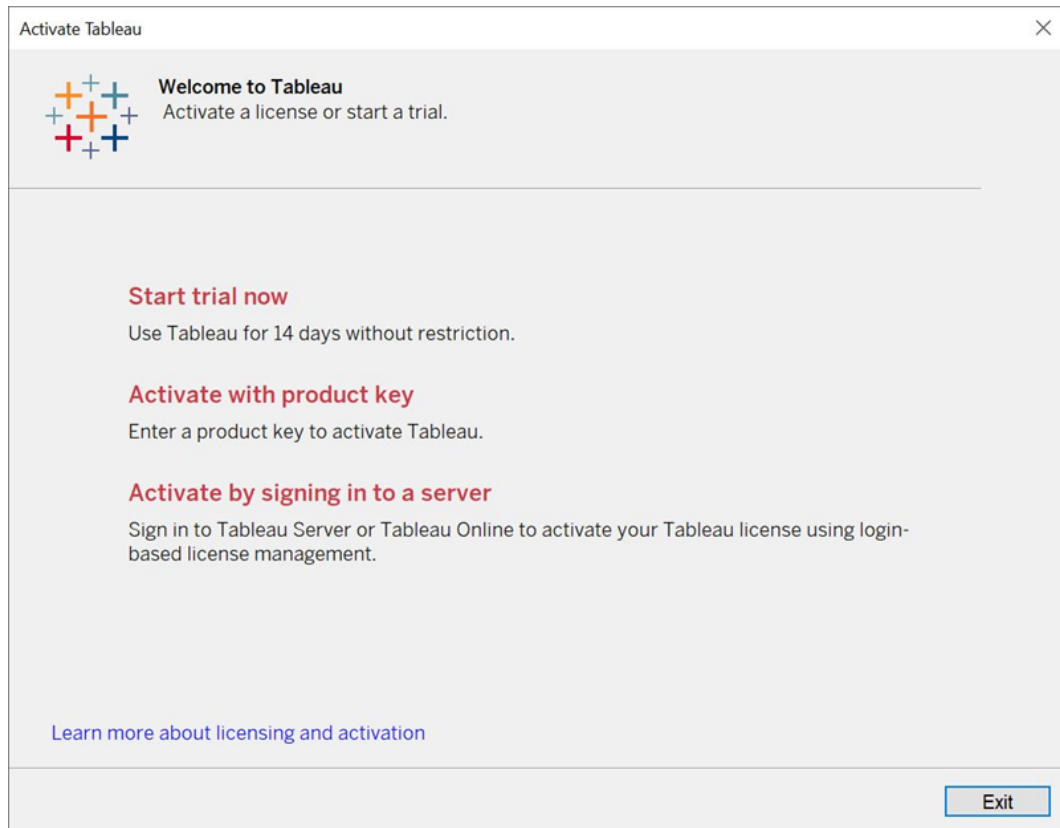
To use a duration length other than the default of 14 days/1209600 seconds, include the `ATRRequestedDurationSeconds` preferences setting. For example:

```
sudo defaults write /Library/Preferences/com.tableau.ATR ATRRequestedDurationSeconds -string "43200"
```

### Step 4: Activate Tableau Desktop

The 2020.1 and later versions of both Tableau Desktop for Windows or macOS support login-based licence management.

1. Run Tableau Desktop setup.
2. The Activate Tableau screen will include the **Activate by signing in to a server** option.



3. Click **Activate by signing in to a server** and then do one of the following:
  - If you're using Tableau Cloud, click the Tableau Cloud link.
  - If you're using Tableau Server, enter the Tableau Server URL, and then click **Connect**.

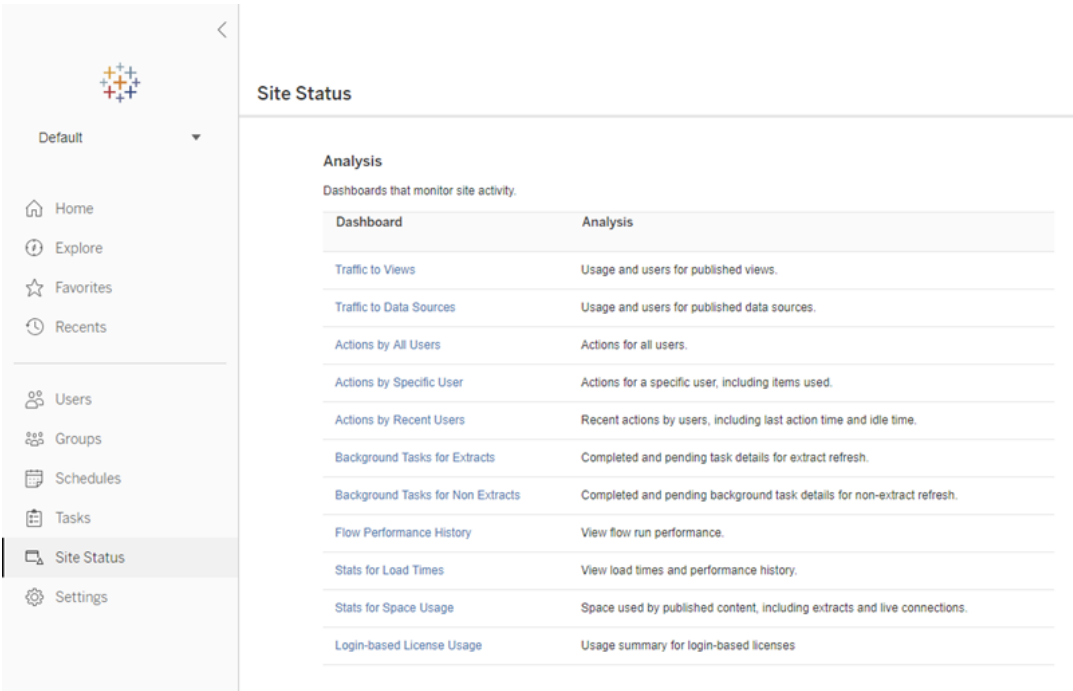
When prompted, enter valid credentials for a user with a Creator role subscription, and then click **OK**.

# View login-based licence usage

You can view login-based licence usage for Tableau Cloud or Tableau Server. The report shows users, hosts, user role, product, version, activations, Creator seats in use, Creator seats not in use and when a Creator seat was last used. You can view data for the past 30 days up to a maximum of 183 days.

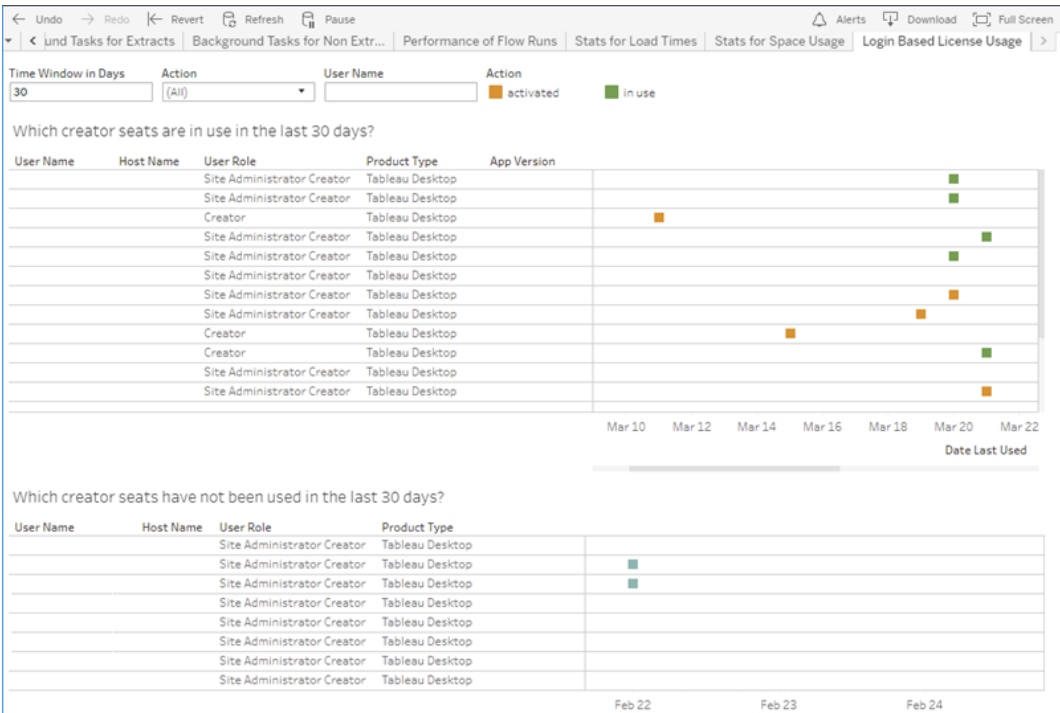
To view the Login-based licence management Licence Usage administrative view:

1. In Tableau Cloud or Tableau Server, in the navigation pane, click **Site Status**.



2. On the Site Status page, click **Login-based Licence Usage**.
3. Optional. On the report screen, you can change the time window to show when seats

were last used, filter on actions, filter on user name and sort by columns.



Troubleshooting

You may encounter one of the following error messages while using login-based licence management. Use the information below to resolve the issue.

Login-based licence management is not enabled on Tableau Server

If login-based licence management is available as an activation option on Tableau Desktop, but not enabled on Tableau Server, or if Tableau Server does not have a login-based licence management capable licence, the following error message may be displayed:

*Login-based licence management is not enabled on the server you connected to. Select a different server to connect to, use a product key to activate your licence or start a trial to begin working immediately.*

Contact your administrator to ensure that you’re using a Tableau Server product key that’s enabled for login-based licence management. To verify that you have activated the

appropriate product key, in the TSM web UI click **Configuration**, and then click **Licensing**. For guidance on activating licences, see [tsm licences activate](#). Login-based licence management should be enabled by default unless it was previously turned off by the server administrator.

Login-based licence management is not enabled on Tableau Desktop

If login-based licence management is not enabled on Tableau Desktop, you will not have the option to activate Tableau using your credentials. Prior to version 2020.1, the ability to use login-based licence management on Tableau Desktop is not turned on as a default. Check the Tableau Desktop version to ensure the correct version is being used.

If the login-based licence management option has been turned off during installation or with an update, see [Step 2: Enable login-based licence management](#).

Product key expiry date doesn't change after purchasing a year subscription

After purchasing a renewal of Tableau Server, and the new subscription term is reflected in Tableau Server, it may take up to 24 hours before the new expiry date appears in **Manage Product Keys** on Tableau Desktop.

You do not have a Creator licence

When attempting to activate from Tableau Desktop, the following error message may be displayed:

*You do not have a Creator licence. Contact your administrator to obtain one.*

This error is displayed if you have not been assigned a Creator role. If you belong to multiple sites on Tableau Cloud or Tableau Server, you need to sign in to the site where you have the Creator role when using login-based licence management. Otherwise you'll get this error.

To verify that the product key you have activated on the server includes Creator licences, open the TSM web UI and click **Configuration**, and then click **Licensing**.

You have activated the maximum number of computers

When attempting to activate from Tableau Desktop, the following error message may be displayed:

*You have activated Tableau the maximum number of times allowed under your account. You must wait for the licence activation on another computer to expire before you can activate Tableau again.*

This error is displayed when you activated Tableau from multiple computers with the same Creator user credentials and exceeded the maximum number of activations. You must wait until the authorisation-to-run (ATR) token expires on one of the existing computers before attempting to activate a new computer. If you are using non-persistent virtual machines (VMs), you can shorten the ATR duration to prevent this error from occurring again.

To shorten the ATR token duration for maximum activation

If you encounter this maximum use error when using a non-persistent virtual deployment, it is possible to shorten the ATR duration to 4 hours (14400) seconds to avoid the error in the future. Alternatively, instead of changing the duration on an individual desktop, you can set the default duration on Tableau Server to affect all users.

The following steps shorten the lease on a computer previously activated with login-based licence management that will no longer be used, in order to free up a seat to be activated on a new computer:

1. Open a Command Prompt as an administrator on a Tableau Desktop computer that will no longer be used.
2. Navigate to the Tableau binaries (\bin) directory, using the following command.

**Windows:** `cd Program Files\Tableau\Tableau <version>\bin`

**Mac:** `cd /Applications/Tableau\ Desktop\ <version>.app/Contents/MacOS`

## Tableau Server on Windows Help

3. Run the following command to set the duration to 4 hours, in seconds (e.g. 14400).

Windows: `atrdiag.exe -setDuration 14400`

Mac: `sudo ./atrdiag -setDuration 14400`

4. Delete the previous ATR token using the following command:

Windows: `atrdiag.exe -deleteAllATRs`

Mac: `./atrdiag -deleteAllATRs`

5. Next, overwrite the existing ATR token. Open Tableau Desktop. Tableau displays the “Licence has Changed” message. Click **Exit** to automatically close and reopen Tableau Desktop.
6. In the registration dialog box, click **Activate**, and then reactivate Tableau Desktop through Tableau Server using login-based licence management, which will overwrite the existing token.
7. Close Tableau Desktop and wait for the ATR duration to elapse (e.g. 4 hours) so that the ATR token expires and frees-up a user seat. Do not open Tableau Desktop before the ATR duration has elapsed. Check to make sure the ATR duration has elapsed. The ATR token TTL End should show a date and time in the future (e.g. 4 hours from now).

Windows: `atrdiag.exe`

Mac: `./atrdiag`

8. After the ATR token expires and you can successfully sign in to Tableau Server on a new computer.

To return your computer to an unlicensed state

1. Open a Command Prompt as an administrator.
2. Navigate to the Tableau binaries (\bin) directory, using the following command:

```
cd Program Files\Tableau\Tableau <version>\bin
```

3. Run the following command:

**Windows:** atrdiag.exe -deleteAllATRs

**Mac:** ./atrdiag.exe -deleteAllATRs

**Note:** This removes only the ATR token from the computer. It does not free-up any of the user seats. The user seat is only freed-up after the deleted ATR token expires.

#### Your Tableau credentials are invalid

When attempting to activate from Tableau Desktop, the following error message may be displayed:

*Your Tableau credentials are invalid. Contact your administrator to reset your account.*

This error is displayed when your Tableau licence is not recognised. Contact your administrator.

#### Your computer's clock is not synchronised to the current time

When attempting to activate from Tableau Desktop, the following error message may be displayed:

*Your computer's clock is not synchronised to the current time. Synchronise your computer's clock to the current time and then try to activate Tableau.*

This error is displayed when your computer's clock is not synchronised with the current time. Synchronise your computer's clock with a time server on the internet or enable automatic time synchronisation.

#### Unable to activate with your credentials

When attempting to activate Tableau, the following error message may be displayed:



*Tableau Server cannot verify your licensing information over the internet. Contact your administrator to check your internet connection.*

This error is displayed when the port `atr.licensing.tableau.com:443` is not open on all Application Server (VizPortal) nodes, or you have a proxy that is not configured properly to forward traffic to Tableau's licensing server.

To diagnose connectivity to Tableau's licensing server, paste the following URL (`https://atr.licensing.tableau.com/_status/healthz`) into a browser or at a curl command prompt.

## Zero Downtime Licensing

With zero downtime licensing, which was introduced in Tableau Server version 2021.1, you can apply most licensing changes to Tableau Server without needing to restart when licence end dates, capacity or installed features are changed.

### When should you restart Tableau Server?

When you apply a licence update that does not require a restart, Tableau Server displays the following message: **Updated Licensing details are being applied across Server.**

However, there are some situations when applying a licence update that require you to restart Tableau Server. For example, if you are activating or deactivating a product key that reduces features or changes the allowed data source connections, you'll need to restart Tableau Server after making your changes. When a restart is required, Tableau Server will display the following message: **Restart Server to apply updated Licensing details.** The following table lists the times when licence changes require you to restart Tableau Server.

| Licence change                           | Restart required? |
|------------------------------------------|-------------------|
| Extending a licence term                 | No                |
| Adding or reducing user licence capacity | No                |
| Adding core licence capacity             | No                |

|                                                           |     |
|-----------------------------------------------------------|-----|
| Reducing core licence capacity                            | Yes |
| Adding a Data Management or Advanced Management licence   | No  |
| Removing a Data Management or Advanced Management licence | Yes |
| Changing allowed data sources                             | Yes |
| Expired product key                                       | Yes |

## About Tableau Enterprise

Tableau Enterprise is our advanced software package to help you explore and manage data faster with Tableau Server. It also makes it easier to purchase the capabilities needed by organisations that require advanced data and deployment management options. It includes Tableau role-based licences, Data Management, Advanced Management and eLearning for Creators and Explorers.

### Tableau Enterprise Licensing

Tableau Enterprise is sold on a per-User role-based licensing model, including Creators, Explorers and Viewers. This model is structured around the specific roles within an organisation, each requiring different levels of functionality. With Tableau Enterprise, each role-based licence includes Data Management, Advanced Management and eLearning for Creators and Explorers.

### Tableau Enterprise Feature Table

The following table lists the features that are included with the Tableau Enterprise licence edition. Feature availability below is noted for Creator. There are differences in available functionality between Creator, Explorer and Viewer.

| Feature                  | Description                                                                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tableau Authoring</b> | Use Tableau Desktop or Tableau web authoring on Tableau Server to create, collaborate and share insights about your data. Tableau provides you with a way to identify and solve problems, or highlight key findings in a |

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     | visual and easily understandable way.                                                                                                                                                                                                                                                                                                                                          |
| Tableau Prep                                        | Tableau Prep is a data preparation tool for cleaning, shaping and combining data for analysis.                                                                                                                                                                                                                                                                                 |
| eLearning                                           | Role-based training Tableau Learning Paths provide a clear track to proficiency with the most up-to-date Tableau training content. Assessments help you evaluate where you are in your learning path and give you confidence in your new skills. Accelerate the onboarding process for new employees and help more experienced users get the most out of Tableau capabilities. |
| About Data Management                               | Data Management is a collection of features and functionality that helps customers manage Tableau content and data assets in their Tableau Server environment.                                                                                                                                                                                                                 |
| About Tableau Advanced Management on Tableau Server | Advanced Management is a collection of features designed to provide enhanced security, manageability and scalability capabilities for Tableau Server.                                                                                                                                                                                                                          |

## About the Identity Migration

Beginning in version 2022.1, Tableau Server stores and manages identity information using the Identity Service. With the Identity Service, Tableau Server uses a more modern, more secure and immutable identity structure for the user provisioning and authentication process. Identity migration is a prerequisite for configuring and using [identity pools](#).

**Note:** If you do not plan to use the identity pools capability, we recommend you do not run the identity migration. Running the identity migration without plans to use identity pools will not provide benefits to your Tableau Server deployment.

All new deployments of Tableau Server 2022.1 (and later) use the Identity Service by default and require no additional action from you. As you add new users to Tableau Server, the default Identity Service is used.

For existing deployments, if upgrading Tableau Server to version 2022.1 (or later) and restoring a backup of Tableau 2021.4 (or earlier), you can start the identity migration after Tableau Server upgrade completes to populate the new Identity Service. The identity migration populates supplemental Identity Service tables for all Tableau Server users, which are then used to authenticate users through the Identity Service. The migration runs in the background and won't interrupt or interfere with your users' use of Tableau Server.

As an administrator, you can monitor and manage the migration, including changing when the migration runs or resolving any potential migration conflicts, through a dedicated **Identity Migration** page available from Tableau Server's Users page. This page is available for the duration of the migration process.

## Summary of steps for existing deployments

For existing deployments, you must configure Tableau Server to use the Identity Service after the migration completes to take advantage of the identity structure improvements and configure identity pools.

Step 1: Before you begin

Step 2: Start the identity migration

Step 3: Complete the identity migration

Step 4: Configure Tableau Server to use the Identity Service

## Key terms

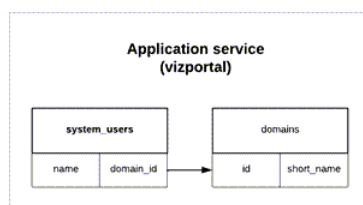
- **Identity Service** - a service in Tableau Server 2022.1 (and later) that is responsible for the administration of user identities, including authentication and provisioning. The service uses an identity schema where user identities are represented by Identity Service tables and the legacy "system\_users" table.
- **Identity pools** – an identity management tool that uses provisioning and authentication information to enable user access to Tableau Server. Identity pools enable a more centralised and flexible identity management workflow built on the Identity Service for the storage and management of user identities in Tableau Server.

- **Legacy identity store mode** - a limited identity schema used by Tableau Server 2021.4 (and earlier), where user identities are only represented by the legacy "system\_users" table.
- **Identity migration** - The auditing process that evaluates existing Tableau Server user identities, queries the upstream external identity stores for additional identity information (as appropriate) and imports that additional identity information to the Identity Service.
- **External identity store** - an identity store type, external and upstream to Tableau Server, where all identity information is stored and managed by an external directory service (Active Directory (AD) or LDAP). If configured, Tableau Server synchronises to the external directory so that a copy of the identity information exists in Tableau Server.
- **Local identity store** - an identity store type provided by Tableau Server. If configured, Tableau Server stores and manages identity information in the Tableau Server repository without any configured external directory for this information.
- **System user** - a Tableau Server user. A user corresponds to a sign-in record ("system\_users") in both the Identity Service (through the "system\_users\_identities" table) and legacy identity store mode. A "system\_users" record can potentially have multiple user identities associated with it and enabled to sign in to multiple sites. The link between a "system\_users" record and sites is defined in the "users" table.

## Purpose of the identity migration

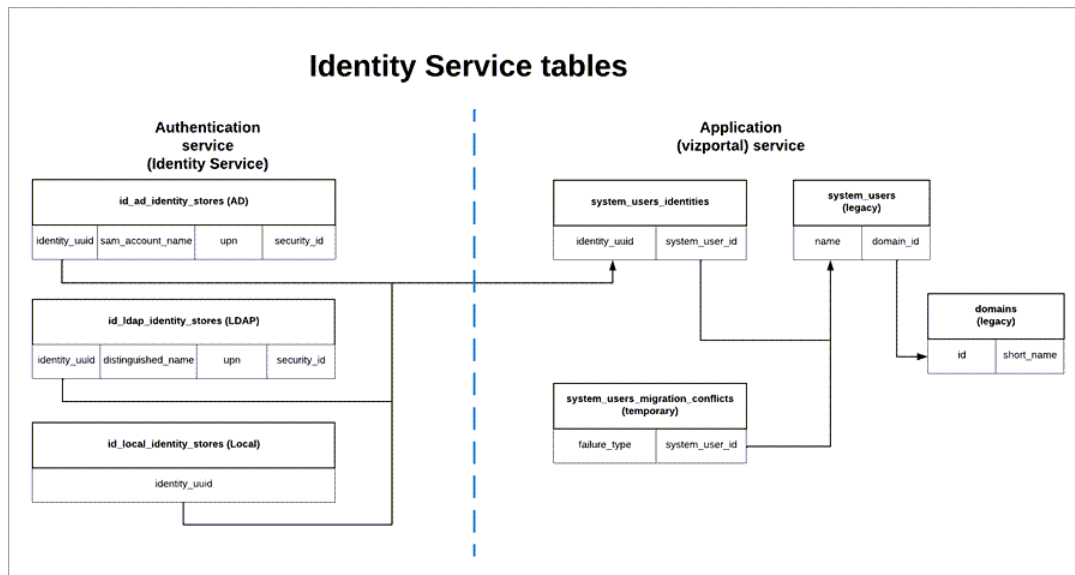
When you create a Tableau Server backup, identity information is saved in the identity schema used by the version of Tableau Server that the backup was created for. The migration is necessary to populate identity information from the identity schema used in the backup to the identity schema used by the Identity Service.

### Identity schema of Tableau Server 2021.4 and earlier



The identity schema used by the legacy identity store mode consists of two tables: "system\_users" and "domains."

## Identity schema of Tableau Server 2022.1 and later



The identity schema used by the Identity Service includes the legacy "system\_users" tables and supplemental Identity Service tables (\*\_identity\_stores and \*identities) that capture more identity information. The additional tables help reduce issues that can be caused by upstream changes in the external identity stores.

## What happens during the identity migration

When information about user identities are migrated, identity information stored in the legacy "system\_users" table are supplemented with the Identity Service tables.

The type of Identity Service tables that the identity information is supplemented with depends on which identity store type Tableau Server is configured for: local, Active Directory (AD) or Lightweight Directory Access Protocol (LDAP).

- For **AD** identity store types, Identity Service tables only inherit unambiguous attributes or attributes that are not stored in the same database record.

For example, sAMAccountName and userPrincipalName (UPN) can be stored in the same name record of a legacy "systems\_users" table, which can occur as a result of a

complex series of rules. In most cases, the migration is able to correctly interpret and successfully migrate the user identity. However, if the migration produces ambiguous results, you must either manually acknowledge the ambiguity or manually resolve the conflict using the dedicated Identity Migration page. For more information, see [Resolve Identity Migration Conflicts](#).

- For **LDAP** identity store types, like AD identity store types, Identity Service tables only inherit unambiguous attributes. In most cases, the migration is able to correctly interpret and successfully migrate the user identity. However, if the migration produces ambiguous results, you must either manually acknowledge the ambiguity or manually resolve the conflict using the dedicated Identity Migration page. For more information, see [Resolve Identity Migration Conflicts](#).
- For **Local** identity store types, Identity Service tables inherit the user and domain fields directly. This means, no additional information or manual resolution is required from you. When Tableau Server is configured for this type of identity store, migration of users identities happens after the Tableau Server backup restore process.

## Step 1: Before you begin

Before you begin, identify your Tableau Server upgrade method below to determine next steps in the identity migration.

- If you're performing a **Blue/Green upgrade** or **manually upgrading** Tableau Server by 1) installing Tableau Server on a new machine and then 2) **backing up and restoring Tableau Server using the `tsm maintenance (backup and restore)` commands**, you're required to take some additional steps to initiate the migration.

For next steps, see [Troubleshoot Issues with the Identity Migration](#).

- If you're doing an **"in-place" single-server or multi-node upgrade** of Tableau Server using the method described here, there are no additional steps required from you to initiate the migration. The migration initiates after Tableau Server upgrade to version 2022.1 (or later) is complete.

Skip to [Step 2](#).

- If you're **manually upgrading** Tableau Server by 1) installing Tableau Server on a new machine and then 2) **exporting and importing configuration and topology information using [tsm settings \(export and import\) commands](#)**, there are also no additional steps required from you to initiate the migration. The migration initiates after the import process completes on the new Tableau Server machine.

Skip to [Step 2](#).

## Step 2: Start the identity migration

To start the identity migration, you must enable the identity migration capability by using the `tsm command features.IdentityMigrationBackgroundJob`.

**Note:** If you've upgraded to Tableau Server versions 2021.4.21, 2022.1.17, 2022.3.9 and 2023.1.5, the identity migration starts by default and you can skip to Step 3: Complete the identity migration.

1. Open a command prompt as admin on the initial node (where TSM is installed) in the cluster.
2. Run the following command:

```
tsm configuration set -k features.IdentityMigrationBackgroundJob -v true
```

After the identity migration begins, you'll see a notification in Tableau Server that links you to the Identity Migration page. The Identity Migration page is where you can monitor the status of the identity migration and identity conflicts that need to be resolved.

## Step 3: Complete the identity migration

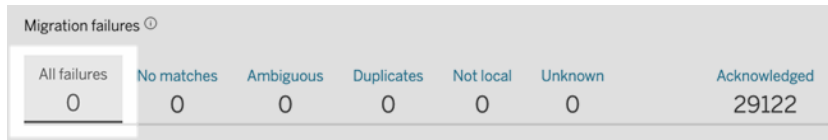
To complete the identity migration, all identity conflicts must be resolved or acknowledged before you can enable the Identity Service for Tableau Server.



1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page to verify the migration has started.

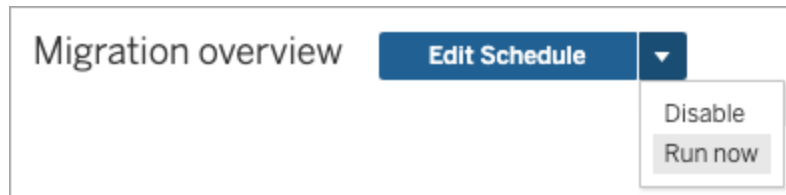
You can monitor and manage its progress using the dedicated Identity Migration page available from Tableau Server's Users page. For more information, see [Manage the Identity Migration](#).

3. Resolve or acknowledge all identity conflicts as described in [Resolve Identity Migration Conflicts](#) so that the **All failures** tab displays "0" like in the image below.



| Migration failures ⓘ |            |           |            |           |         |              |
|----------------------|------------|-----------|------------|-----------|---------|--------------|
| All failures         | No matches | Ambiguous | Duplicates | Not local | Unknown | Acknowledged |
| 0                    | 0          | 0         | 0          | 0         | 0       | 29122        |

4. Do *one* of the following:
  - To run the identity migration job now, next to the Migration Overview heading, click the Edit Schedule drop-down arrow, then select **Run Now**.



- Alternatively, you can wait for the migration job to run during the next scheduled time.
5. After the migration completes, from the Identity Migration page, validate that the Migration Overview shows **100% complete**.



## Step 4: Configure Tableau Server to use the Identity Service

After the identity migration is complete, configure Tableau Server to use the Identity Service to ensure a more secure and immutable identity structure for the user provisioning and authentication process.

1. Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
2. Run the following commands:

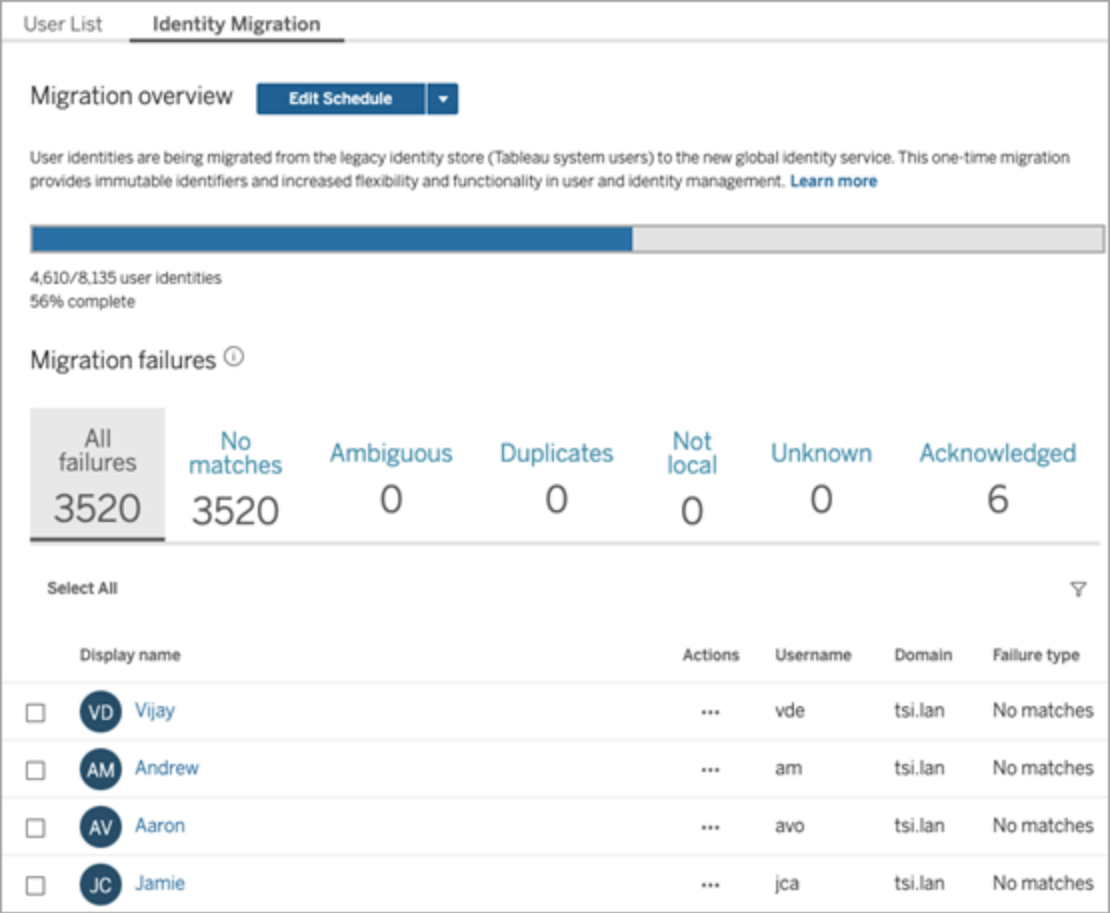
```
tsm authentication legacy-identity-mode disable  
tsm pending-changes apply
```

**Note:** After running the commands above, the dedicated **Identity Migration** page is removed and no longer accessible. The page is accessible only when `tsm authentication legacy-identity-mode` is enabled.

After Tableau Server is configured to use the Identity Service, when users sign in to Tableau Server, Tableau Server searches for their user identities using their identifiers in the configured identity store. From the identifiers, the universal unique identifiers (UUID) are returned and used to match existing Tableau Server user identities. This process then generates sessions for the users and completes the authentication workflow.

## Manage the Identity Migration

As an administrator, you can monitor and manage the identity migration, including changing when the migration jobs run, through the dedicated Identity Migration page available from Tableau Server's Users page. This page is available for the duration of the migration process.



The migration jobs are designed to run in the background without interrupting or interfering with the use of Tableau Server. If needed, however, you can make adjustments that affect how frequently migration jobs run, when the migration jobs run and how long the migration jobs can run.

Generally, the migration can take anywhere from 3 minutes to 10 days, depending on the size of your Tableau Server deployment and any changes to the default settings you make during the migration. For example, if you have 10,000 users, the migration can take about 30 minutes.

**Note:** While the migration jobs are running, all authentication and user-related capabilities work normally.

## Manage identity migration jobs

You can manage the following aspects of the identity migration.

## Resolve identity conflicts

To review the identity conflicts you might encounter during the migration, see [Resolve Identity Migration Conflicts](#).

## Change daily migration job schedule

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page.
3. Next to the Migration Overview heading, click the **Edit Schedule** button.
4. In the Edit Schedule dialog box, change when and how frequently jobs can run.

**Note:** You can ignore the **Priority** and **Execution** options in this dialog box.

Frequency  
▼ 7 days a week, from 03:00 to 00:00

Repeats  
Daily ▼

Every  
Day ▼

At  
03:00 ▼

On  
Su M T W Th F Sa

Cancel Update

- When finished, click **Update**.

## Initiate a migration job

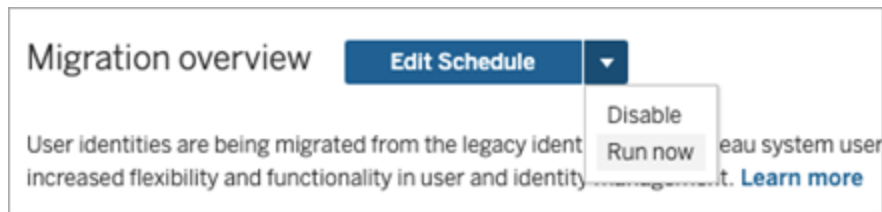
- Sign in to Tableau Server as an administrator.
- From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page.
- From any tab, select a user or multiple users.
- From the Actions menu, select **Retry Migration** or **Acknowledge**, depending on what you need to do.

Select All Clear All 2 items selected Actions ▼

Retry Migration  
Acknowledge

- Next to the Migration Overview heading, click on the Edit Schedule drop-down arrow.

6. Select **Run Now**.



## Pause the identity migration

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page.
3. Next to the Migration Overview heading, click on the Edit Schedule drop-down arrow.
4. Select **Disable**.

## Restart the identity migration

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page.
3. Next to the Migration Overview heading, click on the Edit Schedule drop-down arrow.
4. Select **Enable**.

## Change identity migration settings

To reduce any potential strain the identity migration might have on your Tableau Server, the migration is configured to run with the default settings listed below.

## Migration settings

| Type                                     | tsm command                                                         | Default                        | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------|---------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jobs schedule                            | N/A                                                                 | 3:00 a.m. daily until complete | Configurable from the Identity Migration page, see Change daily migration job schedule above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| User identity requests per second (rate) | <code>tsm authentication identity-migration configure --rate</code> | Up to 5                        | <p>If needed, you can use the <code>tsm authentication identity-migration</code> command to change the migration settings listed above using the steps below.</p> <ol style="list-style-type: none"> <li>1. Open a command prompt as an admin on the initial node (where TSM is installed) in the cluster.</li> <li>2. Run one or both of the commands described in <code>tsm authentication identity-migration</code>.</li> </ol> <p>For example, to change the individual job runtime and rate from their default values, you can run the following command:</p> <pre>tsm authentication identity-migration configure --job-run-</pre> |

|                           |                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|-------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Individual job runtime    | <code>tsm authentication identity-migration configure --job-run-time</code>   | 120 minutes | <code>time 180 --rate 3</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Enable identity migration | <code>tsm configuration set -k features.IdentityMigrationBackgroundJob</code> | false       | <p>By enabling the identity migration, Tableau Server can use the Identity Service to store and manage user identity information.</p> <ol style="list-style-type: none"> <li>1. Open a command prompt as admin on the initial node (where TSM is installed) in the cluster.</li> <li>2. Run the following command:</li> </ol> <pre>tsm configuration set -k features.IdentityMigrationBackgroundJob -v true</pre> <p><b>Note:</b> The identity migration and the Identity Service is a prerequisite for certain capabilities like <b>identity pools</b>. For more information about the tsm command, see <code>features.Identity</code></p> |



|  |  |  |                             |
|--|--|--|-----------------------------|
|  |  |  | tityMigrationBackgroundJob. |
|--|--|--|-----------------------------|

### Disable identity migration

If you've upgraded to Tableau Server versions 2021.4.21, 2022.1.17, 2022.3.9 and 2023.1.5, you might need to disable the identity migration. By disabling the identity migration, Tableau Server cannot use the Identity Service to store and manage user identity information.

1. Open a command prompt as admin on the initial node (where TSM is installed) in the cluster.
2. Run the following command:

```
tsm configuration set -k features.IdentityMigrationBackgroundJob -v false
```

**Note:** The identity migration and the Identity Service is a prerequisite for certain capabilities like [identity pools](#).

## Complete the identity migration and configure the Identity Service

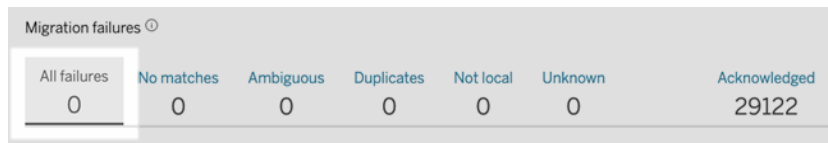
After all user conflicts are resolved or addressed and migration jobs run, you must configure Tableau Server to use the Identity Service to complete the identity migration process.

### Step 1: Validate and complete the identity migration

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page to verify the migration has started.

You can monitor and manage its progress using the dedicated Identity Migration page available from Tableau Server's Users page. For more information, see [Manage the Identity Migration](#).

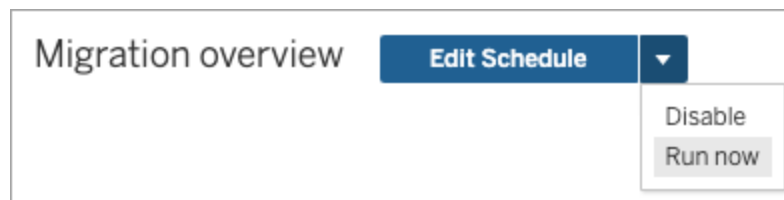
3. Resolve or acknowledge all identity conflicts as described in [Resolve Identity Migration Conflicts](#) so that the **All failures** tab displays "0" like in the image below.



| All failures | No matches | Ambiguous | Duplicates | Not local | Unknown | Acknowledged |
|--------------|------------|-----------|------------|-----------|---------|--------------|
| 0            | 0          | 0         | 0          | 0         | 0       | 29122        |

4. Do *one* of the following:

- To run the identity migration job now, next to the Migration Overview heading, click the Edit Schedule drop-down arrow, then select **Run Now**.



- Alternatively, you can wait for the migration job to run during the next scheduled time.
5. After the migration completes, from the Identity Migration page, validate that the Migration Overview shows **100% complete**.



## Step 2: Configure Tableau Server to use the Identity Service

1. Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
2. Run the following commands:

```
tsm authentication legacy-identity-mode disable
tsm pending-changes apply
```

**Note:** After running the commands above, the dedicated **Identity Migration** page is removed and no longer accessible. The page is accessible only when `tsm authentication legacy-identity-mode` is enabled.

After Tableau Server is configured to use the Identity Service, when users sign in to Tableau Server, Tableau Server searches for their user identities using their identifiers in the configured identity store. From the identifiers, the universal unique identifiers (UUID) are returned and used to match existing Tableau Server user identities. This process then generates sessions for the users and completes the authentication workflow.

## Resolve Identity Migration Conflicts

During the identity migration, Tableau Server might encounter certain user identities that can't be migrated to use the Identity Service. When user identities can't be migrated, they become identity conflicts that require you, the administrator, to manually resolve them.

To ensure that user identities are migrated correctly, you must resolve or address all identity conflicts before the identity migration can complete, using the dedicated **Identity Migration** page.

### Step 1: Resolve identity conflicts

You can resolve identity conflicts in a few ways depending on the conflict type. Regardless of the conflict type, all user identities must be resolved or addressed before you can proceed to **Step 2** below and before the identity migration process can complete.

When identity conflicts occur, the identity migration will group the conflicts into types. These types help narrow down the reason why the migration is unable to migrate the user identity automatically.

There are a few reasons why identity conflicts can occur. For example, you might see an identity conflict when the migration has identified a Tableau Server user that matches more than one user identity in the external identity store.

When identity conflicts are identified, you can address them using one of the following options:

- **Retry Migration** - This option moves the selected user identities back into the queue to be migrated again. After the migration jobs have run again, it's possible that the identity conflicts will resolve on their own, the original identity conflicts will occur again or new identity conflicts will occur.
- **Acknowledge** - This option moves the selected user identities to the **Acknowledged** tab. When you acknowledge user identities, you understand that 1) those users don't have matching user identities in an identity store and will therefore not be migrated, and 2) those users will be unable to sign in to Tableau Server after you enable the Identity Service in [Step 3](#) below.
- **Reevaluate** - When conflicts have already been acknowledged, from the **Acknowledged** tab, this option moves the selected user identities back to their conflict state. This option gives you the chance to see the original conflict, resolve the conflict or acknowledge the identity conflict again.

Quick reference: Identity conflicts

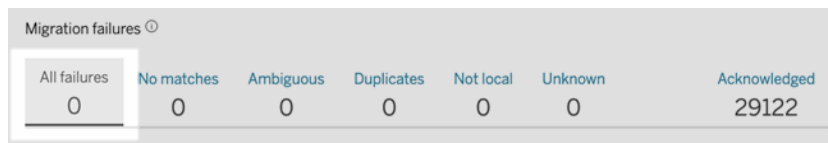
| Conflict type | Applies to configuration | Conflict reason                                                                                                           | Action                                                           |
|---------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| All failures  | All                      | This tab captures all identity conflicts categorised in the No matches, Ambiguous, Duplicate, Not local and Unknown tabs. | Retry Migration or Acknowledge                                   |
| No matches    | AD, LDAP                 | The user identities have no matching users in the external identity store.                                                | Retry Migration or Acknowledge                                   |
| Ambiguous     | AD, LDAP                 | For the specified user identities, there is more than one possible match in the external identity store.                  | Retry Migration, Acknowledge or select one of the suggested user |

|              |       |                                                                                                                                                                                            | identities                     |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Duplicate    | AD    | Two user identities were created using one AD account. This is an artefact of legacy functionality that is not supported in the Identity Service.                                          | Retry Migration or Acknowledge |
| Not local    | Local | User identities that are associated with an identity store that is not local. This conflict occurs because manual changes were made that are not supported.                                | Retry Migration or Acknowledge |
| Unknown      | All   | This conflict might indicate an internal Tableau Server error or an identity conflict caused by a reason not listed in this table.                                                         | Retry Migration or Acknowledge |
| Acknowledged | All   | This tab captures all user identities that will not be migrated. Those users will not be able to sign in to Tableau Server after Tableau Server is configured to use the Identity Service. | Retry Migration or Acknowledge |

To resolve a conflict, follow the steps below.

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page.
3. Select one or more user identities in the **All Failures** tab or in one of the conflict-specific tabs.
4. From the Actions drop-down menu, click **Retry Migration** or **Acknowledge**.

If you select “Retry Migration”, the user identities might generate different conflict types. In this case, address the conflicts as needed until the **All failures** tab displays “0” like in the image below.



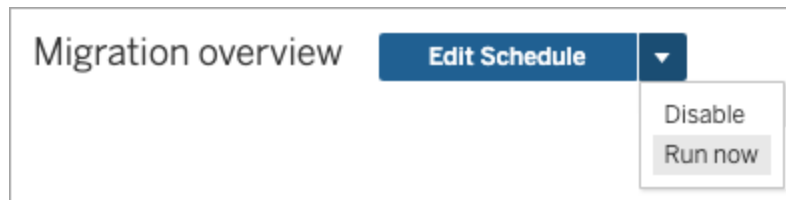
| Migration failures ⓘ |            |           |            |           |         |              |
|----------------------|------------|-----------|------------|-----------|---------|--------------|
| All failures         | No matches | Ambiguous | Duplicates | Not local | Unknown | Acknowledged |
| 0                    | 0          | 0         | 0          | 0         | 0       | 29122        |

**Note:** User identities that are acknowledged are ignored in Active Directory (AD) and LDAP group syncs moving forward. If users associated with these users’ identities require access to Tableau Server at a later time, see [Troubleshoot Issues with the Identity Migration](#) for more information.

## Step 2: Complete the identity migration

To complete the identity migration, in addition to all identity conflicts being resolved or addressed, all migration jobs have to run before you can enable the Identity Service for Tableau Server.

1. Do *one* of the following:
  - To run the identity migration jobs now, next to the Migration Overview heading, click on the Edit Schedule drop-down arrow, and then select **Run Now**.



- Alternatively, you can wait for the migration to run during the next scheduled time.
2. From the Identity Migration page, validate that the Migration Overview displays **100% complete**.



### Step 3: Configure Tableau Server to use the Identity Service

After the identity migration is complete, configure Tableau Server to use the Identity Service to ensure a more secure and immutable identity structure for the user provisioning and authentication process.

1. Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
2. Run the following commands:

```
tsm authentication legacy-identity-mode disable  
tsm pending-changes apply
```

**Note:** After running the commands above, the dedicated **Identity Migration** page is removed and no longer accessible. The page is accessible only when `tsm authentication legacy-identity-mode` is enabled.

After Tableau Server is configured to use the Identity Service, when users sign in to Tableau Server, Tableau Server searches for their user identities using their identifiers in the configured identity store. From the identifiers, the universal unique identifiers (UUID) are returned

and used to match existing Tableau Server user identities. This process then generates sessions for the users and completes the authentication workflow.

## Troubleshoot Issues with the Identity Migration

### Unable to restore backup

After upgrading to Tableau Server 2022.1 (or later), restoring a Tableau Server backup might cause the following error:

*“The backup cannot be restored because Tableau Server uses the new identity service tables by default.”*

This issue might occur when Tableau Server needs to run the identity migration, which is a necessary process to populate the Identity Service. The Identity Service is an identity schema that was introduced beginning with Tableau Server 2022.1 and is used to provision and authenticate users. To prevent any potential issues, the restore process can't proceed when Tableau Server detects that the Tableau Server backup uses a different identity schema than the version that it's being restored to.

**Note:** The Identity Service is the default identity schema in Tableau Server version 2022.1-2022.1.7, 2022.3-2022.3.9 and 2023.1-2023.15.

To resolve this issue, follow the steps described below.

#### Step 1: Enable `legacy-identity-mode` and restore the backup

1. Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
2. Set Tableau Server 2022.1 (or later) to use the legacy identity store mode by running the following commands:

```
tsm authentication legacy-identity-mode enable  
tsm pending-changes apply
```



Tableau Server must use the legacy identity store mode to populate the Identity Service. For more information about the tsm command, see [tsm authentication legacy-identity-mode](#).

3. Restore the backup again to enable the migration to initiate by running the following commands:

```
tsm maintenance restore --file <file_name>
tsm start
```

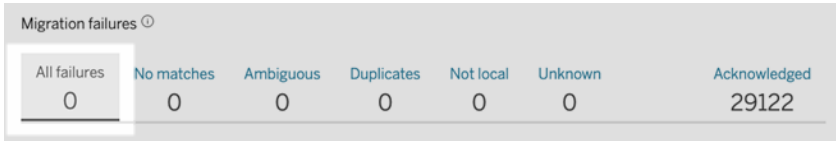
**Important:** After the backup is restored, the migration populates the Identity Service with identity information. For general information about restoring from backup, see [Restore from a Backup](#).

Step 2: Validate and complete the identity migration

1. Sign in to Tableau Server as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server) and then click the **Identity Migration** page to verify the migration has started.

You can monitor and manage its progress using the dedicated Identity Migration page available from Tableau Server's Users page. For more information, see [Manage the Identity Migration](#).

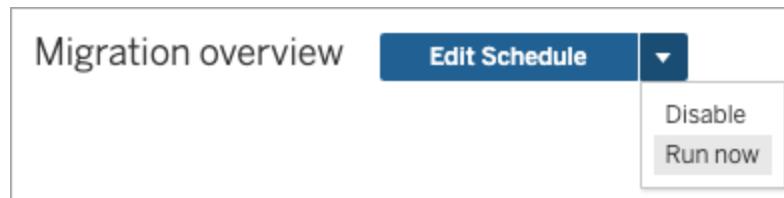
3. Resolve or acknowledge all identity conflicts as described in [Resolve Identity Migration Conflicts](#) so that the **All failures** tab displays "0" like in the image below.



| Migration failures ⓘ |            |           |            |           |         |              |
|----------------------|------------|-----------|------------|-----------|---------|--------------|
| All failures         | No matches | Ambiguous | Duplicates | Not local | Unknown | Acknowledged |
| 0                    | 0          | 0         | 0          | 0         | 0       | 29122        |

4. Do *one* of the following:

- To run the identity migration job now, next to the Migration Overview heading, click the Edit Schedule drop-down arrow, then select **Run Now**.



- Alternatively, you can wait for the migration job to run during the next scheduled time.
- After the migration completes, from the Identity Migration page, validate that the Migration Overview shows **100% complete**.



### Step 3: Configure Tableau Server to use the Identity Service

- Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
- Run the following commands:

```
tsm authentication legacy-identity-mode disable
tsm pending-changes apply
```

**Note:** After running the commands above, the dedicated **Identity Migration** page is removed and no longer accessible. The page is accessible only when `tsm authentication legacy-identity-mode` is enabled.

After Tableau Server is configured to use the Identity Service, when users sign in to Tableau Server, Tableau Server searches for their user identities using their identifiers in the configured identity store. From the identifiers, the universal unique identifiers (UUID) are returned

and used to match existing Tableau Server user identities. This process then generates sessions for the users and completes the authentication workflow.

## “Unexpected error” on Identity Migration page

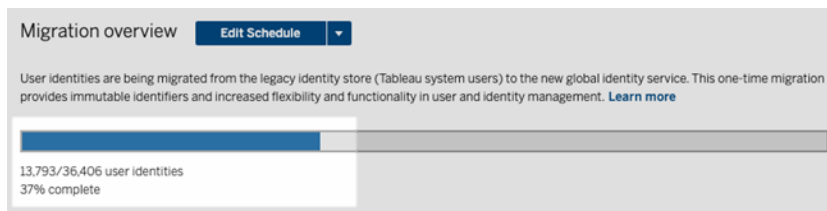
After resolving or acknowledging all user identities from the Identity Migration page, you see an “Unexpected error” message. This message can display when you’ve tried to resolve or acknowledge more than 1000 user identities at one time.

To resolve this issue, select and resolve or acknowledge 1000 or fewer user identities, then try again.

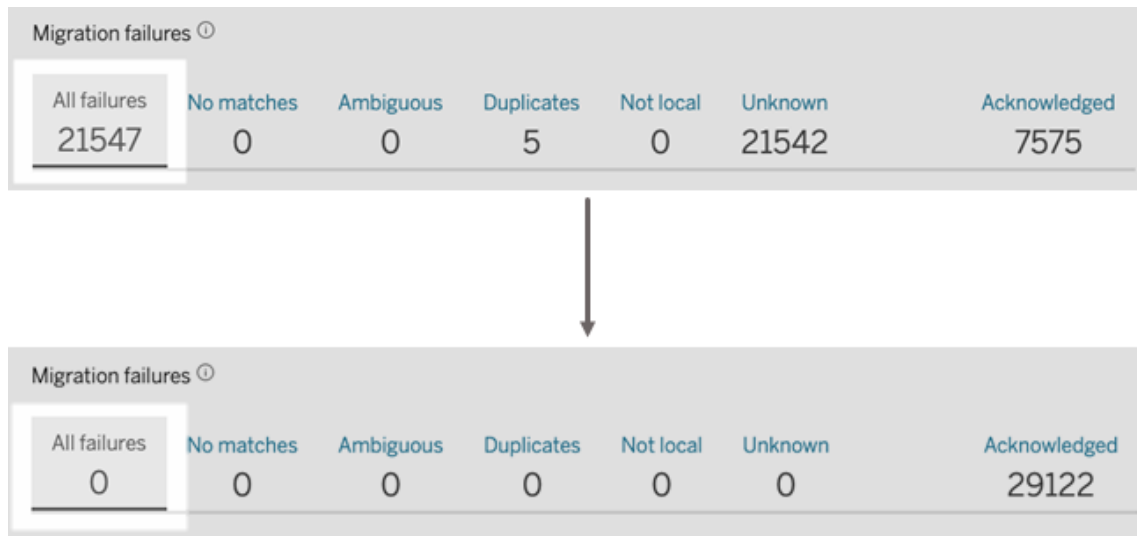
For more information about managing identity conflicts, see [Resolve Identity Migration Conflicts](#).

## Migration progress appears unresponsive or stuck

If the migration status or migration progress bar appears unresponsive or stuck, validate that you have resolved and acknowledged all user conflicts under **Migration failures**.



To resolve this issue, ensure all conflicts are resolved and acknowledged by selecting one or more users’ identities in the **All failures** tab and clicking **Acknowledge** from the Actions drop-down menu. Perform this task until the **All failures** tab displays "0". For more information about managing identity conflicts, see [Resolve Identity Migration Conflicts](#).



**Note:** After all identity conflicts have been resolved or addressed, all migration jobs have to run before you can enable the Identity Service for Tableau Server. You can run the migration jobs now by clicking the Edit Schedule drop-down arrow next to the Migration overview heading, and then selecting **Run Now**. When the Migration Overview shows **100% complete**, you can configure Tableau Server to use the Identity Service. For more information, see Step 3: Complete the identity migration.

### "Identity migration is in progress" pop-up persists

The "identity migration is in progress" notification persists despite completing the identity migration because the Identity Service has not been enabled yet. To complete the identity migration, the Identity Service needs to be enabled in Step 4: Configure Tableau Server to use the Identity Service so that Tableau Server can use the identity structure that enables identity pools capability.

### Identity Migration page disappears

When the identity migration is complete and Tableau Server is configured to use the Identity Service, the dedicated **Identity Migration** page is removed and no longer accessible. The Identity Migration page is needed only for the identity migration or when `tsm authentication legacy-identity-mode` is enabled.

## Users can't sign in

After the identity migration has been completed and the Identity Service enabled, some users are unable to sign in to Tableau Server. In most cases, this issue occurs to users whose identities had conflicts and were subsequently **Acknowledged** during the identity migration. Users' identities that were acknowledged are not migrated to the Identity Service and subsequently ignored during Active Directory (AD) or LDAP group syncs going forward.

If users associated with those acknowledged user identities require access to Tableau Server again, manually add the users to Tableau Server. After the users are manually added, subsequent AD or LDAP group syncs recognise the user identities and sync as expected.

## Revert identity migration

If there are issues, such as certain users not being able to sign in to Tableau Server, that you believe are caused by the Identity Service, you can use the `tsm authentication legacy-identity-mode` command to revert back to use the legacy identity store mode. After reverted, both new users who were added after the identity migration and users who could only sign in to Tableau Server before the migration are able to sign in to Tableau Server without any issues.

After reverting from the Identity Service to the legacy identity store mode, you can use the Identity Migration page to run the migration for the problematic user identities. For more information about managing identity conflicts, see [Resolve Identity Migration Conflicts](#).

# Provision and Authenticate Users Using Identity Pools

Introduced in Tableau Server version 2023.1, identity pools are an identity management tool that uses provisioning and authentication information to enable user access to Tableau Server. Identity pools enable a more centralised and flexible identity management workflow built on the [Identity Service](#) for the storage and management of user identities in Tableau Server.

Identity pools do not replace the user provisioning and authentication configurations you make using Tableau Services Manager (TSM) during Tableau Server setup. Instead, identity pools are designed to complement and support additional user provisioning and authentication options you might need in your organisation, particularly for organisations where TSM is configured with Active Directory (AD) or Lightweight Directory Access Protocol (LDAP). Identity pools add an alternative method, after Tableau Server setup, that supports Tableau Server administrators to add users, who are often external users, partners or contractors, to your Tableau Server deployment.

Identity pools are optimised for the following use cases:

- **External users:** A large enterprise organisation who doesn't want to add external users to their internal AD.

For example, suppose your organisation has two types of employees: regular employees and contract employees. Your regular employees are provisioned through Active Directory (AD) with SAML authentication that is managed through your IdP, Okta. Your contract employees consist of users who are typically assigned temporary group membership or are a part of another organisation who provisions users outside of AD and authenticates separately. Identity pools can enable you to add Tableau Server users who are external to your AD.

- **Multiple identity stores:** An organisation hosting SaaS applications that sources users from multiple identity stores.

For example, suppose your organisation shares Tableau content to multiple external organisations from a single site. You can separate these users using different identity pools configured with local identity stores to more easily identify and manage the users from each organisation.

- **Security boundaries between internal organisations:** An organisation of multiple acquired child organisations with distinct security boundaries.

For example, you can add users from the newly added organisation to an identity pool configured with a local identity store to workaroud the complexities associated with combining identity stores.

## What are identity pools?

An identity pool has three main components: an identity store to provision users, OpenID Connect (OIDC) authentication and assigned users.

- **Identity store:** The **identity store** that you source or provision your users can be a local identity store or an external identity store.
  - If a local identity store, an identity pool can be configured to use a new local identity store or an existing local identity store. **Note:** Local authentication is not supported.
  - If an external identity store, an identity pool can only use the same external identity store (AD or LDAP) that you configured in TSM during Tableau Server setup. You can't configure an identity pool to use a different external identity store.

The provisioning and authentication configurations you make in TSM during Tableau Server setup is referred to as the default or “initial pool (TSM configured)”.

- **Authentication:** The only supported authentication method for an identity pool is **OIDC**.
- **Users:** In order for users to sign in to Tableau Server, they must either be sourced from the initial pool (TSM configured) or be a member of at least one identity pool.

## When to use identity pools

As a Tableau Server administrator, you can use an identity pool to segment your users into identity cohorts based on where your users are provisioned from and how those users authenticate into Tableau Server. Though the identity store and authentication configurations you make in TSM during Tableau Server setup, also referred to as the initial pool (TSM configured), remains unchanged, identity pools are configurable from Tableau Server.

**Note:** Identity pools are currently available for server-level configuration only. Identity pools can't be scoped to a site.

## More about identity pools

### Initial pool (TSM configured) versus identity pools

As noted above, the combination of provisioning and authentication configurations you make in TSM during Tableau Server setup is referred to as the “initial pool (TSM configured)”. The initial pool (TSM configured) is a required component of the Tableau Server setup process and cannot be modified.

An identity pool, however, is optional and you can create as many identity pools as needed from Tableau Server directly.

### Identity pools impact on users' sign-in experience

By default, when no identity pools are created for Tableau Server, there is no change to how your users navigate to the Tableau Server landing page and sign in to Tableau Server.

When one or more identity pools are created, the Tableau Server landing page displays multiple sign-in options. The primary sign-in option is displayed at the top of the page and is the way your users that belong to the initial pool (TSM configured) can sign in.

Below the primary sign-in option are the secondary sign-in options. Each option represents an identity pool, displayed in the order they were created. Users assigned to those pools must sign in using the option for the identity pool they belong to. To help guide your users to the correct sign-in option, consider adding a description to the identity pool when creating one.

**Note:** All users will see all pools that are configured for your Tableau Server, regardless of their pool membership.

### Username and identifiers in Tableau

A username is the information that represents the system user. An identifier is used to supplement the username information and can be used by external identity stores as alternatives



to usernames.

In Tableau, a username is an immutable value that is used to sign in to Tableau and identifiers are mutable values used in Tableau's identity structure as a way to match users to their usernames. Identifiers enable Tableau to be more flexible because they can deviate from the username. If there are changes to the username in the external identity store, Tableau Server administrators can update the identifier to ensure users are matched to the correct usernames.

When you add an existing user to an identity pool, you might expect the ability to set an identifier. For example, if an existing user belongs to an identity pool configured with a local identity store and you want to add them to an identity pool configured with an AD identity store, we ask you to provide the username to search for identifiers associated with that user. On the other hand, if an existing user belongs to an identity pool configured with an AD identity store and you want to add them to an identity pool configured with a local identity store, we ask you to provide an optional identifier. An exception to this is if you want to add a user to the initial pool (TSM configured) that's configured with a local identity store and local authentication. You will be unable to set an identifier for that user.

## Set Up and Manage Identity Pools

To create and manage identity pools, you are required to programmatically make calls against the [Identity Pools Methods](#) using the Tableau REST OpenAPI. To add or manage users in an identity pool, you can use Tableau Server user interface (UI) directly or through the Tableau REST API.

The identity pools setup process is summarised in the following steps.

1. **Configure Tableau Server and establish a session.**
2. **Provision users** by setting up a new local identity store instance. **Note:** You can skip this step to use an existing local identity store or the external identity store you configured in TSM during Tableau Server setup.
3. **Set up authentication** to authenticate your users to Tableau Server using OpenID Connect (OIDC).
4. **Create an identity pool** that uses the identity store and OIDC authentication you configured.

5. **Add users to an identity pool** by using Tableau Server UI or REST API to enable users to sign in to Tableau Server.

After setup, you can [test](#), [manage](#), and [troubleshoot](#) your identity pools.

**Note:** You can use the [Identity Pools](#) Postman collection in the Salesforce Developer's Postman workspace to learn about, develop and test the methods described in this topic.

## Prerequisites

Before getting started with identity pools, the following requirements must be met:

- Integration with an OIDC identity provider (IdP), such as Okta, is already configured
- You are running Tableau Server 2023.1 or later
- You have performed the [identity migration](#) if you are running Tableau Server after upgrading from version 2021.4 or earlier

## Get started

Step 1: Configure Tableau Server and establish a session

Enabling changes associated with setting up identity pools require a one-time TSM configuration and a declaration of session and host variables.

1. Open a command prompt as an administrator on the initial node (where TSM is installed) in the cluster.
2. Run the following command:

- a. `tsm configuration set -k gateway.external_url -v http://<host>`
- b. `tsm pending-changes apply`

For example, you can run the following commands to configure your Tableau Server, `http://myco`:

```
tsm configuration set -k gateway.external_url -v http://myco
tsm pending-changes apply
```

For more information, see [gateway.external\\_url](#).

3. (Optional) Run the following commands to add a description for the initial pool (TSM configured):

- a. `tsm configuration set -k wgserver.authentication.identity_pools.default_pool_description -v "<description>"`
- b. `tsm pending-changes apply`

For example, you can run the following commands to add a "Sign-in for MyCo employees" description:

```
tsm configuration set -k wgserver.authentication.identity_pools.default_pool_description -v "Sign-in for MyCo employees"
tsm pending-changes apply
```

For more information, see [wgserver.authentication.identity\\_pools.default\\_pool\\_description](#).

4. Sign in to Tableau Server as an administrator and do the following:
  - a. Go to the browser's developer tools and navigate to the application's cookies.
  - b. Note the **workgroup\_session\_id** value.

For example, if working in Chrome, right-click anywhere on the Tableau Server homepage, right-click and select **Inspect**. Click **Application** from the top navigation pane and click **Cookies** from the left navigation pane. Under Cookies, click your Tableau Server name, like `http://myco.com`, and note the **workgroup\_session\_id** value in the center pane.

5. In the script or API developer tool you're using to make identity pools requests using the Tableau REST OpenAPI, do the following:
  - a. Add the `workgroup_session_id` value as a global variable.
  - b. In addition, add port 80, host (your Tableau Server URL), and protocol (HTTP or HTTPS) to your global variables.

For example, the following table shows the global variables necessary for your Tableau Server, `http://myco`.

| Global Variable       | Value                                                                                           |
|-----------------------|-------------------------------------------------------------------------------------------------|
| Work-group session ID | AbC_2ab-cDe-fDwGVzPu1hCQ FJk5Z6OroPCLEDTKk-wDxaeA0YzriY04f ca608d3c-fc01-4e40-ae5e-9b2131e4e7mm |
| Port                  | 80                                                                                              |
| Host                  | <code>http://myco</code>                                                                        |
| Protocol              | HTTP                                                                                            |

## Step 2: Set up an identity store

Tableau Server requires you to configure an identity store to source or provision your Tableau Server users.

When setting up an identity pool, you can use a new or existing **local identity store**, or you can use an **external identity store**, either Active Directory (AD) or Lightweight Directory Access Protocol (LDAP) if that external identity store was configured during Tableau Server setup.

**Note:** New AD or LDAP instances that are not the AD or LDAP instance you configured in TSM during Tableau Server setup (also referred to as the initial pool (TSM configured)), are not configurable with identity pools.

To set up a new local identity store, use the procedure below. Skip to Step 3: Set up authentication if you want to use an existing local identity store or the identity store you configured during Tableau Server setup.

1. Make a **Sign In** request to the Tableau REST API to generate a credentials token.

Example

URI

```
POST https://myco/api/3.19/auth/signin
```

2. After the credentials token is generated, add the credentials token to the header of all subsequent API requests.
3. Configure the identity store by calling the **Configure Identity Store** endpoint using the Tableau REST API OpenAPI.
4. In the request, specify the following:
  - a. Type. The type value is always 0 for a local identity store type. If you want to use an existing local identity store or the identity store you configured in TSM during Tableau Server setup, you don't need to set up a new local identity store instance. Instead, skip to Step 3: Set up authentication, below.
  - b. Name. The name must be unique.
  - c. Display name. This is optional.

Example

URI

```
https://myco/api/services/authn-service/identity-stores/
```

Request body (JSON)

```
{
  "type": "0",
  "name": "Local identity store #1",
  "display_name": "Local identity store #1"
}
```

Response body

*None*

### Step 3: Set up authentication

You can configure OpenID Connect (OIDC) authentication method to authenticate your users.

**Note:** OIDC is currently the only authentication method configurable with identity pools, regardless of the identity store type you use with the identity pool.

1. After setting up an identity store, call the [Create Authentication Configuration](#) endpoint using the Tableau REST API OpenAPI.
2. In the request, specify the following:
  - a. Authentication type. The authentication type values is "OIDC".
  - b. iFrame. The iFrame's default value is "false".
  - c. The required OIDC client ID, client secret, configuration URL, ID claim, client authentication, and username claim.
    - The client ID, client secret is provided by your OIDC IdP.
    - The configuration URL is also provided by your IdP. The URL and can typically use the following format: `https://<idp_url>/well-known/openid-configuration`.
    - The ID claim's default value is "sub". For more information, see [Changing the sub claim](#).
    - The client authentication's default value is "CLIENT\_SECRET\_BASIC".
    - The username claim's default value is "email". For more information, see [Default: using email claim to map users](#).

#### About username claim

Tableau uses the username claim for identity matching purposes. If you provide identifiers when adding users to Tableau Server, the identifier is used to match

the value provided in the username claim. If no identifiers are provided, Tableau defaults to the username set in Tableau Server.

**Notes:**

- If you intend to use this authentication configuration with an identity pool that uses AD as its identity store, make sure that the assigned user has the AD sAMAccountName value in the username claim.
- If you intend to use this authentication configuration with an identity pool that uses LDAP as its identity store, make sure that the assigned user has the LDAP username value in the username claim.

**Example**

**URI**

`https://myco/api/services/authn-service/auth-configurations/`

**Request body (JSON)**

```
{
  "auth_type": "OIDC",
  "iframed_idp_enabled": true,
  "oidc": {
    "client_id": "0oalhotzhjv4tyCd08",
    "client_secret": "EsKd2NCxY-BiLu_zcIwr2lJZLziT_7sw9Fi6HV3",
    "config_url": "https://dev-532601-admin.oktapreview.com/.well-known/openid-configuration",
    "custom_scope": "",
    "id_claim": "sub",
    "username_claim": "email",
    "client_authentication": "CLIENT_SECRET_BASIC",
    "essential_acr_values": "",
    "voluntary_acr_values": "",
    "prompt": "login,consent",
    "connection_timeout": 100,
    "read_timeout": 100,
    "ignore_domain": false,
  }
}
```

```

    "ignore_jwk": false
  }
}

```

Response body

*None*

#### Step 4: Create an identity pool

Depending on the identity store that you configured during Tableau Server setup, the identity pool you create can have only one of the following identity store and authentication method combinations:

- AD identity store + OIDC authentication
- LDAP identity store + OIDC authentication
- Local identity store + OIDC authentication

The first two combinations require that the initial pool (TSM configured) is configured to use AD or LDAP.

The procedure described below creates an identity pool with last combination, "local identity store + OIDC authentication".

1. After configuring OIDC authentication, call the [Create Identity Pool](#) endpoint using the Tableau REST API OpenAPI.
2. In the request, specify the following:
  - a. Name and description for the identity pool. Both the identity pool name and description are visible to all users on the Tableau Server landing page.
  - b. Identity store instance ID and authentication type instance ID.

#### Notes:

- To get the identity store instance ID and authentication type instance ID, you can call the [List Identity Stores](#) and [List Authentication Configurations](#)



endpoints.

- If you want to create an identity pool that uses the identity store you configured in TSM during Tableau Server setup, the identity store instance value is always '1'.

#### Example

##### URI

`https://myco/api/services/authn-service/identity-pools/`

##### Request body (JSON)

```
{
  "name": "MyCo contractors",
  "identity_store_instance": "2",
  "auth_type_instance": "0",
  "is_enabled": true,
  "description": "Sign-in for MyCo contractors"
}
```

##### Example response body

*None*

3. After creating the identity pool, go to your IdP configurations and set the sign-in redirect URI to `http://<host>/authn-service/authenticate/oidc/<identity_pool_id>/login`.

For example, `http://myco/authn-service/authenticate/oidc/57tgfe21-74d2-3h78-bdg6-g2g6h4734564/login`

**Note:** To get the identity pool ID, you can call the [List Identity Pools](#) endpoint.

#### Notes:

- You can create as many identity pools as your organisation needs.
- Other identity store types and authentication methods are supported by the initial pool (TSM) configured. For more information, see [Authentication](#).

## Step 5: Add users to identity pool

You can use Tableau Server directly to add users to an identity pool. Users must belong to the initial pool (TSM configured) or be added to an identity pool to sign in to Tableau Server.

When adding users to an identity pool, your workflow can change depending on the identity store that was configured with the identity pool.

The procedure below describes how to add users to an identity through the Tableau Server UI. However, you can add users to an identity pool using the Tableau REST API by calling the [Add User to Identity Pool](#) endpoint.

1. Sign in to Tableau Server UI as an administrator.
2. From the left navigation pane, select **Users** (or **All Sites > Users** for a multi-site Tableau Server).
3. Click the **Add Users** button, and select **Create new user** or **Import users from file**.

### For **Create new user**:

- a. Select the identity pool you want to add the new user to, and then click Next.
  - i. If you selected an identity pool that's configured with an AD or LDAP identity store, enter usernames, assign site membership and site roles. When finished, click the Import Users button.
  - ii. If you selected an identity pool that's configured with a local identity store, enter the username. The dialog box expands so that you can add a display name, an identifier (in most cases), email address and set site and site roles. When finished, click the **Create User** button.

For more information about usernames and how to assign site membership and site roles, see [Set Users' Site Roles](#).

### About usernames and identifiers in Tableau

A username is the information that represents the system user. An identifier is used to supplement the username information and can be used by external identity stores as alternatives to usernames.

In Tableau, a username is an immutable value that is used to sign in to Tableau and identifiers are mutable values used in Tableau's identity structure as a way to match users to their usernames. Identifiers enable Tableau to be more flexible because they can deviate from the username. If there are changes to the username in the external identity store, Tableau Server administrators can update the identifier to ensure users are matched to the correct usernames.

When you add an existing user to an identity pool, you might expect the ability to set an identifier. For example, if an existing user belongs to an identity pool configured with a local identity store and you want to add them to an identity pool configured with an AD identity store, we ask you to provide the username to search for identifiers associated with that user. On the other hand, if an existing user belongs to an identity pool configured with an AD identity store and you want to add them to an identity pool configured with a local identity store, we ask you to provide an optional identifier. An exception to this is if you want to add a user to the initial pool (TSM configured) that's configured with a local identity store and local authentication. You will be unable to set an identifier for that user.

### **For Import users from file:**

- a. Upload a .csv file that contains the following columns in the order listed:

```
username, password, display name, license level, admin  
level, publishing capability, email address, identity pool  
name, identifier
```

**Note:** Username and password are the only required columns. However, if you don't specify the identity pool name, the user will be added to the initial pool (TSM configured). For more information, see CSV Import File Guidelines.

For example, suppose you want to add Henry Wilson and Fred Suzuki to the General Contractors identity pool. Your .csv might contain the following values:

```
henryw,henrypassword,Henry Wilson,View-  
er,None,yes,hwilson@myco.com,General Contractors,hwilson  
freds,fredpassword,Fred Suzuki,Creat-  
or,None,no,fsuzuki@myco.com,General Contractors,fsuzuki
```

**Note:** When one or more identity pools are created, the Tableau Server landing page updates to include sign-in options for users that are members of those identity pools. For more information, see Provision and Authenticate Users Using Identity Pools.

## Test identity pools

After setting up an identity pool, we recommend you test it by signing out of Tableau Server and signing in again as a user that belongs to the identity pool. Make sure you complete the sign in process to ensure that OIDC authentication was configured correctly.

**Note:** If you've configured an optional description for the initial pool (TSM configured) in Step 1: Configure Tableau Server and establish a session or have a Server Settings (General and Customisation) note for Tableau Server, we suggest that the description is specific to users who sign in using the initial pool (TSM configured) and the Sign In Customisation note applies to all users who sign in to Tableau Server.

## Manage identity pools

You can manage the users in identity pools from both the server-level and site-level Users page. On the Users page, you can see which identity pools users belong to and summary details about the identity pool.

For all other identity pools management tasks, including updating an authentication configuration or identity pool and deleting a local identity store or identity pool, use the Tableau REST API OpenAPI described in the [Identity Pools Methods](#).

## Troubleshoot identity pools

### Limitations of identity pools

Identity pools are available with Tableau Server only.

**Note:** Identity pools are currently available for server-level configuration only. Identity pools can't be scoped to a site.

### Tableau Server landing page shows IdP errors

On the Tableau Server landing page, below the primary sign-in option, an IdP-related error message might display next to an identity pool sign-in option. This OIDC authentication-related issue can occur when one or both of the following are true: 1) Tableau Server hasn't been configured to send an external URL to the IdP and 2) the global variables haven't been declared.

To resolve this issue, make sure you complete the procedure described in Step 1: Configure Tableau Server and establish a session above.

### Tableau Server landing page is not showing identity pools

If the identity pools capability is disabled, you can enable it again using the following TSM commands:

```
tsm configuration set -k features.IdentityPools -v true

tsm configuration set -k features.NewIdentityMode -v true

tsm configuration set -k wgserver.authentication.legacy_identity_mode.enabled -v false

tsm pending-changes apply
```

**Note:** Running these commands causes Tableau Server to restart.

# Add Users to Tableau Server

You can add users to Tableau Server one at a time or in batches. You can add them to the server as unlicensed users, and then add them to sites and assign site roles as you onboard them to Tableau Server. Or you can add users to sites and specify their site roles at the same time, at which point they are ready to sign in.

## Before you begin

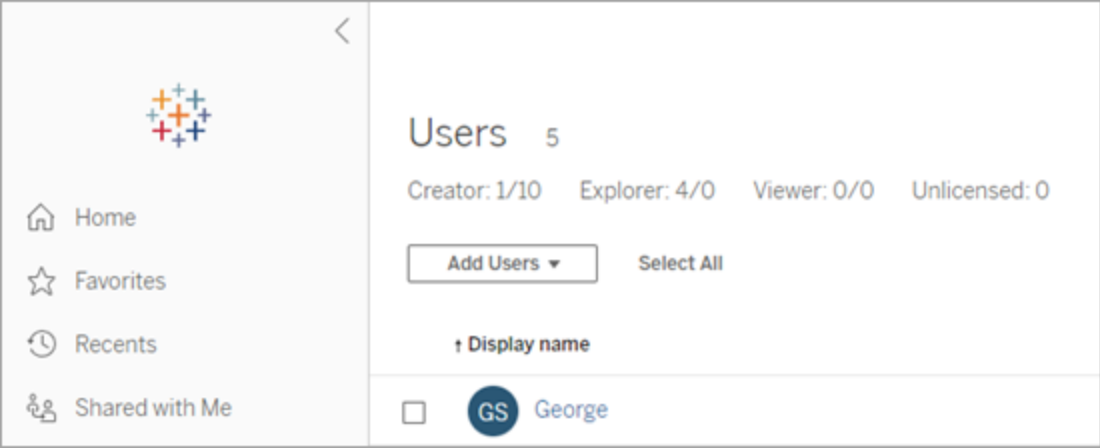
- If your Tableau Server is configured with an Active Directory external identity store, review *User Management in Deployments with External Identity Stores* to understand how multiple domains, domain naming, NetBIOS and Active Directory user name format influence Tableau user management.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

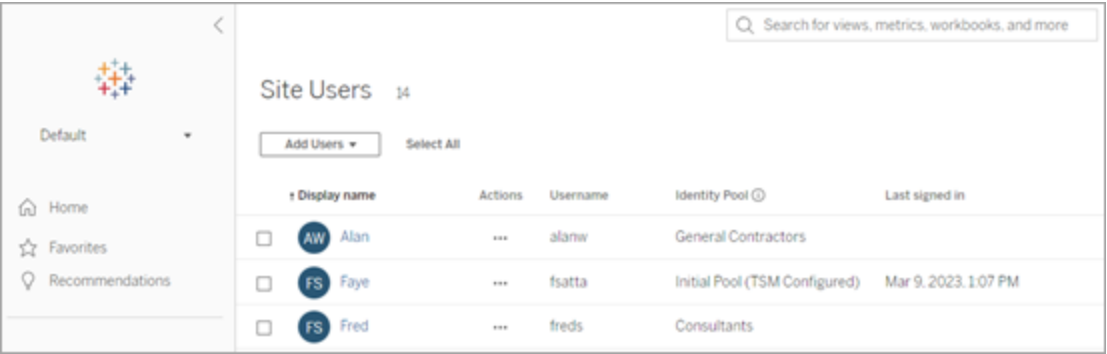
- Verify that you have enough user licences and role licences for your user base. If you attempt to add a user for a site role that you do not have a licence for, then you will receive an error.
- To add user licences to your Tableau Server deployment, visit the [Tableau Customer Portal](#) to purchase licences and the corresponding product key(s). After you have purchased licences, see *Add Capacity to Tableau Server* to update the server with the new key(s).
- The steps in this topic describe how to add an individual user and assign their site role. To add users in batches, see *Import Users*.

## When adding users at the server level versus the site level

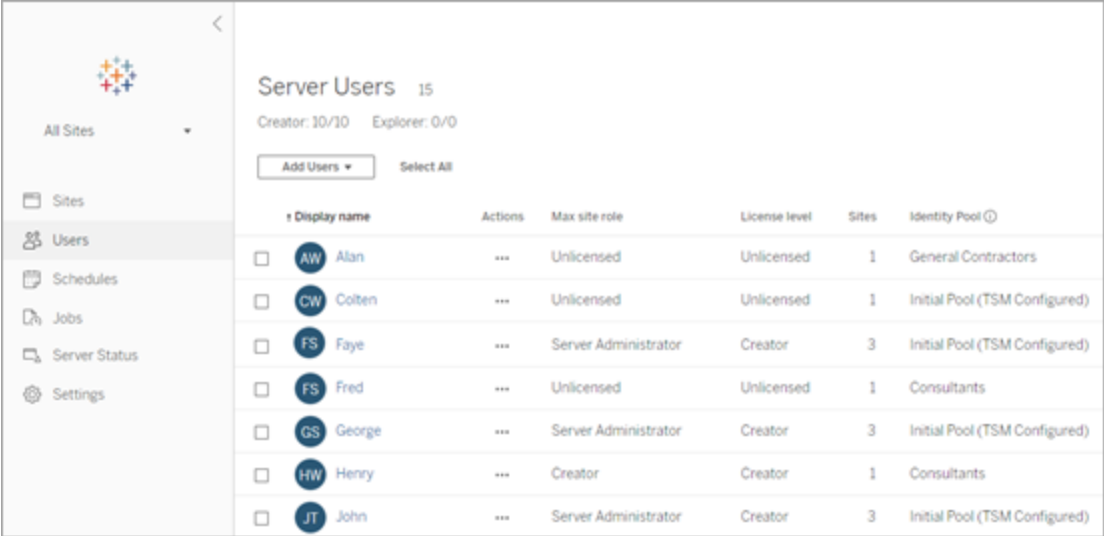
In a single-site environment, server administrators can add users on the **Users** page.



After you add a site to Tableau Server, it becomes a multi-site server with a **Server Users** page (all server users from every site appear here) and a **Site Users** page. Only server administrators can access the **Server Users** page, and both site administrators and server administrators can access the **Site Users** page.



The **Server Users** page is the only place where you can assign users to multiple sites, delete users from the server, and if the server is using local authentication, reset user passwords.



The screenshot shows the 'Server Users' page in Tableau Server. The left sidebar contains navigation links: All Sites, Sites, Users (selected), Schedules, Jobs, Server Status, and Settings. The main content area displays 'Server Users 15' with a sub-header 'Creator: 10/10 Explorer: 0/0'. Below this are buttons for 'Add Users' and 'Select All'. A table lists the users with columns for Display name, Actions, Max site role, License level, Sites, and Identity Pool. The users listed are Alan, Colten, Faye, Fred, George, Henry, and John.

| Display name | Actions | Max site role        | License level | Sites | Identity Pool                 |
|--------------|---------|----------------------|---------------|-------|-------------------------------|
| AW Alan      | ...     | Unlicensed           | Unlicensed    | 1     | General Contractors           |
| CW Colten    | ...     | Unlicensed           | Unlicensed    | 1     | Initial Pool (TSM Configured) |
| FS Faye      | ...     | Server Administrator | Creator       | 3     | Initial Pool (TSM Configured) |
| FS Fred      | ...     | Unlicensed           | Unlicensed    | 1     | Consultants                   |
| GS George    | ...     | Server Administrator | Creator       | 3     | Initial Pool (TSM Configured) |
| HW Henry     | ...     | Creator              | Creator       | 1     | Consultants                   |
| JT John      | ...     | Server Administrator | Creator       | 3     | Initial Pool (TSM Configured) |

## Add a user to the server

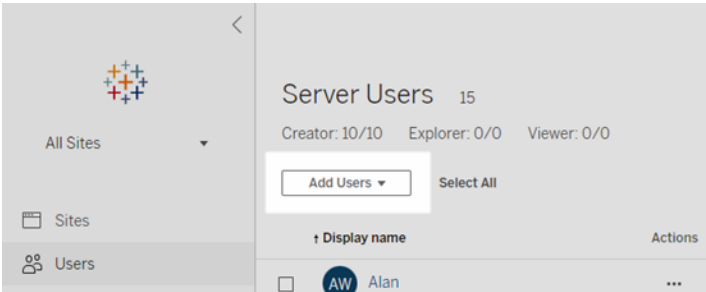
When adding a user, the workflow changes depending on whether at least one **identity pool** is configured for Tableau Server.

### No identity pools configured

If no identity pools are configured, i.e. Tableau Server is only using the user provisioning and authentication configured during Tableau Server setup (also referred to as the initial pool (TSM configured)), follow the steps described below to add a user.

1. In the site menu, select **Manage All Sites > Users**, and then click **Add Users**.

To add a user to a site, you select the site and go to the **Users** page.



The screenshot shows the 'Server Users' page with the 'Add Users' button highlighted by a white box. The page header shows 'Server Users 15' and 'Creator: 10/10 Explorer: 0/0 Viewer: 0/0'. The table below shows the first user, Alan, with columns for Display name and Actions.

| Display name | Actions |
|--------------|---------|
| AW Alan      | ...     |



2. Do one of the following:

- If the server is configured for **local authentication**, click **New User**, and enter a user name. With local authentication, the best way to avoid user name collisions is to provide an email address for the user name. For example, *jsmith@example.com* instead of *jsmith*.

User names are not case sensitive. Characters not allowed in user names include the semi-colon (;) and colon (,).

- If the server is configured for **Active Directory authentication**, click **Active Directory User**. If you are adding a user from the same Active Directory domain that Tableau Server runs on, the server domain will be assumed, and you can type the AD user name without the domain.

**Note:** Do not enter the user's full name; this can cause errors during the importing process.

3. If the server is using local authentication, provide the following:

- **Display Name** – Type a display name for the user (e.g. *John Smith*).
- **Password** – Type a password for the user.
- **Confirm password** – Retype the password.
- **Email** – This is optional and can be added at a later time in the user profile settings.
- **Selected users are Server Administrators:** Specify whether the user should be a server administrator.
- **Name (Site Membership) / Site Role:** If the user is not a server administrator, you can assign a user to zero or more sites, along with a site role for each site. You do not have to choose site membership and site role at this time. If you don't

specify site membership and site role for a new server user, the user will be added as a server user only, with a site role of Unlicensed. For details, see [Set Users' Site Roles](#).

4. Click **Create**.

**New User**

Username:  Username available

Display name:

Password:

Confirm password:

Email (optional):

All sites

| Site                                                     | Site role <span>ⓘ</span>               |
|----------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Documentation - 20 User Limi... |                                        |
| <input checked="" type="checkbox"/> Finance              | <input type="text" value="Publisher"/> |
| <input type="checkbox"/> Human Resources                 |                                        |

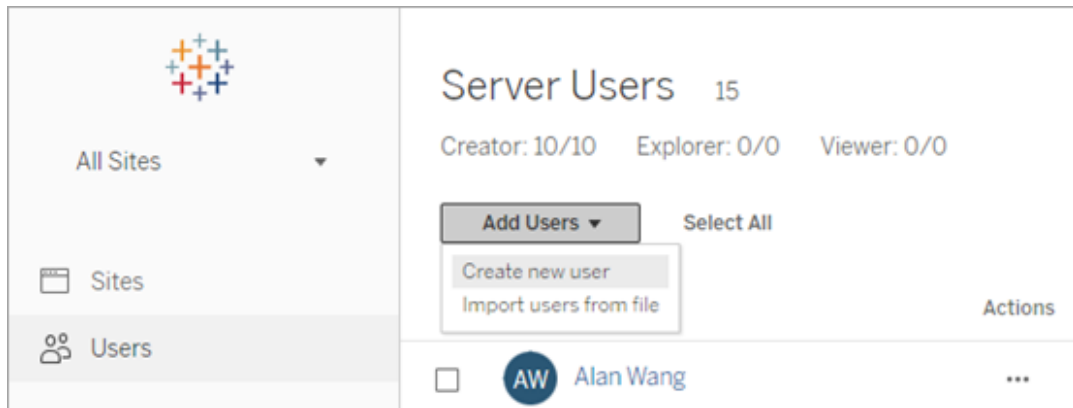
☐ Selected users are Server Administrators

## One or more identity pools configured

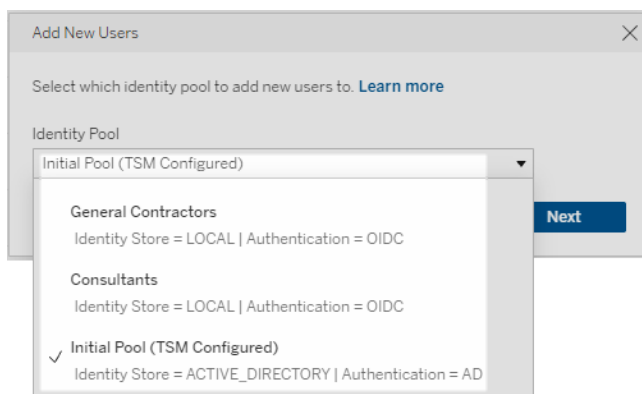
When adding a user, if one or more identity pools are configured, you must first select an identity pool or the **initial pool (TSM configured)**, which is the user provisioning and authentication configured in TSM during Tableau Server setup.

1. In the site menu, select **Manage All Sites > Users**, and then click **Add Users > Create new user**.

To add a user to a site, you select the site and go to the **Users** page.



2. In the Add New Users dialog box, select the identity pool you want to add the user to.



3. Do one of the following:
  - If the identity pool you selected in step 2 is configured for **LOCAL** identity store and **LOCAL** authentication:
    - a. In the New User dialog box, in the **Username** text box, enter a user name.  
With local authentication, the best way to avoid user name collisions is to provide an email address for the user name. For example,

*jsmith@example.com* instead of *jsmith*.

User names are not case sensitive. Characters not allowed in user names include the semi-colon (;) and colon (,).

The diagram illustrates the 'New User' dialog box. The top part shows a simplified version with a 'Username' field, 'Cancel', and 'Create User' buttons. An arrow points from this simplified version to a larger, more detailed version of the same dialog box below. The detailed version includes fields for 'Username', 'Display name', 'Password', 'Confirm password', 'Email (optional)', and a 'Site role' dropdown menu. Below the dropdown is a link that says 'Each site role has different capabilities. [Learn more](#)'. At the bottom are 'Cancel' and 'Create User' buttons.

b. Enter the following information:

- **Display name** – Type a display name for the user (e.g. *John Smith*).
- **Password** – Type a password for the user.
- **Confirm password** – Retype the password.
- **Email (optional)** – This is optional and can be added at a later time in the user profile settings.
- **Selected users are Server Administrators**: Specify whether the user should be a server administrator.

- **Site Role:** If the user is not a server administrator, you can assign a site role. You do not have to choose site role at this time. If you don't specify site role for a new user, the user will be added as a server user only, with a site role of Unlicensed. For details, see Set Users' Site Roles.
- c. When finished, click **Create User**.
- If the identity pool you selected in step 2 is configured for **LOCAL** identity store with **OIDC** authentication:
    - a. In the New User dialog box, in the **Username** text box, enter a user name. With local authentication, the best way to avoid user name collisions is to provide an email address for the user name. For example, *jsmith@example.com* instead of *jsmith*.
- User names are not case sensitive. Characters not allowed in user names include the semi-colon (;) and colon (,).

The diagram illustrates the 'New User' dialog box in Tableau Server. It shows a simplified version in the background and a more detailed version in the foreground. The detailed dialog box includes fields for Username, Display name, Identifier (optional), and Email (optional). It also features a 'Site' dropdown menu set to 'All sites', a search bar for sites, and a table with two columns: 'Site' and 'Site role'. The table lists 'Default' and 'Site1' as available roles. Below the table, there is a checkbox to 'Make selected users Server Administrators' and a link to 'Learn more'. The dialog box has 'Cancel' and 'Create User' buttons at the bottom right.

| Site                     | Site role |
|--------------------------|-----------|
| <input type="checkbox"/> | Default   |
| <input type="checkbox"/> | Site1     |

b. Enter the following information:

- **Display name** – Type a display name for the user (e.g. *John Smith*).
- **Password** – Type a password for the user.
- **Identifier (optional)** – Type the identifier you want to associate with the user. Identifiers are for identity matching purposes. For more information, see [Usernames and identifiers in Tableau](#).
- **Email (optional)** – This is optional and can be added at a later time in the user profile settings.

- **Site and Site role** – If the user is not a server administrator, you can assign a user to zero or more sites, along with a site role for each site. You do not have to choose site membership and site role at this time. If you don't specify site membership and site role for a new server user, the user will be added as a server user only, with a site role of Unlicensed. For details, see [Set Users' Site Roles](#).
  - **Make selected users Server Administrators** – Specify whether the user should be a server administrator.
- c. When finished, click **Create User**.
- If the identity pool you selected in step 2 is configured for **ACTIVE\_DIRECTORY** or **LDAP** identity store:
    - a. Type the AD or LDAP user name without the domain. In this workflow, you're adding a user from the same Active Directory domain that Tableau Server was configured with in TSM during Tableau Server setup. Therefore, the server domain will be assumed, and you can type the AD or LDAP user name without the domain.

**Note:** Do not enter the user's full name; this can cause errors during the importing process.

**Import Users from Active Directory**

Enter Active Directory usernames, separated by semicolons(;).

Site

Search

All sites ▼

🔍 Search sites

|                          | Site    | Site role |
|--------------------------|---------|-----------|
| <input type="checkbox"/> | Default |           |
| <input type="checkbox"/> | Site1   |           |
| <input type="checkbox"/> | Site2   |           |

Each site role has different capabilities. [Learn more](#)

☐ Make selected users Server Administrators

Cancel

Import Users

- b. When finished, click **Import Users**.

## Sign in to the Tableau Server Admin Area

As a server administrator on Tableau Server, you can access admin settings to configure sites, users, projects, and to do other content-related tasks.

If you want to change server settings such as processor, caching, authentication, distributed deployment, and other related configurations, see [Sign in to Tableau Services Manager Web UI](#).

If you are running Tableau Desktop and want to sign in to Tableau Server to publish or access content and data sources, see [Sign in to Tableau Server in Tableau Desktop](#).



## Tableau Server on Windows Help

Here's how to sign in to the Tableau Server admin pages:

1. Open your browser and enter the server URL. Here are some examples of what the URL might look like:

`http://localhost/` (if you're working directly on the server computer)

`http://MarketingServer/` (if you know the server's name)

`http://10.0.0.2/` (if you know the server's IP address)

If the server is *not* using port 80, you need to include the port number in the URL, as in these examples:

`http://localhost:8000/`

`http://MarketingServer:8080/`

`http://10.0.0.2:8888/`

...where 8000 or 8080 or 8888 is the port that you configured.

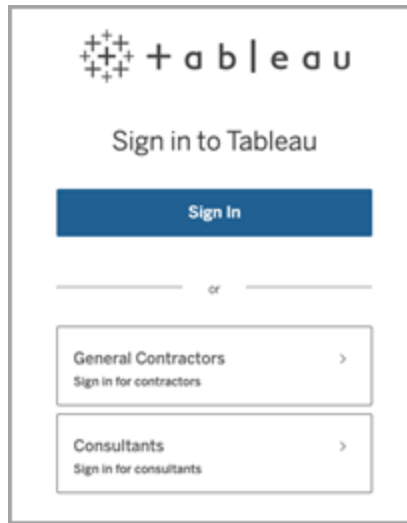
Tableau Server displays one of the following pages depending on whether **identity pools** are configured:

- When no identity pools are configured, a page where you can enter a user name and password.

A screenshot of the Tableau Server login page. At the top left is the Tableau logo, which consists of a 3x3 grid of plus signs followed by the word "tableau" in a lowercase, sans-serif font. Below the logo are two input fields: the first is labeled "Username" and the second is labeled "Password". Both fields are empty. Below the password field is a blue rectangular button with the text "Sign in" in white.

- When identity pools are configured, the Tableau Server landing page with primary (initial pool (TSM configured)) and secondary (identity pools) sign-in

options.



2. Enter the credentials for the server administrator that you created when you finished installing Tableau Server.

You're then taken to the main page of the **Default** site, and you're ready to create users, sites, and manage content.

## Reset the server administrator account and password

If you have lost the password for the initial server administrator account, run the following commands:

1. `tsm reset`.
2. `tabcmd initialuser`. See [initialuser](#).

## Navigate the Admin Areas of the Tableau Web Environment

As an administrator on Tableau Server or Tableau Cloud, you can access admin settings that aren't available to other users to configure sites, users and projects and to do other content-related tasks.

The settings in this article refer to the Tableau web environment. Tableau Server administrators with appropriate credentials can also change server settings such as processor, caching, authentication, distributed deployment and related configurations using the TSM web environment. For information, see [Sign in to Tableau Services Manager Web UI](#).

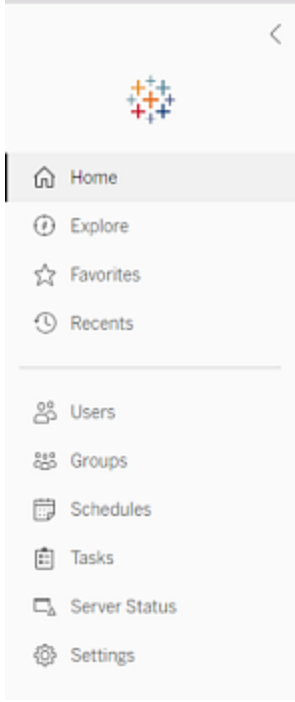
### Access based on site role and number of sites

The menus you get when you sign in to Tableau Server or Tableau Cloud depend on the following conditions:

- Whether you're a site or server administrator.  
  
Site administrator access is available on Tableau Cloud and Tableau Server. Server administrator access is only on Tableau Server.
- Whether you have access to only one site or to multiple sites.

#### Server administrator

On a **single-site** server, the site selector does not appear, and all other menus are the same.

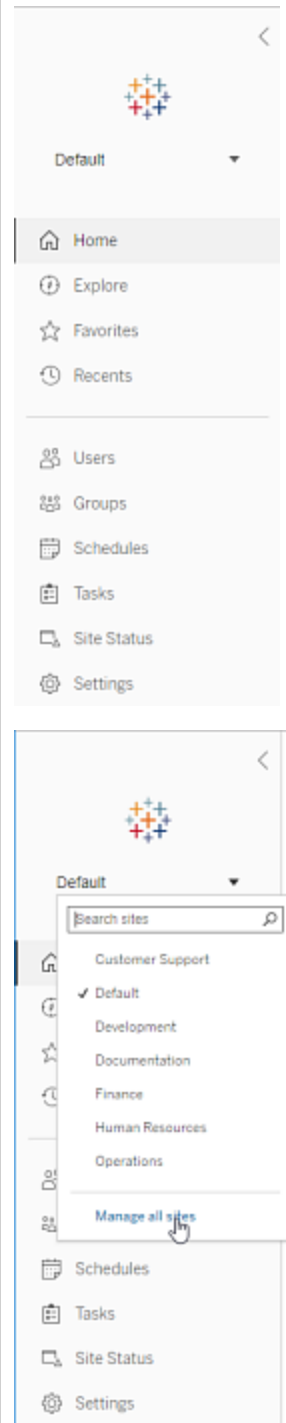
A screenshot of the Tableau Server navigation menu. At the top is the Tableau logo and a back arrow. Below are several menu items: Home (with a house icon), Explore (with an information icon), Favorites (with a star icon), Recents (with a clock icon), Users (with a person icon), Groups (with a group of people icon), Schedules (with a calendar icon), Tasks (with a list icon), Server Status (with a monitor icon), and Settings (with a gear icon). The 'Home' item is highlighted with a grey background.

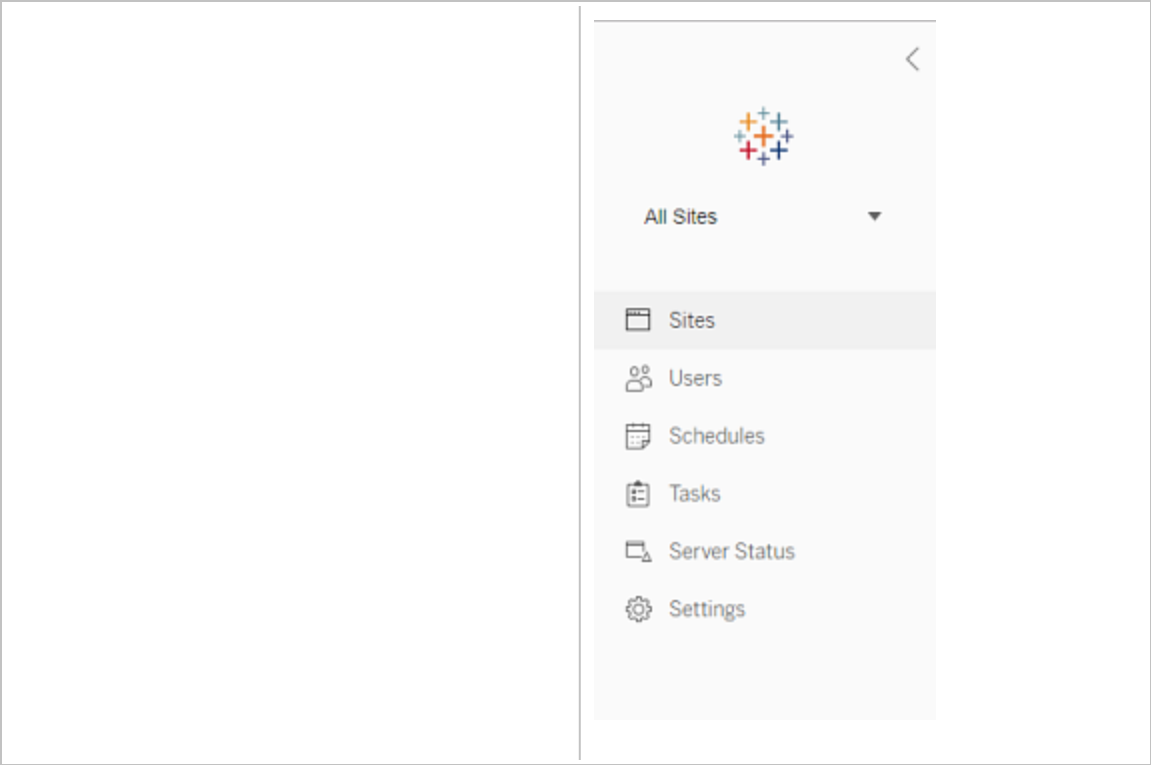
In a **multi-site** environment, menus along the left enable you to modify a specific site or all sites, and to configure users, groups, schedules, tasks and server settings.

To access server administrator settings that affect all sites, open the site menu by clicking the arrow next to the current site name, and then select **Manage all sites**.

The **Content** and **Group** tabs go away, and the site menu text changes to **All Sites** to let you know you are managing server-wide settings, and options like **Server Status** reflect the server-wide view.

To return to the site administration menus, select **All Sites**, and then select the site you want to manage.





Site administrator

If you are a site administrator for Tableau Cloud or Tableau Server, and you have access to multiple sites, you'll get menus for selecting which site to manage, for managing that site's content, users, groups, schedules and tasks and for monitoring its status.

The site selector displays the name of the current site. To go to another site, select the site menu, and then select the site name.

If you have access to only one site, the site selector does not appear, but all other menus are the same.

A screenshot of the Tableau Server administration interface for a site administrator. At the top, there is a back arrow and the Tableau logo. Below the logo is a dropdown menu labeled 'Default'. A sidebar on the right contains a list of navigation items: 'Home' (highlighted with a house icon), 'Explore' (with a magnifying glass icon), 'Favorites' (with a star icon), 'Recents' (with a clock icon), 'Users' (with a person icon), 'Groups' (with a group of people icon), 'Schedules' (with a calendar icon), 'Tasks' (with a list icon), and 'Site Status' (with a monitor icon).

## Server administrator tasks

Server administrators (available with Tableau Server Enterprise only) can do the following:

- Monitor server status and activity.
- Generate log files.
- Add sites and edit site settings. Only server administrators can add sites to the server.
- Add users to the server, and assign users to sites.
- Add and manage site groups.
- Add users to or remove users from **identity pools**.

To manage settings only for a specific site, you must first navigate to the site. Within each site, you can do the following:

- Administer content: Create projects, move content from one project to another, assign permissions, change ownership of a content resource and so on.
- Manage schedules for extract refreshes and subscriptions.
- Monitor site activity and record workbook performance metrics.
- Manage storage space limits for content published by users.
- Allow web authoring.
- Enable revision history.
- Allow site administrators to add and remove users.
- Set the maximum number of licences that site can consume for each licence type (Creator, Explorer, Viewer).
- Allow users to subscribe to workbooks and views, and allow content owners to sub-

scribe others to workbooks and views.

- Enable offline snapshots for favourites (iOS only).

## Site administrator tasks

A site administrator on Tableau Cloud or Tableau Server can do the following tasks:

- Administer content: Create projects, move content from one project to another, assign permissions, change ownership of a content resource and so on.
- View, manage, and manually run schedules for extract refreshes and subscriptions.
- Add and manage site users (if allowed by the server administrator; see Site Settings Reference).
- Add and manage site groups.
- Monitor site activity.

# Sign in to Tableau Services Manager Web UI

This topic explains how to sign in to the Tableau Services Manager (TSM) web UI. The TSM web pages are used to configure Tableau Server settings such as user authentication, server processes, caching and other server-related settings. You can also configure TSM from a command line shell. See [tsm Command Line Reference](#).

**Important:** Signing into TSM is *not* the same as signing into Tableau Server. TSM is used to configure the server, and requires an account with administrative privileges on the computer running TSM. Depending on how your enterprise is organised, the TSM administrator could be a user who does not have a Tableau Server account. A Tableau Server administrator has access to administrative pages for creating and editing sites, user, product and other content-related tasks. For information about signing in to Tableau Server as a Tableau Server administrator, see [Sign in to the Tableau Server Admin Area](#).

If you are running Tableau Desktop and want to sign in to Tableau Server to publish or access content and data sources, see [Sign in to Tableau Server in Desktop](#).

## Requirements

- The account that you use to sign in to TSM must have authorisation to make changes on the local computer where Tableau Server is installed.

By default, the account that you use to sign in to TSM must be a member of the Administrators group on the Windows computer where Tableau Server is installed. Alternatively, you can specify a Windows group for TSM administration. See [Configure a Custom TSM Administration Group](#).

- If you are running a distributed deployment of Tableau Server, then enter the host name, or IP address of the computer running the initial node. The credentials you enter must have administrative access to the computer running the initial node, as specified above.
- Specify an HTTPS protocol in the server URL. Tableau Server installs a self-signed certificate as part of the installation process. Therefore, the protocol must be specified as `https`. For more information about the self-signed certificate and certificate trust for TSM connections, see [Connecting TSM clients](#).
- Specify the port for TSM web UI (8850) in the URL.
- If you are running a local firewall, open port 8850.
- You must specify the hostname or IP address of the computer running TSM. If you have set up a load balancing or proxy solution in front of Tableau Server, do not specify the load balancer or proxy address.



## Sign in to the TSM web UI

1. Open a browser and enter the Tableau Server URL, and append the dedicated TSM web UI port.

Here are some examples of what the URL might look like:

`https://localhost:8850/` (if you're working directly on the server computer)

`https://MarketingServer:8850/` (if you know the server's name)

`https://10.0.0.2:8850/` (if you know the server's IP address)

2. In the sign-in page that appears, enter your administrator user name and password.

**Note:** Tableau Server creates and configures a self-signed certificate during the installation process. This certificate is used to encrypt traffic to the TSM Web UI. Because it's a self-signed certificate, your browser will not trust it by default. If you are logging into TSM Web UI from a remote computer (i.e. not in the Tableau Server cluster), then your browser will display a warning about the trustworthiness

of the certificate before allowing you to connect.



The image shows a web interface for Tableau Services Manager. At the top is the Tableau logo, which consists of a cluster of plus signs followed by the text '+ a b | e a u'. Below the logo is the heading 'Sign In to Tableau Services Manager'. Underneath the heading is a note: 'Requires administrator access to the computer where Tableau Server is installed.' There are two input fields: 'Username' and 'Password'. Below these fields is a green button labeled 'Sign In'.

## Customise Your Server

You can customise the Tableau Server web pages to personalise it for your company or group. You can perform these customisations:

- Change the server name that appears in the browser tab, tooltips and messages.
- Change the logos that appear in the web environment.

For more information, see [tsm customise](#).

- Set the language used for the web environment and the locale used for views. See [Language and Locale for Tableau Server](#).
- Install custom fonts on Tableau Server and client computers that connect to Tableau Server. See [Use Custom Fonts in Tableau Server](#).
- Add a custom note to the server sign in page. The Sign In setting lets you add text. You can optionally add a URL to make the text a link. This note will also appear if a user receives a sign in error.

Custom notes do not display on Tableau Mobile. If Tableau Server is configured with [identity pools](#), the Sign In Customisation note appears on both the Tableau Server landing page below all sign-in options and on the page where your initial pool (TSM configured) users enter their username and password.

To set a custom note, sign in to a site on Tableau Server. On the left-side navigation pane, select **Manage all sites** from the drop-down site list. Select **Settings** and add a message to **Sign In Customisation**.

For more information, see [Server Settings \(General and Customisation\)](#).

- Add a custom message to the welcome banner on the home page for all server users to see. The custom message can contain up to 240 characters of text and hyperlinks as well as one paragraph break. Administrators can also disable the default Tableau welcome banner for the server.

To set a custom welcome banner, sign in to a site on Tableau Server. On the left-side navigation pane, select **Manage all sites** from the drop-down site list. Select **Settings**, then navigate to the **Customisation** page.

Administrators and project leaders can also add images for projects in thumbnail view.

## Language and Locale for Tableau Server

Tableau Server is localised into multiple languages. Server language and locale settings impact how this affects users. The **Language** setting controls user interface (UI) items such as

menus and messages. The **Locale** setting controls items in views such as number formatting and currency.

Administrators can configure language and locale on a server-wide basis (see [Server Settings \(General and Customisation\)](#)), and individual users can configure their own settings (search for "Your Account Settings" in the Tableau Server Help). If a user configures their own language and locale, their settings override the server settings.

## Supported Languages

Tableau Server is localised into multiple languages. See the "Internationalisation" section of the [Tableau Server Technical Specification](#) page for more information.

## Default Settings

The default language for Tableau Server is determined during Setup. If the host computer is configured for a language Tableau Server supports, Tableau Server installs with that language as its default. If computer is configured for a language that is not supported, Tableau Server installs with English as its default language.

## How Language and Locale are Determined

Another influence on which language and locale display when a user clicks a view is the user's web browser. If a server user has not specified a **Language** setting on their User Account page, and their web browser is set to a language that Tableau Server supports, the browser's language will be used – even if Tableau Server itself is set to a different language.

Here's an example: Assume that Tableau Server has a system-wide setting of English as the **Language** for all users. Server user Claude does not have a language specified on his Tableau Server User Account page. Claude's browser uses German (Germany) for its language/locale.

When Claude signs in to Tableau Server, the server UI displays in German and when he clicks a view, the view uses the Germany locale for numbers and currency. If Claude had set his user account **Language** and **Locale** to French (France), the UI and view would have been

displayed in French. His user account setting supersedes those of his web browser, and both of those have precedence over the Tableau Server system-wide setting.

Another setting to be aware of is the **Locale** setting in Tableau Desktop (**File > Workbook Locale**). This setting determines the locale of the data in the view, such as which currency is listed or how numbers are formatted. By default, **Locale** in Tableau Desktop is set to **Automatic**. However, an author can override that by selecting a specific locale. Using the above example, if the author of View A set **Locale** to **Greek (Greece)**, certain aspects of the data in View A would display using the Greek (Greece) locale.

Tableau Server uses these settings, in this order of precedence, to determine language and locale:

1. Workbook locale (set in Tableau Desktop)
2. Tableau Server User Account language/locale settings
3. Web browser language/locale
4. Tableau Server Maintenance page language/locale settings
5. Host computer's language/locale settings

## Use Custom Fonts in Tableau Server

You can use custom fonts with Tableau Server. When you do this the safest way to guarantee that users have the experience you intend is to keep the following in mind:

- 
- The fonts need to be installed on the computer where Tableau Server is running. On Windows servers, install the fonts for all users (select Install for all users). After installing the fonts, restart Tableau Server to use the new fonts.
- The fonts need to be installed on any client computers that will connect to Tableau Server. You need to have the fonts installed locally in order for your browser to properly

display them.

- As a best practice, use "web safe" fonts that are installed by default on all major browsers. This increases the likelihood that the fonts will display properly on client machines.
- Different browsers render the same fonts differently, so even when a client browser has the custom font installed, it may look different when viewed in different browsers. This can be especially noticeable with comments or titles where specific spacing is used for an intentional effect.

**Note:** For more information about installing fonts in Windows, see the [Microsoft Knowledgebase](#).

## Manage Sites Across a Server

You can plan and manage your sites in Tableau Server. You can manage users and groups for your sites, manage projects and content access, manage data, and create and interact with views on the web.

### Sites Overview

The topics in this section describe the Tableau Server concept of a site and aspects of working with multiple sites. Topics include authentication type each site uses, and what to know about user licences and administrator-level access to sites.

#### What is a site

You might be used to using the term *site* to mean “a collection of connected computers”, or perhaps as the short form of “website”. In Tableau-speak, we use site to mean a collection of users, groups and content (workbooks, data sources) that’s walled off from any other groups and content on the same instance of Tableau Server. Another way to say this is that Tableau

Server supports multi-tenancy by allowing server administrators to create sites on the server for multiple sets of users and content.

All server content is published, accessed and managed on a per-site basis. Each site has its own URL and its own set of users (although each server user can be added to multiple sites). Each site's content (projects, workbooks and data sources) is completely segregated from content on other sites.

For site administrator recommendations for how to set up users on a site, how to structure a site for publishers and other content users, how to give users permissions to share and manage their content and so on, see the [Manage Individual Sites](#) section.

For information about how users can get their content to Tableau Server, see [Publish Data Sources and Workbooks](#) in the Tableau user help.

### Authentication and sign-in credentials

All sites on a server use the same Run As user account. By default they use the same user authentication type. You configure both of these settings when you install Tableau Server. For information, see [Configure Initial Node Settings](#).

Users who have access to more than one site on the same Tableau Server instance use the same credentials for each site. For example, if Jane Smith has a user name of *jsmith* and a password of *MyPassword* on Site A, she uses those same credentials on Site B. When she signs in to Tableau Server, she'll be able to choose which site she wants to access.

### The Default site

Tableau Server installs with a site named Default. If you maintain a single-site environment on Tableau Server, this becomes the site you work with, and on which your users share their Tableau analysis. If you add sites, Default becomes one of the sites you can select when you sign in to Tableau Server. Default differs from sites that you add to the system in the following ways:

- It can never be deleted but, just like sites that you add, it can be renamed.
- It stores the samples and data connections that ship with Tableau Server.
- The URL used for Default does not specify a site. For example, the URL for a view named Profits on a site named Sales is `http://localhost/#/site/sales/views/profits`. The URL for this same view on the Default site would be `http://localhost/#/views/profits`.

## Why or why not add sites

On Tableau Server, users, projects, groups, data sources, and workbooks are managed per site. You can add users to multiple sites.

Each environment and its needs is unique. However, as a baseline, Tableau Visionaries and Product Managers tend to recommend using sites for true multi-tenancy needs. In other words, create a new site only when you need to manage a unique set of users and their content completely separately from all other Tableau users and content.

For site administrator recommendations for how to set up users on a site, how to structure a site for publishers and other content users, how to give users permissions to share and manage their content and so on, see the Manage Individual Sites section.

### Examples for which it makes sense to use sites

- You are a consultant who manages Tableau analysis for multiple clients, and you want to create a site for each client, to ensure that data from one client is not exposed to another.
- You want to allow Guest user access to a small and contained area of the server.

### Examples for which projects can work better than sites

- A content-development process in which data sources and reports evolve from sandbox to production phases.



Migrating users and content from one site to another is a laborious process. Although you might have good reasons to use sites for this and similar processes, by creating sites, you as the site administrator compound your ongoing maintenance burden. For each configuration update you make to one site (for example creating new projects and setting permissions), you would usually need to duplicate the same work on each additional site.

- You want to separate areas of the server by functional area.

Among a group of Tableau users, it's common that some users need to access content in multiple areas. Using sites would encourage publishing the same data sources and reports to multiple sites. This leads to data source proliferation and can negatively impact server performance. Using projects is a simpler way to work with this scenario.

For additional ideas, see the following resources:

- Why use projects in the topic [User Projects to Manage Content Access](#).
- Discussions about sites on the Tableau Community forums. [Here's a link](#) to get you started.

## Administrator-level access to sites

Tableau Server includes three administrator-level site roles: Server Administrator, Site Administrator Creator, and Site Administrator Explorer.

The **Server Administrator** site role always takes the highest licence available, and it allows full access to Tableau Server, including all content access. You can find more information about this role in [Server Administrator Overview](#). Server administrators also create sites as needed. (Site administrators don't have permissions to do this.)

A server administrator can assign one of the **Site Administrator** site roles to users to delegate creating and maintaining a specific site's user and content framework. The content framework enables Tableau users to share, manage, and connect to data sources and workbooks.

- Assign **Site Administrator Creator** to administrators who also connect to data, and create and publish data sources or workbooks. This site role takes a **Creator** licence.
- Assign **Site Administrator Explorer** if the user manages the content framework but doesn't need to edit the content itself. This site role takes an **Explorer** licence, and it allows viewing and interacting access.

By default, the Site Administrator site roles allow creating and managing the site's users and groups, creating projects to organise content on the site, assigning permissions to allow users (groups) to access the content they need, scheduling extract refreshes, and a few other tasks.

A server administrator can deny site administrators' user management tasks. For example, you might do this if you use the Site Administrator Creator role for the data experts. In other words, you want to allow these users to manage connections to underlying data, create and publish "single source of truth" data sources, create top-level projects, and organise content across projects without restriction; but not necessarily add and remove site users.

For each site the server administrator can also limit site administrator access, so that site administrators can manage groups and content, but not add or remove users or set users' site roles.

In some organisations, the same person might be both a server administrator and site administrator for one or more sites. Even so, the tasks performed by a site administrator and a server administrator are distinct.

## Licensing and user limits

You can add server users to multiple sites, and set their site roles and permissions on each site. A user who belongs to several sites does not need a licence for each site. Each server user needs only one licence. The licence that user will use corresponds to the highest site role they have on the server. To learn more about how licences and site roles intersect, see [Set Users' Site Roles](#).

Server administrators can use the **Limit number of users** setting (select **Site <name> > Settings**) to specify a user limit for the site, or set a site role limit, which limits the number of

Creators, Explorers and Viewers allocated at the site level. To learn more, see [Manage Site Role Limits](#).

Only licensed users are counted. For example, if a site has 90 licensed users (including administrators), 20 unlicensed users, the user count is 90. For information about how to view the number of licences and site roles across the server, see [View Server Licences](#).

## Export or Import a Site

**Note:** For detailed information about migrating sites from Tableau Server to Tableau Cloud, see our [Tableau Cloud Manual Migration Guide](#).

You can provision a new Tableau Server site by importing (migrating) information from another site. You do this by exporting the existing site's (the *source* site) information to a file. Then you complete steps to verify and import that information to the *target* site.

### Site Migration Options

You can migrate a site in any of these ways:

- To another site on the same Tableau Server instance.
- To a site on a separate Tableau Server instance.
- From Tableau Server on Windows to Tableau Server on Linux or vice-versa.

**Note:** When migrating sites between instances of Tableau Server, the target site must be on a version of Tableau Server that is the equal to or later than the version of Tableau Server for the source site. Both the source and target sites must be from supported versions of Tableau Server.

## Site Migration Limitations

What information is preserved in a site export

- The export file you create preserves workbooks, projects, data sources and users. This includes permissions set on content, user favourites lists and site quotas.
- Users' custom views are preserved; however, depending on the type of site migration, custom view URLs might change in a way that breaks users' bookmarks to their views.
- When you export a site on Tableau Server to import to another Tableau Server site, subscription and extract refreshes schedules are preserved.

What information isn't preserved in a site export

- Usage data, which appears in the site's administrative views, is not preserved. For example, view and data source counts, user actions and performance data.
- Backgrounder jobs that are in-progress while a site is being exported, will not be exported and will not show up on the new site once the import is complete.
- OAuth access tokens embedded in data connections are reset. For those data sources, you will need to edit the connections and re-authenticate to the underlying data.
- Prep flows and flow schedules are not included. These will need to be manually migrated.
- Content saved to users' Personal Space is not included.

## Prepare the Source and Target Sites

Before you export a site, complete the following checklist to prepare both environments.

Some of these instructions depend on whether both sites are on the same server instance or on separate ones.

### Delete stale content

Make sure the source site contains only what you want to import to the new site. As a best practice, remove anything from your source site that you do not want to include in your new site, whether these things will be included in an export/import or will need to be manually migrated. Delete unused workbooks, data sources or projects. If you have Prep flows or flow schedules you no longer use, delete these as well.

### Remove obsolete users

Confirm that all server users are licensed, and remove accounts that are no longer in use. You can't remove users during the import process, so if the two sites are on the same server instance, all users you export from the source site are imported to the target site.

### Create or identify the target site

You must import a site file to a site that already exists on the target Tableau Server instance. Because the import process removes anything from the target site that is not included in the import file, we recommend that you import to an empty site. For more information, see [Add or Edit Sites](#).

If your source site has workbooks that use published data sources, the data connections in these workbooks continue to refer to the source site name. To maintain those connections without having to republish the workbooks, make sure the target and source site names match.

### Locate site IDs

The tsm command you use to export or import a site requires a parameter that takes the site ID. You can get the site ID from the URL when you are signed in to the site from a web browser.

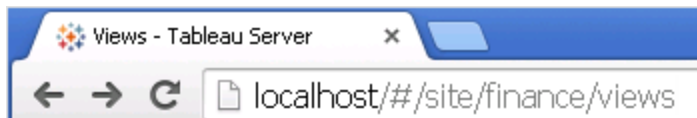
If only one site exists on the server, that site is named **Default**. When you are signed in to the Default site, the browser URL looks something like this:

```
https://server-name/#/projects
```

In the URL, the absence of the `/site` parameter indicates that it's the Default site. The site ID for the Default site is 'Default' without the quotation marks.

On a multi-site Tableau Server deployment, the browser URL includes `#/site/` followed by the site ID. The following URL would appear if you navigate to the Views page on a site whose site ID is `finance`:

```
https://localhost/#/site/finance/views
```



### Check the identity store

You can export from and import to sites that do not use the same user identity store type, but you will need to modify the mapping files used for the import. This step is built into the import process and described in Step 3: Verify that site settings are mapped correctly.

### Create users on the target server if necessary

The site import process assigns users to the target site. If the source site is on a Tableau Server instance other than the target site, you must create users on the target server before you can perform the import. If the two sites are on the same Tableau Server instance, the target site has access to the existing users, and you can skip this step.

### Configure the target server to deliver subscriptions

Subscriptions are imported, but you must configure the server to deliver them. For more information, see [Set Up a Site for Subscriptions](#).

### Check schedules

The **Schedules** page lists the existing schedules for extract refreshes and subscriptions.

| Schedules 8                                                  |                  |           |           |                 |            |                        |
|--------------------------------------------------------------|------------------|-----------|-----------|-----------------|------------|------------------------|
| <div> <div>+ New Schedule</div> <div>0 selected</div> </div> |                  |           |           |                 |            |                        |
| † Name                                                       |                  | Frequency | Task type | Tasks           | Execution  | Next run at            |
| <input type="checkbox"/>                                     | Afternoon-daily  | ...       | Daily     | Subscription    | Parallel   | Aug 4, 2016, 4:00 PM   |
| <input type="checkbox"/>                                     | End of the month | ...       | Monthly   | Extract Refresh | 0 Parallel | Aug 31, 2016, 11:00 PM |
| <input type="checkbox"/>                                     | Monday morning   | ...       | Weekly    | Subscription    | Parallel   | Aug 8, 2016, 7:00 AM   |
| <input type="checkbox"/>                                     | Nightly          | ...       | Daily     | Extract Refresh | 0 Parallel | Aug 5, 2016, 12:00 AM  |
| <input type="checkbox"/>                                     | Weekday mornings | ...       | Weekly    | Subscription    | Parallel   | Aug 5, 2016, 6:00 AM   |

For migrations **from one Tableau Server site to another**, refreshes and subscriptions assigned to default schedules on the source site are mapped to the same schedules on the target site. If the source site has schedules that do not exist on the target site, and the target site is on another Tableau Server instance, you must create the schedules on the target site that you want the source schedules to map to. You can edit the mapping files to make sure this is done as you expect.

## Tips for importing to a target with fewer users or schedules

When a target site has fewer users or schedules than the source site, many-to-one importing is not supported. How you can address this depends on whether the source and target sites are on the same Tableau Server instance.

You can take any of the following approaches that apply to your site migration use case:

- Remove extra users or schedules from the source site before you export. This is the preferred option if the two sites are on the same server instance.
- Add missing users or schedules to the target site before beginning the import. This is required if the target site is on another server instance.

- Add the missing users or schedules to the target site in the middle of the import process and manually update the mapping files. This is an option only if the sites are on the same instance.
- Manually map the users or schedules to different users and schedules in the target site during the import process. This is required if a user name differs between servers – for example, the exported user named *adavis@company.com* is defined on the target site as *davis*.

## Migrating a Site

You must use the `tsm sites` commands to complete the site migration process. The steps below walk you through exporting information from the source site, mapping site settings and importing the mapped files to the target site.

### Step 1: Export a site

On the source Tableau Server machine, type the following command:

```
tsm sites export --site-id <source-siteID> --file <filename>
```

Tableau Server must be running when you use the `export` command. During the export process, Tableau Server locks the site you are exporting.

For example, to export a site with site ID **weather-data** to the file **export-file.zip**, type the following:

```
tsm sites export --site-id weather-data --file export-file
```

By default, Tableau Server saves `<export-file>.zip` to `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\siteexports`. For more information, see [tsm File Paths](#).

### Step 2: Generate the import mapping files

To generate import files for the target site, you need the `.zip` file you created when you completed the steps in Step 1: Export a site.



## Tableau Server on Windows Help

1. On the target Tableau Server machine, copy the exported .zip file to the directory Tableau Server expects to find the files for importing. For example:
2. Verify that the target site already exists on Tableau Server, as the import process will not create a new site. For more information, see [Prepare the Source and Target Sites](#).
3. Run the following command on the target Tableau Server machine (Tableau Server must be running):

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteimports
```

```
tsm sites import --site-id <target-siteID> --file <export-  
file.zip>
```

This command generates a set of .csv files that show how source site settings will map to the target site. In the steps described in the next section of this article, you confirm these mappings and adjust them where needed.

By default, these .csv files are generated to a `mappings` directory created under `siteimports`. For example:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteimports\working\import_<id>_<date-  
time>\mappings
```

For more information, see [tsm File Paths](#).

### Step 3: Verify that site settings are mapped correctly

The .csv files you generated in the previous section describe how the source site's resources will be assigned to the target site when the import is complete. Items in the files that Tableau Server was unable to map, and that you need to edit, are indicated by a series of question marks (???). Before you can complete the import process, you must replace the question marks with valid assignments on the target site.

**Important:** Some requirements apply to mapping users, schedules and published content resources, particularly when the source and target sites are on separate Tableau Server instances. For more information, see [Prepare the Source and Target Sites](#) earlier in this article.

To verify mapping files

1. Navigate to the directory that contains the .csv map files generated by the `tsm sites import` command. By default:

```
C:\ProgramData\Tableau\Tableau Server-
\data\tabsvc\files\siteimports\working\import_<id>_<date-
time>\mappings
```

2. Use your preferred text editor to open one of the .csv files in the `mappings` directory, and do the following.

- a. Confirm that the mappings are correct.
- b. If an entry shows a series of question marks (???), replace them with a valid value.

For descriptions of the settings in each of these files, use the tables in [Mapping File Content Reference](#) later in this article.

- c. Save the changes and preserve the CSV file formatting.

Repeat this process for the remaining .csv files.

Step 4: Import the correctly mapped files to the target site

After you verify the site mappings in the .csv files, you can import the settings to the new site to complete the migration process.

1. Run the following command on the target Tableau Server machine:

```
tsm sites import-verified --import-job-dir <import-id-dir-  
ectory> --site-id <target-siteID>
```

For example:

```
tsm sites import-verified --import-job-dir "C:\Pro-  
gramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteimports\working\import_ff00_  
20180102022014457"  
--site-id new-site
```

2. When the success message appears, sign in to the new site and confirm that everything was imported as you expected.

**Note:** The `tsm sites import` and `tsm sites export` commands can leave a site in a locked state if an error occurs. To unlock a site, use the `tsm sites unlock` command.

## Mapping File Content Reference

The following tables list the columns in each of the mapping files created when you run the `tsm site import` command.

CSV file name: `mappingsDomainMapperForGroups`

| Column title       | Can it be edited? | Description                                                                                                                               |
|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| source_name        | No                | A user group name on the source site.                                                                                                     |
| source_domain_name | No                | The identity store type on the source site: either <b>local</b> (for local identity store) or a domain name (for Active Directory or LDAP |

|                    |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |      | external identity store).                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| target_domain_name | Yes* | <p>The identity store type on the target site: either <b>local</b> for local identity store, or a domain name (such as example.com or example.lan) for Active Directory or LDAP external identity store.</p> <p>*For the <b>All Users</b> group, keep the <b>target_domain_name</b> value set to <b>local</b>, even if your target server is configured for Active Directory identity store. The <b>All Users</b> group is a special default user group that must exist on every Tableau Server.</p> |

CSV file name: mappingsScheduleMapper

| Column title                 | Can it be edited? | Description                                                                                                                                                                                                          |
|------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| source_name                  | No                | The names of custom and default extract or subscription schedules on the source site.                                                                                                                                |
| source_scheduled_action_type | No                | The type of schedule, either <b>Refresh Extract</b> , for extract refreshes or <b>Subscriptions</b> , for subscription deliveries on the source site.                                                                |
| target_name                  | Yes               | The names of custom schedules on the target site. You can edit this value. For example, if the schedule is named <b>Friday Update</b> on the source site you can rename it <b>Friday Refresh</b> on the target site. |

|                              |     |                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| target_scheduled_action_type | No* | <p>The type of schedule, either <b>Refresh Extract</b>, for extract refreshes or <b>Subscriptions</b>, for subscription deliveries on the target site.</p> <p>*In the rare case that you see question marks (???) in this column, replace them with either <b>Refresh Extract</b> or <b>Subscriptions</b>, to match the entry you see under <b>source_scheduled_action_type</b>.</p> |
|------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

CSV file name: mappingsSiteMapper

| Column title         | Can it be edited? | Description                     |
|----------------------|-------------------|---------------------------------|
| source_url_namespace | No                | The site ID of the source site. |
| target_url_namespace | No                | The site ID of the target site. |

CSV file name: mappingsSystemUserNameMapper

| Column title       | Can it be edited? | Description                                                                                                                                                                     |
|--------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| source_name        | No                | The user name attribute of a user on the source site.                                                                                                                           |
| source_domain_name | No                | The identity store type on the source site: either <b>local</b> (for local identity store) or a domain name (for Active Directory or LDAP identity store), or <b>external</b> . |
| target_name        | Yes               | The user name attribute for users who will be assigned to the target site upon import.                                                                                          |

|                    |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |     | <p>Confirm that all the user names in the list exist on the target server, and replace question marks (???) with user names that exist on the target server.</p> <p>You cannot create user names by adding rows to the CSV file. Similarly, you cannot remove user names by deleting rows.</p> <p>You can edit a user name in the <b>target_name</b> column to be different from its source user name, as long as the user already exists on the target server with that name.</p> <p>For example, a user can have a <b>source_name</b> value of <b>agarcia@company.com</b> and a <b>target_name</b> value of <b>ash-leygarcia@company.com</b>.</p> <p>You can map a user on the source site to only one user name on the target site.</p> |
| target_domain_name | Yes | <p>The identity store type on the target site: either <b>local</b> (for local identity store) or a domain name (for Active Directory or LDAP external identity store).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

CSV file name: MappingsScheduleRecurrenceMapperWithAutoCreation

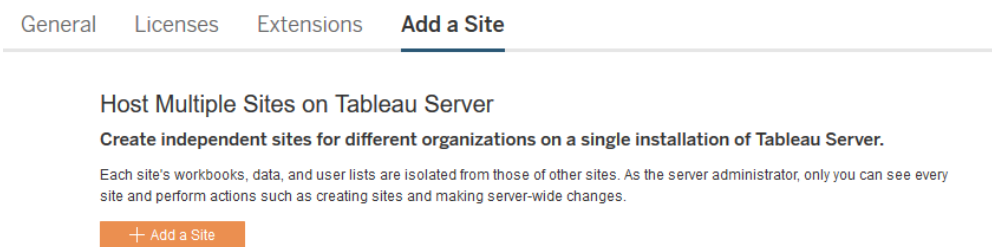
This file does not require updates.

## Add or Delete Sites

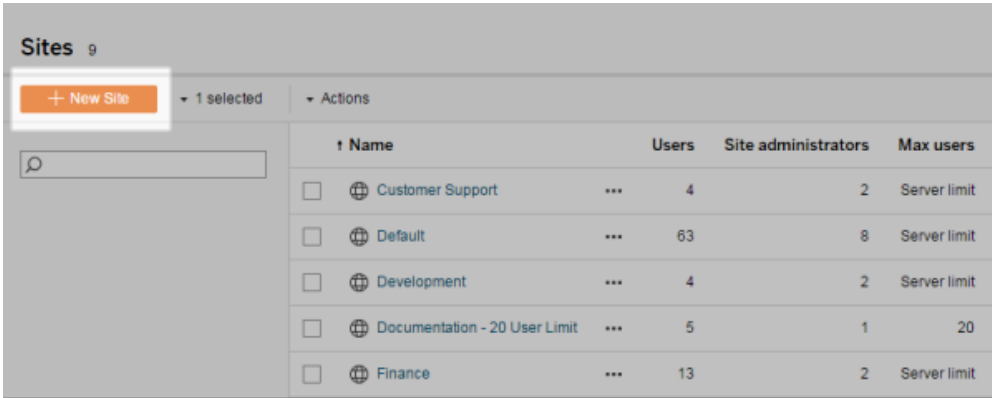
Tableau Server comes with one site named Default. Server administrators can add or delete sites as the needs of an organisation change.

## Add a site

1. Do one of the following:
  - If you're adding a site to the server for the first time, select **Settings > Add a Site**, and then click **Add a Site**.



- If you've added sites before, in the site menu, click **Manage All Sites**, and then click **New Site**.



2. **Edit the site's settings** to customize it for your organization.

## Delete sites

Server administrators can delete sites that have been added to Tableau Server. Deleting a site also removes workbooks and data sources that were published to the site, as well as users. If a user belongs to additional sites, they will not be removed. To permanently delete a user, go to the Server Users page.

**Note:** The Default site cannot be deleted.

1. On the site menu, click **Manage all sites**, and then click **Sites**.
2. Select the site you want to remove, and then on the **Actions** menu, click **Delete**.
3. Click **Delete** in the confirmation dialog box that appears.

## Site Availability

A site can become suspended or locked due to a site import failure, or because a server administrator chooses to suspend the site for a period of time.

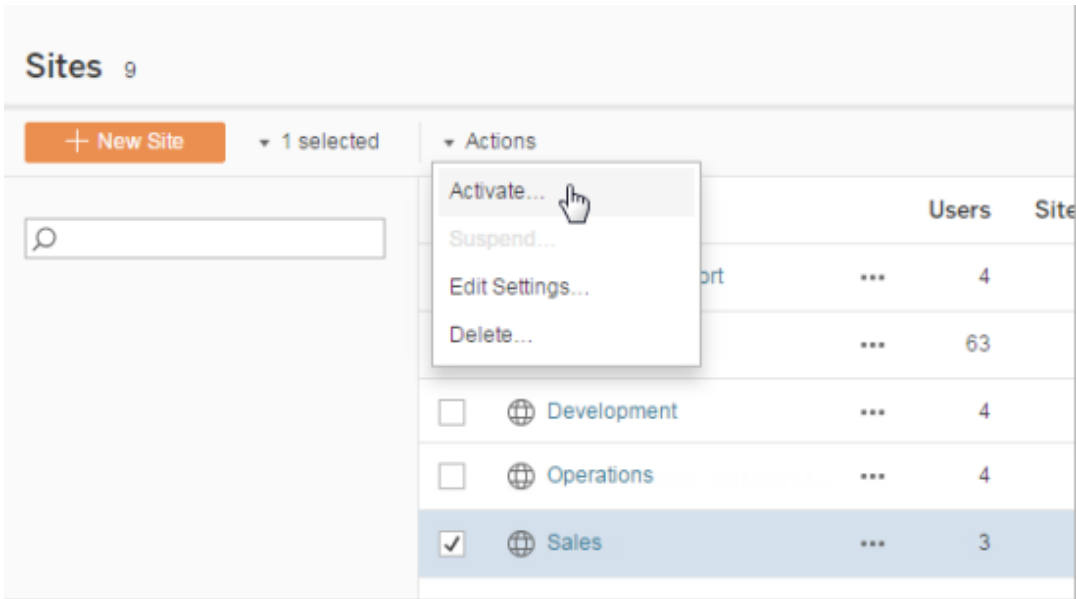
When a site is suspended, only the server administrator can activate the site to make it available again.

**Note:** If a site becomes locked and you cannot access the Sites page through the Server interface, use the `tsm sites unlock` command to change the state to active.

### To activate or suspend a site

1. In the site menu, click **Manage All Sites**, and then click **Sites**.
2. Select the site, and then select **Actions > Activate** or **Suspend**.





## Manage Site Role Limits

Server administrators can create site role limits to set a maximum number of licences of each type (Creator, Explorer or Viewer) that can be consumed on a given site. After a server administrator sets a site role limit, site administrators can add users (thereby automatically consuming licences) up to that site role limit. If a user is a member of multiple sites across the server, then that user will count against each site's role limit, but will only consume one licence (which corresponds to the highest site role they have on the server). Server administrators do not count against site role limits.

To learn more about the capabilities of each site role, see [User-based licences](#) in the Tableau Server help [Licensing Overview](#). For information for server administrators on how to set up site role limits, see [Site Settings Reference](#).

### Create role limits on a site

Before you can enable site administrators to manage their users, you can [View Server Licences](#) to determine how to allocate licences across the Server, or [Add Capacity](#) for new users to the Server.

Server administrators can configure site role limits through the Settings page in the web UI, or through the [REST API](#).

To set a site role limit on a site:

1. Go to the General tab of the Settings page for your site.
  - If you have a single site, on the side navigation, click Settings and General.
  - If you have multiple sites, select the site you want to configure and click Settings and General.
2. Under Managing Users, specify that Server and site administrators can add and remove users.
3. Under Limit the number of users to: select Site Role Limit
4. Set a limit for Creators, Explorers and Viewers.
5. Click Save

Server administrators can set site role limits within the following restrictions:

- A site role limit cannot exceed the number of licences of that type that have been activated on the server
- A site role limit cannot be less than the number of users of that site role already present for that site
- If a limit is set for any licence type, a limit must be set for every licence type.
- If the limit for a role is left blank, the server licence limit is used.

## When site role limits are met

If a user is added to a site as an Explorer, they will consume an Explorer licence, unless the site has met its role limit set for Explorer. When this happens, a few different things can occur:

- If there are available licences at a higher tier, the user will be added to the site as an Explorer, but will consume a Creator licence.
- If no higher licences are available, the user is added to the site as an Unlicensed user.

Site role limits can be affected by users consuming licences that are different than their given site roles (Viewers consuming Explorer licences, for example). In this case, administrators can unlicense those users, then update the site role quotas. For more information on how to troubleshoot licensing issues, see [Troubleshoot Licensing](#).

## Allow Users to Save Revision History

Revision history enables your users to see how workbooks and data sources (content resources) have changed over time. Each time someone saves (publishes) a content resource, Tableau Server creates a new version, which becomes the current version. It makes the previous version the most recent revision in the revision history list. Revision history gives users confidence to experiment with their content, knowing that their older versions are available.

### Notes

- This information applies to Tableau Server, and is for server administrators who want to allow publishers to work with revisions.
- On Tableau Cloud, workbook and data source revision history are enabled on all sites. Users can save up to 10 revisions.
- For information about working with the content revisions themselves, including potential issues, see [Work with Content Revisions](#) in the User/Analyst section of the Tableau help.

### Permissions users need to work with revision history

To access revision history, a user must have a site role of **Creator** or **Explorer (Can Publish)**, plus the following permissions, depending on the content type:

- Project: **View** and **Save**
- Workbooks in the project: **View**, **Save** and **Download Workbook/Save As**
- Flows in the project: **View**, **Save**, and **Download Flow/Publish As**
- Data sources in the project: **View**, **Save** and **Download Data Source**

For virtual connections in the project, you must have a **Creator** site role and the **View** and **Overwrite** permissions. (Virtual connections require Data Management. See About Data Management for details.)

## Enable revision history and set the number of revisions allowed

Revision history is set at the site level, and is enabled by default, with a limit of 25 revisions for each content resource.

1. Sign in to a site as a Server Administrator, and click **Settings**.
2. Under **Revision History**, select **Save a history of revisions**, and enter the maximum number of revisions you want to allow for each content resource.
3. Click **Save**.

When you lower the number of revisions, the most recent revisions are saved. For example, if you set the limit to 15, the 15 most recent versions of the workbook or data source are saved.

**Note:** A content resource's revision history list might not show the changes to the limit until a background cleanup process runs on the server.

## Clear all revisions

Server administrators can delete all previous revisions of published workbooks and data sources from a site. The most recent version of each published workbook and data source is always retained.

1. Sign in to a site as a Server Administrator, and click **Settings**.
2. Under **Revision History**, click **Clear Revision History**.
3. Click **Save**.

## Security for previewing and restoring workbooks

When users select **Restore** or **Preview** for workbook revisions, user passwords are exchanged between the user's browser and the server. Tableau Server encrypts these passwords using public/private key encryption. To ensure these public keys are provided by

Tableau Server, you must configure the server to use SSL (HTTPS). For more information, see [SSL](#).

## See also

[Potential revision history issues](#) in the User/Analyst section of the Tableau help.

# Tableau Mobile App Security Settings

Starting in , you can adjust Tableau Server security policies for the Tableau Mobile app. These policies help keep your data secure by checking to see if mobile devices are compromised, and by limiting certain interactions with the Tableau Mobile app.

The policies apply to only the standard version of Tableau Mobile, not the MAM versions of the app. If you have deployed an MAM app, use the specific to Tableau Mobile, in addition to your MAM system's settings, to secure the app.

## Security settings

Configure security settings for Tableau Mobile either on the site settings page for Tableau Server or using the REST API. For more information about the REST API, see [Mobile Settings Reference](#) in the Tableau REST API Help.

To access the site settings page:

1. Sign in to your Tableau Server site as administrator.
2. From the navigation pane, select **Settings**.
3. Select the **Mobile** tab.

Starting in Server 2023.1 settings related to mobile device security are available.

These settings include detecting the following conditions:

- **Jailbreak Detection**

This setting is enabled by default at the **Critical** level and detects whether the app is running on a device that has been jailbroken or rooted.

- **Malware Detection** (Android devices only)

This setting is enabled by default at the **Critical** level and detects whether the device has malware on it.

- **Maximum Days Offline Without a Policy Refresh**

This setting is enabled by default at the **Critical** level with a default maximum of 14 days. It determines if the app can be used on a device that has been offline (and thus without a policy refresh) longer than the configured maximum.

- **Prevent Debugging**

This setting is on by default and cannot be disabled. It detects whether the device has a debugger attached to it.

- **Screen Sharing and Screenshots** (Android devices only)

This setting is enabled by default and determines whether a Tableau Mobile app user can share screenshots or use screen sharing with the app.

You can change the severity level for the Jailbreak Detection and Malware Detection settings:

- **Warn:** Enforce the policy and if it fails, show a dismissible blocking message.
- **Error:** Enforce the policy and if it fails, show a blocking message until the issue is resolved.
- **Critical:** Enforce the policy and if it fails, show a blocking message and the app decides how to handle the logout/clear session through the providers. This is the default.

## Extract Refresh Schedules

Tableau Desktop authors and data stewards can create and publish *extracts*. Extracts are copies or subsets of the original data. Because extracts are imported into the data engine, workbooks that connect to extracts generally perform faster than those that connect to live data. Extracts can also increase functionality.

## Before refreshing extracts

When an extract refresh is performed on extracts created in Tableau 10.4 and earlier (that is, a .tde extract), the extract is upgraded to .hyper extract automatically. While there are many benefits of upgrading to a .hyper extract, you will be unable to open the extract with previous versions of Tableau Desktop. For more information, see [Extract Upgrade to .hyper Format](#).

## Setting up refresh schedules

As a server administrator, you can enable scheduling for extract refresh tasks, and then create, change and reassign schedules. General scheduling options you change on the server are available as part of the publishing process when a Tableau Desktop user publishes an extract.

Schedules that you create have the following options:

### Priority

The priority determines the order in which refresh tasks are run, where 0 is the highest priority and 100 is the lowest priority. The priority is set to 50 by default.

### Execution mode

The execution mode indicates to the Tableau Server backgrounder processes whether to run refreshes in parallel or serially. Schedules that run in parallel use all available backgrounder processes and serial schedules run on only one backgrounder process. However, a schedule can contain one or more refresh tasks, and each task will only use one backgrounder process, whether in parallel or serial mode. This means that a schedule in parallel execution mode will use all **available** backgrounder processes to run the tasks under it in parallel, but each task will only use one backgrounder process. A serial schedule uses only one backgrounder process to run one task at a time.

By default, the execution mode is set to parallel, so that refresh tasks finish as quickly as possible. You might want to set the execution mode to serial (and set a lower priority) if you have a very large schedule that prevents other schedules from running.

## Frequency

You can set the frequency to hourly, daily, weekly or monthly.

For information, see [Create or Modify a Schedule](#).

## Refreshing extracts manually

In the Tableau Server web environment, both server and site administrators can run extract refreshes on-demand on the **Schedules** page:

- Select the schedule and click **Actions > Run Now**.

You can also refresh extracts from the command line using the `tabcmd refreshextracts` command. For more information, see [tabcmd Commands](#).

## Refreshing extracts from Tableau Desktop

Tableau Desktop users can refresh extracts they publish and own. They can do this the following ways:

- **At publish time:** When an author publishes a workbook or data source that uses an extract, that author can add it to server refresh schedule. The refresh can be a full or an incremental refresh.

Incremental refreshes reference a column in the extract that has a data type of date, date/time or integer; such as a timestamp. Tableau uses this column to identify new rows that need to be added to the extract. For more information, see [Refreshing Extracts](#) and [Schedule Extract Refreshes as You Publish a Workbook](#) in the Tableau Help.

- **User interface:** In Tableau Desktop, you can use the **Refresh from Source**, **Add Data From File**, and **Add Data From Data Source** commands to upload an addition to or refresh an extract on Tableau Server. A user might want to do this if Tableau Server doesn't have sufficient credentials to access the underlying data. For more



information, see [Updating Extracts on Tableau Server](#) in the Tableau Help.

- **Data Extract command line utility:** The Data Extract command line utility installs with Tableau Desktop. You can use it to append to or refresh a published extract. For more information, see [Tableau Data Extract Command Line Utility](#) in the Tableau Help.

## Enable Extract Refresh Scheduling and Failure Notification

Your publishers can schedule extract refreshes when two conditions are met:

- Tableau Server is configured to send email messages when extract refreshes fail. This is configured by a Tableau Server Manager (TSM) administrator and is on by default. For details, see [Configure Server Event Notification](#).
- The site or sites in which you want to allow publishers to schedule extract refreshes is configured to send email when the refresh fails. This is configured by a server administrator in Tableau Server and is on by default. The instructions below explain how to do this if it is not enabled.

While you're enabling scheduling, you can decide whether also to enable sending email to owners of data sources or workbooks that are refreshed when those extract refreshes do not complete successfully. You can read more about these emails below. When you enable refresh failure notification, the owners of the content that has scheduled refreshes can opt out individually by changing their account settings.

1. Sign in to Tableau Server as a server administrator.
2. Go to the General tab of the Settings page for the site you want to configure for subscriptions:
  - If you have a single site, at the top the browser window, click **Settings** and **General**.
  - If you have multiple sites, select the site you want to configure and click **Settings** and **General**.
3. On the **General** page, do the following:

- Scroll to the **Manage Notifications** settings and tick **Extract jobs**.

If a scheduled refresh for a particular data source fails, the email goes only to the owner of that data source, not to owners of workbooks that connect to that data source.

- Under **Embedded Credentials**, select both options to let publishers embed credentials and schedule extract refreshes. (Automatic refresh schedules require embedded credentials so Tableau Server can directly access data.)

**Note:** On a multi-site server, failure notifications are a site setting, and embedded credentials are a server setting. To configure embedded credentials on a multi-site server, select **Manage All Sites** and then **Settings**.

## Managing schedules from the server

In your organisation it might be more appropriate to manage embedded credentials and refresh schedules centrally from the server. If you do that, you might clear the tick boxes in the **Embedded Credentials** section described in the steps above, so that Tableau Desktop publishers do not see schedule options during publishing.

Managing schedules centrally enables you to distribute extract refresh and subscription tasks, so you can run them when most people are offline. It also enables you to oversee which credentials are embedded in connections.

## How refresh failure emails work

The email notification for a failed extract refresh lists the extract name and location on the server, gives the time of last successful refresh, the number of consecutive times the refresh has failed, and suggests the reason for the failure and possible solution.

After five consecutive failures, the refresh schedule is suspended until you or the data owner takes an action to address the cause of the failure, such as updating database credentials or a path to the original data file.

### How the last successful refresh date is determined

The last successful refresh date and time are shown when that last refresh occurred within a number of days. By default it is 14 days, and this value is set in `wgserver.alerts.observed_days`. If the number of days since the last successful refresh exceeds the number specified in this setting, the message in the email shows “not in the last *N* days”.

## Create or Modify a Schedule

The Schedules page is accessible only by Tableau Server Administrators. It shows a list of schedules, including their name, type, what they're for (scope), the number of tasks, behaviour (concurrent or serial processing) and when they are scheduled to run.

**Note:** If you enable custom schedules for subscriptions on one or more sites, users will control schedules for their subscriptions on those sites. To learn more, see [Enable Custom Schedules for Subscriptions](#).

### To create a new schedule

1. In a site, click **Schedules**.
2. Click **New Schedule**.

The screenshot shows the 'Create Schedule' dialog box. It has a title bar with the text 'Create Schedule' and a close button (X). The dialog contains the following fields:

- Name:** A text input field containing the text 'Schedule Name'.
- Type:** A dropdown menu with 'Extract Refresh' selected.
- Priority:** A spinner box with the value '50'.
- Frequency:** A dropdown menu with '1 day a week, at 11:20' selected.

At the bottom right of the dialog are two buttons: 'Cancel' and 'Create'.

3. Specify a descriptive **Name** for the schedule.
4. Select a **Task type** the schedule will handle—refreshing extracts, running flows, or delivering subscriptions.
5. You must define a priority from 1 to 100, where 1 is the highest priority. This is the priority that will be assigned to the tasks by default. If two tasks are pending in the queue, the backgrounder will evaluate the task priority for extract refreshes and flows, and the schedule priority for subscriptions to determine which one runs first. For more information, see [How Scheduled Server Jobs are Prioritised](#).
6. **Execution:** choose whether a schedule will run in parallel or serially. Schedules that run in parallel run on all available backgrounder processes so that they can complete faster.

**Note:** Schedules for the same workbook will always run serially, even if you set this option to parallel.

7. Finish defining the schedule. You can define an hourly, daily, weekly or monthly schedule. The **Frequency** is populated automatically based on the selections you make.

**Create Schedule**

Priority: 50

Execution: Parallel

Frequency: ^ 3 times a month at 11:20

Repeats: Monthly

On: Day

16 | 20 | 24

|    |    |    |      |    |    |    |
|----|----|----|------|----|----|----|
| 1  | 2  | 3  | 4    | 5  | 6  | 7  |
| 8  | 9  | 10 | 11   | 12 | 13 | 14 |
| 15 | 16 | 17 | 18   | 19 | 20 | 21 |
| 22 | 23 | 24 | 25   | 26 | 27 | 28 |
| 29 | 30 | 31 | Last |    |    |    |

8. Click **Create**.

## To modify an existing schedule

1. Navigate to the Schedules page.
2. Select an existing schedule, click the Actions drop-down arrow, and then select **Edit Settings**.

Schedules 48

[New Schedule](#) [Select All](#)

| Name                                                            | Frequency  | Task type       | Tasks | Execution | Next run at            |
|-----------------------------------------------------------------|------------|-----------------|-------|-----------|------------------------|
| <input type="checkbox"/> <a href="#">Saturday night</a>         | ... Weekly | Extract Refresh | 0     | Parallel  | Feb 29, 2020, 11:00 PM |
| <input type="checkbox"/> <a href="#">schedule80</a>             | ... Hourly |                 |       | Parallel  | Feb 26, 2020, 4:00 PM  |
| <input type="checkbox"/> <a href="#">schedule81</a>             |            |                 |       | Parallel  | Feb 27, 2020, 12:00 AM |
| <input type="checkbox"/> <a href="#">schedule82</a>             |            |                 |       | Parallel  | Feb 27, 2020, 10:30 AM |
| <input type="checkbox"/> <a href="#">schedule83</a>             |            |                 |       | Parallel  | Mar 1, 2020, 10:30 AM  |
| <input type="checkbox"/> <a href="#">schedule84</a>             |            |                 |       | Parallel  | Feb 29, 2020, 10:30 AM |
| <input type="checkbox"/> <a href="#">Weekday early mornings</a> | ... Weekly | Extract Refresh | 0     | Parallel  | Feb 27, 2020, 4:00 AM  |
| <input type="checkbox"/> <a href="#">Weekday mornings</a>       | ... Weekly | Subscription    |       | Parallel  | Feb 27, 2020, 6:00 AM  |

3. Finish editing the schedule, and click **Save**.

## Rules for Creating or Modifying Schedules

Following are rules you must follow when creating new or modifying existing schedules.

**Note:** If you have existing schedules that do not follow these rules, you must modify them accordingly. Not doing so, may result in unexpected behaviour and the tasks may not run at the scheduled time.

- Schedules that run every 15 or 30 minutes must have start and end times that are on the hour. Examples of on the hour: 5:00 a.m. to 6:00 a.m.
- Daily schedules on any recurrence must have the same start and end minute. For example, 10:35 am to 4:35 pm. The hour can be different. However, if the daily schedule is set to only happen once a day, it needs only a start time and not an end time.

## See also

[Manage Refresh Tasks](#)

[Extract Refresh Schedules](#)

[Schedule Flow Tasks](#)

## Enable Custom Schedules for Subscriptions

Custom schedules for subscriptions allow users to receive email messages on a schedule that they define, rather than using a fixed schedule defined by a server administrator. Custom schedules for subscriptions have been available to users of Tableau Cloud since March 2017, and these schedules can now be enabled on a per-site basis in Tableau Server version 2018.2. Enabling custom schedules for subscriptions is a permanent change on any sites where you make this change. Any sites where you don't enable custom schedules remain on fixed schedules defined by a server administrator.

### Enable custom schedules

Before you can enable custom schedules on one or more sites, you must first enable custom schedules on Tableau Server, and then enable custom schedules on one or more sites on that server. To learn more about enabling subscriptions on Tableau Server, see [Set Up a Site for Subscriptions](#).

#### Step 1: Enable custom schedules on Tableau Server

From a command prompt with Tableau administrator permissions, run the following commands:

```
tsm configuration set -k features.SelfServiceSchedules -v true
tsm pending-changes apply
```

This operation will restart Tableau Server.

#### Step 2: Enable custom schedules on a site

1. Log in to Tableau Server as a server administrator using a web browser:

```
https://<hostname>/#/login
```

2. Browse to the **Site Settings** page for a site, and then enable custom schedules:

1. Click **All Sites**, and then choose one of the sites from the drop-down list.
2. Click **Settings**.

3. On the **General** tab, under **Subscriptions**, select the following tick box: **Permanently convert from fixed schedules created by administrators to custom schedules created by users. (You can't undo this).**
4. Click **Save**.

When custom schedules are enabled on a site, all fixed schedules with a subscription are converted to an equivalent custom schedule.

## How Scheduled Server Jobs are Prioritised

### Jobs and Tasks

In Tableau Server, users can schedule extract refreshes, subscriptions or flows to run periodically. These **scheduled items** are referred to as **tasks**. The Backgrounder process initiates unique instances of these tasks to run them at the scheduled time. The **unique instances of the tasks** that are initiated as a result are referred to as **jobs**. **Jobs** are also created for runs that are initiated **manually**, by clicking the **Run now** option.

For example, an extract refresh task is created to run daily at 9 AM. This is an extract refresh task, and every day at 9 AM, a job will be created for the Backgrounder to run.

You can assign a priority number to Tasks and Schedules using values from 1 to 100. Lower the number, higher the priority, 1 is the highest priority, and 100 is the lowest.

### Priority Rules for Jobs

When processing scheduled extract refreshes, subscriptions and flow runs, Tableau Server prioritises background jobs in this order:

1. Any job already in process is completed first.
2. Any task or schedule that you initiate manually using **Run now** starts when the next backgrounder process becomes available. Exception to this are the flow tasks and schedules. Flow runs use the assigned task priority to determine the order in when they should run. If there is no task priority assigned it defaults to 0 which is the highest



priority.

Note: Learn how to restrict Run now settings – Server Settings (General and Customisation).

3. Jobs with the highest priority (the lowest number) start next, independent of how long they have been in the queue.

For extract refreshes and flows, this is the task priority. The task priority is inherited from the schedule priority when the task is first created. The task priority can be subsequently changed but the task priority returns to the default value when the data source is republished.

For subscriptions, this is the schedule priority. If you have enabled custom schedules for subscriptions, then the priority of those jobs is set to 50.

For example, a job with a priority of 20 will run before a job with a priority of 50, even if the second job has been waiting longer. To change task priority, see [Create or Modify a Schedule](#).

4. Jobs with the same priority are executed in the order they were added to the queue. The first job added to the queue starts first; then the second job starts.
5. When multiple jobs with the same priority are scheduled to run at the same time, they start in the order they were created or enabled. Jobs scheduled for the same time are executed by task type with the fastest category of jobs starting first: flow runs, followed by data driven alerts, followed by system jobs, followed by subscriptions, followed by extract creation, followed by incremental extracts and then full extracts.

Flows that are scheduled to run as part of a linked task are all assigned the same priority and run in the order they are defined in the linked task. For more information about linked tasks, see [Schedule linked tasks](#).

6. As the last tie breaking measure, the Backgrounder uses the historical run time. Jobs that have run faster in the previous runs, will be prioritised over jobs that have taken longer historically.

**Note:** Setting backgrounder resource limits on a specific site will have an additional queue as these jobs are picked up after other higher priority jobs. For details, see [Tableau Server Backgrounder Resource Limits](#).

The following limitations also impact when the jobs are run:

- The number of concurrent jobs is limited to the number of backgrounder processes you have configured for Tableau Server.
- Separate refreshes for the same extract or data source cannot run at the same time.
- Jobs associated with a schedule that is set to run serially run one at a time.

## Configure Workbook Performance after a Scheduled Refresh

To improve the load times for workbooks, Tableau Server caches the results of queries included in workbooks. For most workbooks, query results are computed and cached when they are first viewed by a user on Tableau Server. However, for workbooks that connect to data extracts, Tableau Server can recompute query results when the corresponding extract refresh tasks run. This reduces the load time for these workbooks when they are first viewed, so this option is turned on by default for workbooks that have been viewed recently.

**Important!** External query cache warmup will be deprecated in version 2023.1. To improve view load times for workbooks, you should allow View Acceleration on your site instead. For more information, see [View Acceleration](#).

## Determine the performance impact

Although this option reduces the initial load time for workbooks, recomputing query results also increases the load on Tableau Server. If your Tableau Server installation is already performance-constrained, you might want to turn this option off or lower the threshold for workbook caching.

Here are some possible reasons why you might want to turn this option off or lower the threshold:

- The Background Tasks for Non Extracts administrative view displays many long-running jobs in the **Warming up external query cache on data change** category.
- The Background Task Delay administrative view displays long delays.
- CPU and memory consumption for the backgrounder processes is consistently high.

However, note that this is only one of the options that impacts the performance of background tasks. For more information about performance, see [Performance](#).

## Turn off workbook caching for the server

To decrease the load on Tableau Server, you can turn off workbook caching after a scheduled refresh at the server-level. If you turn this option off, Tableau Server caches query results for workbooks the first time the workbooks are viewed.

Use the following tsm configuration set option to turn off workbook caching after a scheduled refresh:

```
backgrounder.externalquerycachewarmup.enabled
```

For more information on how to use and apply tsm set options, see [tsm configuration set Options](#).

## Turn off workbook caching for a site

You can also turn off workbook caching after a scheduled refresh for an individual site. For example, you might do this if there is one site in particular that contains many slow workbooks which increase load on the server.

1. Select the site for which you want to turn off workbook caching in the sites drop-down.
2. Click **Settings**.
3. In the **Workbook Performance after a Scheduled Refresh** section, clear the check box.

**Note:** Although this option is available in the settings for an individual site, you must have server administrator permissions to view it.

## Configure the workbook caching threshold

Tableau Server only recomputes query results for workbooks that both have scheduled refresh tasks and have been viewed recently.

You can increase or decrease the number of workbooks that are cached after a scheduled refresh with the following tsm configuration set option:

```
backgrounder.externalquerycachewarmup.view_threshold
```

By default, the threshold is set to 2.0. The threshold is equal to the number of views that a workbook has received in the past seven days divided by the number of refreshes scheduled in the next seven days. (If a workbook has not been viewed in the past seven days, it is unlikely that it will be viewed soon, so Tableau Server does not spend resources recomputing queries for the workbook.)

## Ensure Access to Subscriptions and Data-Driven Alerts

To ensure that users see the Subscribe and Alert buttons in the Tableau Server toolbar and can receive related emails, do the following:

- **Configure SMTP and event notifications on Tableau Server:** See [Set Up a Site for Subscriptions](#).
- **Ensure that users have an email address in Tableau Server:** Users can update their email address on [their account settings page](#).
- **Embed database credentials or don't require them:** To email data in a view, Tableau Server needs to access the data without user involvement. This can be accomplished by using a workbook with embedded database credentials, a Tableau Server data source or data that doesn't require credentials (such as a file that's included with the workbook at publish time).
- **Ensure that users can access needed workbooks and views:** Access to workbooks and views on the server is controlled by the **View** permission. To receive images of content in email messages, users also need the **Download Image/PDF** permission. For more information, see [Permissions](#).
- **Avoid trusted authentication for embedded views:** If you use restricted tickets (the default) to render an embedded view, the Subscribe and Alert buttons don't appear.

(Alerts only) Ensure that users can access published data sources with View and Connect capabilities.

## Set Up a Site for Subscriptions

When users subscribe to a workbook or view, a snapshot of the view is emailed to them on a scheduled basis so they can see the latest updates without having to sign in to Tableau Server. Administrators, project leaders with appropriate site roles, and content owners have the option to subscribe other users to workbooks and views. For more information, see [Subscribe to Views](#).

**Note:** To create and receive subscriptions, users need access to related databases and views. [See this list of requirements](#) for details.

Looking for Tableau Server on Linux? See [Setup a Server for Subscriptions](#).

## Prerequisite: Configure the server to send subscription emails

Before you can enable subscriptions for a site, you need to complete the steps to enable subscriptions on the server. Follow the steps in these topics to configure subscriptions on the server.

1. [Configure SMTP Setup](#)
2. [Configure Server Event Notification](#)

## Enable subscriptions

After you have configured SMTP and server event notifications, you can enable subscriptions.

To enable subscriptions:

1. Sign in to Tableau Server as a server administrator.
2. Go to the General tab of the Settings page for the site you want to configure for subscriptions:
  - If you have a single site, on the side navigation, click **Settings** and **General**.
  - If you have multiple sites, select the site you want to configure and click **Settings** and **General**.
3. Scroll to **Subscriptions** and select the subscription options for your users.

**Note:** Subscription options are only visible after the TSM administrator has enabled the server-wide configuration option, **Allow users to receive email for views that they have subscribed to**. For details, see [Configure Server Event Notification](#).

- a. Select **Let users subscribe to workbooks and views**
  - b. (Optional) To allow content owners to subscribe other users to their content, select **Let content owners to subscribe other users**.
  - c. (Optional) To allow users to include attachments with their subscriptions, select **Let users add attachments to subscribed workbooks and views**. This option will not be available if the TSM administrator has not enabled attachments in TSM. For details, see [Configure Server Event Notification](#).
4. (Optional) Scroll to **Email Settings**.
    - a. Enter an **Email From Address** that will show as the "From" address in email messages.
    - b. Enter an **Email Footer** for email messages.

A site's "From" address and message footer are also used in emails for **data-driven alerts**.
5. (Optional) Scroll to **High-Visibility Data Labels in View and Workbook Subscriptions** and select **Include high-visibility quality warnings and high-visibility sensitivity labels in view and workbook subscription emails**. (In earlier versions, scroll to **Data Quality Warnings in Subscriptions** and select **Include data quality warnings in subscription emails**.)

**Note:** Data quality warnings in subscription emails are only visible when Tableau Catalog is enabled. For more information, see [Enable Tableau Catalog](#).

6. Click **Save**.

To specify the subscription schedules available to users, see [Create or Modify a Schedule](#).

## Test subscriptions in a site

1. [Subscribe to a view](#).
2. In the site with the subscription you want to test, on the side navigation, click **Schedules**.
3. Select the schedule you chose for the subscription, and then click **Actions > Run Now**.

A snapshot of the view should be emailed to you within 10 minutes. If you experience an issue, see [Troubleshoot Subscriptions](#).





## Manage all user subscriptions

1. In the side navigation, click **Tasks**, and then click **Subscriptions**.

All user subscriptions for the current site appear, including information like subscriber name, view name and delivery schedule.

2. Select any subscription you want to update. From the **Actions** menu, select **Change Schedule**, **Change Subject**, **Change Empty View Mode** or **Unsubscribe**.

(The empty-view option sends subscription emails only when data exists in a view. It's a good choice for high-priority alerts.)

## Suspended Subscriptions

By default, a subscription is suspended after 5 consecutive subscription failures and result in the subscription emails not sent. To change the threshold number of subscription failures that can occur before they are suspended, use the tsm configuration set option, back-grounder.subscription\_failure\_threshold\_for\_run\_prevention. This sets the threshold for the number of consecutive failed subscriptions necessary before suspending the subscription. This is a server-wide setting.

Only Server administrators can configure the threshold number of subscription failures before a subscription is suspended.

Server administrators can opt in to receive email notifications when a subscription is suspended. You can do this by navigating to **My account settings -> Subscription Notifications**. This setting is at a site-level so has to be configured for site separately.

### Resume suspended subscriptions

If a subscription fails more than five times, you'll receive a notification email that your subscription has been suspended. There are a few ways to resume a suspended subscription if you're a subscription owner or administrator:

- From the **My Content** area of Tableau web pages, an icon appears in the Last update column to indicate that the subscription is suspended. **Select... > Resume Subscription** to resume.
- From the **Subscriptions** tab of the affected workbook, an icon appears in the last update column to indicate that the subscription is suspended. **Select... > Resume Subscription** to resume.
- From the **Subscriptions** tab under **Tasks**, an icon appears in the last update column to indicate that the subscription is suspended. **Select... > Resume Subscription** to resume (Server administrators only).

When a subscription is resumed, the alert failing count goes back to zero. The next evaluation of the subscription will occur at the next scheduled evaluation time.

## See also

[Subscribe to Views](#) in the Tableau Desktop and web authoring Help.

Project-level administration to learn which site roles allow full Project Leader capabilities.

## Set Up for Data-Driven Alerts

When data reaches important thresholds for your business, data-driven alerts automatically send email notifications to key people that users specify. As a Tableau Server administrator, you set up data-driven alerts much like you do subscriptions. For information about how users create and manage these alerts, see [Send Data-Driven Alerts](#) in Tableau User Help.

**Note:** To create and receive data-driven alerts, users need access to related databases and views. [See this list of requirements](#) for details. If alerts are enabled for a site, any user on that site can create them except users with the Viewer role.

## Configure email for data-driven alerts

1. Complete the steps in [Configure SMTP Setup](#) so the server can send the email.
2. While viewing a site, click **Settings** at the top of the browser window.
3. Under Email Settings, enter a site-specific "From" address or message footer.

The "From" address and message footer of a site are also used in emails for subscriptions.

4. Click **Save**.

## Manage all data-driven alerts in a site

1. At the top of the browser window, click **Tasks**, and then click **Alerts**.
2. Select any alerts you want to update.
3. From the **Actions** menu, do any of the following:
  - Add or remove yourself as a recipient.
  - Edit alerts to change data thresholds, delivery schedules, and the full list of recipients.
  - Change alert ownership to different users, or delete alerts.

## Disable data-driven alerts for a site

Data-driven alerts are supported for all sites by default, but administrators can disable them for specific sites.

1. While viewing a site, click **Settings** on the left-side navigation pane.
2. Under Data-Driven Alerts, untick **Let users create alerts and receive alert emails**.
3. Click **Save**.


## Suspend data-driven alerts

By default, an alert is suspended after 350 consecutive alert failures. Server administrators can configure the threshold number of alert failures before an alert is suspended. To change the threshold number of data-driven alert failures that can occur before alerts are suspended, use the **tsm configuration set** option, `dataAlerts.SuspendFailureThreshold`.

This sets the threshold for the number of consecutive failed alerts necessary before suspending the alert. This is a server-wide setting. The threshold value applies to every configured data-driven alert on the server.

### Resume suspended alerts

If an alert fails enough times, you'll receive a notification email that your alert has been suspended. There are a few ways that administrators or alert owners can resume a suspended alert:

- From the Tasks > Alerts area of Tableau web pages, an  icon appears in the Last checked column to indicate that the alert is suspended. Select ... > **Resume Alert** to resume the alert.
- Click **Resume Alert** in the notification email to resume the alert. A notification will either allow you to resume the alert, or indicate that the view has changed and the alert should be deleted.
- From the Alerts panel of the affected view or workbook. To resume the alert from a view or workbook, select **Alert** to open the Alerts panel. An icon appears next to the suspended alert. Select **Actions** > **Resume Alert** on the affected alert to resume.

Alert owners will receive an email notification when the alert is working again.

## Control how often the server checks data-driven alerts

By default, Tableau Server checks every 60 minutes to confirm whether data conditions for alerts are true. If you notice performance impacts, you can customise this time interval with

the **tms configuration set** option, `dataAlerts.checkIntervalInMinutes`.

Regardless of the `dataAlerts.checkIntervalInMinute` setting, the server also checks alerts whenever extracts in the related workbook are refreshed. To check an alert more frequently than the setting specifies, change the extract-refresh schedule.

## Track the server's alert-checking process

In the Background Tasks for Non Extracts view, you can track the server's alert-checking process by looking for these tasks:

- Find Data Alerts to Check
- Check If Data Alert Condition Is True

The "Find" task limits "Check" tasks to alerts that can currently send related emails. For example, if a user has chosen an email frequency of "Daily at most", after the alert condition becomes true, the server waits 24 hours before checking the alert again.

Each "Check" task uses one server background process, loading the related view to evaluate the alert condition. If all users see the same version of a view, it loads only one time. But if users have applied filters to a view, or the data they see is limited by user-level security, the view loads once for each recipient.

## Identify and fix failing alerts

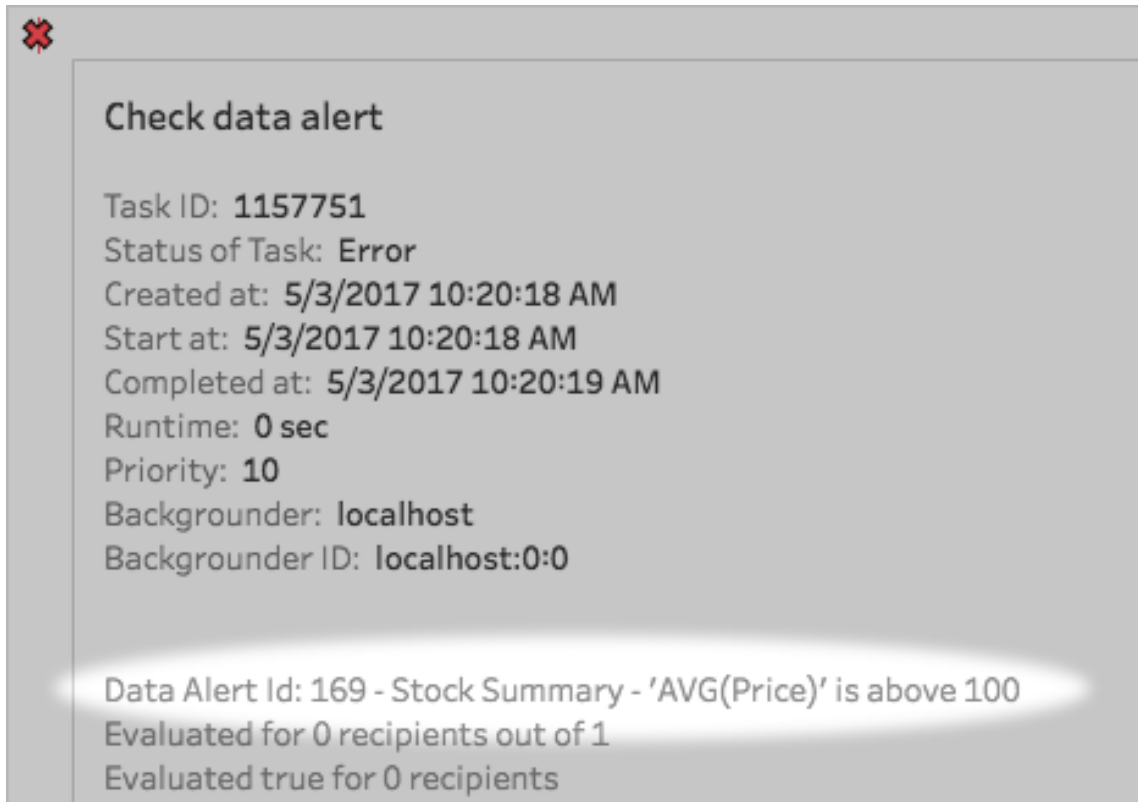
As an administrator, you can proactively identify failing alerts that users may be unaware of. To check:

1. Select Status in your site menu.
2. Select Background tasks for non-extracts.
3. From the Task dropdown menu, select Check if Data Alert is True.

4. In the far right, click Error to see a list of failing alerts.
5. Hover over the red failure icon to display a tooltip with alert details.

To determine the alert owner, look for the alert ID number in the data\_alerts table of the Tableau Server Repository. (In the **alert management** area of a site, you can also look for the alert name following the number, but be aware that multiple different alerts may use the same name.)

**Note:** Alert owners are automatically notified when an alert fails ten times. Administrators can customise when alert owners receive notifications. Users won't be notified for alerts that failed prior to upgrading to Tableau Server 2018.1.



**Check data alert**

Task ID: **1157751**  
Status of Task: **Error**  
Created at: **5/3/2017 10:20:18 AM**  
Start at: **5/3/2017 10:20:18 AM**  
Completed at: **5/3/2017 10:20:19 AM**  
Runtime: **0 sec**  
Priority: **10**  
Backgrounder: **localhost**  
Backgrounder ID: **localhost:0:0**

**Data Alert Id: 169 - Stock Summary - 'AVG(Price)' is above 100**  
**Evaluated for 0 recipients out of 1**  
**Evaluated true for 0 recipients**

Failing alerts are often caused by content changes on Tableau Server. Encourage users to recreate alerts if changes like the following occur:

- A workbook, view, or data field is removed or renamed.
- Database credentials embedded in workbooks expire.
- Data Driven Alerts require embedded credentials for Live Connections, the use of OAuth isn't currently supported with Alerts.
- A data source becomes inaccessible.

**Tip:** To automatically get emailed when alerts fail, follow the steps in [Collect Data with the Tableau Server Repository](#), and connect to the "background\_jobs" table. From this table, create a custom view that includes the "Check If Data Alert Condition Is True" job name and its finish code. Then [set up a data-driven alert](#) to email you whenever a finish code equals 1 (failure).

## Set Up for Metrics

### Retirement of the legacy metrics feature

Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.

Metrics are a type of Tableau content that tracks the value of an aggregate measure, such as sum of sales. Because metrics refresh frequently and display their current value in an easy-to-glance format, they are useful for monitoring data. To learn more about how users work with metrics, see [Create and Troubleshoot Metrics \(Retired\)](#).

As a Tableau Server administrator, you have the ability to control how often metrics refresh and how failing refreshes are handled. You can also make sure that users are able to create metrics or disable metrics for particular sites or for the entire server.

## Ensure that users can create metrics

When metrics are enabled for a site, all users with a Creator or Explorer (can publish) site role can create metrics, if they have the correct permissions.

Metrics are created from existing views on a Tableau site. To ensure that users can create metrics on a view, verify that:

- Users have the Create/Refresh Metrics permission capability for the workbook that the view belongs to. For more information, see [Permissions](#).
- The password for the data source is embedded, if it is required. For more information, see [Edit Connections on Tableau Server](#).

## Disable metrics for a site

Metrics are enabled on all sites by default. You can disable metrics on a per-site basis.

1. On the site where you want to disable metrics, from the navigation panel, click **Settings**.
2. Under **Metrics Content Type**, untick **Enable metrics**.
3. Click **Save**.

When you disable the metrics content type, metrics no longer appear on the site. The data for any existing metrics is retained, but these metrics will no longer refresh. If you re-enable metrics, these metrics will reappear and resume refreshing.

You can also disable metrics on a specific workbook by denying the Create/Refresh Metrics permission capability. For more information, see [Permissions](#).

## Disable metrics for a server

In addition to disabling metrics for specific sites, you can disable metrics server-wide. When disabled at the server level, metrics don't refresh or appear on any sites, metrics processes



don't run, and the site settings for metrics aren't available. Existing metric data is retained, so that if you re-enable metrics, those metrics will be restored.

Metrics are enabled by default. To disable metrics, use the **tsm configuration set** option `metricsservices.enabled`.

## Configure how often metrics refresh

When a metric refreshes, it checks for new data via the view it was created from, known as the connected view. You might want to increase the time between refreshes if you notice a performance impact on your server – or decrease it if your users require more up-to-date data.

Metrics that rely on live data refresh every 60 minutes, by default. To adjust the refresh interval for live data, use the **tsm configuration set** option `metricsservices.checkIntervalInMinutes`. This is a server-wide setting.

Metrics that rely on extract-based data refresh when the extracts refresh. To control how often these metrics refresh, change the extract refresh frequency. For more information, see [Extract Refresh Schedules](#).

## Configure failure notifications for metric refreshes

If a metric is not able to connect to the data it needs to refresh, the refresh will fail. When a metric refresh fails 10 times in a row, the metric owner receives an email notification.

To adjust the number of consecutive failures before a warning email is sent, use the **tsm configuration set** option `metricsservices.failureCountToWarnUser`. This is a server-wide setting.

## Configure when metric refreshes are suspended

If a metric refresh fails 175 times in a row, the refresh is suspended. Once a metric refresh is suspended, the server will no longer attempt to check for new data, until the refresh is manually resumed.

To adjust the number of consecutive failures before a refresh is suspended, use the **tsm configuration set** option `metricsservices.maxFailedRefreshAttempts`. This is a server-wide setting.

## Manage metrics

Though metrics are created from a view, they are not tied to the view like alerts or subscriptions. This means you can manage metrics similar to how you manage workbooks, by renaming, moving, tagging, deleting or setting permissions on a metric.

Find metrics to manage either by navigating the project hierarchy or via the following paths.

- To see all metrics on a site: Navigate to the Explore section, then select **All Metrics**.
- To see metrics created from all the views in a workbook: Navigate to the workbook, then select the **Connected Metrics** tab.
- To see metrics created from a single view: Open the view, then select **Watch > Metrics** from the toolbar.

## Address failing and suspended metric refreshes

Metric refreshes may fail for one of the following reasons.

- The connected view was deleted or modified.
- Permissions changed for the connected view.
- The password for the data source is no longer embedded or is no longer valid.
- The metric owner doesn't have the required site role to refresh the metric. A site role of Creator or Explorer (can publish) is required.
- There was a temporary connectivity issue, which will resolve itself.

**Note:** If the metric refresh is suspended because the owner doesn't have the required site role for it to refresh, you won't be able to resume the refresh unless you change the owner.

For more information on why metric refreshes fail and what users can do to fix them, see [Fix failing refreshes](#).

Encourage users to overwrite a metric if the connected view was modified in a way that caused the refresh to fail, but the view is still available. Users can overwrite a metric by creating a metric with the same name in the same project as the existing metric.

### Resume suspended refreshes

If the cause of the failure is fixed, for example by embedding the correct password for the data source, you can resume the metric refresh.

1. Locate the affected metric. Metrics with suspended refreshes display the text **Refresh Suspended**, instead of the time of last refresh, in grid and list view.
2. On the warning message, click **Resume refresh**.

Tableau attempts to perform the refresh. If this attempt succeeds, you'll receive a confirmation, and the refresh will resume on schedule. If the attempt doesn't succeed, the refresh remains suspended. You or the metric owner can delete or overwrite the metric, or keep it to reference historical data.

## Monitor metric activity with administrative views

Use the administrative views for Tableau Server to monitor metric refreshes and see which users are creating and viewing metrics.

1. Navigate to the site you want to monitor, or monitor server-wide activity by selecting **All Sites** from the site picker.
2. From the navigation panel, click **Site Status** or **Server Status**.
3. Select the dashboard you want to inspect.

- To monitor metric refresh activity, open the Background Tasks for Non Extracts dashboard.

Filter for the tasks **Find Metrics to Update** or **Update All Metrics on a View**.

- To see which users are creating metrics, open the Actions by All Users or Actions by Specific User dashboard.

Filter for the action **Create Metric**.

- To see recent activity involving metrics, open the Actions by Recent Users dashboard.

Look at the list of actions under **What Actions Were Recently Performed?**

## Edit a Published Data Source

Imagine that you've published a data source and your team is using the data source across a number of workbooks. This is a good start, but you have some changes in mind that will make your data source great. Before you implement these changes, you want to see how your proposed changes look in Tableau. And most importantly, you need to test your changes to ensure they won't negatively impact any existing workbooks that use the data source.

Editing a published data source allows you to test changes and make improvements to your data source while maintaining it as a single source of data.

**Note:** Only users with a site role of Creator can edit publish data sources in the browser.

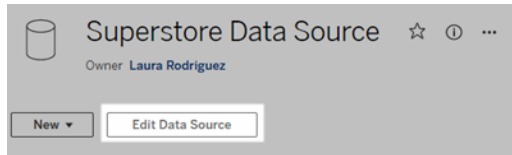
### Edit and test changes

Whether you're creating a new published data source or editing an existing published data source, you can create joins and edit the schema from the Data Source page without leaving your browser. Then use the Scratchpad to test your changes, create folders, organise hierarchies and rename fields and aliases before publishing your data source. While editing your data source, you'll have all the same features and functionality that you have when authoring in Tableau Cloud. For more information, see [Web Authoring and Tableau Desktop Feature Comparison](#).

To edit a published data source:

## Tableau Server on Windows Help

1. From the Start or Explore page, navigate to the data source you want to edit.
2. Click **Edit Data Source**.



3. Click the **Data Source** page to make joins or edit the schema.
4. Click the **Scratchpad** sheet.
5. From the **Data** pane, create folders, organise hierarchies, rename fields and their aliases or update metadata that are saved with the published data source.
6. Drag and drop fields onto the scratchpad to make sure your changes are working as expected.
7. Click **Publish**.

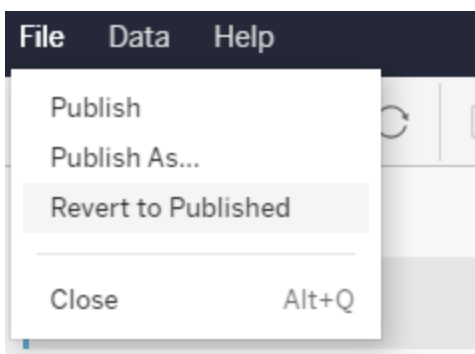
Just like you can with workbooks, you can also **Publish As** if you want to make a copy of the data source.

**Note:** Personal Spaces don't support published data sources.

## Roll back changes

To revert to the last version of the published data source:

1. Navigate to the data source that you want to revert.
2. Click **File**.
3. Choose **Revert to Published**.



This reverts to the latest published version of that data source.

## Understand supported connections

Editing published data sources doesn't support:

- Tableau Bridge connectors in Tableau Cloud.
- Data sources that use embedded passwords in Tableau Cloud and Tableau Server.

Also, the Data Source page isn't available for published data source connection types that aren't supported, including but not limited to .hyper file types. To see which connection types are supported, see [Creators: Connect to Data on the Web](#).

## Learn about permissions

To edit a published data source, you'll need a Creator licence that has Save or Save As permissions for data sources in the respective folder. For more information, see [Permissions](#).

## Edit data sources published by a flow

If you make edits to a data source that was published by a flow, the changes will be overwritten during the next scheduled flow. Instead, edit the data source in the flow. For more information, see [Publish a Flow to Tableau Server or Tableau Cloud](#).

# Managing Background Jobs in Tableau Server

In Tableau Server, users can schedule extract refreshes, subscriptions or flows to run periodically. These scheduled items are referred to as **Tasks**. The Background process initiates unique instances of these tasks to run them at the scheduled time. The unique instances of the tasks that are initiated as a result are referred to as **Jobs**. Jobs are also created for runs that are initiated manually, by clicking the **Run Now** option in the web interface, programmatically through REST API, or tabcmd commands.

For example, an extract refresh task is created to run daily at 9 AM. This is an extract refresh task, and every day at 9 AM, a job will be created for the Background to run. In addition to

user-generated jobs, the Backgrounder also does a number of System jobs on behalf of the user to support general Tableau work flows, such as thumbnail generation.

Running all these jobs can mean that Backgrounder uses a lot of resources at various times during the day. Using the Job Management feature, Server and Site administrators can get more details on these jobs that happen in their Server or Site, and take action on those jobs to better manage server resource usage. System jobs are only viewable by Server administrators, and by default are filtered out..

The **Run Now** settings on the **General** settings page also allows you to manage your resources by either allowing or blocking users from running jobs manually. By default, this option is selected to allow users to run jobs manually. Untick the box to prevent users from running jobs manually. To learn more about managing Backgrounder resources, see Tableau Server Backgrounder Process.

The Jobs page which contains the information about jobs can be accessed by navigating to the **Existing Tasks** menu of the left navigation menu.

**Note:** Information about jobs can only be viewed by Server and site administrators.

## Overview

This topic describes how to view and understand the information displayed in the Jobs page.

At the top of the page, there are high-level statistics for the number of **Failed**, **Completed** and **Cancelled** jobs within the past 24 hours. For Server administrators, this also includes System jobs. Applying filters do not change these values.

| ID  | Status      | Priority | Task Type                | Job Requested Time   | Run Time (min) | Queue Time (min) | Average Run... | Average Queue... |
|-----|-------------|----------|--------------------------|----------------------|----------------|------------------|----------------|------------------|
| 975 | Pending     | 78       | Extract Refresh/Creation | Sep 9, 2019, 9:15 AM | 0.0            | 1.5              | 5.4            | 21.6             |
| 678 | Pending     | 24       | Subscription             | Sep 9, 2019, 9:04 AM | 0.0            | 13.0             | 28.6           | 20.5             |
| 356 | Cancelled   | 63       | Extract Refresh/Creation | Sep 9, 2019, 9:03 AM | 13.7           | 0.4              | 21.9           | 28.8             |
| 168 | In Progress | 73       | Subscription             | Sep 9, 2019, 9:01 AM | 3.3            | 12.4             | 32.6           | 18.1             |
| 404 | Completed   | 73       | Extract Refresh/Creation | Sep 9, 2019, 8:58 AM | 10.2           | 8.1              | 17.0           | 4.6              |
| 563 | Pending     | 72       | Extract Refresh/Creation | Sep 9, 2019, 8:54 AM | 0.0            | 22.2             | 30.8           | 8.2              |
| 817 | Pending     | 42       | Extract Refresh/Creation | Sep 9, 2019, 8:54 AM | 0.0            | 22.8             | 16.5           | 3.5              |
| 824 | In Progress | 91       | Extract Refresh/Creation | Sep 9, 2019, 8:52 AM | 4.3            | 20.6             | 6.6            | 17.4             |
| 357 | Completed   | 90       | Extract Refresh/Creation | Sep 9, 2019, 8:50 AM | 14.1           | 12.6             | 24.8           | 12.3             |
| 726 | Completed   | 92       | Extract Refresh/Creation | Sep 9, 2019, 8:49 AM | 1.1            | 26.4             | 33.7           | 36.6             |
| 239 | Cancelled   | 40       | Flow                     | Sep 9, 2019, 8:47 AM | 22.2           | 7.3              | 38.7           | 22.8             |
| 49  | In Progress | 96       | Subscription             | Sep 9, 2019, 8:47 AM | 17.2           | 12.8             | 27.4           | 2.2              |
| 652 | Pending     | 3        | Extract Refresh/Creation | Sep 9, 2019, 8:46 AM | 0.0            | 31.0             | 3.1            | 20.3             |

For each job generated, there is a Job ID, the status of that job, the priority, the type of task that the job was generated from, the current run time – if the job is in-progress, current queue time – if queued, as well as the average run time and average queue time.

Tableau records historical run times and queue times to compute the average run times and average queue times. Both average run times and average queue times are calculated as weighted averages using the following formula: ((current run time or queue time average x 4) + most recent run time or queue time)/5.

The Job ID can be useful when viewing jobs on **Admin views** and can also be used to query the **Workgroups Database**. When you click on the Job ID, you will see more detailed information about the job, such as the Job LUID, the project name, the schedule, the content name, content owner, job creator the last time the job ran successfully and the site name. The site name is displayed if you navigate to the Jobs page using the **Manage All Sites** menu.

Job Details for Job 617

LUID: 0e2aedec-71c7-4a56-8c2c-b03c47cc5b5a  
Project: Project1  
Schedule: Every Sunday - 4:00PM  
Content: Rust interpreter speed study  
Content Owner: Sabreen  
Job Creator: Andres  
Last Successful Run: Sep 9, 2019, 7:45 AM  
Site: Site1

OK



**Note:** Doing a **Refresh Now** from the **Data Sources** page will only show the LUID information in the **Job Details** dialog box.

**Important:** Jobs that existed 24 hours or less before an upgrade to Tableau Server 2019.4 will not have data for **Average Queue Time**, **Average Run Time**, **Last Successful Run Time** and **Job Creator** on the **Jobs** page.

## Task Types

There are several types of tasks:

- **Extracts:** This includes extract creation, incremental extract refreshes and full extract refreshes. For more information on extract refreshes, see [Quick Start: Refresh Extracts on a Schedule](#).
- **Subscriptions:** Includes subscriptions for workbooks and views. For more information, see [Set Up a Site for Subscriptions](#).
- **Flow:** This includes scheduled flows and manual flow runs. See [Job runtime capacity](#) for information about the maximum runtime for flows and [Concurrent jobs capacity](#) for capacity limits when running concurrent flow jobs. Scheduling more flows than the number of resource blocks you have can result in an error. See the Knowledge Base article [Flow Job Pending](#) for more information.
- **Encryption:** Includes the following:
  - Extract encryption and decryption
  - Flow encryption and decryption
  - Re-key extracts and flows
- **System:** This is all the system Jobs that the Backgrounder handles behind the scenes to support Tableau Server.

## Filters

You can filter to see only certain jobs. The available filters are by Job Status type, Task Type and Time Range. For the Time Range filter, you can choose from past one to 24 hours, in four

hour increments. The option to filter in System Jobs is available if you are a Server Administrator.

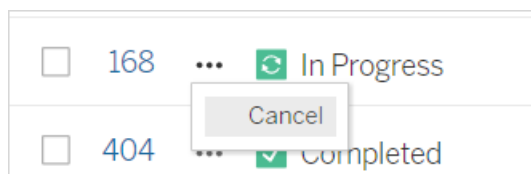
## Cancelling Jobs

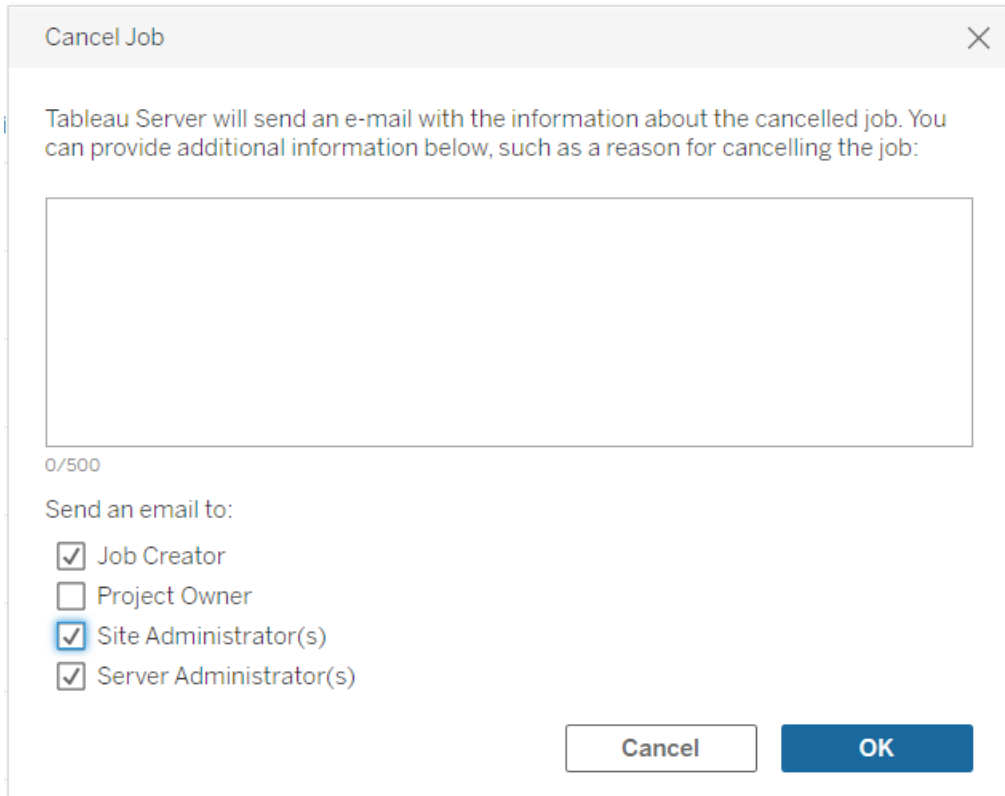
Extract refreshes, subscriptions and flow run jobs can be cancelled. You can only cancel one job at a time, and selecting multiple jobs at one time for cancellation is not supported.

When you cancel a job, an email with the time the job was cancelled, the affected content and the time the job ran before being cancelled is sent to the recipients that you select in the **Cancel Job** dialog box . In addition, you can add your customised notes to be included in the email.

If you do not select any recipients, the job will be cancelled, but no email will be sent.

To cancel a job, click on the ellipses next to the Job ID and use the dialog to cancel the job:





A screenshot of the 'Cancel Job' dialog box in Tableau Server. The dialog has a title bar with 'Cancel Job' and a close button. The main text says: 'Tableau Server will send an e-mail with the information about the cancelled job. You can provide additional information below, such as a reason for cancelling the job:'. Below this is a large text input area. At the bottom left, it says '0/500'. Below the input area, there is a section 'Send an email to:' with four checkboxes: 'Job Creator' (checked), 'Project Owner' (unchecked), 'Site Administrator(s)' (checked and highlighted with a blue border), and 'Server Administrator(s)' (checked). At the bottom right, there are two buttons: 'Cancel' and 'OK'.

## Status


There are seven types of status that jobs can be in, and hovering over each status will display more relevant information.

- **Completed:** This job shows as **Completed successfully** and you can see the time when the job completed in the tooltip that is displayed when you hover over the status.

✓ Completed

This job successfully completed on Jun 13, 2019, 10:23 AM. [Learn more](#)

- **In Progress:** This job shows as **In Progress**. A time for how long the job has been running for is displayed in the tooltip when you hover over the status.

 In Progress


This job has been running for 19.3 min.  
[Learn more](#)

- **In Progress:** This job is **In Progress**, but is **running late**. Tableau keeps track of the average run times for the same job, and if the current run time is longer than the average run time, then it is considered running late. Times for how much longer than average the job has been running and its average run time is provided in the tooltip that is displayed when you hover over the status.

 In Progress

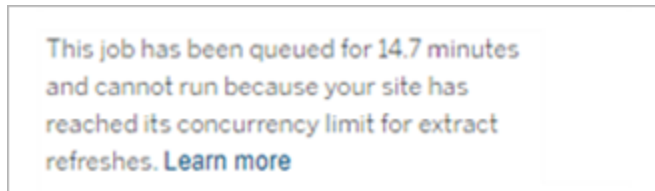
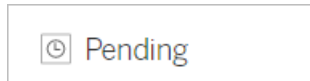
This job has been running for 22.7 min  
longer than previous runs (5.9 min). [Learn more](#)

- **Pending:** This job is currently **Pending**, waiting to be run when there is available Backgrounder capacity. A time for how long the job has been in the queue for is provided in the tooltip that is displayed when you hover over the status.

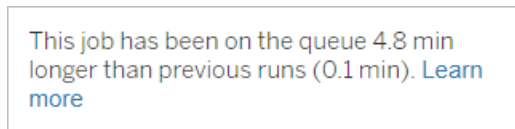
 Pending

This job has been queued for 42.9 min.  
[Learn more](#)

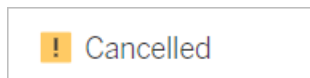
- **Pending:** The flow cannot be run because the number of Resource Blocks is less than the number of flow you have scheduled and the site has reached its concurrency limit.



- **Pending:** This job is currently **Pending**, but is **running late**. Tableau keeps track of the average queue times for the same job, and if the current queue time is longer than the average queue time then it is considered running late. Times for how much longer than average the job has been queued is provided in the tooltip that is displayed when you hover over the status.



- **Cancelled:** This job was **Cancelled** by a Server or Site administrator. The time the job was cancelled and how long it ran for before cancellation is provided in the tooltip that is displayed when you hover over the status.



This job was cancelled on Jun 11, 2019, 9:55 PM after running for 29.5 min. [Learn more](#)

- **Failed:** This job is showing as **Failed**. The time when the job failed, how long it ran for before it failed, and why the job has failed is provided in the tooltip that is displayed when you hover over the status.

 Failed

This job failed on Jun 11, 2019, 4:23 AM after running for 51.6 min because of: Invalid credentials [Learn more](#)

- **Suspended:** This job is showing as **Failed** with a pause icon. If the job fails 5 times consecutively, the job will be suspended. Suspended tasks are still available but Backgrounder will not create jobs for these tasks until they are resumed by the user.

 Failed

This job did not run since it was initiated from a task that is suspended. To run jobs initiated from this task, you must first resume the task. [Learn more](#)

## Tableau Service Manager Jobs

TSM jobs are administrative tasks that help configure and maintain Tableau Server. These jobs run by Tableau Services Manager.

Here are some key TSM jobs:

- **Cleanup:** This job is created when a cleanup command is issued to Tableau Server. The cleanup command deletes old log files and temporary files. For more information on the TSM CLI cleanup command, see `tsm maintenance`.
- **Deployments:** This job is created to apply any configuration updates that you make to Tableau Server. This can be initiated either through the TSM web interface or TSM CLI. For more information on the TSM CLI command, see `tsm pending-changes`. Here are a few examples of configuration updates: enabling SSL, enabling Run as User and server topology changes.

Depending on how many topology changes are being made, and the complexity, this job can take longer than the previous time it ran successfully. For example, if the previous change was a hot topology change, and the current one is not, the current job can take longer to complete than the previous one.

- **Generate backup:** This job is created when a backup command is issued to Tableau Server. The backup command creates a backup file of Tableau data (data in the File Store and repository). For more information on the TSM CLI backup command, see `tsm maintenance backup`.

The time taken for the backup job to complete depends on the amount of data that needs to be backed up. If the amount of data to be backed up has increased from the last time this job was run, it will take longer for the job to complete compared to the previous time.

- **Initialise Tableau Server:** This job is initiated to initialise Tableau Server during the installation process. For more information on the TSM CLI command, see `tsm initialise`.
- **Restore:** This job is created when a restore command is issued to Tableau Server. The restore command restores a Tableau Server data backup file. For more information on the TSM CLI restore command, see `tsm maintenance`. The time taken for the restore job to complete depends on the size of the backup file. If the backup file is larger than the previous times, the restore job will take more time to complete.

- **Start Server:** The job is created to start all the stopped Tableau Server processes. This can be initiated either through the TSM web interface or TSM CLI. For more information on the TSM CLI command see, `tsm start`.
- **Stop Server:** This job is created to stop all the running Tableau Server processes. This can be initiated either through the TSM web interface or TSM CLI. For more information on the TSM CLI command, see `tsm stop`.

## Cancelling tsm Jobs

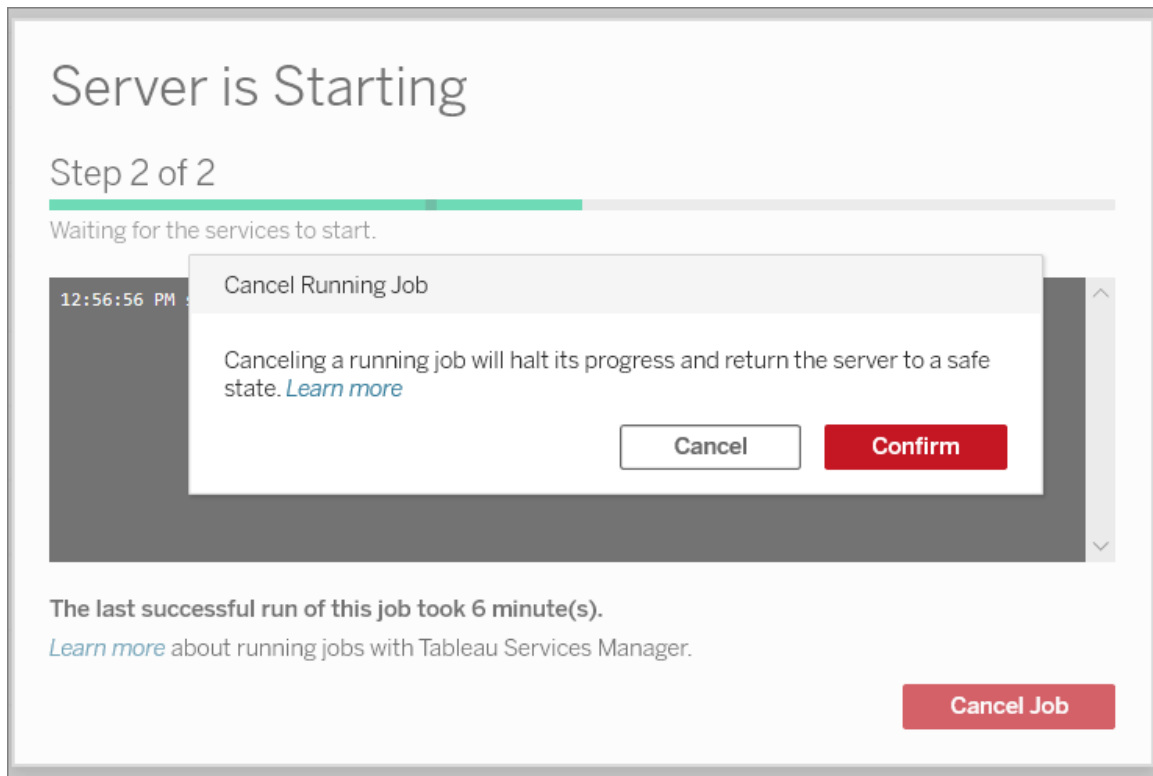
You can cancel jobs either through the TSM web interface or using the TSM CLI. For more information, see [Cancel TSM Jobs](#).

## Cancel TSM Jobs

TSM Jobs can be cancelled through TSM web interface or TSM CLI. There are many TSM jobs, but only certain jobs can be cancelled once they are in progress. Any job that hasn't yet started can be cancelled using TSM CLI.

**TSM web interface:** For jobs that can be cancelled while they are running, the Cancel option is available in the Job dialog box as shown below:





**TSM CLI:** To cancel jobs using TSM CLI, see [tsm jobs](#).

To see more information about TSM jobs in general, see [Tableau Service Manager Jobs](#).

## Cancelling Jobs that are in progress

Only certain jobs can be cancelled while they are already running: Clean-up, Decommission File Store, Generate Backup, Restart Server, Start Server. The cancel behaviour can be different depending on the job and the state of the job at the time it was cancelled. This is explained in detail below:

- **Cleanup:** If you cancel a cleanup job, it will stop any services that were started in order to do the cleanup. Depending on when it was cancelled, some files may be deleted and some may not have been deleted yet resulting in partial cleanup.
- **Decommission File Store:** If you cancel this job, it returns the Tableau Server File Store topology to the state that it was prior to starting the decommissioning process.

- **Generate Backup:** If you cancel this job, any services used for backup are stopped and Tableau Server will try to delete any files that it created as part of the backup process.
- **Restart Server:**
  - Job is cancelled when Tableau Server processes are stopping: The job is cancelled, but the services will try to get to a stopped state.
  - Job is cancelled while Tableau Server processes are restarting: The job is cancelled, but the services will try to restart.
- **Start Server:** The job will be cancelled, but the processes will still try to start.
- **Stop Server:** The job will be cancelled, but the services will try to stop.

Here are some of the main reasons why you may want to cancel a job:

1. Since tsm jobs can only be run one at a time, you might need to cancel a current job if you need to run another job instead.
2. If the running job includes changes to the Tableau Server that you did not intend to make.

## Administrative Views

The Status page contains an embedded Tableau workbook with various administrative views. These views help you to monitor different types of server or site activity.

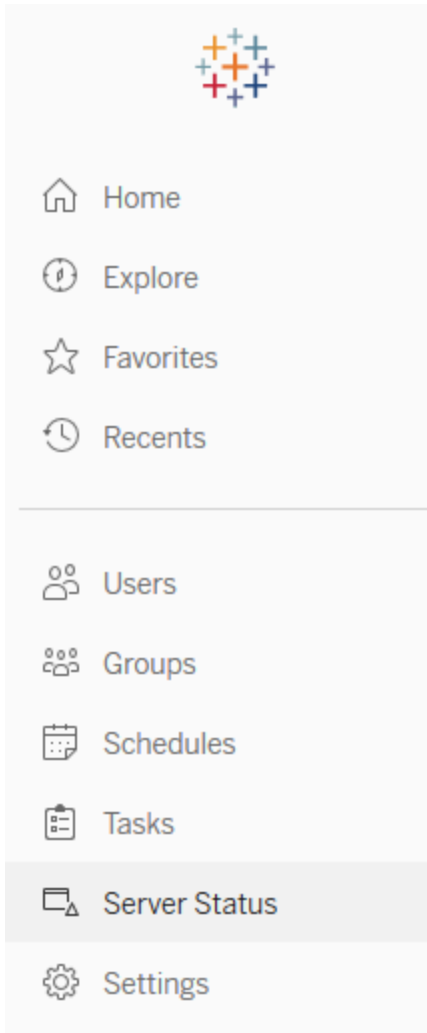
**Important:** Beginning with version 2023.1.0 you must install the PostgreSQL driver if you want to use the built-in administrative views. You can find the driver and installation instructions on the [Driver Download page](#).

**Upgrading:** If you are upgrading in place, your existing driver will continue to work and you do not need to install the new driver, but downloading and installing the driver will provide the most up-to-date version. If you are upgrading by installing a fresh instance of Tableau Server, you need to download the driver.

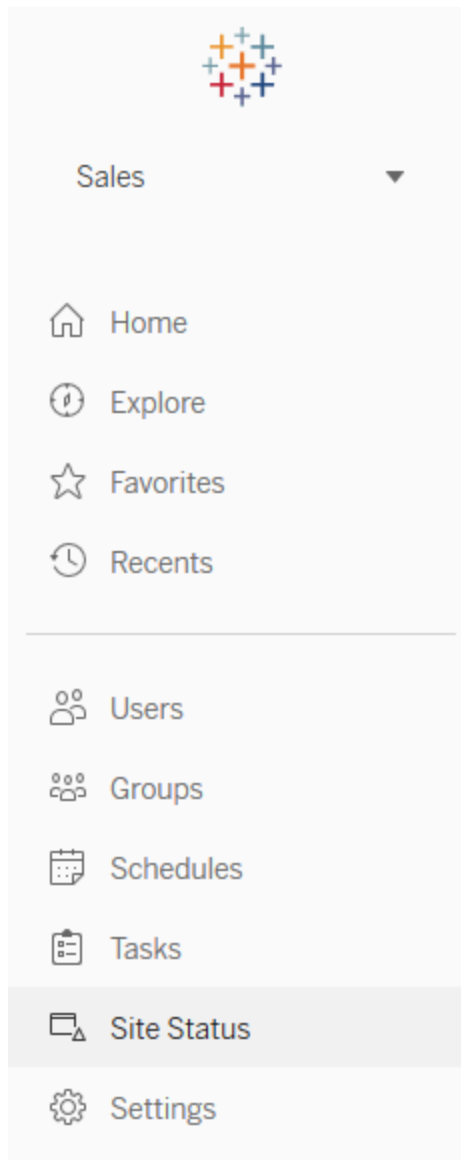
## Navigating to administrative views

To see administrative views, click **Status**. Site administrators can see administrative views for their site. Administrators of multiple sites can see views for the current site.

On a multi-site server, server administrators can see views for the entire server. Click the site menu, and then click **Manage All Sites** to access the server menus.



To see views for individual sites on a multi-site server, click the site menu, select the site name and then click **Site Status**.



## Pre-built Administrative Views

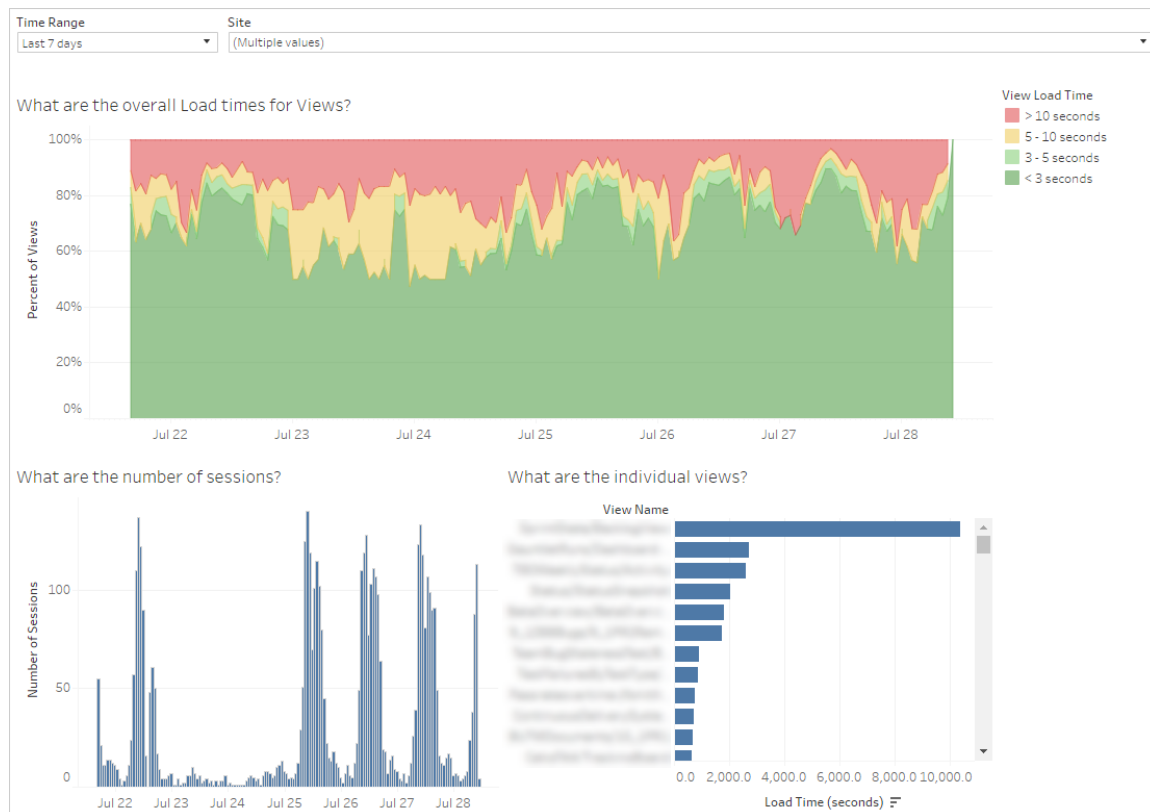
Administrative views are powerful monitoring tools that can help you optimise Tableau Server and better understand how your users are interacting with Tableau content. The administrative views listed to the right are included with Tableau Server. Click on the link for a view to learn more about how to interpret and act on the information the view provides.

To create your own administrative view, see [Create Custom Administrative Views](#).

## Performance of Views

**Note:** This view is only available to server administrators. To access server views on multi-site deployments, click the site menu and select **Manage All Sites**. For information about how to navigate to administrative views, see [Administrative Views](#).

The Performance of Views administrative view displays how long it takes for views to load and how many sessions are running at a time on the server.



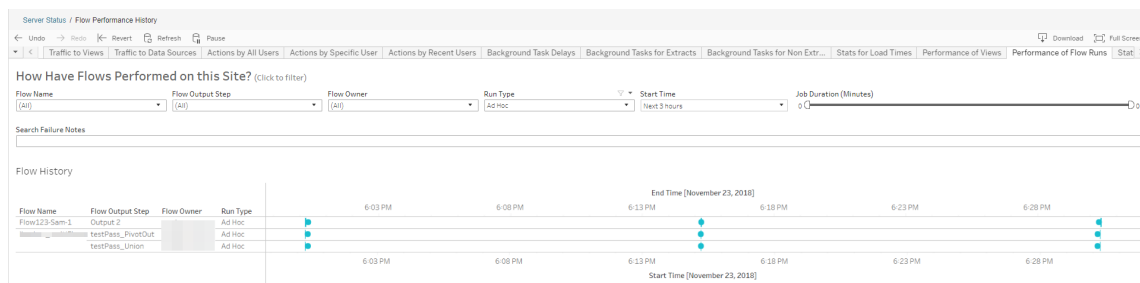
You can compare spikes in the number of sessions with spikes in slow load times to identify the times of day when high user traffic is slowing down the server. You can also look at the individual views by load time to understand which views take the longest to load. For information on how to optimise the server, see [Optimise for User Traffic](#).

Some views might take a long time to load regardless of when they are viewed. You can identify which workbooks need to be optimised with the **Stats for Load Times** administrative view. Some simple ways to optimise workbooks includes the following:

- Display less information in each view.
- Break up views.
- Reduce the number of filters.
- Use data extracts.

## Performance of Flow Runs

Use this view to see the performance history for all the flows on a site. You can filter by Flow Name, the Output Step Name, Flow Owner, Run Type (Scheduled or Ad Hoc), and the time the flow runs were started. For information about other administrative views available for flows, see [Monitor Flow Health and Performance](#).



Here are some questions you can answer using this view:

- **What flow tasks are currently scheduled?** – To do this, use the Start Time filter and select the time frame you want to look at. For example, to see flow tasks that are scheduled in the next 3 hours, select **Hours -> Next ->** and enter **3**.
- **What is the duration of flow tasks?** – To answer this, click on a mark in the view and you should see details including the task duration.

**How many flows were run ad hoc, and how many were scheduled runs?** – To answer this, use the **Run Type** filter and select **Ad hoc** or **Scheduled**.

**Note:** This is not functional in this release and will not actually filter the data.

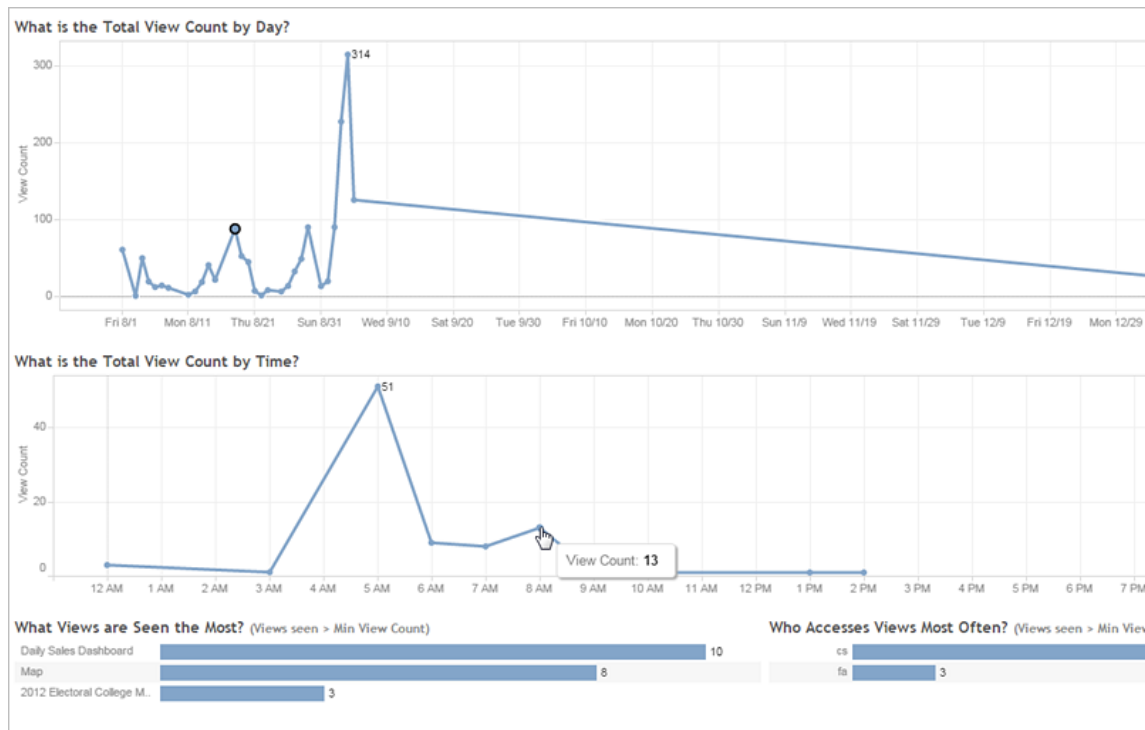
In addition to the questions described above, here are some examples of insights you might be able to gather:

- The flows that are running most frequently will have the most marks.
- To see how many flows are running at the same time currently, hover over a mark that shows “**In Progress**” or “**Pending and select “Keep Only**” to filter all flow runs that are currently running.
- To see how many flows are running at the same time during a specific time range, select a range for the **Start Time** filter. For example, you can choose “**Next three hours**” to see which flows will be running in the next three hours.

## Traffic to Views

The Traffic to Views view gives you the ability to see how much of your user traffic goes to views.

You can filter what information is displayed and the time frame it comes from by selecting the view, the workbook and the time range. Server administrators can specify the site.



Two time lines at the top of the view show you how views are being used over a time range you specify (the default is the last 7 days):

- **What is the Total View Count by Day** – This shows total view count by day, based on the filters you set. Hover your mouse pointer over a point on the line to see the count of views. Select the point to update the other sections of the view based on your selection.
- **What is the Total View Count by Time** – This shows the view count by time of day. The filters and any selection impact this graph.

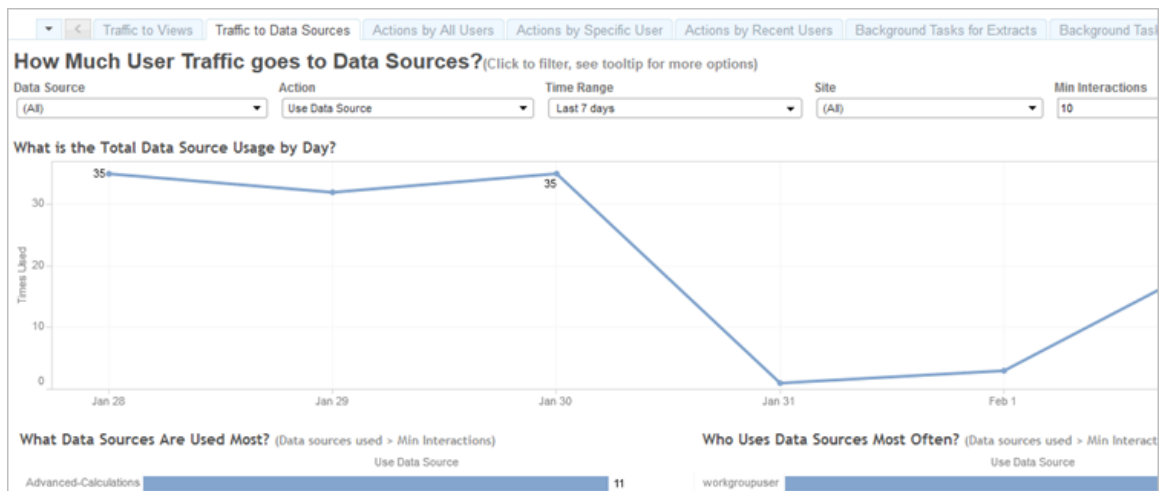
Two bar graphs at the bottom of the view show results that are filtered by the **Min View Count** filter at the top of the view. These show you the views that are most often accessed, and the users who most frequently access views. Only those views and users with counts greater than or equal to the minimum view count value are displayed:

- **What Views are Seen the Most** – This is a list of the most visited views. Like the other sections of the view, the information is limited by filters and any selection you make.
- **Who Accesses Views Most Often** – This shows the users who most often access the views and is limited by filters and any selection you make.



## Traffic to Data Sources

The Traffic to Data Sources view gives you the ability to see usage of data sources on your Tableau Server installation. This can help you determine which data sources are most heavily used and those that are less often used. You can filter the information you see by selecting the data source, the action taken on that data source, and the time range. Server administrators can specify the site.



A time line at the top of the view shows you how data sources are being used over a time range you specify (the default is the last 7 days):

- **What is the Total Data Source Usage by Day** – This shows total data source usage by day, based on the filters you set. Hover your mouse pointer over a point on the line to see the count. Select the point to update the other sections of the view based on your selection.

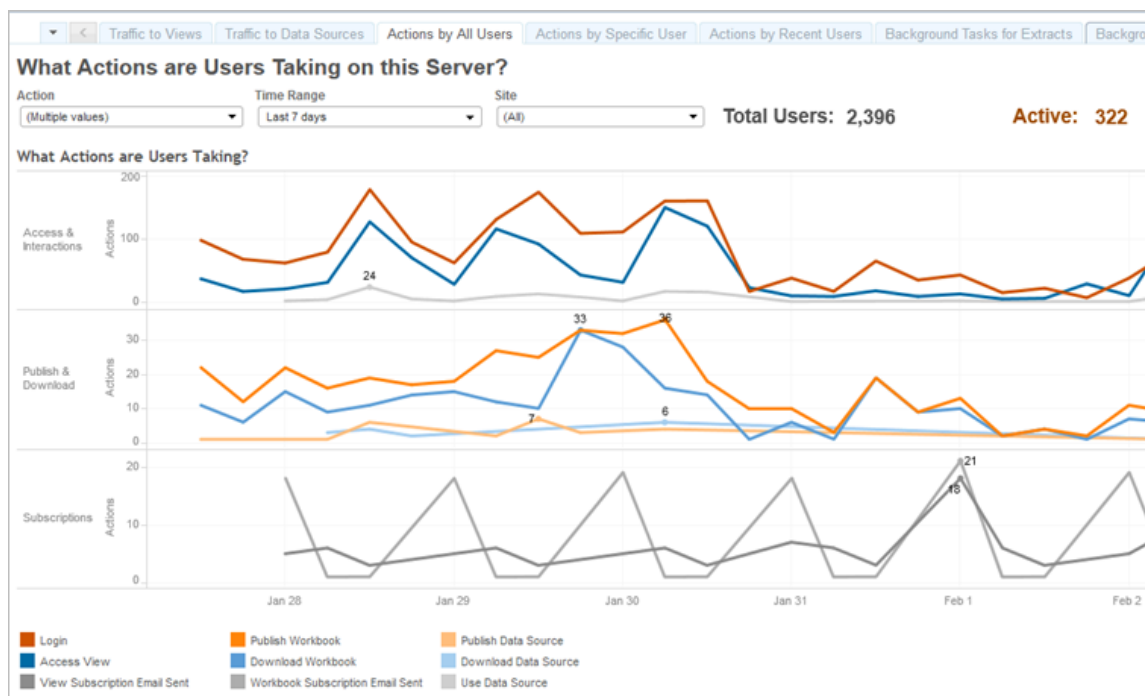
Two bar graphs at the bottom of the view show results that are filtered by the **Min Interactions** filter at the top of the view. These show you which data sources are most used, and who uses data sources most often. Only those data sources and users with interaction counts greater than or equal to the minimum interactions value are displayed:

- **What Data Sources are Used Most** – This is a list of the most used data sources. Like the other sections of the view, the information is limited by filters and any selection you make.

- **Who Uses Data Sources Most Often** – This shows the users who most often use the data sources. This is impacted by filters and any selection you make.

## Actions by All Users

The Actions by All Users view gives you insight into how your Tableau Server installation is being used. You can filter the view by actions and by time range. Server administrators can filter by site. The Total Users count shows the number of users who have performed an action. This value is not affected by any filtering. The Active user count shows the number of active users who have performed one of the selected actions.



Up to three separate groups of time lines show you how users are using Tableau Server over a time range you specify (the default is the last 7 days). If no actions are selected for a particular group, that group does not display. Possible groups are:

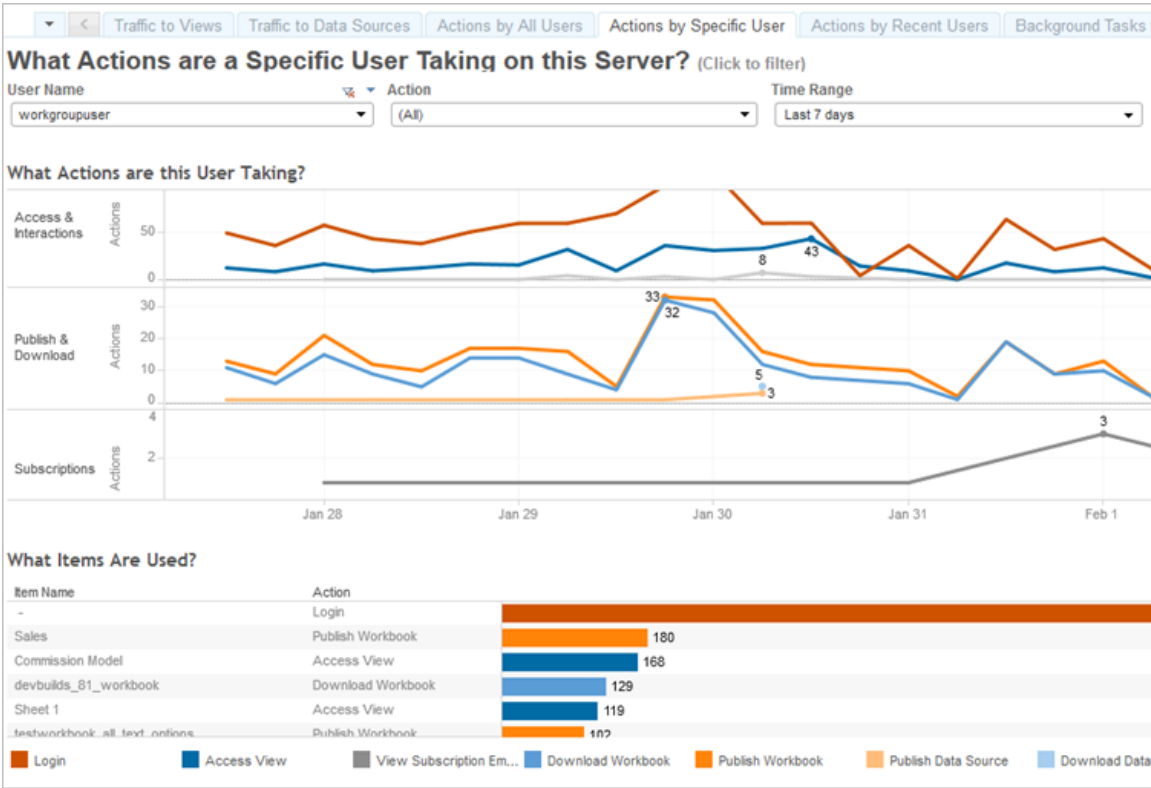
- **Access & Interactions** – This shows you sign in (log on) activity, view access and data source use.
- **Publish & Download** – This shows publishing and downloading of flows, workbooks and data sources.

- **Subscriptions** – This shows counts of subscription email sent for workbooks and views. It also shows the counts of flow runs.

Use the legend at the bottom to view a subset of the displayed actions. Click a single action to highlight the line for the action, or **Ctrl + Click** on multiple actions to highlight more than one. To clear the selection and display all the selected actions, click on any action in the legend.

## Actions by Specific User

The Actions by Specific User view gives you insight into how individual users are working in your Tableau Server installation. You can filter the view by user name, actions, and time range. Server administrators on multi-site installations can filter by site.



Up to three separate groups of time lines show you how a selected user is using Tableau Server over a time range you specify (the default is the last 7 days). If no actions are selected for a particular group, or if no actions were taken, that group does not display. Possible groups are:

- **Access & Interactions** – This shows you sign in (log on) activity, view access and data source use. This means any interaction with a Data Source by the selected user, including extract refreshes scheduled by that user, or the user accessing a workbook that is associated with that data source.
- **Publish & Download** – This shows publishing and downloading of flows, workbooks and data sources.
- **Subscriptions** – This shows counts of subscription email sent for workbooks and views. It also shows the counts of flow runs.

A bar graph at the bottom of the view shows which items the selected user is using.

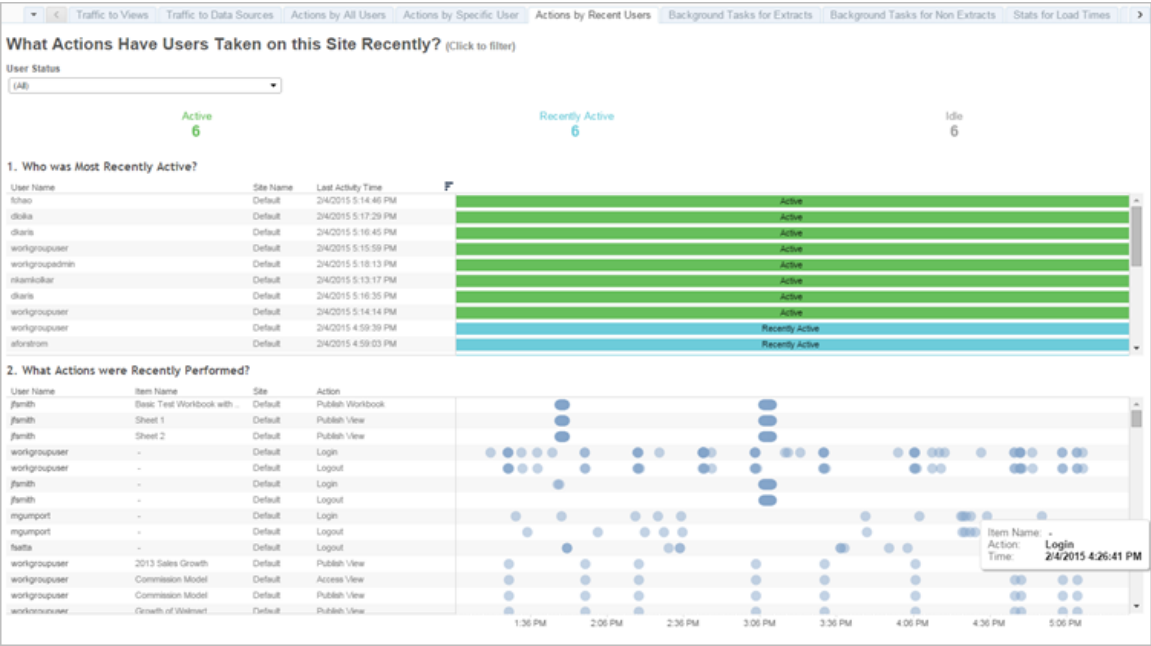
Use the legend at the bottom to view a subset of the displayed actions. Click a single action to highlight the line for the action, or **Ctrl + Click** on multiple actions to highlight more than one. To clear the selection and display all the selected actions, click on any action in the legend.

## Actions by Recent Users

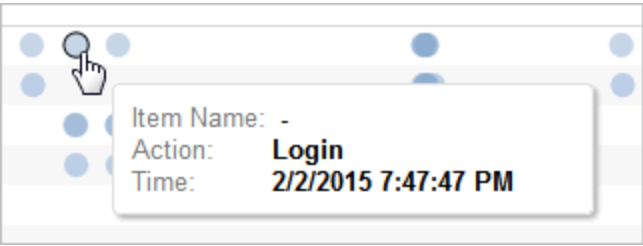
The Actions by Recent Users view shows you which signed-in users have been active on Tableau Server over the past 24 hours. This can be useful if you need to perform some maintenance activity and want to know how many and which users this will affect, and what they are doing on Tableau Server.

The view **Active**, **Recently Active**, and **Idle** users that are currently signed in to Tableau Server. For this view, an active user is one who took an action in the last 5 minutes, a recently active user is one who last took an action within 30 minutes, and an idle user is one who last took an action more than 30 minutes ago. The actions are displayed in the lower section of the view.

Tableau Server on Windows Help

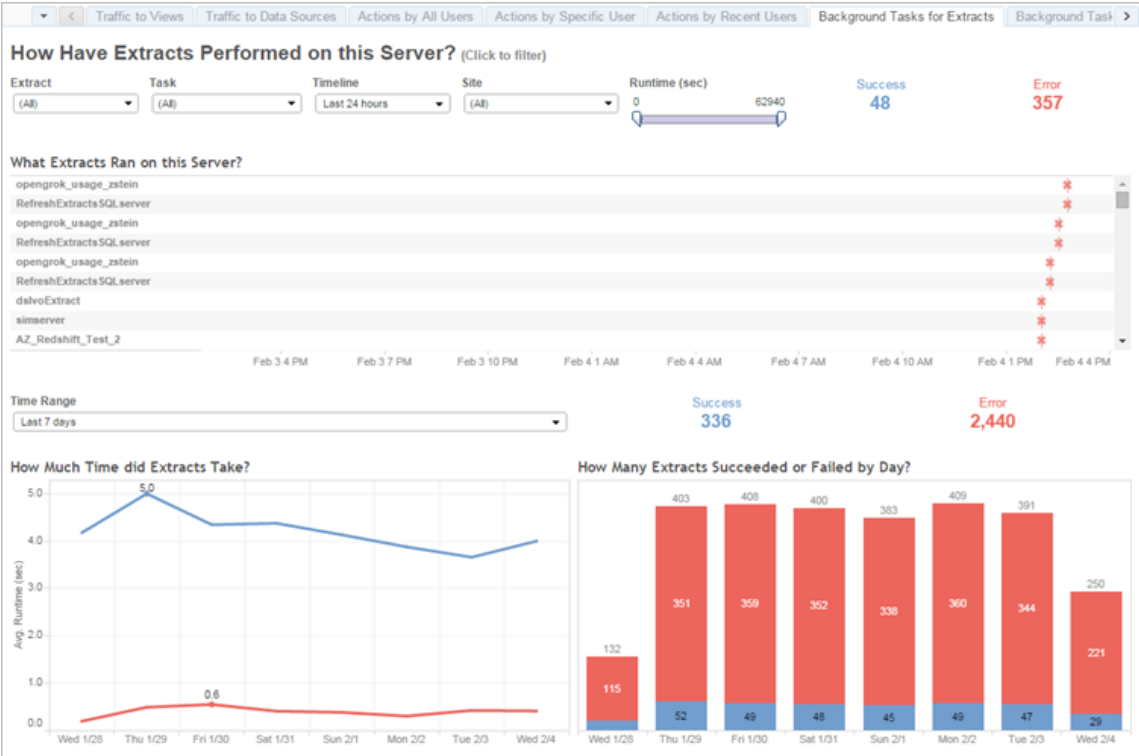


Select a user to see only the actions that user performed recently. Hover over an action to see details of the action.



Background Tasks for Extracts

The Background Tasks for Extracts view displays extract-specific tasks that run on the server.



Understand this view


To better understand this pre-built administrative view, make note of the following:

- The table, "What Extracts Ran on this Server", lists the extracts that ran in the time period specified in **Timeline**.
- You can click **Success** or **Error** to filter the table based on status.
- You can also click a specific task to update the "How Much Time did Extracts Take" graph for the selected task.
- The table, "How Many Extracts Succeeded or Failed", updates for the status (success or failure) of the task, but the count of extracts that succeeded or failed does not change.

Status

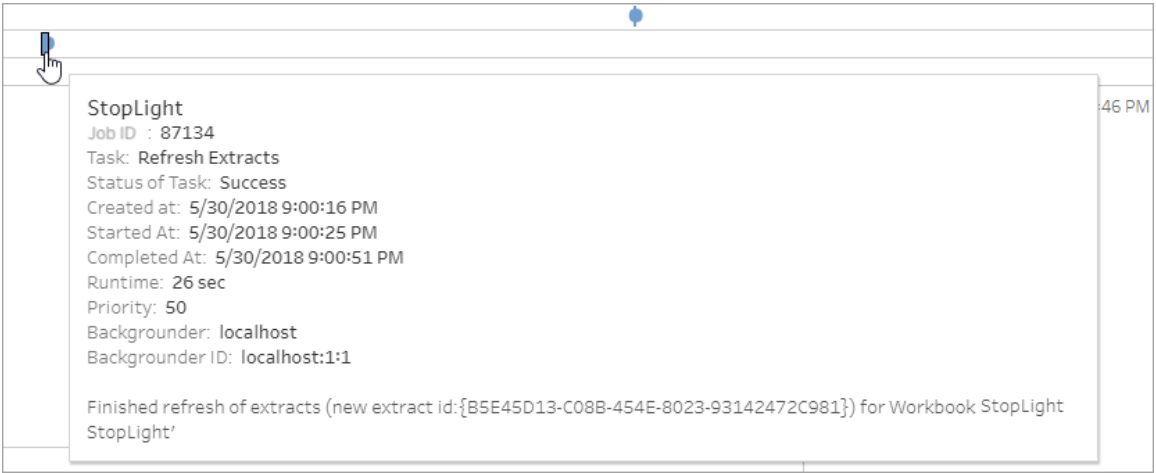
Tasks can have a status of success or error.

| Icon | Description                                            |
|------|--------------------------------------------------------|
|      | <b>Error</b> – Server was unable to complete the task. |

| Icon                                                                              | Description                                 |
|-----------------------------------------------------------------------------------|---------------------------------------------|
|  | <b>Success</b> – Server completed the task. |

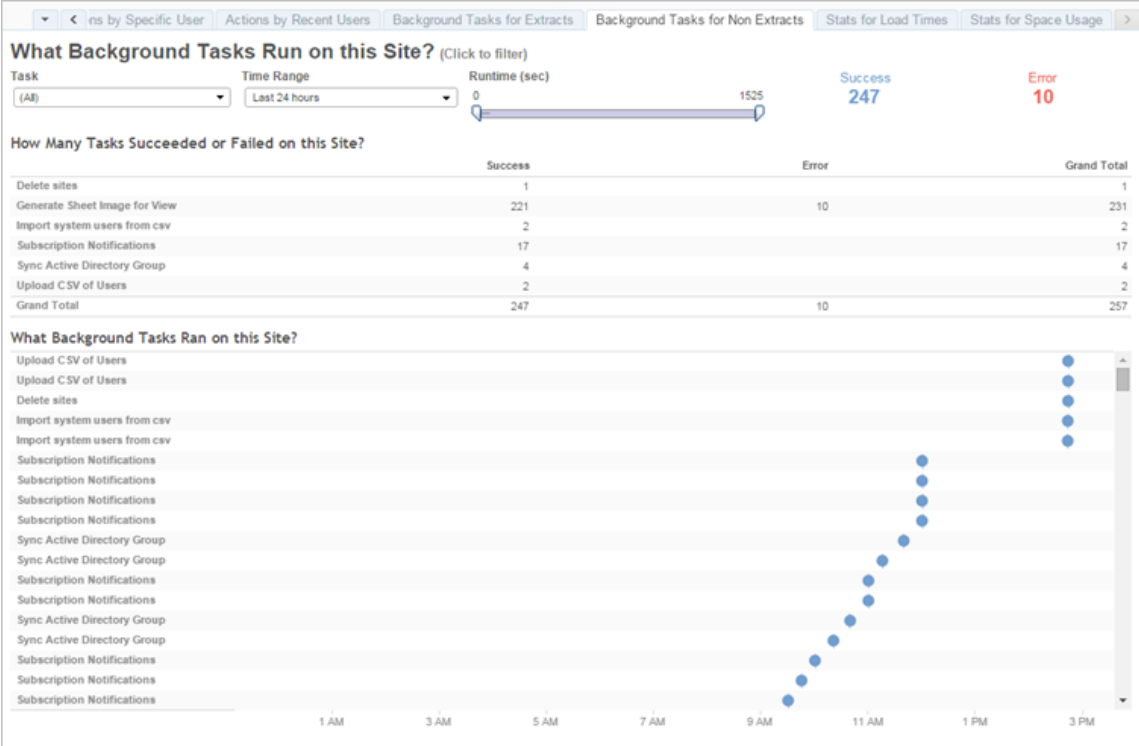
See details about a task

For details on about the task, use your mouse to hover over the success or error icon.





## Background Tasks for Non Extracts

The Background Tasks for Non Extracts view displays tasks that the server runs that are not related to extract refreshes. For example, edited OAuth connections, subscription notifications, and so on.



A table lists the tasks that ran in the time range specified. Click **Success** or **Error** to filter the table based on status. Select a specific task in the **How Many Tasks Succeeded or Failed on this Site** table to update the **What Background Tasks Ran on this Site** graph for the selected task.

Tasks can have a status of success or error. For details about the task, use your mouse to hover over the success or error icon.

| Icon                                                                                | Description                                            |
|-------------------------------------------------------------------------------------|--------------------------------------------------------|
|  | <b>Error</b> – Server was unable to complete the task. |
|  | <b>Success</b> – Server completed the task.            |

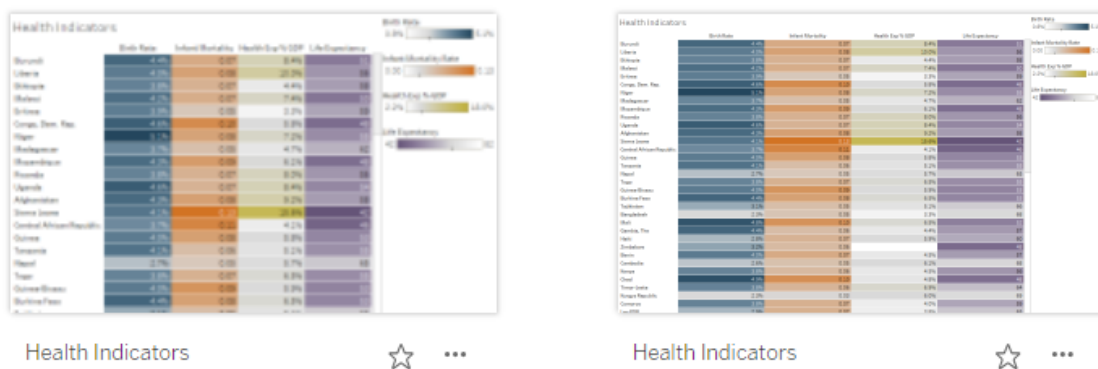
Details that you can see about the task are its ID, status and priority and when it was created, started and completed. You can also see its runtime: the total runtime of the background job, which includes the runtime of the job plus background job overhead such as initialisation and cleanup. You can also see which background runner the job is running on.



## Upgrade Thumbnails Job

In Tableau Server version 2019.1 and later, workbooks and views use higher resolution thumbnails. When you upgrade to Tableau Server version 2019.1 or later, the Backgrounder runs the Enqueue Thumbnails Upgrade job and the Upgrade Thumbnails job, which refreshes thumbnails for any views that have not been edited or published since Tableau version 2018.2 and converts them from low resolution thumbnail images (192 x 192 pixels) to high resolution thumbnail images (300 x 300 pixels), as shown in the figure below.

**Note:** Starting in Tableau Server version 2020.2 and later, the Upgrade Thumbnails job is turned off by default. Server Administrators can use `tabcmd` to run the Upgrade Thumbnails job. For more information, see [upgradethumbnails](#).



When the Upgrade Thumbnails job refreshes the thumbnail images, the modified date of the view is changed to match the thumbnail update date. The Upgrade Thumbnails job does not change the modified date of workbooks when it updates the contained view's thumbnails.

Depending on the number of workbooks you have, the Upgrade Thumbnails job can run for a few minutes to a few hours. You may notice that CPU usage on Backgrounder nodes is higher than normal during the time that the Upgrade Thumbnails job is running. You may also notice that thumbnail images may appear in low resolution for up to a week after upgrading to Tableau Server 2019.1 or later, while the Upgrade Thumbnails job processes all of the thumb-

nail images used in your workbooks. We recommend that you wait for the Upgrade Thumbnails job to complete before you back up Tableau Server.

After the first run of the Upgrade Thumbnails job, it runs on a predefined weekly schedule. The Upgrade Thumbnails job runs at lowest priority and creates one task per workbook in the `background_jobs` table to upgrade any low resolution thumbnails. Low resolution thumbnails published to Tableau Server by Tableau Desktop version 2018.3 and earlier are automatically cleaned up each week when the Upgrade Thumbnails job runs.

### Troubleshooting

You can check the status of the Upgrade Thumbnails job using the [Background Tasks for Non Extracts administrative view](#). The Upgrade Thumbnails job can display either the success or error status.

### Upgrade Thumbnails job failed, or it completed but some thumbnails are still low-resolution.

The Upgrade Thumbnails job might show error status if your credentials are wrong. In that case, the workbook thumbnails will still appear in fuzzy, low-resolution (192 x192 pixels). Update your credentials, and the Upgrade Thumbnails job will update the workbook thumbnails the next time it runs.

## Background Task Delay

**Note:** This view is only available to server administrators. To access server views on multi-site deployments, click the site menu and select **Manage All Sites**. For information about how to navigate to administrative views, see [Administrative Views](#) .

The Background Task Delay view displays the delay for flow tasks, extract refresh tasks and for subscription tasks – that is, the amount of time between when they are scheduled to run and when they actually run. You can use the view to help you identify places you can improve server performance by distributing your task schedules and by optimising tasks.



Here are possible reasons for the delays, and ways that you might reduce the delays:

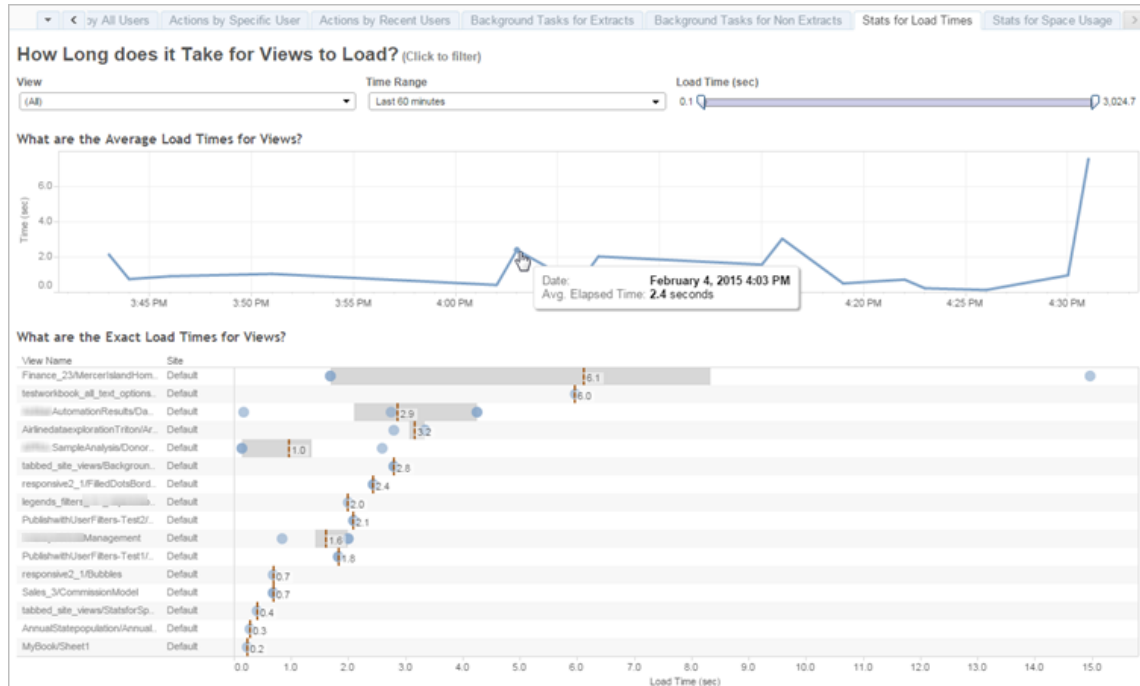
- Many tasks are scheduled for the same time. In the example view, tasks that show long delays are clustered at the same time every day, which creates spikes in the wait time. Note that you can set the **Timeline** filter to a single day to view task delays by hour and identify the hours of the day which have many tasks scheduled at the same time. A solution to this issue can be to distribute the tasks to off-peak hours to reduce load on the server.
- Specific tasks take a long time to run and are preventing other tasks from running. For example, there might be an extract refresh job that is connecting to a slow data source or that is processing a large amount of data. Use the **Background Tasks for Extracts** administrative view to identify which extract refresh tasks are running slowly. You can then optimise the extract refresh task by filtering the data, aggregating the data, or creating multiple data sources for individual tables in a data source.

- Other server processes are running at the same time and are consuming server resources and slowing down performance. Monitor the CPU and memory usage of server processes to see which processes are consuming the most resources and then adjust the configuration of processes on your server. For more information on monitoring processes, see [Collect Data with Windows Performance Monitor](#). For more information on tuning the performance of server processes, see [Performance Tuning](#).

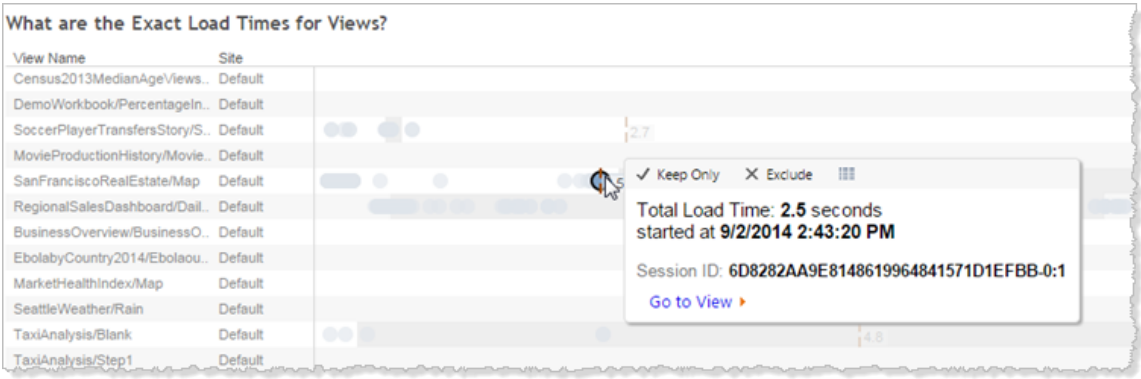
## Stats for Load Times

The Stats for Load Times view shows you which views are the most expensive in terms of server performance. You can filter by view and time range. Server administrators can filter by site. You can also limit the view based on load time in seconds, using the sliding Load Time filter. Load times are for the server. Depending on your client browser and networking, actual load time may vary slightly.

The **Average Load Times** graph shows average load times for views based on the filters you set. Hover over a point to see details. Select a point on the line to update the rest of the view for the selection:



The **Exact Load Times** view shows exact time to load the listed views. A vertical line shows the average load time for each view. Select a mark to see details of a specific instance of the view loading:

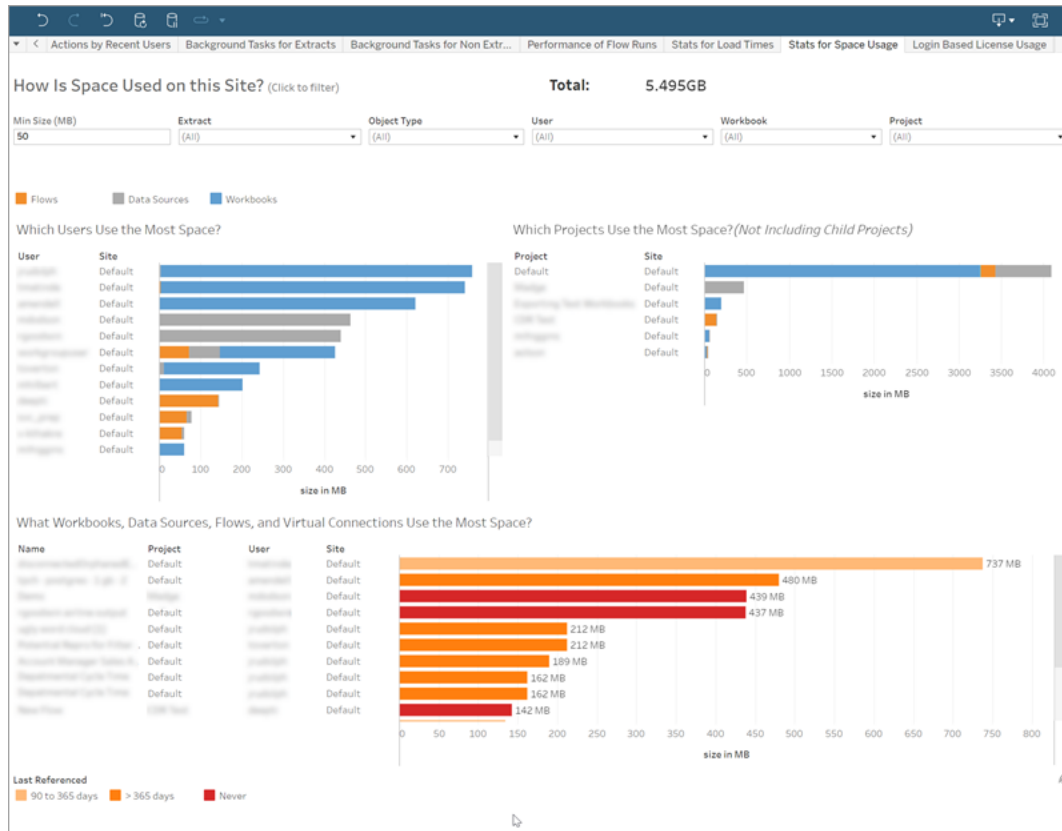


## Stats for Space Usage

The Stats for Space Usage view can help you identify which Tableau content uses the most disk space on the server. Disk space usage displays by user, by project and by the size of the Tableau content (workbook, data source, flow output or virtual connection) and is rounded down to the nearest number.

Note that virtual connections require Data Management. See About Data Management for details.

To open this view, click **Site Status** on the left nav, then under Dashboard, click **Stats for Space Usage**.



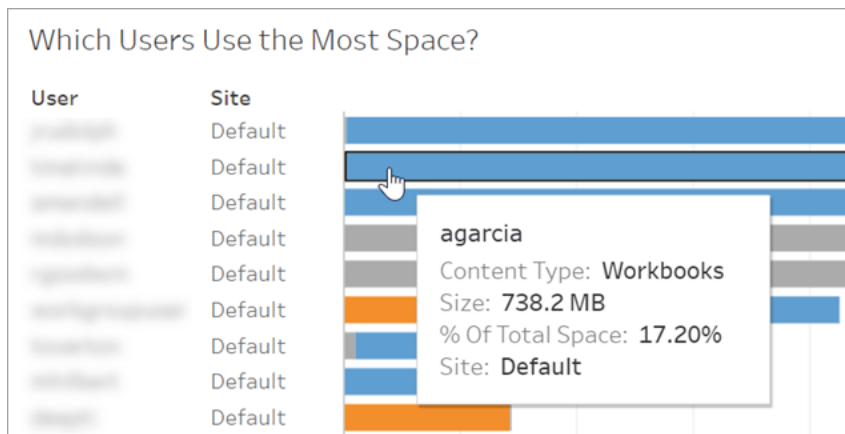
Use the **Min Size** filter to control which Tableau content displays, based on the amount of space they use.

Three bar graphs give you information about space usage on your Tableau Server:

- **Which Users Use the Most Space** – This shows the users who own data sources and workbooks that use the most space. Click a username to filter the next two graphs for that user. Click the data source bar or the workbook bar for a user to filter the next two graphs for that type of object for that user. Click the selected user or bar to clear the selection.
- **Which Projects Use the Most Space** – This shows the projects with the data sources and workbooks that use the most space. If a user or object type is selected in the Which Users Use the Most Space graph, this displays information specific to the selection.

- **Which Workbooks, Data Sources, Flows and Virtual Connections Use the Most Space** – This shows which Tableau content uses the most space. The bars are colour-coded based on the length of time since the last refresh.

Move your cursor over any bar to display usage details:



Click on a bar to select it and update the other areas of the view based on that selection.

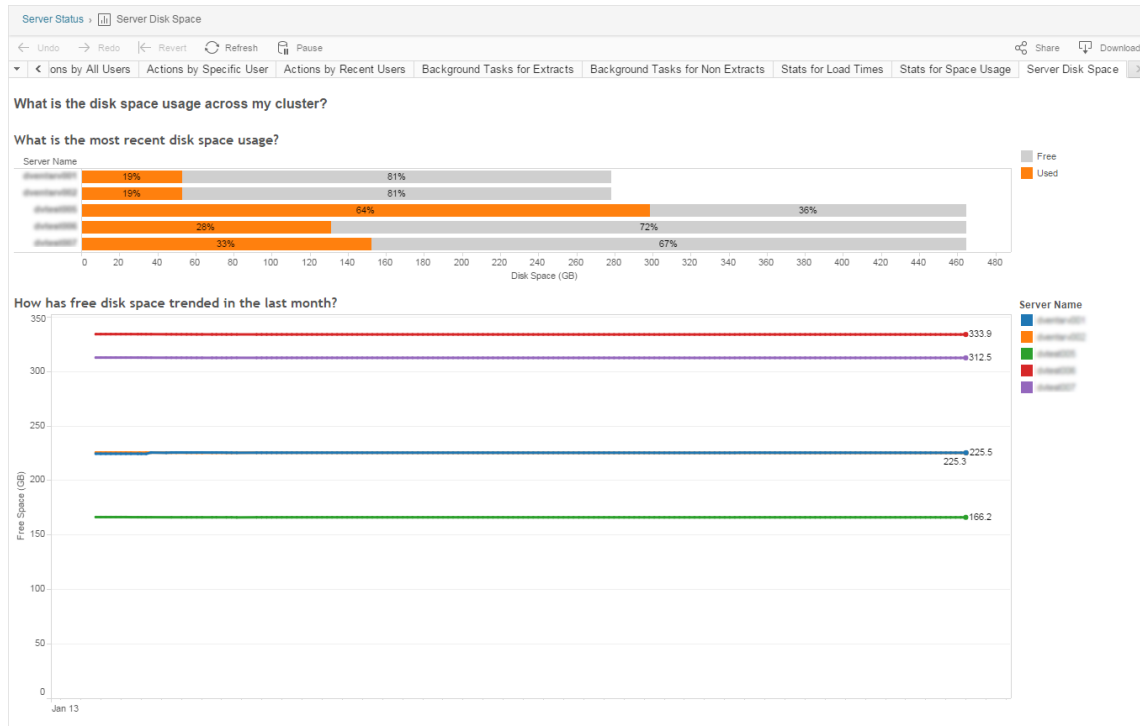
## Server Disk Space

**Note:** This view is only available to server administrators. To access server views on multi-site deployments, click the site menu and select **Manage All Sites**. For information about how to navigate to administrative views, see [Administrative Views](#).

Use the Server Disk Space view to see how much disk space is in use on the computer or computers that run Tableau Server, where disk space refers only to the partition where Tableau Server is installed. You can also use this view to identify sudden changes in disk space usage.

This view reports disk space usage as a decimal GB value. If the operating system of your Tableau Server computers report the value using binary GB, the amounts can differ.

For a distributed installation, the view displays information about each computer in the cluster.



The Server Disk Space view includes two graphs:

- **What is the most recent disk space usage?** – This graph shows disk space usage for the last 30 days both in gigabytes and as a percentage. Disk space refers only to the partition where Tableau Server is installed.
- **How has free disk space trended in the last month?** – This graph shows changes to disk space usage over the last month. Rest your pointer on a line to view the exact amount of free disk space for a point in time.

When Tableau Server is low on disk space, you can remove files to free space.

For more information, see [Troubleshoot Disk Space Usage on Tableau Server Nodes](#)

**Tip:** You can have Tableau Server notification you when free disk space falls below a threshold that you specify. For more information, see [Configure Server Event Notification](#).

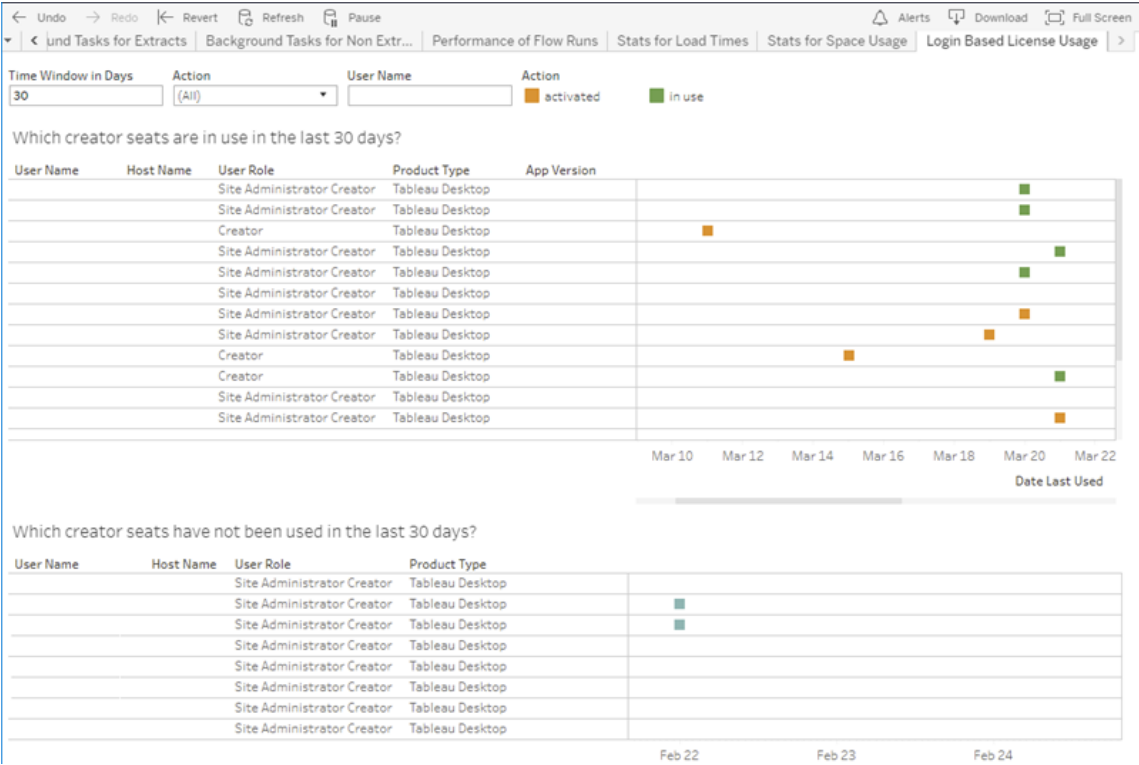


## Login-based Licence Usage

**Note:** This view is only available to site administrators and server administrators when login-based licence management is enabled on Tableau Server. For information about how to navigate to administrative views, see [Administrative Views](#) .

The Login-based Licence Usage view lets server administrators view login-based licence activation usage for Tableau Cloud or Tableau Server. The Login-based Licence Usage view can help you manage licences efficiently and determine if you need more or fewer licences. This view can help you answer the following questions:

- Who is using a Tableau Desktop or Tableau Prep Builder licence in my enterprise?
- Has a Creator role been shared or transferred?
- Has any activation activity occurred on a computer where it should not be?
- On which host is the activation being used?
- Which role is assigned to the user?
- On which Tableau product is the licence in use?
- On which Tableau version is the licence in use?
- Did the Creator role activate through Tableau Desktop or Tableau Prep Builder?
- Has the Creator seat been activated?
- How many Creator seats are in use?
- How many Creator seats are not in use?
- When was a Creator seat was last used?



In addition to using the login-based licence usage administrative view, you can also access login-based licence usage data (`identity_based_activation_reporting`, `identity_based_activation_user_role_change`, and `identity_based_activation_admin_view`) in the "workgroup" PostgreSQL database of the Tableau Server repository. Before you can access this data, you must [enable access to the Tableau Server repository](#).

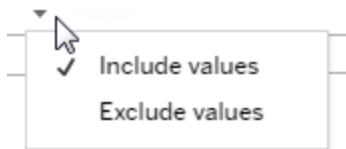
Filters

On the report screen, you can change the time window to show when seats were last used, filter on actions, filter on user name and sort by columns.

- **Time Window in Days.** Enter the number of days for which to view login-based licence management activated client usage data. You can view data for the past 30 days up to a maximum of 183 days.
- **(All).** Apply all filters to the view.

- **Activated.** Show Creator users that have activated using login-based licence management.
- **in use.** Show Creator users who activated using login-based licence management whose seats are in use.
- **last used.** Show when the login-based licence management client was last used.
- **unassigned.** Show which login-based licence management activated Creator seats are currently unassigned.
- **user name.** Show login-based licence management activations in use by the specified user.

When you hover over the filter card, a drop-down icon appears. Click the icon to specify whether the view should include data that matches the filter (the default) or exclude data that matches the filter:



### **Which creator seats are in use in the last <nn> days?**

This area of the dashboard shows a list of three types licences (activated, in use and unassigned). Hovering over an activated, in use or unassigned mark gives you information including the registered user of the copy of Tableau. Click a column head to sort the list.

### **Which creator seats have not been used in the last <nn> days**

This area of the dashboard shows a list of licences that have not been used during the specified time period. A timeline shows the last use date. Hovering over a last use mark gives you information including the registered user of the copy of Tableau.

## Desktop Licence Usage

**Note:** This view is only available to server administrators. To access server views on multi-site deployments, click the site menu and select **Manage All Sites**. For information about how to navigate to administrative views, see [Administrative Views](#).

The Desktop Licence Usage view lets server administrators see usage data for Tableau Desktop licences in your organisation. This can help you manage licences efficiently and determine if you need more or fewer licences. This view can help you answer the following questions:

- Who is using a Tableau Desktop licence in my enterprise?
- Have any licences been shared or transferred?
- Is any licence being used on a computer where it should not be?
- Does a specific user use their licence?
- What types of licences are being used in my enterprise?
- Do I need to convert any trial licences?

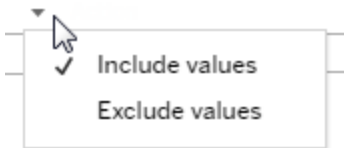
**Note:** To obtain data about licences, each copy of Tableau Desktop version 10.0 or later needs to be configured to send data to Tableau Server. This configuration can be done at installation time, using scripting or third-party software to install and configure Tableau, or after installation, by modifying the registry or property list file. For more information, see [Configure Desktop Licence Reporting](#).

In order to view licence data, Desktop Licence Reporting must be enabled on Tableau Server. See [Enable and configure Desktop licence reporting](#).

## Filters

- **Product Keys.** Type a string to filter the dashboard to only those licences that include the string anywhere in the product key. For example, to see only licences that begin with TDTD, type TDTD and press Return to filter the view. Click the **X** after the string to reset the filter.
- **Action.** Use this filter to control what is displayed on the dashboard, based on the action taken. Actions are **Activate**, **Use** and **Return** (deactivate). If the **Use** action is not selected, nothing will be displayed in the top bar graph.
- **Department.** Use this filter to control which departments the dashboard displays licences for. The filter is populated based on the **Department** values specified when Tableau Desktop is registered.
- **Select time duration in days.** Use this slider to specify the length of time, in days, that the dashboard displays information for. The default value is 183 days.

When you hover over the filter card in the first three filters, a drop-down icon will appear. Click the icon to specify whether the view should include data that matches the filter (the default) or exclude data that matches the filter:



### Who has used Tableau in the last <nn> days?

This area of the dashboard shows a bar graph of three types of Tableau Desktop licences (Perpetual, Trial and Term) and the number of users who have used each licence type during the specified time period. Hover over a licence type segment to see an explanation of the licence type. Click a segment to filter the rest of the dashboard for only that licence type. This action filters both the tables that show licences that have been used and those that have not. For example, to see a list of term licences that have been used during the time period, click the Term bar. The "used" and "not been used" lists are filtered to show only term licences.

A table of detailed information shows under the bar graph. For each row in the table, action icons display on the right, above a timeline that shows you when the action last took place.

To see a list of the underlying data in a format that allows you to select and copy values like email or product key, click a row in the list of licences and click the View Data icon:



The data will display in summary form. Click **Full data** to see all the data. From this view you can select and copy individual values, or download the data as a text file.

### What licences have not been used in the last <nn> days

This area of the dashboard shows a list of licences that have not been used during the specified time period. A timeline shows the last use date. Hovering over a last use mark gives you information including the registered user of the copy of Tableau.

## Desktop Licence Expiration

**Note:** This view is only available to server administrators. To access server views on multi-site deployments, click the site menu and select **Manage All Sites**. For information about how to navigate to administrative views, see [Administrative Views](#) .

The Desktop Licence Expiration view gives server administrators information about which Tableau Desktop licences in your organisation have expired or need maintenance renewal. This can help you manage licences efficiently. This view can help you answer the following questions:

- What trial or term licences have expired?
- What perpetual licences have expired maintenance?
- What perpetual licences have maintenance renewals coming up?

To renew a licence or get additional renewal information, see [How to renew your Tableau licences](#).

**Note:** In order to get data about licences, each copy of Tableau Desktop version 10.0 or later needs to be configured to send data to Tableau Server. This configuration can be done at installation time, using scripting or third-party software to install and configure Tableau. For more information, see [Configure Desktop Licence Reporting](#).

In order to view licence data, Desktop Licence Reporting must be enabled on Tableau Server. See [Enable and configure Desktop licence reporting](#).

## Filters:

- **Product Keys** – Type a string to filter the dashboard to only those licences that include the string. For example, to only see licences that begin with TDTD, type TDTD and press return to filter the view. Click the "x" after the string to reset the filter.
- **Department** – Use this filter to control what department(s) the dashboard displays licences for. The filter is populated based on the Department values used when registering copies of Tableau Desktop.
- **Time Duration** – Use this filter to control the length of time for which the dashboard displays information.

The view includes the following tables, which are affected by the filters you set at the top of the view:

- **What keys have expired maintenance** – This table shows the product keys for which maintenance has expired, with a vertical line indicating the point at which the six month window for renewing maintenance closes. If maintenance for a key is expired for more than six months you need to purchase a new key in order to qualify for support or

upgrades.

- **What trial and term licences have expired** – This shows the trial or term product keys that have expired.
- **What is the maintenance schedule for my keys** – This shows the keys and their maintenance status.

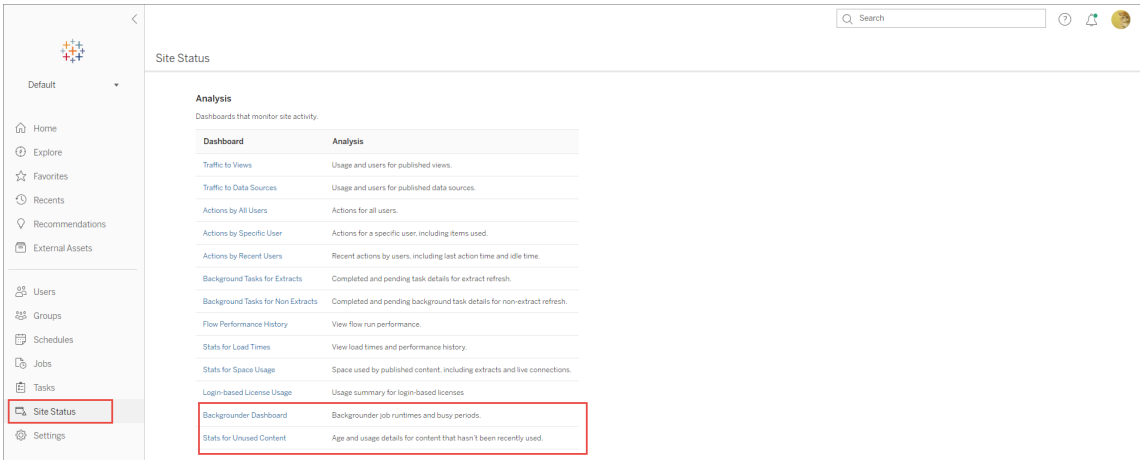
## Backgrounder Dashboard

The **Backgrounder Dashboard** view is an overview of the background jobs. Using this view, you can find more information about:

- The time it takes for jobs to run.
- When backgrounder is busy or overloaded.
- Jobs that completed successfully, failed or cancelled.

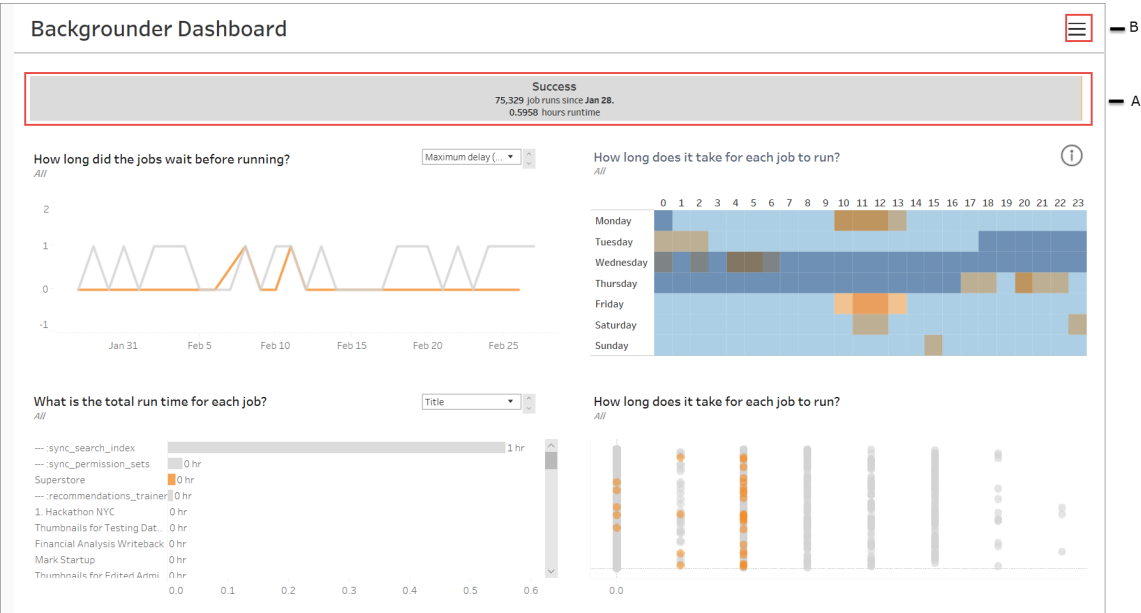
Note: This view does not include flow run jobs.

In previous versions of Tableau Server, admin views were all displayed in the same workbook, in separate tabs. However, the two new admin views are displayed as separate workbooks and not part of the existing admin view workbook. You can navigate to the new admin views from the Server or Site Status page:





Summary and Filters



**A** - At the top, is a summary chart that tells you the number of jobs that have succeeded, failed or cancelled. You can click on the sections of the bar chart to filter the information by job status. This filter is applied to the entire view and the information displayed includes only jobs with the job status that you selected.

**B** - You can find additional filter options by clicking on the filter icon. A Filter pane is displayed that allows you to filter by **Task type**, **Job executed at**, **Site**, **Project**, **Content owner**, **Schedule** and **Backgrounder ID** . The Backgrounder ID is unique to a Backgrounder process. You can use this to see the information about the work done by each Backgrounder process. When you select one or more of these filters, they are applied to the entire view.

×

FILTERS

Task type

(All)

Job executed at

Last 6 weeks

Site

18 19 20 21 22 23

(All)

Project

(All)

Owner

(All)

Schedule name

(All)

Backgrounder

(All)

Job Status

(All)

Priority

0100

Job Status

Failed

Success

## Details

The Backgrounder Dashboard has four sections each showing different information about jobs. Each of these sections have more filters in the drop down menu that you can apply to that specific section.

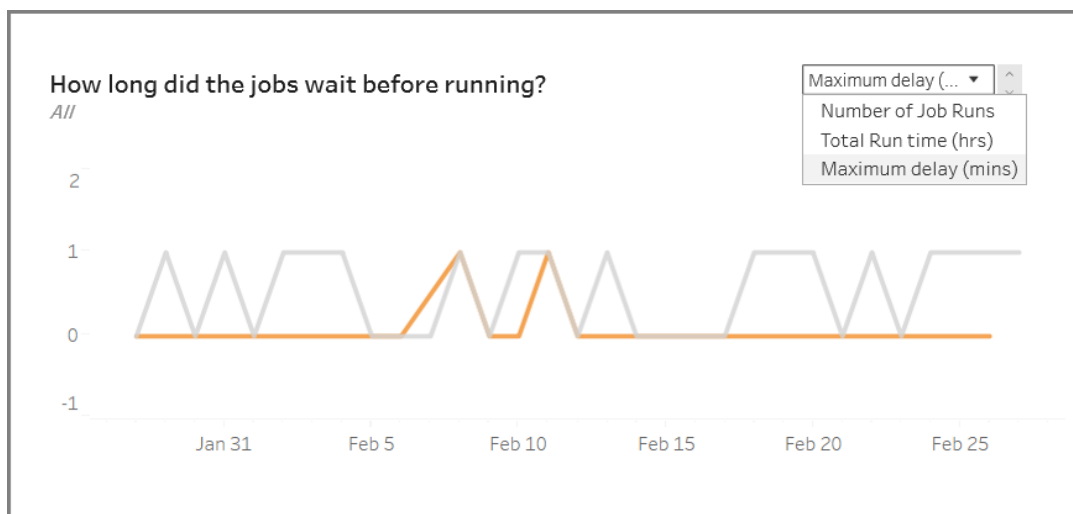
1. **The section at the top left** gives you information about the jobs with the selected job status or any filters you selected using the Filter pane. If no selection is made, all jobs are included.

The information displayed also varies based on the selection you make using the drop down:

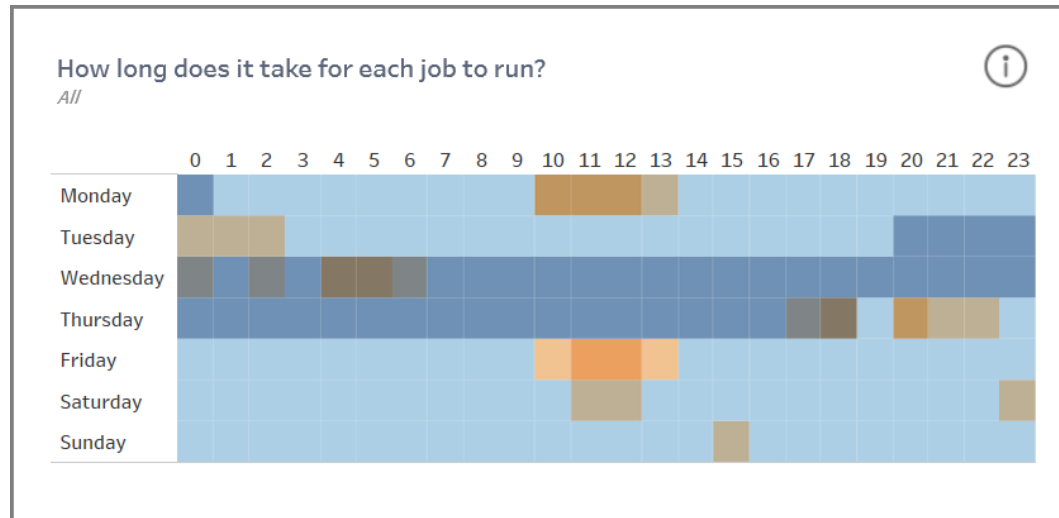
1. **Total run time:** This shows you the total run time for all jobs with the selected job status, and any other filters you selected.

For example, if you selected, Job Status: Failed, and Task type: Subscriptions, the graph shows all subscription jobs that failed.

2. **Number of Jobs:** This shows you the number of jobs that ran for the selected job status and any other selected filters.
3. **Maximum delay:** This shows you the how long the jobs were queued before running.

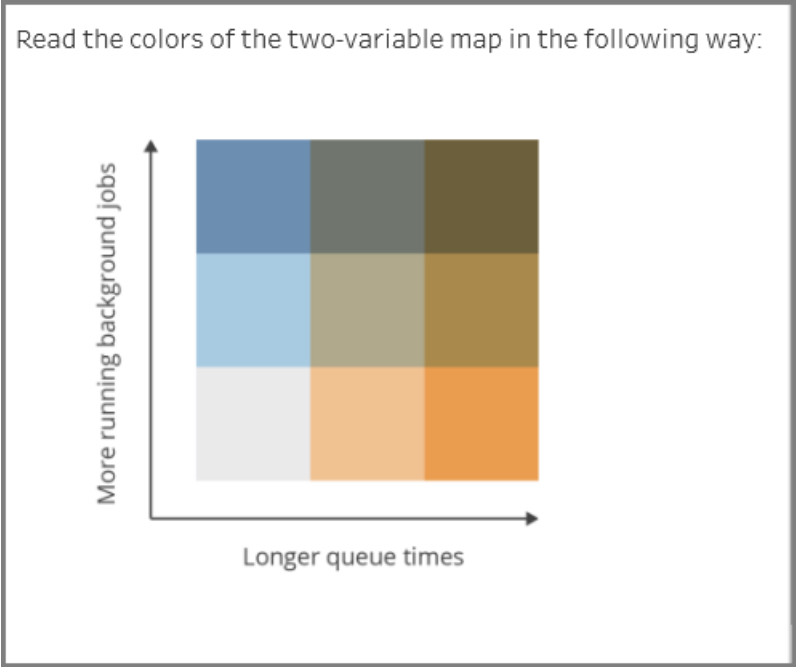


2. **The section at the top right** gives you information on how busy or overloaded the Backgrounder is on a given day and time. The information displayed however depends on the filter selections you made for the job status and other options in the Filter pane.

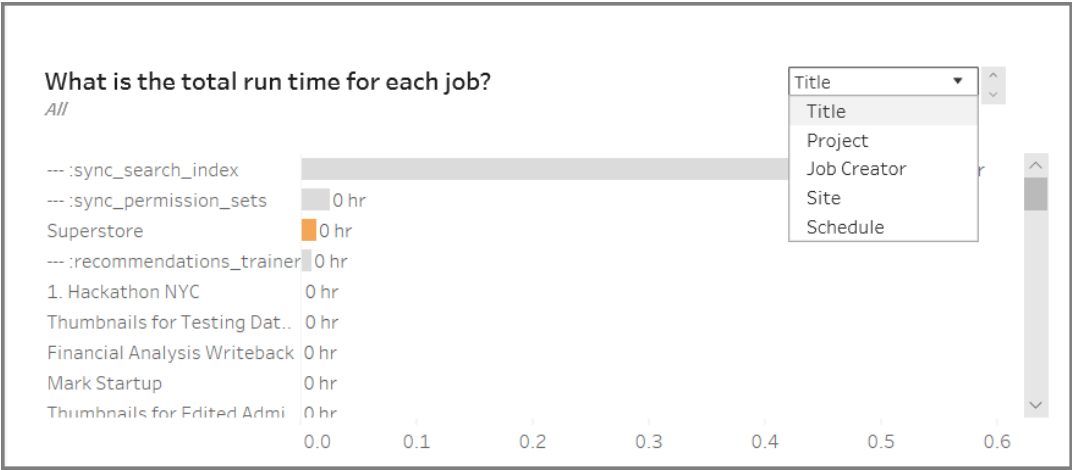


If you click on the information icon at the top right part of this section it, a colour legend is displayed.

- The variations in the blue colour correlates to the number of jobs running in that time period. The darker the blue, the more jobs that are running.
- The variations in the orange colour correlates to the queue times. The darker the orange, the longer the queue time.
- Using both of these metrics, you can identify when the backgrounder is busy (dark blue) or is overloaded (dark orange).



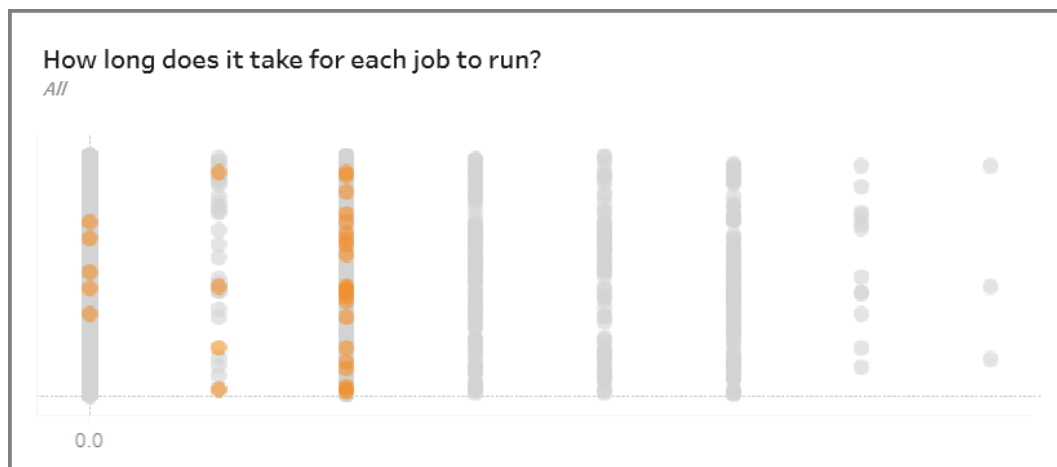
3. **The section at the bottom left** gives you run time information about the jobs with the selected status or any other filters you selected using the Filter pane. If no selection is made, all jobs are included. Select marks in the top sections to populate this section with details for the selected content.



The drop down selections gives you more options and the information displayed changes accordingly:

- When **Title** is selected, the run time information for each individual job is displayed.
- When **Project** is selected, the total run time for each project is displayed.
- When **Job Creator** is selected, the total run time for jobs created by a specific user is displayed.
- When **Site** is selected, the total run time for jobs on that specific site is displayed.
- When **Schedule** is selected, the total run time for jobs using that specific schedule is displayed.

4. **The section at the bottom right** tells you how long it took for each job to run.



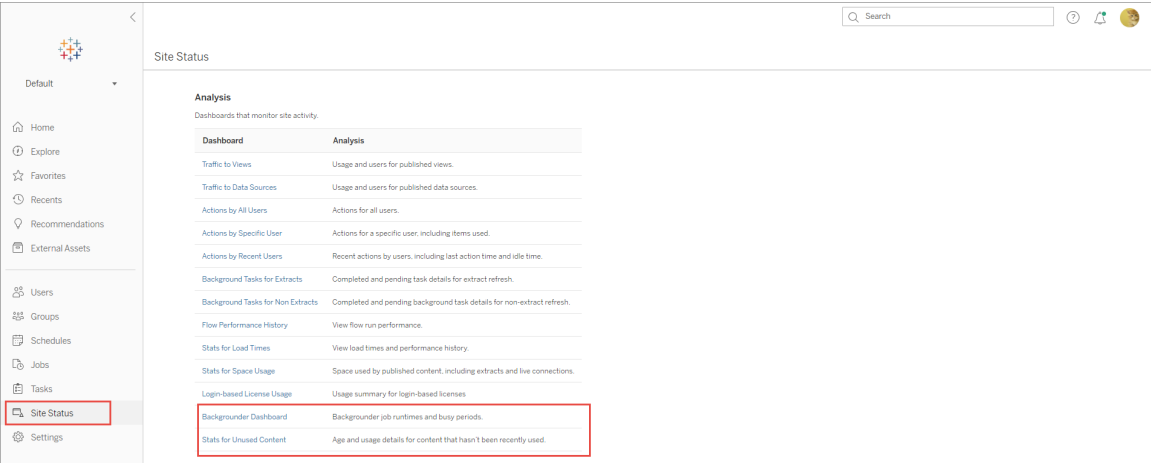
## Stale Content

The Stale Content view can be used to identify content that hasn't been used or accessed in the specified time period (displayed as Stale Access Threshold). You can set that time period in days. The minimum value for the time period is 1 day and the maximum is 120 days.

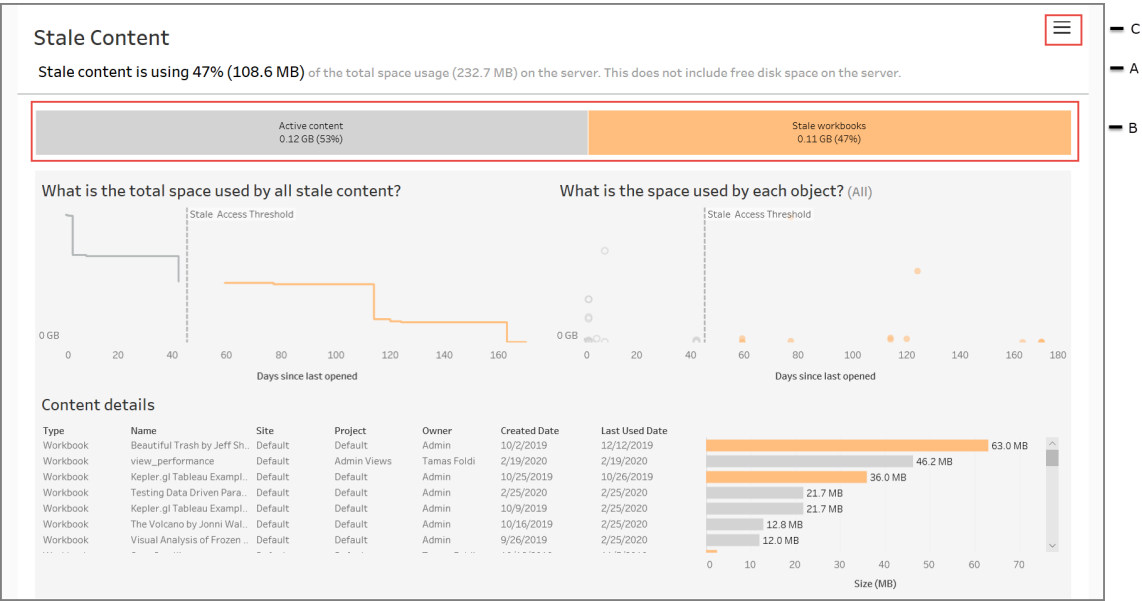
This view also provides the information about the disk space used by stale and active content.

In previous versions of Tableau Server, admin views were all displayed in the same workbook, in separate tabs. However, the two new admin views are displayed as separate workbooks and not part of the existing admin view workbook. You can navigate to the new admin

views from the Server or Site Status page:



## Summary and Filters



**A** - At the top of the view, you will see a statement that summarises the amount of space that is used by stale content compared to the total space used. The total space used is defined as the sum total of disk space used by active and stale content.

**B** - This summary is followed by a chart that gives you a further breakdown of the types of stale content and content that is considered active – meaning content that has been accessed in the

time period below the stale threshold. You can click on the bar chart and apply it to filter the data displayed in the view.

**C** - You can see and apply additional filter options by clicking the filter icon. This filter pane includes:

- Stale Threshold
- Site
- Project
- Content Owner
- Size
- Content type



**FILTERS**

**Stale Threshold**  
45 days

**Site**  
(All)

**Project (top level)**  
(All)

**Content Owner**  
(All)

**Size**  
0 GB 14 GB  
140 160 180

**Content type**  
☒ (All)  
☒ Published Datasource  
☒ Workbook

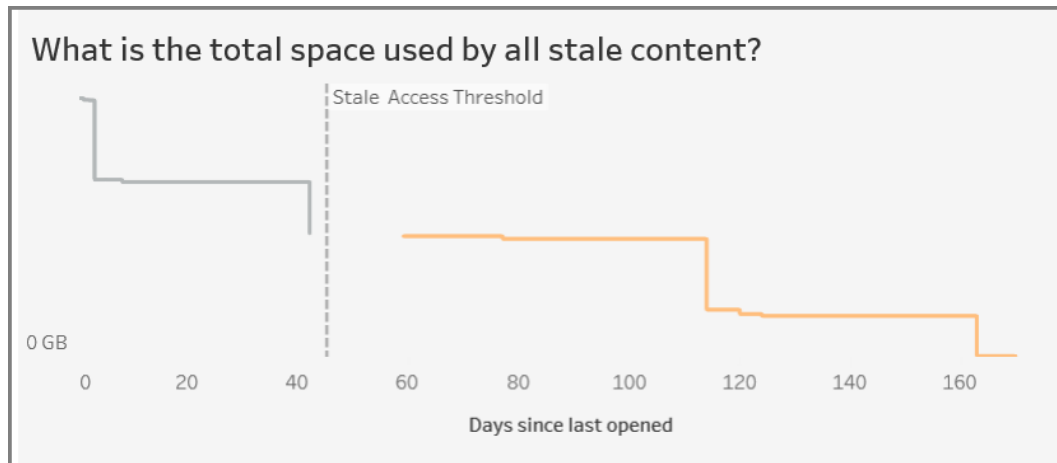
These filters are applied to the entire view.

## Details

The Stale Content view has three sections as described below that provides details:

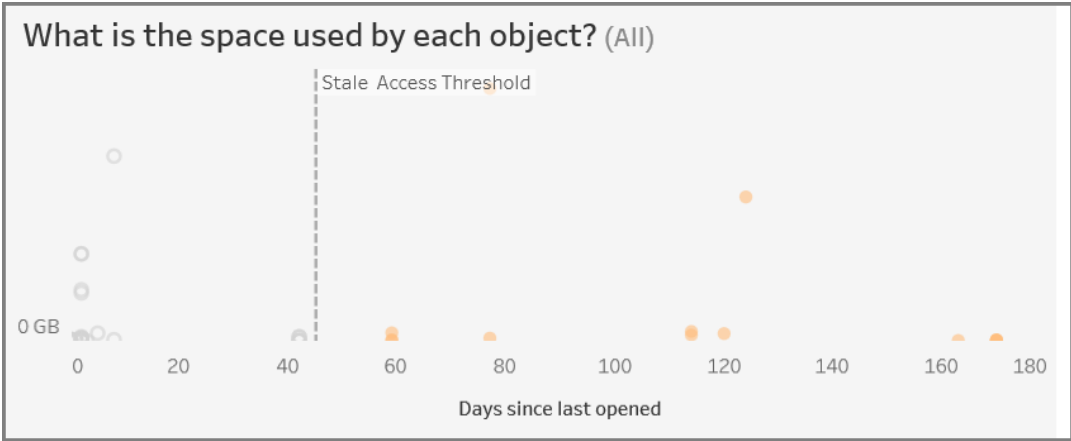
1. **The top left section** shows you the total space used for the selected content. The x-axis shows the number of days that have passed since the content was last opened, and the y-axis shows you the size. The graph also shows the stale threshold.

Set your desired staleness threshold, then use this view to identify content that is the most stale. Click the **Stale Workbooks** or **Stale Datasources** in the bar at the top to filter to the content of interest. Select the marks to the right of the **Stale Access Threshold** to see more details about content. The details are displayed in the bottom left section.



2. **The top right section** shows you the amount of space that is used by each selected content. For example, if you select Stale workbooks, the space used by each stale workbook is displayed. You can use this section to find out which content is the most stale, or is taking the most space.

This section helps you identify content that hasn't been used in a long time. Click the **Stale Workbooks** or **Stale Data Sources** on the bar at the top. Select the oldest set of unused content (marks further to the right) to see more details. The details are displayed in the bottom left section. This can be your next set of content to consider for archiving or deleting as these are contents that nobody has been using, regardless of size.



3. The section at the bottom shows detailed information about the selected content as shown below:

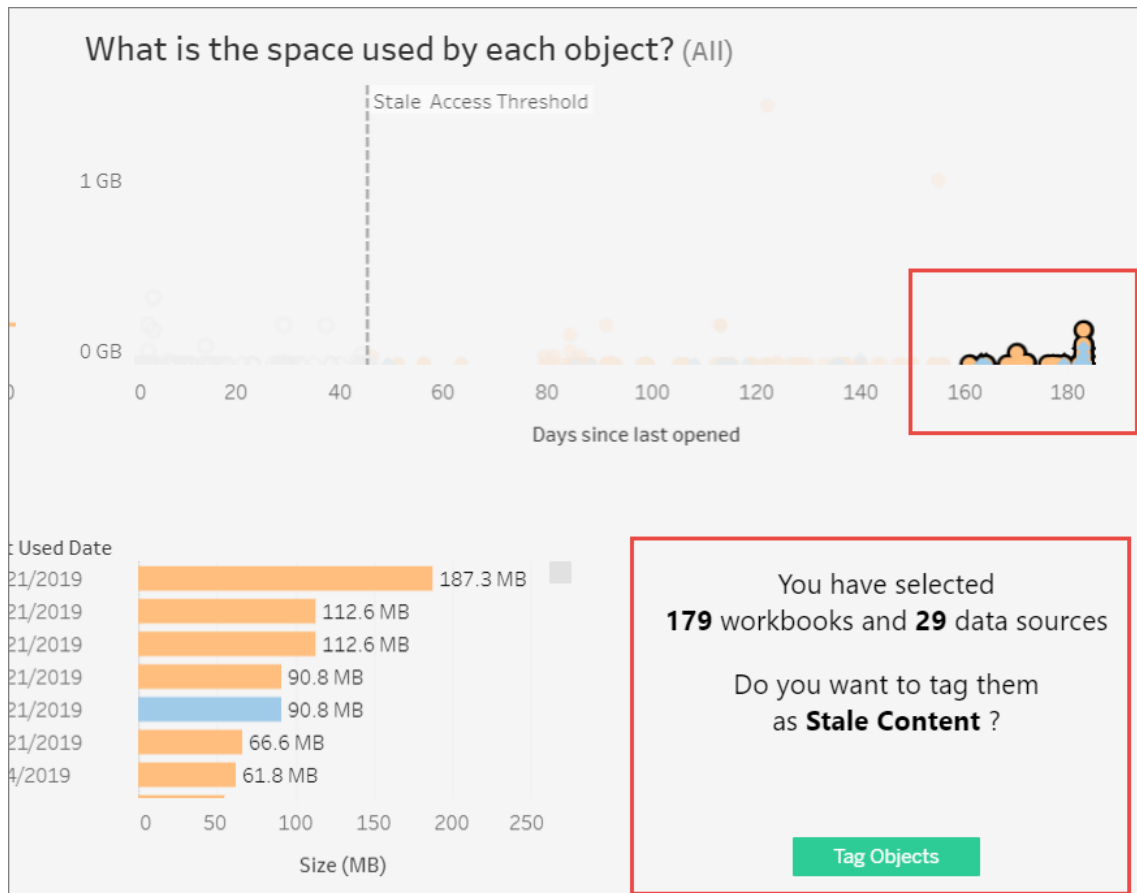
Content details

| Type     | Name                          | Site    | Project     | Owner       | Created Date | Last Used Date | Size    |
|----------|-------------------------------|---------|-------------|-------------|--------------|----------------|---------|
| Workbook | Beautiful Trash by Jeff Sh... | Default | Default     | Admin       | 10/2/2019    | 12/12/2019     | 63.0 MB |
| Workbook | view_performance              | Default | Admin Views | Tamas Foldi | 2/19/2020    | 2/19/2020      | 46.2 MB |
| Workbook | Kepler.gl Tableau Examl...    | Default | Default     | Admin       | 10/25/2019   | 10/26/2019     | 36.0 MB |
| Workbook | Testing Data Driven Para...   | Default | Default     | Admin       | 2/25/2020    | 2/25/2020      | 21.7 MB |
| Workbook | Kepler.gl Tableau Examl...    | Default | Default     | Admin       | 10/9/2019    | 2/25/2020      | 21.7 MB |
| Workbook | The Volcano by Jonni Wal...   | Default | Default     | Admin       | 10/16/2019   | 2/25/2020      | 12.8 MB |
| Workbook | Visual Analysis of Frozen ... | Default | Default     | Admin       | 9/26/2019    | 2/25/2020      | 12.0 MB |

### Archive or Delete Stale Content

Starting in 2020.3, the Stale Content admin view includes a feature that allows you to select and tag content as stale. You can select content from either the section at the bottom or the top right section. When you make a selection, you will see the number of objects and the type of content that are selected, as seen in the screen shot below. Click the **Tag Objects** button to tag the selected content.

In the screen shot shown below, content that has not been opened in the last 160 days or more are selected to be tagged as stale content.



To find all the tagged content, on Tableau Server web interface, navigate to **Explore**. Select the **Stale Content** filter to see all the content that have the stale content tag. You can now select the content and either move it to a project that you use for archiving or delete the content.

The screenshot shows the Tableau Server 'Explore' interface. On the left is a navigation sidebar with options like Home, Explore, Favorites, Recents, Shared with Me, Recommendations, External Assets, Users, Groups, Schedules, Jobs, and Tasks. The main area displays a table of workbooks. On the right, there's a filter pane with dropdowns for Project, Owner, and Tag. The 'Tag' dropdown is open, showing a search bar and a list of tags: chicken (2), HST (4), noodle (2), Stale Content (229), and test (1). The 'Stale Content' tag is highlighted with a red box.

| Type                     | Name                                               | Actions | Views (all-time) | Sheets | Size     | Project | Owner           | Modified               |
|--------------------------|----------------------------------------------------|---------|------------------|--------|----------|---------|-----------------|------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> 08222019Test              | ...     | 8                | 3      | 2.5 MB   | Default | Amanda Luthy    | Oct 10, 2019, 3:27 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 10.5_Sets - Availability  | ...     | 9                | 5      | 1.3 MB   | Default | Lisa Bailey     | Feb 13, 2020, 2:24 PM  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> 1014 state     | ...     | 2                | 1      | 698.1 KB | Default | workgroupuser   | Oct 14, 2019, 2:06 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 1063370_rebuilt_centos    | ...     | 19               | 1      | 212.2 MB | Default | Vanya Tucherov  | Jan 30, 2020, 1:33 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 1063370_repro_linux       | ...     | 10               | 1      | 212.2 MB | Default | Vanya Tucherov  | Jan 30, 2020, 11:57 AM |
| <input type="checkbox"/> | <input type="checkbox"/> 1063370_repro_stripped... | ...     | 7                | 1      | 212.2 MB | Default | Vanya Tucherov  | Feb 22, 2020, 5:05 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 1067308                   | ...     | 1                | 1      | 70.4 KB  | Default | Bryan Caldwell  | Mar 4, 2020, 1:30 PM   |
| <input type="checkbox"/> | <input type="checkbox"/> 11 features               | ...     | 1                | 4      | 1.0 MB   | Default | Rupal Rashmi    | Jan 28, 2020, 2:52 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 1101939                   | ...     | 7                | 2      | 4.7 MB   | Default | Matt Morgenroth | Apr 21, 2020, 3:49 AM  |
| <input type="checkbox"/> | <input type="checkbox"/> 123 345 lala lalla        | ...     | 1                | 2      | 15.7 KB  | Default | Rupal Rashmi    | Jan 28, 2020, 2:51 PM  |
| <input type="checkbox"/> | <input type="checkbox"/> 123 abc 456 xyz           | ...     | 1                | 2      | 16.9 KB  | Default | Rupal Rashmi    | Jan 28, 2020, 2:54 PM  |

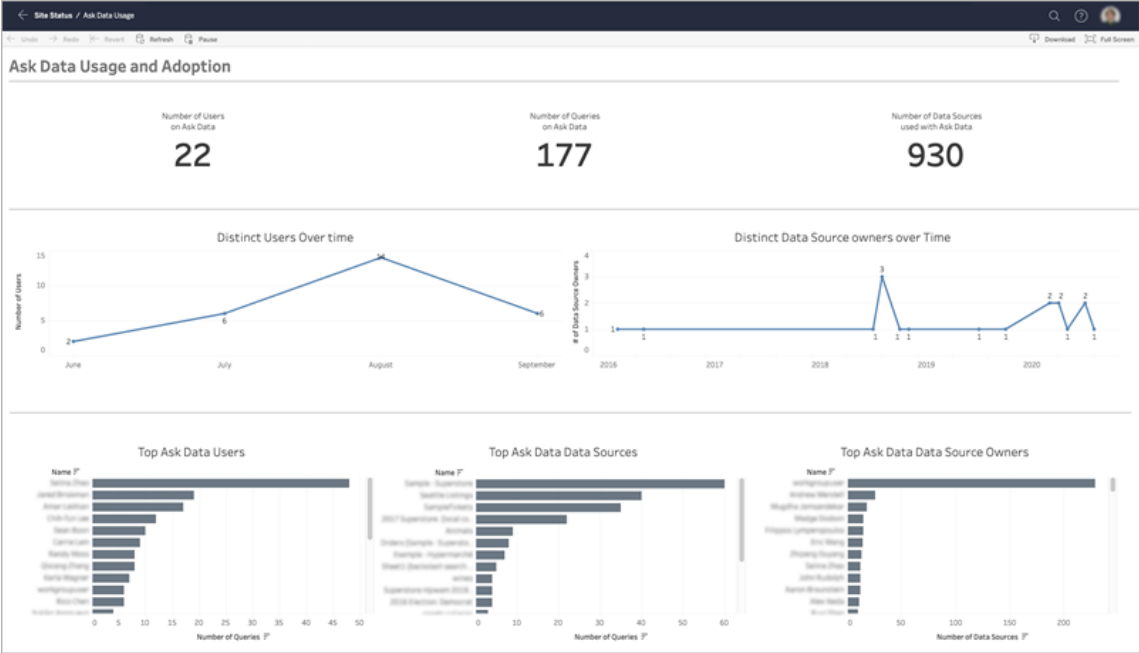
If you have Advanced Management on your Tableau Server, you can use the Tableau Content Migration Tool to manage archiving stale content on a regular schedule. For example, you can build a plan that runs on a regular schedule that can automatically pick up content tagged as Stale Content and move it to an Archive project. After a certain amount of time, the content in this project can be purged from the system. For more information see, [Migration Plans: Workbooks](#).

## Ask Data Usage

### Important changes for Ask Data and Metrics

Tableau's Ask Data and Metrics features were retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. With advances in natural language technologies, we're developing an improved interface that will make it easier to ask questions of your data and stay on top of changes. For more information, see [How Tableau AI and Tableau Pulse are reimagining the data experience](#).

The Ask Data Usage view is a pre-built dashboard that allows site or server admins to see and understand the usage patterns and value of Ask Data for a site. Admins can see the growth of engagement with Ask Data and monitor the results of internal training or roll-outs. The dashboard highlights the top Ask Data users, data sources, and data source owners, along with some headline value metrics.



To enable Ask Data, see [Disable or Enable Ask Data for a Site](#).

Explore the dashboard

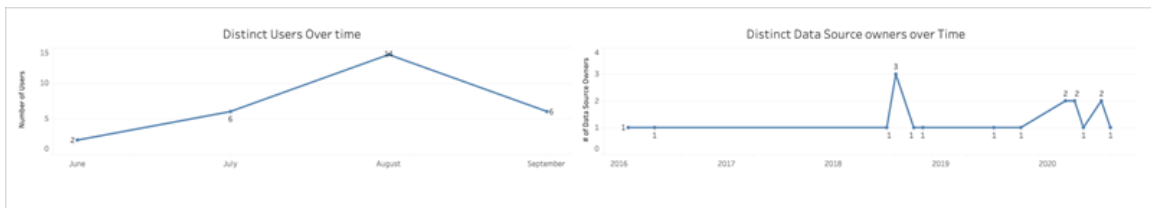
The Ask Data Usage view provides information about Ask Data across the entire site. You can use the following metrics to understand user engagement and help drive self-service analytics adoption in your organisation.



At the top of the dashboard, three headline metrics provide an overview of Ask Data usage on the site.

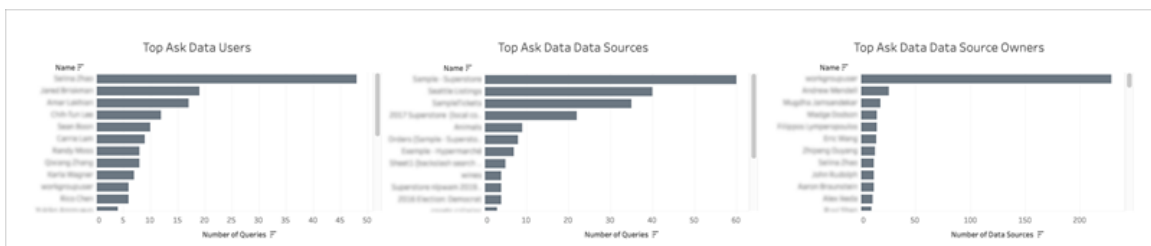
- **Number of Users on Ask Data** - This shows the total number of Ask Data users on the site.
- **Number of Queries on Ask Data** - This shows the total number of Ask Data queries issued on the site.

- **Number of Data Sources Used with Ask Data** - This shows the total number of data sources used with Ask Data.



In the middle of the dashboard, two line charts show you how Ask Data is used over time.

- **Distinct Users Over Time** - This shows the distinct number of Ask Data users over time.
- **Distinct Data Source Owners Over Time** - This shows the distinct number of data source owners over time.



At the bottom of the dashboard, three bar charts list the top Ask Data users, data sources, and data source owners.

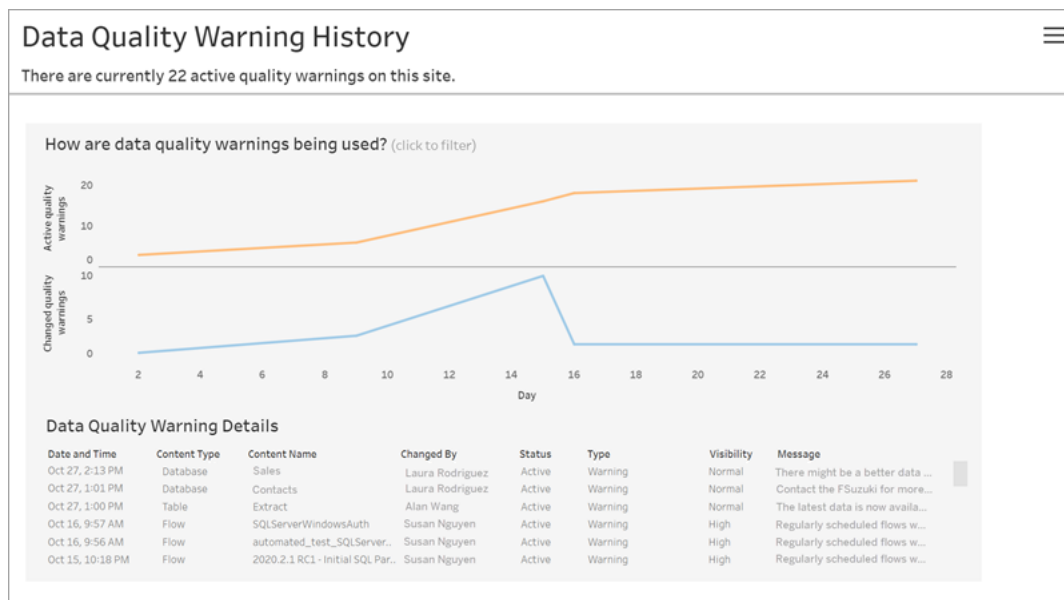
- **Top Ask Data Users** - This lists the top Ask Data users and the total number of queries issued by each user.
- **Top Ask Data Data Sources** - This lists the top Ask Data data sources and the total number of queries issued for each data source.
- **Top Ask Data Data Source Owners** - This lists the top Ask Data data source owners and the total number of data sources owned by each user.

## Data Quality Warning History

When Tableau Catalog is enabled in your environment, site administrators can see how data quality warnings are being used on the site using the pre-built admin view, Data Quality Warning History.

For more information about Tableau Catalog, part of Data Management, see "About Tableau Catalog" in the [Tableau Server](#) or [Tableau Cloud](#) Help.

From the Site Status page, select the Data Quality Warning History dashboard:



The dashboard shows how many data quality warnings are active over a period of time. It also shows how many warnings have been changed (created, updated and deleted) over that same time period.

See warning details

Under the line charts are the details about the data quality warnings, including:

- **Date and Time** - When the warning was created or last changed.
- **Content Type** - The type of asset the warning is set on, such as a database, table or data source.

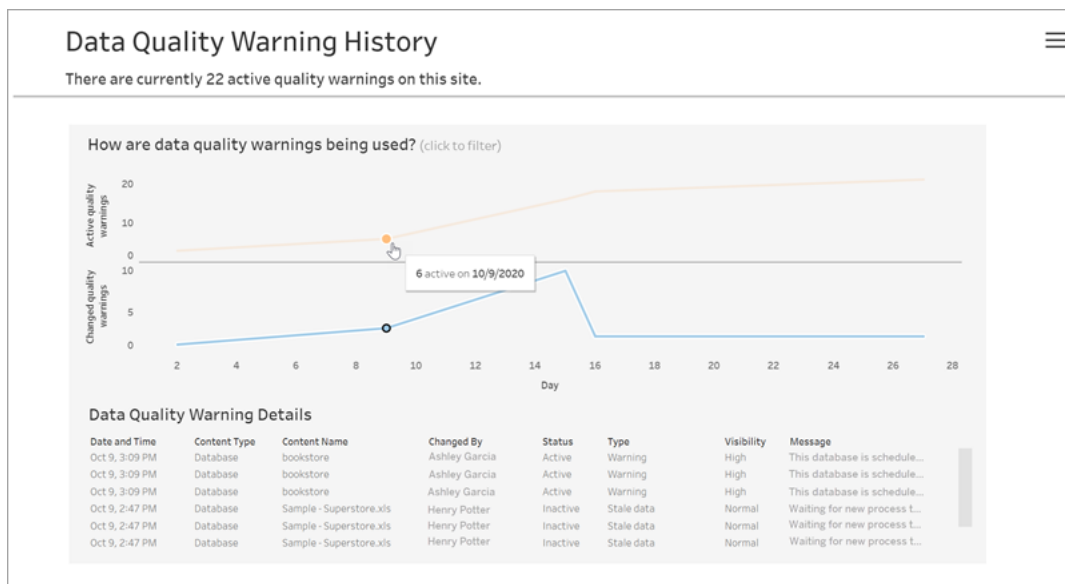


## Tableau Server on Windows Help

- **Content Name** - Name of the asset the warning is set on.
- **Changed By** - Name of the person who created or last changed the warning.
- **Status** - If the warning is active or inactive.
- **Type** - Warning type can be Stale data, Warning, Deprecated, Sensitive data or Under maintenance.
- **Visibility** - The warning can be configured to have normal (the default) or high visibility.
- **Message** - The message the warning creator wrote to display to users when they see the details of the warning.

### Filter warning history

When you review data quality warning history, you can click on a mark on the view to filter the details shown below the view.



The numbers on the Day axis represent the date within the time range. For example, if today is 18th November, and you filter for the last 7 days, the Day axis shows 12–18.

More filters are available when you click on the filter icon in the upper-right corner: filter by time range and by content type.

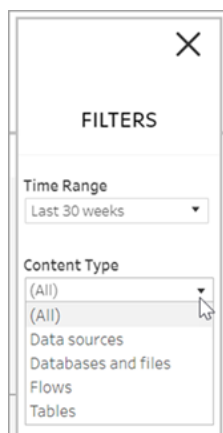
### Filter by time range

You can configure the time range from years to minutes.



### Filter by content type

You can see all the data quality warnings on your site, or you can filter to see warnings for specific types of assets, like data source or table:



### Access data quality warning history data

In addition to using the Data Quality Warning History admin view, you can also access data quality warning history data in the 'workgroup' PostgreSQL database of the Tableau Server repository. Before you can access this data, you must [enable access to the Tableau Server repository](#).

See [About the Tableau Data Dictionary](#) for a link to open the latest data dictionary where you can search for these tables with quality warning history data:

- `historical_events`
- `historical_event_types`
- `hist_data_quality_indicators`
- `data_quality_indicators`

Who can do this

To set a data quality warning, you must be a server or site administrator.

## Create Custom Administrative Views

In addition to the pre-built administrative views available on the Maintenance page on the Server, you can use Tableau Desktop to query and build your own analyses of server activity. To do this, you can connect to and query views in the Tableau Server repository using one of two built-in users: the "tableau" or "readonly" user.

To connect to the Tableau Server repository, see [Collect Data with the Tableau Server Repository](#).

- The **tableau** user – The tableau user has access to special views and a subset of tables in repository database. These views and tables are provided so that administrators can create custom administrative views. Tableau makes an effort to limit changes to these tables and views so that custom views built with them do not break.
- The **readonly** user – The readonly user has access to a large number of the repository tables, providing more data about server usage. Administrators can use these to create custom administrative views too, but many of the tables are intended primarily to support the functioning of Tableau Server and may be changed or removed without warning. This means that views created from these tables can break when the database structure is changed.

For examples of custom administrative views, see the [Tableau Community](#). You can also use the temporary workbook that is generated when you view the built-in Administrative views.

Before you can connect using one of the built-in users, you must enable access to the Tableau Server database. After doing this you can use Tableau Desktop to connect to and query the database as the tableau user or the readonly user.

The `tsm configuration set` option `auditing.enabled` controls whether Tableau Server collects historical user activity and other information in the repository. It is enabled by default. Be aware that collecting historical events impacts the size of Tableau Server's backup file (`.tsbak`).

- All `hist_` tables are controlled by the `tsm configuration set` option `wgserver.audit_history_expiration_days`, which controls how many days of event history are kept in the repository and has default value of 183 days.
- The `_http_requests` table is cleaned of all data older than 7 days when you run `tsm maintenance cleanup` with the `--http-requests-table` option. For more information, see [Remove Unneeded Files](#).
- The `_background_tasks` table is cleaned automatically and keeps data for the last 30 days.
- All other tables with names that begin with a "\_" prefix contain current data.

For more information about the tables in the Tableau Server repository, see [Workgroup Database Data Dictionary](#).

## Performance

You can monitor and tune the performance of Tableau Server.

### Tableau Server Performance Overview

When you take the time to understand the performance of Tableau Server, you make it easier to serve your users by improving the efficiency of Tableau Server. Although every server environment is unique, and there are many variables that can impact performance, the

general steps that you take to understand and act on performance data in Tableau Server are the same.

- **Notifications.** Configure email notifications for important server events. For example, you can receive notifications when server processes become unavailable and when the server is running out of disk space.
- **Monitoring.** Collect and analyse data about Tableau Server to understand how well the server is performing.
- **Tuning.** Make adjustments to tasks, process configurations and more to improve the performance of Tableau Server.
- **Troubleshooting.** Identify bottlenecks in resources, workbooks and more to improve the performance of Tableau Server.

## General Performance Guidelines

### Hardware and Software

**Add more cores and memory:** Regardless of whether you're running Tableau Server on one computer or several, the general rule is that more CPU cores and more RAM will give you better performance. Make sure you meet the Tableau Server recommended hardware and software requirements.

If you are running Tableau Server in a virtual environment, use your VM host's best practices for vCPU allocation in relation to the number of physical CPU cores on the VM host.

### External repository

For optimal performance for Tableau Server we recommend isolating the repository on a dedicated node in your deployment. If you have an Advanced Management licence, consider running the repository as an external database.

If your organisation has a peak load of more than 1000 VizQL sessions per hour, we also recommend running Tableau Server on Linux. In this scenario, VizQL sessions refer to any user actions that display or generate visualisations from Tableau Server.

For more information, see [Tableau Server External Repository](#).

## Configuration

**Schedule refreshes for off-peak hours:** Backup tasks tend to stall other background tasks until the backup is completed. Use the Background Tasks for Extracts administrative view to see your refresh and backup task schedules. Your refresh tasks should be scheduled for off-peak hours that don't overlap with your backup window.

**Look at caching:** Caching helps Tableau Server respond to client requests quickly, especially for views that connect to live databases. Use the `tsm data-access caching list` command to confirm the caching frequency is set to `low` (this is the default).

Tableau Server uses a query cache to store query results. The size of the query cache is automatically set based on the amount of available system memory, as long as you have not set it manually. The query cache consists of the logical query cache, the metadata cache and the native query cache. The default settings are suitable for most situations but it is possible to manually configure them using the TSM command line interface. The TSM settings are: `native_api.InitializeQueryCacheSizeBasedOnWeights`, `native_api.QueryCacheMaxAllowedMB`, `native_api.LogicalQueryCacheMaxAllowedWeight`, `native_api.MetadataQueryCacheMaxAllowedWeight`, `native_api.NativeQueryCacheMaxAllowedWeight` and `native_api.QueryCacheEntryMaxAllowedInPercent`. For more information, see `native_api.InitializeQueryCacheSizeBasedOnWeights`.

**Consider changing two session memory settings:**

- **VizQL session timeout limit:** The default VizQL session timeout limit is 30 minutes. Even if a VizQL session is idle, it is still consuming memory and CPU cycles. If you can make do with a lower limit, use `tsm configuration set Options` to change the

`vizqlserver.session.expiry.timeout` setting.

- **VizQL clear session:** By default, VizQL sessions are kept in memory even when a user navigates away from a view. This reduces the need to rebuild views but consumes more session memory. To free up memory, you can end sessions when users leave views by changing the value of the `vizqlserver.clear_session_on_unload` setting to `true`. (Regardless of this setting, sessions for the Tableau Mobile app are always kept in memory, improving mobile performance.)

**Assess your process configuration:** Tableau Server is divided into six different components called server processes. While their default configuration is designed to work for a broad range of scenarios, you can also reconfigure them to achieve different performance goals. Specifically, you can control on which computers the processes run and how many are run. See Performance Tuning for general guidelines for one-, two- and three-node deployments.

## Antivirus Software

Antivirus software that scans directories used by Tableau Server can interfere with installation and ongoing use of Tableau Server. In some cases, this can result in installation failures, problems starting Tableau Server or impacts to performance. If you plan to run antivirus software on the computer running Tableau Server, follow the recommendations in the [Knowledge Base](#).

## Server Resource Manager (SRM)

The Server Resource Manager (SRM) monitors the system resources each Tableau process is using as well as tracking the total usage of Tableau Server on the system. If either a specific process or the product as a whole takes up too much system resources, SRM can notify the processes to free the resources or restart those processes.

The thresholds that determine when SRM will notify or restart a process are set in the SRM configuration options. The Tableau development team has set the default settings based on internal testing and don't recommend you change these settings directly.

If you are seeing excessive system resource usage, we recommend that you contact Tableau Support to help determine if these configuration options need to be modified to solve the problem or issue that you are seeing.

## Tableau Server Notifications

You can setup up email notifications when server is running out of disk space and for when server processes stop or start. These conditions often mean that there is an immediate problem.

To send notifications, Tableau Server must be able to connect to a mail server, also known as a Simple Mail Transfer Protocol (SMTP) server. An SMTP server is a service that you can send outbound email messages to (it doesn't handle incoming email). Before you configure notifications, you must first configure Tableau Server to communicate with your SMTP mail server. For more information, see [Configure SMTP Setup](#).

Once you have configured your SMTP mail server, you can setup notifications for monitoring server health events. For more information, see [Configure Server Event Notification](#).

## Performance Monitoring Overview

When you monitor a server, you collect and analyse data that signals whether the server is performing badly or running into problems. For example, if you notice that your server is using 100% of its processing capacity for long periods of time, you know that there's a problem.

The data that you need to collect and analyse can be broken down into the following broad categories:

- Resource usage data – how Tableau Server uses hardware resources like disk space, memory, and processors.
- Session and load time data – how users interact with Tableau Server, including how long it takes for views to load and how many concurrent users there are.



- Background task data – how Tableau Server runs tasks that are not directly tied to a user action. For example, background tasks include extract refresh tasks, subscription tasks and more.

Some of this data, including load time data and extract refresh data, is already accessible from the administrative views that are built into Tableau Server. However, to collect resource usage data you need to use an external performance monitoring tool. (For the purposes of this section, we'll use Windows Performance Monitor as an example, because it's included with Windows Server.) To collect additional load time data and background task data, you can connect to the Tableau Server repository.

After you've collected the performance data that you want to analyse, you can use the sample workbook included in this section as a starting point for analysing your performance data. To make it easier to analyse your performance data in one place, you can then publish the views that you create to Tableau Server as custom administrative views.

For more information on the built-in administrative views, see [Administrative Views](#).

For more information on custom administrative views, see [Create Custom Administrative Views](#).

For more information on advanced monitoring tools, see [About Tableau Resource Monitoring Tool](#).

**Note:** To use the sample workbook and to publish views to Tableau Server, you must have Tableau Desktop.

## Collect Data with Windows Performance Monitor

To monitor resource usage and server processes, you can use Windows Performance Monitor (PerfMon), which is included with Windows Server. Use PerfMon to gather detailed performance information, including how often the CPU is being used, how much memory is being used, information about each Tableau Server process and more.

For more information about what each Tableau Server process does, see [Tableau Server Processes](#).

**Disclaimer:** This information refers to a third-party product. This example is not an endorsement of this product over any other competing products.

Before you can use PerfMon, you set up a data collector set, which is how PerfMon stores the data that it collects. To collect information about Tableau Server processes with PerfMon, Tableau Server must be running when you create the data collector set. The data that you collect in PerfMon are often referred to as performance counters.

#### How to collect data with Windows Performance Monitor

##### Step 1: Create a new data collector set

1. Click the Windows Start menu and search for "performance".
2. Right-click **Performance Monitor** and then click **Run as administrator**.
3. In the left pane, click **Data Collector Sets**.
4. In the right pane, right-click **User Defined**, click **New**, and then click **Data Collector Set**.
5. In the **Create new Data Collector Set** wizard, enter a name for the data collector set. For example, you might enter **Tableau Server Performance**.
6. Select **Create manually (Advanced)** and then click **Next**.
7. Under **Create data logs**, select **Performance counter** and click **Next**.

##### Step 2: Select performance counters

1. Set the sample interval to 30 seconds.
2. Click **Add**.

3. Select the computer that you want to record performance data for.

If you run Tableau Server on a single computer, select **<Local Computer>**. If you run Tableau Server on multiple computers, you must repeat some of these steps to gather data about each computer.

4. Select performance counters from the list.

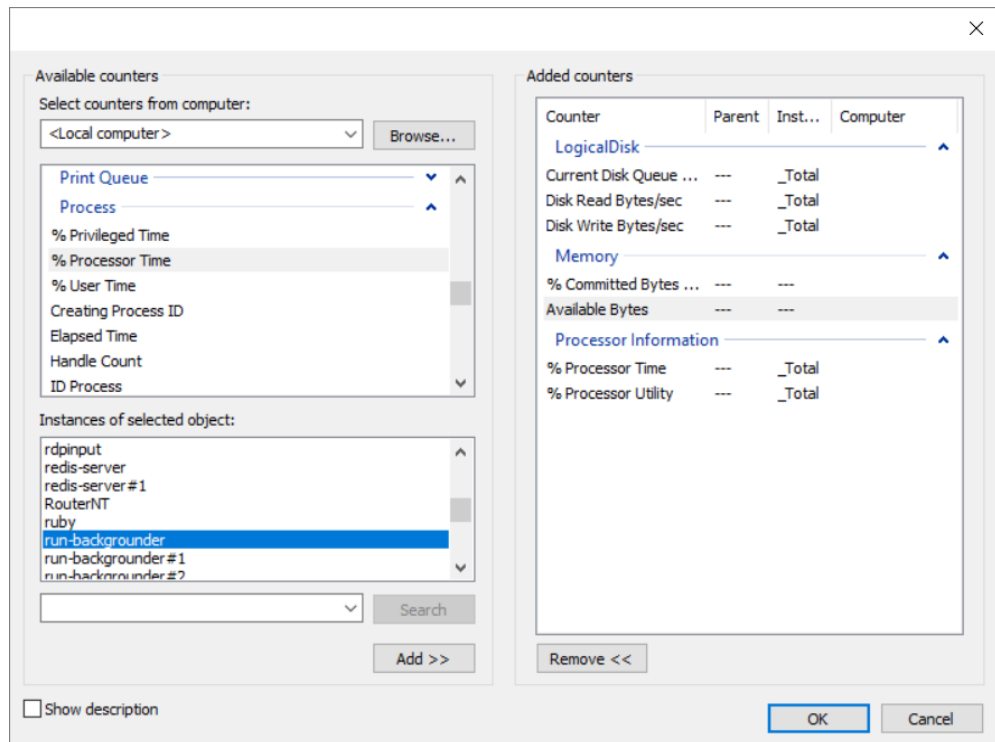
The following table lists some performance counters that we recommend for tracking Tableau Server performance.

| Category              | Performance Counters                                                             | Notes                                                                                                                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Logical Disk          | Current Disk Queue Length<br><br>Disk Read Bytes/sec<br><br>Disk Write Bytes/sec | The number of outstanding write requests and the amount of bytes read and written to the server's hard disk. Select these counters for the disk on which you installed Tableau Server (referred to as the <i>instance</i> in PerfMon). |
| Memory                | % Committed Bytes in Use<br><br>Available MBytes                                 | The percentage of virtual memory in use, and the amount of memory available in megabytes.                                                                                                                                              |
| Processor Information | %Processor Time<br><br>% Processor Utility                                       | The percentage of time that the processor spends active, and the percent of processing capacity being used by the processor.                                                                                                           |

| Category | Performance Counters                  | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Process  | % Processor Time<br><br>Private Bytes | <p>The percentage of processing capacity being used by a particular process, and the amount of memory reserved for the process. Select these counters for the following processes (referred to as <i>instances</i> in PerfMon):</p> <ul style="list-style-type: none"> <li>• <code>run-backgrounder</code> (Backgrounder)</li> <li>• <code>run-dataserver</code> (Data server)</li> <li>• <code>redis-server</code> (Cache server)</li> <li>• <code>hyperd</code> (Data engine)</li> <li>• <code>run-vizqlserver</code> (VizQL Server)</li> </ul> |

To select each performance counter:

1. Double-click to select a category in the drop-down list.
2. Select the performance counter or counters that you want to use.
3. Under **Instances of selected object**, if appropriate, select the process (or instance) that you want to collect information about.



4. Click **Add**.
5. If you run Tableau Server on multiple computers, return to step 3, select another computer and then repeat the above steps.

**Important:** Depending on how you configured server processes to run across computers, you might have to monitor only a subset of the processes listed for each computer. For example, it's a best practice to isolate the backgrounder processes on a separate computer. As a result, for that computer, you would only monitor the backgrounder processes.

6. Click **OK** and then click **Next**.

## Step 3: Save the data collector set

1. Browse to the directory where you want to store the data, and then click **Next**.

**Important:** You must store the data in a place that's accessible by Tableau. For example, you might want to store the data on a network drive. If you don't have a network drive mapped, right-click **This PC** and select **Add a Network Location**.

2. Click **Finish**.
3. In the left pane of the main **Performance Monitor** window, select the data collector set that you created.
4. In the right pane, right-click the performance counter **DataCollector01** and then click **Properties**.
5. Select **Comma separated** as the log format and then click **OK**.

## Step 4: Run the data collector set

In the left pane, right-click the name of the data collector set that you created and click **Start**. The Windows Performance Monitor tool starts monitoring your server and storing information in the location that you specified.

## Step 5: Allow Remote Access for Multiple Computers

For PerfMon to collect data about other computers, you need to make sure that the other computers can be reached – that is, that they are on the same network and do not have firewall rules that prevent access. The firewall rules that you need to set differ across versions of Windows, so you might need to contact your network administrator for information. In addition, you must make sure that the Run As user account has permission to collect data on the remote computers. By default, PerfMon runs the data collector set as the SYSTEM user. To change the Run As user, complete the following steps:

1. In the left pane of PerfMon, open the **Data Collector Sets** node and then the **User Defined** node.
2. Right-click the name of the data collector set and then click **Properties**.
3. In the **Run As** section of the **General** tab, click the **Change** button and specify a different account.

## Collect Data with the Tableau Server Repository

The Tableau Server repository is a PostgreSQL database that stores data about all user interactions, extract refreshes, and more. You can enable access to the repository and use the data in it to help analyse and understand Tableau Server performance.

Looking for Tableau Server on Linux? See [Collect Data with the Tableau Server Repository](#).

After you enable access to the Tableau Server repository, you can create views with data from the repository. The views that you create with this data are sometimes called custom administrative views. In addition to being used for performance monitoring, custom admin views can be used for tracking user activity, workbook activity, and more. For more information on the type of data that you can use for these views, see [Create Custom Administrative Views](#) and [About the Tableau Server Data Dictionary](#). Alternatively, if you are only interested in performance data, you can use the preselected database tables in the sample performance workbook.

### Enable access to the Tableau Server repository

You can use Tableau Desktop to connect to and query the Tableau Server repository using two built-in users. The user named `tableau` has access to several database views you can use as part of building your own analyses of Tableau Server activity. The user named `readonly` has access to additional database tables that you can use to create views for even more in-depth analysis and this is the user we recommend you use.

Before you can connect to the repository, you need to enable access for the `readonly` user to the database. Use the `tsm data-access repository-access enable` command to enable repository access. When you enable repository access, you also create a password for the `readonly` user. You will use this password to access to the repository. You may also need to have port 8060 opened on the repository node so you can connect to the database.

1. Verify that port 8060 is opened on the computer where the repository is installed. This is a requirement if you are connecting remotely.
2. Enable repository access and create a readonly user password:

```
tsm data-access repository-access enable --repository-username  
readonly --repository-password <PASSWORD>
```

If your password includes special characters, then you must enclose the password in double quotes.

This command will restart Tableau Server.

**Note:** If you later decide that you want to disable remote access to the Tableau Server repository, use the `tsm data-access repository-access disable` command. The command disables external access to the repository. This will not disable access from localhost. For more information, see `tsm data-access repository-access disable`.

## Connect to the Tableau Server repository

This section describes how to connect to a custom set of tables from Tableau Server repository. For more information on the tables that you can connect to, see [About the Tableau Server Data Dictionary](#).



1. In Tableau Desktop select **Data > Connect to Data**, and then select **PostgreSQL** as the database to connect to.

**Note:** You might need to install the PostgreSQL database drivers. You can download drivers from [www.tableau.com/en-gb/support/drivers](http://www.tableau.com/en-gb/support/drivers).

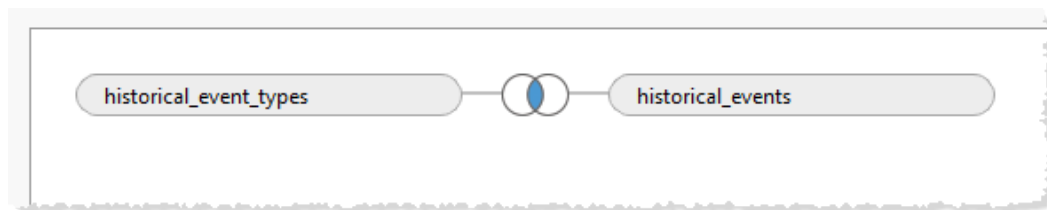
2. In the PostgreSQL connection dialog box, enter the name or URL for Tableau Server in the **Server** box. If you have a distributed server installation, enter the name or IP address of the node where the repository is hosted.

Connect using the port you have set up for the pgsqll.port, which is 8060 by default.

3. Specify `workgroup` as the database to connect to.
4. Connect using the user and the password you specified.
5. Click the **Require SSL** option if you have configured Tableau Server to use SSL for connecting to the repository. For more information, see [Configure Postgres SSL to Allow Direct Connections from Clients](#).
6. Click **Connect**.

7. Select one or more tables to connect to.

The `tableau` user has access to all of the tables that start with an underscore or with `hist_`. For example, you can connect to `_background_tasks` and `_datasources`. The `hist_` tables include information about server users that isn't currently presented in the Actions by Specific User view. The `readonly` user has access to additional tables that can be used to query other information about server usage.



8. Click **Go to Worksheet**.

### PostgreSQL Version

Use the following steps to find the version of PostgreSQL used by Tableau Server:

## Tableau Server on Windows Help

1. Log in to Tableau Server directly or through a remote connection.
2. Launch **Task Manager**.
3. Click the **Details** tab.
4. Right-click one of the postgres.exe processes and select **Properties** to see the version of PostgreSQL installed.

You can also connect to the workgroup database and issue the following query to get the version: `select version()`

### About the Tableau Server Data Dictionary

The Tableau Server Data Dictionary includes information about the tables and views in the "workgroup" PostgreSQL database of the Tableau Server repository. This database provides persistent storage for Tableau Server and is primarily intended to support that application. The Data Dictionary is not a complete description of all tables and fields in the database, and is provided for customers who want to query the database for information about usage on Tableau Server. Because the database and its contents are intended to support Tableau Server, the structure and contents may change without warning. This means any custom views you build from directly querying the database could break.

**Important:** The Data Dictionary is provided with an **As-Is** level of support. For assistance creating reporting based on the dictionary, including writing queries to the database or updating broken workbooks, please engage with the Tableau Community forums.

[Open the Data Dictionary](#) (new window).

## Analyse Data with the Sample Performance Workbook

**Important:** Before reading this topic, you need to complete the steps in Collect Data with Windows Performance Monitor and Collect Data with the Tableau Server Repository.

To get started analysing the data that you collect with Windows Performance Monitor (PerfMon) and with the Tableau Server repository, you can download and use the sample performance workbook that Tableau provides. The sample workbook contains worksheets for

some of the most important performance indicators, including CPU and memory utilisation by process, disk activity, view load times, and more. After you download the workbook, use it as a starting point for your data exploration and extend it to meet your needs.

Download the sample performance workbook

1. In the workbook that is embedded below, click the **Download** button in the lower-right corner of the workbook.
2. Navigate to the directory where you downloaded the workbook and double-click on the workbook to open it in Tableau Desktop.

Edit the connections to the Tableau Server repository

After you open the workbook, you must edit the data connections to point to the PostgreSQL repository for your installation of Tableau Server.

The sample workbook includes the following data source connections:

- **Background Tasks** – a connection to the Tableau Server repository that joins the `_background_tasks` table and the `_sites` table.
  - **Historical Events** – a connection to the Tableau Server repository that joins the `historical_events`, `hist_users`, and `historical_event_types` tables.
  - **Resource Usage** – a connection to the data you collect from PerfMon.
  - **Sessions and Load Times** – a connection to the Tableau Server repository that joins the `_users`, `_http_requests`, `_sessions`, and `_sites` tables.
1. From any of the sheets in the workbook, right-click the **Background Tasks** data source in the **Data** pane, and then click **Edit Data Source**. (Note that you might have to right-click on a dashboard and click **Unhide All Sheets**.)

PostgreSQL Connection

## PostgreSQL

Server: 10.32.139.39 Port: 8060

Database: workgroup

Enter information to sign in to the database:

Authentication: User Name and Password

Username: readonly

Password:

☐ Require SSL

OK Cancel

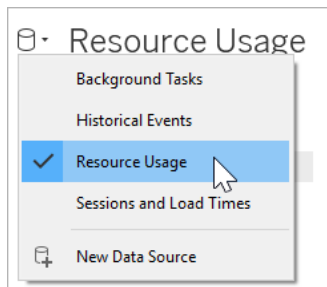
2. Replace the server address with the hostname or IP address of your server.

## Tableau Server on Windows Help

3. Enter the password that you set for the `readonly` user.
4. Click **OK**.
5. Repeat the steps above for the **Sessions and Load Times** data source.

Edit the connection to the PerfMon data

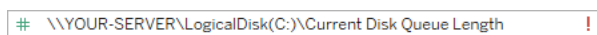
1. Click the **Data Source** tab.
2. In the data source list, select **Resource Usage**.



3. In the menu, click **Data > Resource Usage > Edit Connection**.
4. Navigate to the directory where you stored the data from PerfMon.
5. Select the file and click **Open**.

Replace references to PerfMon fields

Because the data that you collect from PerfMon includes references to specific host names, you must also replace the references in the workbook for specific field names. For example, when you click on the **CPU** worksheet, you might notice that most of the fields have a red exclamation mark next to them. This indicates that the field is missing from the new data source.



To map the fields in your data to the fields in the workbook, follow these steps:

1. Navigate to the **CPU** worksheet or to any of the worksheets that use the Resource Usage data source.
2. Right-click a field in the **Measures** list that has a red exclamation mark next to it.
3. Click **Replace references**.
4. Select the corresponding field in the dialog.

For example, you might replace references to **\\YOUR-SERVER\LogicalDisk (C:)\Current Disk Queue Length**.

### Update calculations

The sample workbook includes calculations that aggregate processor utilisation for multiple processes. To view data for all of the processes on your server, you must edit the calculations to include additional instances of server processes.

For example, the **VizQL Server CPU %** calculation includes a reference to one process:

```
[\\YOUR-SERVER\Process(vizqlserver)\% Processor Time]
```

However, if your server runs more than one VizQL Server process, then you must aggregate the additional process in the calculation. For example, you might enter the following:

```
[\\YOUR-SERVER\Process(vizqlserver)\% Processor Time] + [\\YOUR-SERVER\Process(vizqlserver#1)\% Processor Time]
```

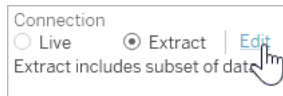
### Remove the date filter from the extract

To limit the amount of data bundled in the sample performance workbook (and reduce the size of the download), the workbook includes a date filter on the included extract. The visualisations in the workbook will display as blank until the date filter is removed.

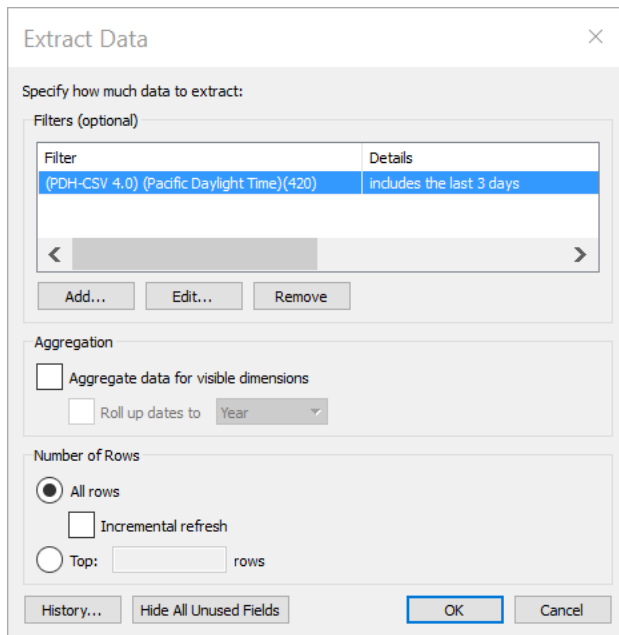
1. Click the **Data Source** tab.
2. In the upper-right, click **Edit**.



## Tableau Server on Windows Help



3. Select the data source filter.
4. Click **Remove**.



### Publish to Tableau Server

Optionally, when you finish updating your performance workbook, you can publish it to Tableau Server so that the views in the workbook are accessible from the Tableau Server interface.

## Performance Tuning

This section describes how to use the performance data that you collect to identify ways to improve the performance of Tableau Server. Because no two server environments are identical, we can't provide hard and fast rules for tuning server performance. However, you can draw conclusions about performance from patterns in the data that you collected.

For example, are there recurring spikes? Do any of the patterns that you notice in the administrative views correspond to similar patterns in Windows Performance Monitor? Observing patterns like this can guide you in testing and incremental tuning.

Most performance tuning for Tableau Server boils down to these general approaches:

- **Optimise for User Traffic:** This tunes the server to respond to user requests and to display views quickly.
- **Optimise for Extracts:** This tunes the server to refresh extracts for published data sources. You might want to optimise for extract refreshes if your organisation has a lot of data and the data needs to be as up to date as possible.
- **Optimise for Extract Query-Heavy Environments:** This is a specialised server configuration to optimise for query performance of workbooks that use extracts as their data source.

Rendering views and refreshing extracts generate the most load on the server, so you should optimise for the task that your organisation is most interested in.

As a best practice, optimise your workbooks for performance. For more information and resources on how to optimise your workbooks, see [Optimise Workbook Performance](#).

## Optimise for User Traffic

You can optimise for traffic if you have many active Tableau Server users and few published data sources that need extract refreshes.

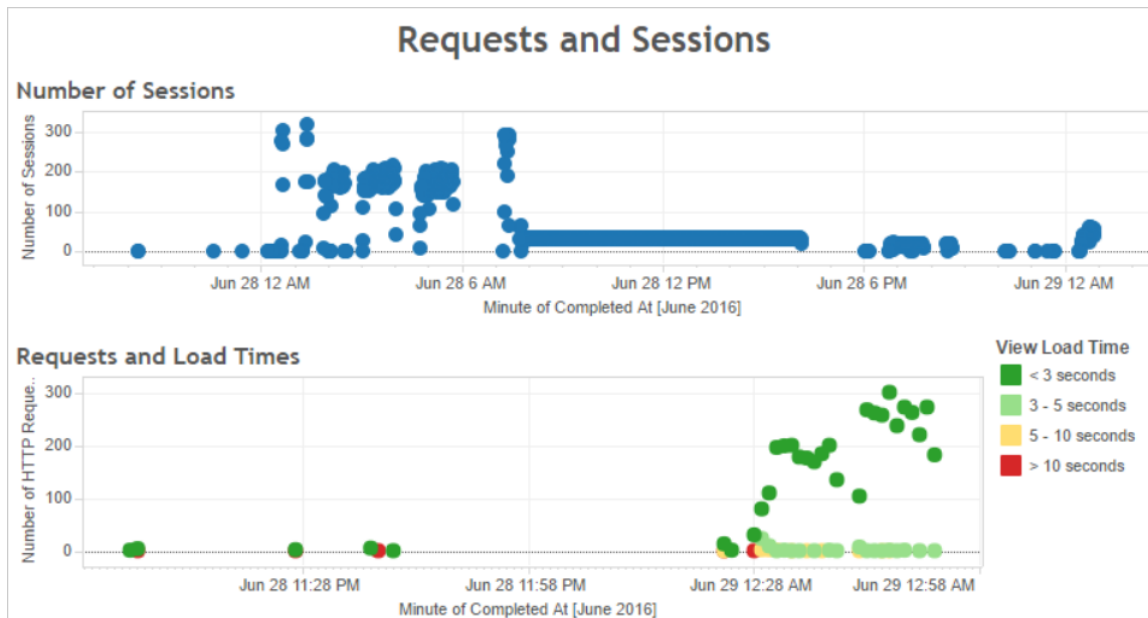
**Note:** This topic uses the sample performance workbook from the monitoring section. For more information, see [Analyse Data with the Sample Performance Workbook](#).

- When to optimise for user traffic
- [Ways to optimise for user traffic](#)

When to optimise for user traffic

Slow load times for views

Use the **Requests and Sessions** dashboard of the sample performance workbook to analyse how long views take to load.



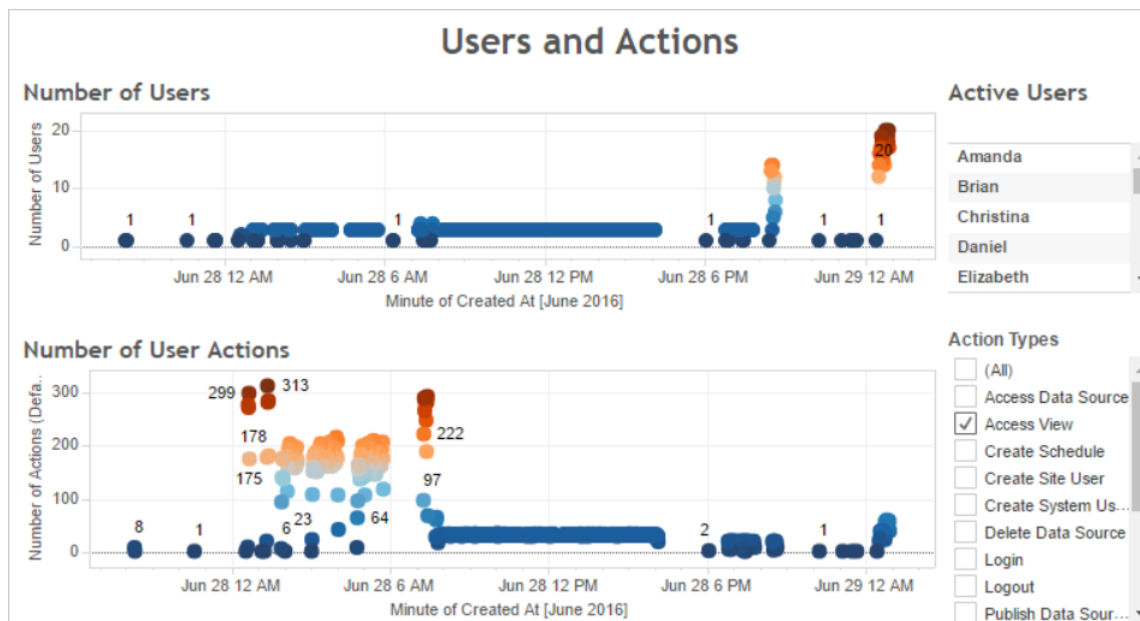
If multiple views take longer than 10 seconds to load, and if the slow load times correspond to a large number of sessions, that can indicate that user traffic is slowing down the server.

However, if a particular view takes a long time to load regardless of when it is viewed, it's a sign that the workbook for the view needs to be optimised. You can identify which workbooks need to be optimised with the Stats for Load Times administrative view. Some simple ways of optimising workbooks includes displaying less information in each view or breaking up views, reducing the number of filters, and using data extracts.

High resource usage corresponding to user traffic

If your server displays high CPU and memory usage during peak traffic hours, you should optimise for user traffic. To determine peak traffic hours and analyse how many concurrent users are on your server, use the **Users and Actions** dashboard. In addition, you can use the

Traffic to Views administrative view to see how much user traffic involves accessing views (as opposed to performing administrative functions, publishing, or other tasks).

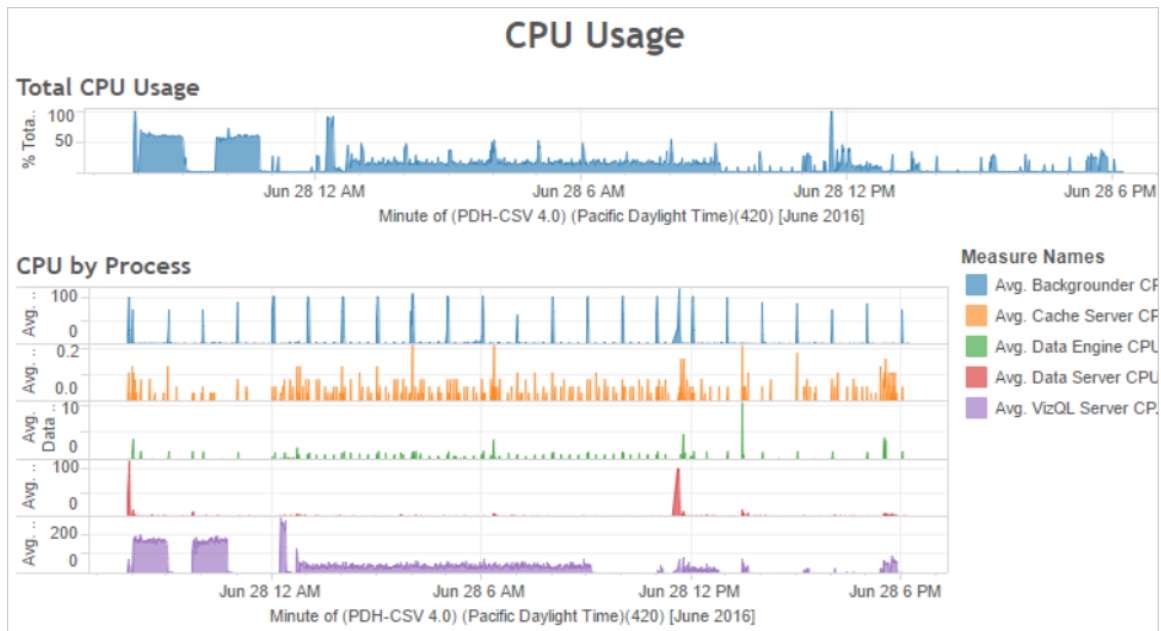


If you click a point in the **Number of Users** view, the dashboard displays the users that were active at the time and the number of user actions that those users performed. By default, the only user actions displayed are user views, but you can use the **Action Types** filter to display additional user actions.

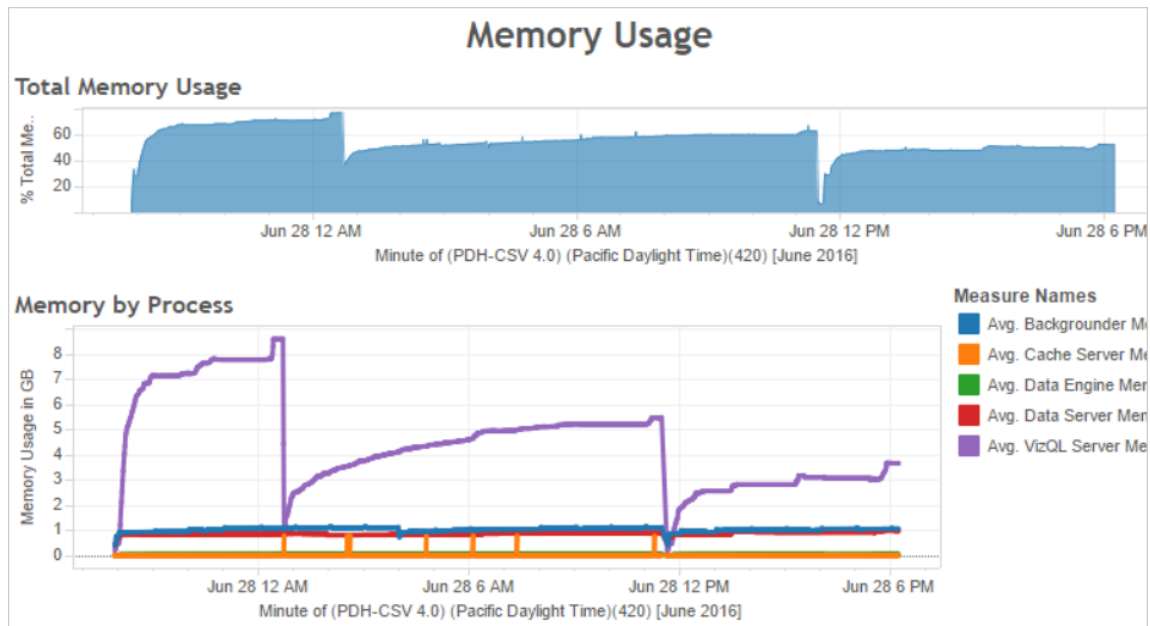
Make a note of the times of day when there are many concurrent users and views so that you can compare this to resource usage. As a rule of thumb, the number of users should correspond to a high number of user actions. However, the view in this example displays an artificially high number of actions for a single user as part of a load generation test. As an example, you can compare the high number of views at 12 AM on June 28th with the resource usage in the dashboard illustrated later.

Use the **CPU Usage** dashboard to display the percent of total CPU usage and the percent of CPU usage for each process. In the following example, note the large spike in total CPU usage and in the VizQL server process at 12 AM on June 28th. Because the VizQL server process loads and render views, the VizQL server process is often the first process to show strain under high user traffic.

**Note:** The percent of CPU usage for individual processes may add up to more than 100 percent. This is because processor utilisation for individual processes is measured for a given processor core. By contrast, the total CPU usage is measured for all processor cores.



Use the **Memory Usage** dashboard to display the percent of total memory usage and the average memory usage in gigabytes. As a general rule, memory usage increases steadily with user traffic. Here again the VizQL server process is the first to show strain under high traffic.



### Ways to optimise for user traffic

When high user traffic corresponds to high resource usage as it does in the example shown previously, you should optimise for user traffic.

#### Adjust the number of VizQL server processes

The most effective way of optimising for user traffic is to adjust the number of VizQL server processes. Add one VizQL server process at a time and measure the effect with more performance monitoring. Because VizQL server processes can consume a lot of CPU and memory, adding too many processes can slow down the server instead. If you see consistently high memory usage, try to reduce the number of VizQL server processes to reduce the amount of memory reserved.

For more information about configuring processes, see [Configure Nodes](#).

#### Adjust the number of other processes

Although the most effective way of improving performance for user traffic is to adjust the number of VizQL server processes, you can also tune other processes that support the VizQL server process or that prevent the VizQL server process from accessing resources.

For example, the VizQL server process makes frequent requests to the cache server process, so you might also want to increase the number of cache server processes. On the other hand, the Backgrounder processes might contend for CPU resources with the VizQL server process. As a result, if you do not need to run frequent extract refreshes, you might reduce the number of processes for the backgrounder. If you do need additional instances of the backgrounder, and if you're running Tableau Server on a cluster, you can move the Backgrounder process to a dedicated node.

### Adjust the VizQL session timeout limit

In the example shown previously, the amount of memory used by the VizQL server process increases with user traffic, and it remains reserved by Tableau Server for some time after the traffic finished. This is because the VizQL server process reserves memory for each session for a specified amount of time. If the VizQL server process uses a high percentage of the available memory, try reducing the timeout for each session to make memory available more quickly.

To do this, use the `tsm configuration set` command to reduce the `vizqlserver.session.expiry.timeout` setting. The default is 30 minutes.

### Refresh the cache less often

If your users do not always need the most up-to-date data, you can optimise for user traffic by configuring Tableau Server to cache and reuse data as much as possible.

To do this, use the `tsm data-access caching list` command to confirm the refresh frequency. The default is `Low`. Use the `tsm data-access caching set` command to change the refresh frequency.

### Assess view responsiveness

When a user opens a view, the components of the view are first retrieved and interpreted, then displayed in the user's web browser. For most views, the display rendering phase occurs in the user's web browser and in most cases, this yields the fastest results and highest level of interactive responsiveness. Handling most interactions in the client web browser reduces bandwidth and eliminates round-trip request latencies. If a view is very complex, Tableau Server

handles the rendering phase on the server instead of in the client web browser, because that generally results in the best performance. If you find that views aren't as responsive as you'd like, you can test and change the threshold that causes views to be rendered by the server instead of in the client web browser. For more information, see [Configure Client-Side Rendering](#).

### Configure Client-Side Rendering

When you navigate to a view in Tableau Server, the processing required to display the view, called *rendering*, can be performed by either your client device or Tableau Server. The choice depends on the complexity of the view, which is determined by the number of marks, rows, columns and more. If a view is less complex, it's faster for a client device to render the view. If a view is more complex, it's faster to send a request to Tableau Server and take advantage of the server's greater computing power.

**Note:** If a view uses the polygon mark type or the page history feature, server-side rendering is always performed, even if client-side rendering is enabled.

### Supported browsers

Client-side rendering is supported in Internet Explorer version 9.0 or higher, Firefox, Chrome, and Safari. All of these web browsers include the HTML 5 `<canvas>` element, which client-side rendering requires.

Client-side rendering is also supported by the Tableau Mobile app.

### Configure the complexity threshold for computers and mobile devices

Because computers have more processing power than mobile devices, Tableau Server performs more client-side rendering on computers than on mobile devices.

As a server administrator, you can configure when client-side rendering happens on computers and mobile devices by adjusting the complexity threshold for each. For example, you



## Tableau Server on Windows Help

might lower the threshold for mobile devices if you notice that views display slowly on them. Or, you might increase the threshold to reduce the number of requests to Tableau Server.

By default, the complexity threshold for computer web browsers is 100. To adjust the complexity threshold for computers, use the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold -v  
[new value]
```

By default, the complexity threshold for mobile devices is 60. To adjust the complexity threshold for mobile devices, use the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold_mobile  
-v [new value]
```

For example, to change the mobile threshold to 40, you might enter the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold_mobile  
-v 40
```

For more information on how to use tsm option set, see [tsm configuration set Options](#).

### Disable client-side rendering

Client-side rendering is enabled by default and is recommended to improve the performance of views. However, you might want to disable client-side rendering temporarily for testing or if your server is being accessed primarily by computers or mobile devices with very little processing power.

Use the following command to disable client-side rendering:

```
tsm configuration set -k vizqlserver.browser.render -v false
```

For more information on how to use tsm option set, see [tsm configuration set Options](#).

## Testing with the URL Parameter

To test server-side rendering on a session basis, type `?:render=false` at the end of the view's URL. For example:

```
http://localhost/views/Supplies/MyView?:render=false
```

If client-side rendering is disabled on Tableau Server, enter `?:render=true` to enable it for the session:

```
http://localhost/views/Supplies/MyView?:render=true
```

You can also test particular complexity thresholds on individual views to see if it's appropriate to adjust the server-wide threshold for your server and network conditions. For example, you may find that lower complexity (such as 80) or higher complexity (such as 120) tipping points result in more responsiveness to user interactions. To test a threshold, you can keep the server's default configuration (client-side-rendering enabled) and enter the test threshold number at the end of the view's URL. For example:

```
http://localhost/views/Supplies/MyView?:render=80
```

## Optimise for Extracts

Try to optimise for extracts if the extract schedules correspond to high resource usage or if extracts take a long time to finish.

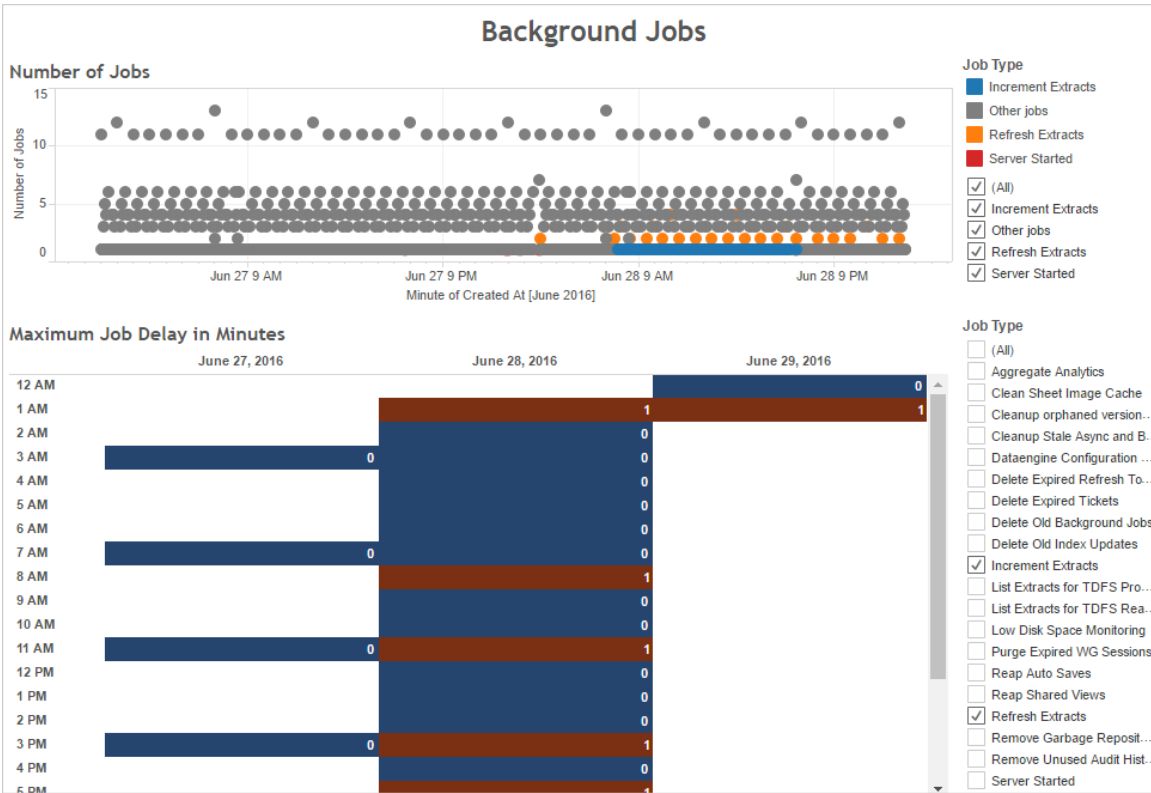
**Note:** This topic uses the sample performance workbook from the monitoring section. For more information, see [Analyse Data with the Sample Performance Workbook](#).

### When to optimise for extracts

High CPU usage corresponds to extract schedules

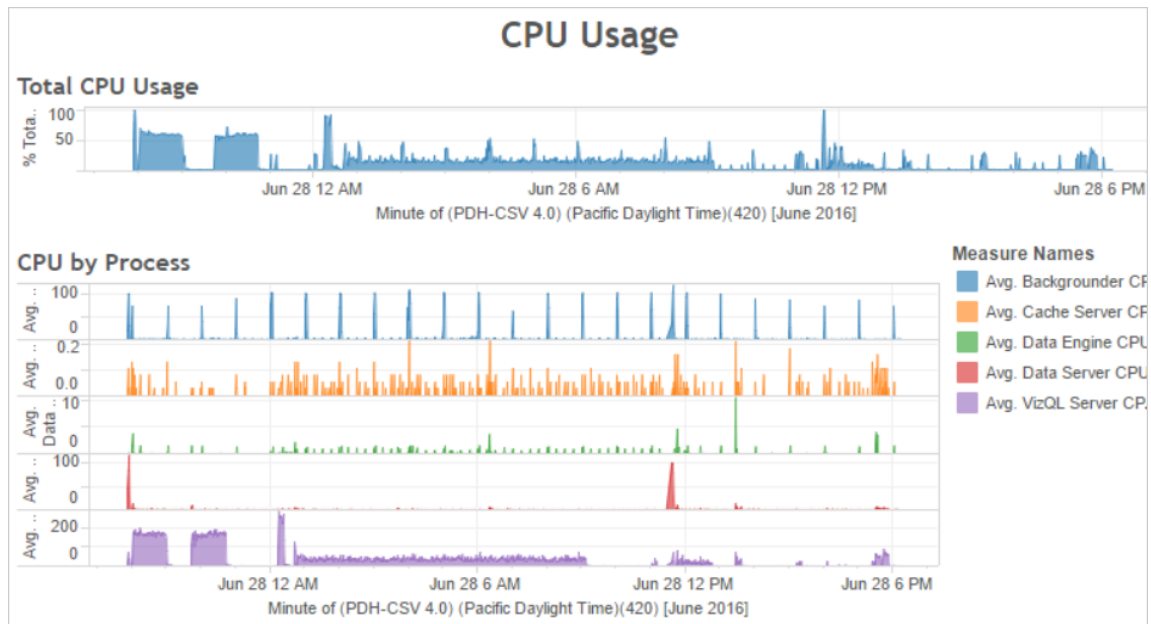
Use the **Background Jobs** dashboard of the sample performance workbook to view the number of background jobs run by Tableau Server, including extract refresh jobs. The dashboard also displays how long background jobs are delayed – that is, the amount of time between when a background job is scheduled and when it actually runs. If you see long delays at

particular times of the day or if many jobs are running at the same time, try distributing the job schedules across different times of the day to reduce the load on the server.



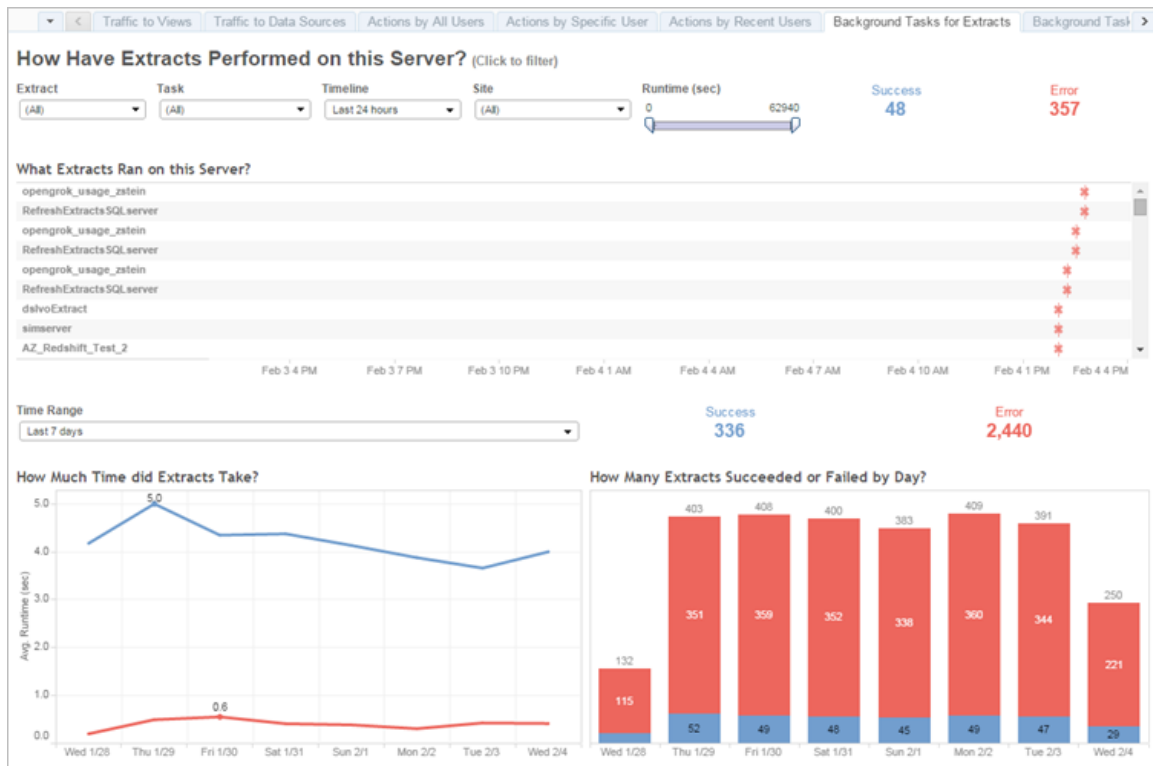
Also compare the times when there are many background jobs or long delays with the CPU usage of the server. Use the **CPU Usage** dashboard to display the percent of total CPU usage and the percent of CPU usage for each process. Because the background process runs background jobs, it is the first process to show strain when there are many extract refresh jobs or when there are slow extract refresh jobs. Note that the CPU usage of the background process periodically but briefly reaches 100 percent. This indicates that there are intensive refresh jobs on a recurring schedule.

**Note:** The percent of CPU usage for individual processes may add up to more than 100 percent because processor utilisation for individual processes is measured for a given processor core. By contrast, the total CPU usage is measured for all processor cores.



Extracts fail or run slowly

Use the Background Tasks for Extracts administrative view to determine how many extracts fail and how long extracts take to complete. Frequent failures can indicate a problem with a particular data source.



### Ways to optimise for extracts

When high CPU usage corresponds to extract refresh schedules like it does in the example shown previously, you should optimise for extracts.

#### Adjust the extract refresh schedule

Use the **Background Jobs** dashboard of the sample performance workbook to identify optimal times for running extracts. In addition to running extracts in off-peak hours, you can distribute extract refreshes to minimise concurrent server load. If extract refreshes continue to cause problems, reduce the frequency of extract refreshes as much as possible in these ways:

- Schedule extracts for times when the server isn't busy.
- Reduce the frequency of refreshes.

## Speed up specific extracts

Use the Background Tasks for Extracts administrative view to identify failing extracts and long-running extracts.

- Reduce the size of extracts. You can help improve server performance by keeping the data set of the extract short, through filtering or aggregating, and narrow, by hiding unused fields. To make these changes, use the Tableau Desktop options **Hide All Unused Fields** and **Aggregate data for visible dimensions**. For more information, see [Creating an Extract](#) in the Tableau Help.

For general tips on building well-performing workbooks, search for “performance” in the Tableau Help. To see how workbooks perform after they've been published to Tableau Server, you can create a performance recording. For more information, see [Create a Performance Recording](#).

- Use incremental refresh jobs. Incremental refresh jobs append new rows to an existing extract instead of creating the extract from scratch. This type of extract refresh runs quickly because it processes only the data that has been added since the last time the extract refresh job ran. However, it does not account for data that has been updated rather than appended to a data source. As a result, if you run incremental refresh jobs, you should still occasionally run full refresh jobs. For example, you might run a full refresh job once or twice a week for a data source instead of every day.

## Configure the execution mode for extract refreshes

When you create extract refresh schedules, ensure that they run in parallel execution mode. When you run a schedule in parallel, it runs on all available background processes, even if the schedule contains only one refresh task. When you run a schedule serially, it only runs on one background process. By default, the execution mode is set to parallel so that refresh tasks finish as quickly as possible.

However, in some circumstances, it can make sense to set the execution mode to serial. For example, you might set the execution mode to serial if a very large job is preventing other schedules from running because it uses all available background processes.

### Increase the number of backgrounder processes

A single background process can consume 100 percent of a single CPU core for certain tasks. As a result, the total number of instances you should run depends on the computer's available cores. If you have Tableau Server installed in a cluster and you run backgrounder processes on a separate node, a good rule of thumb is to set the number of backgrounder process to between half the number of cores and the full number of cores of the computer running the backgrounder processes.

For more information about configuring processes, see [Configure Nodes](#).

### Isolate processes

If you have Tableau Server installed in a cluster, you see the largest benefit from moving the backgrounder processes to a separate node to avoid resource contention. This is because the backgrounder process is very CPU-intensive and running it on the same node where other CPU-intensive processes are running can slow down the server. For example, both the VizQL server process and the data engine process can be CPU-intensive. Read the two-node configuration in the [Recommended Baseline Configurations](#) topic for more details.

## Optimise for Extract Query-Heavy Environments

The topic provides guidance on setting up a specific Tableau Server topology and configurations to help optimise and improve performance in an extract query-heavy environment.

**What is an extract query-heavy environment?** Extracts and federated data sources are queried while loading workbooks, views and dashboards creating a lot of query workload. Therefore, if you have a lot of extracts and federated data sources, you can be said to have a 'extract query-heavy environment'.

**If your environment is extract query-heavy, as defined above, the next couple of sections can help you decide if this configuration is right for you.**

## When to use this configuration

**Key reasoning behind this configuration:** Hyper is Tableau's memory-optimised Data Engine technology suited for fast data ingests and analytical processing, making it key to optimising query-heavy workloads. As your extract use grows, we recommend **configuring Data Engine on dedicated nodes of the Tableau Server cluster**. This configuration allows Tableau Server to scale out the infrastructure to optimise performance when querying extracts.

There are several factors that affect Tableau Server performance when viewing content using extracts and federated data sources. The goal here is to **achieve consistent and reliable query performance** when viewing content on the Server. Use this configuration if one of the following conditions applies to your environment:

- You are seeing wide variability in workbook loading times and the workbook uses extracts or federated data sources.
- Your Tableau Server deployment is growing in the number of Creators, Explorers, Viewers and extract-based content, so you want to scale out efficiently.
- You are seeing resource contention between Data Engine and VizQL Server when File Store is present on the machine.
- You analyse large amounts of data. This configuration helps in optimising performance in big data scenarios, in both data ingestion and analysis. To learn more about Tableau and big data, see [Hyper-charge big data analytics using Tableau](#).

**Note:** Use Server-side performance recording to determine query execution times. To determine resource usage of Tableau use **Performance monitor** for Windows installations, and *sysstat* or *vmstat* tools for Linux installations.

## Benefits of using this configuration

These are the key benefits to configuring dedicated nodes for Data Engine:



- Dedicated Data Engine nodes will reduce resource contention between extract queries and other resource-intensive workloads such as those processed by VizQL Server.
- Extract queries are load-balanced dynamically on the dedicated nodes, taking into account the current state of the system to ensure that no one node is over- or under-utilised.
- More consistent performance in user experience when loading extract-dependent workbooks. The focus here is to establish a consistent and reliable performance rather than making individual queries better.
- You have more control over scaling out Tableau Server processes that need more resources. If VizQL Server, Data Engine and Backgrounder are all running on the same node and slow extract queries are the problem, it will be difficult to see performance improvements by adding a second node with all three processes. With this configuration, you can add more nodes that will specifically improve extract query workloads.
- Helps improve availability and up-time. In the event of a failure and one of the dedicated Data Engine nodes being unavailable, VizQL Server will attempt to route the pending requests on the problem node to other dedicated Data Engine nodes.
- Data Engine leverages as many cores as available on the machine. Given this, you have the flexibility to add more resources to the dedicated Data Engine nodes to reduce query response time and variability on expensive extract queries or add more dedicated Data Engine nodes to get more extract query throughput in your Server.
- Data Engine has a default configuration limiting it to an average 75% of CPU per hour. This is intended to help avoid contention with other Tableau Server processes. If you are running Data Engine on a dedicated node, you can increase this average to 95%. For information on doing this, see [hyper.srm\\_cpu\\_limit\\_percentage](#).

### When not to use this configuration

- If you are not experiencing issues with extract-based query load, hardware resources may be better allocated to other portions of Tableau Server.
- On nodes where File Store, Data Engine and VizQL Server co-exist, you are not seeing resource contention between Data Engine and VizQL Server.
- Before implementing this configuration, it is highly recommended that you evaluate your CPU usage for VizQL Server and for the node where Data Engine is installed with the File Store.

### Configuration

The main goal of this configuration is to have Data Engine on one or more dedicated nodes.

- In deployments where File Store is installed locally, this means configuring File Store on one or more dedicated nodes. Data Engine is automatically installed on the same node as the File Store.
- In deployments where you are configuring External File store, you can still configure Data Engine on dedicated nodes on Tableau Server.

By separating VizQL Server and File Store processes, the load between querying extracts and viewing or interacting with views can be balanced and better managed. This configuration is targeted at consistent performance when querying extracts.

Below is a visual representation of the configuration where the Data Engine/File Store processes have two dedicated nodes, nodes 5 and 6. This is an example where File Store is configured locally, which is why the Data Engine and File Store processes are co-located.

The same configuration works for deployments with External File Store, but Nodes 5 and 6 will only have Data Engine configured in that case.

Additionally, since Node 1 also has the Repository and File Store processes, all of the data needed to perform a backup exist on Node 1, which can improve backup performance.

| External Load Balancer |                       |        |        |        |             |             |
|------------------------|-----------------------|--------|--------|--------|-------------|-------------|
| Process                | Node 1 (Initial Node) | Node 2 | Node 3 | Node 4 | Node 5 (DE) | Node 6 (DE) |
| Cluster Controller     | ✓                     | ✓      | ✓      | ✓      | ✓           | ✓           |
| Gateway                | ✓                     | ✓      | ✓      | ✓      |             |             |
| Application Server     | ✓                     | ✓      |        |        |             |             |
| VizQL Server           | ✓ ✓                   | ✓ ✓    |        |        |             |             |
| Cache Server           | ✓ ✓                   | ✓ ✓    |        |        |             |             |
| Search & Browse        | ✓                     | ✓      |        |        |             |             |
| Backgrounder           |                       |        | ✓ ✓    | ✓ ✓    |             |             |
| Data Server            | ✓ ✓                   | ✓ ✓    | ✓ ✓    | ✓ ✓    |             |             |
| Data Engine            | ✓                     | ✓      | ✓      | ✓      | ✓           | ✓           |
| File Store             | ✓                     |        |        |        | ✓           | ✓           |
| Repository             | ✓                     | ✗      |        |        |             |             |

## Hardware Guidance

To get the most out of this configuration, you will need to experiment with various hardware sizes and configurations to see what best fits your peak load performance objectives. Hyper is a high-performance database technology and the key resources that impact performance are memory, cores and storage I/O. Understanding how Hyper uses resources to process queries will help you make your hardware selection and understand the reason between different configurations.

- Memory:** When an extract-based query is processed for a user or background process, Tableau Server selects a dedicated Data Engine node to process the query. That dedicated Data Engine node will then copy the extract from local storage, most often the server hard disk, into memory. Having more available system memory allows the operating system to better manage memory usage for Tableau. Dedicated Data Engine nodes use system memory to store the result set of executed queries. If the result set is still valid and the operating system has not cleared it from memory, the result set in memory can be reused.

Tableau Server's minimum hardware recommendation is 32 GB of memory, but if you are expecting a high volume of extract-based workbook loads, you should consider 64

GB or 128 GB. If you are hitting other resource limits in addition to memory (like cores), instead of scaling up to 128 GB of memory, it might be better to scale out to an additional 64 GB dedicated Data Engine node.

The process of copying the extract from local storage into memory can take time, and optimising disk performance may be necessary. Optimising disk performance is covered in the **Storage I/O** section.

- **Cores:** When processing an extract-based query, the number of cores is an important hardware resource that can impact performance and scalability. CPU cores are responsible for executing a query, and having more available cores will result in faster execution time. Generally speaking, doubling the number of cores will reduce the query execution time in half. For example, a 10-second query currently utilising 4 physical cores or 8 vCPUs, will take 5 seconds if you upgrade to 8 physical cores or 16 vCPUs.

The current Tableau Server minimum hardware recommendation is 8 cores, but if your deployment utilises extracts, consider 16 or 32 core machines. An important thing to note is that if memory and I/O are your bottlenecks, then increasing available cores will not improve your query performance.

- **Storage I/O:** Hyper is designed to leverage the available performance of your extract storage device to speed up query processing. We recommend picking fast disk storage like Solid State Drives (SSD) with high read/write speeds. Currently, SSDs that utilise NVMe storage protocol offer the fastest available speeds.

**Note:** Sizing resources for dedicated Data Engine nodes only impacts the extract query performance. When loading a workbook, there are many other processes involved that make up total VizQL load request time. The VizQL Server process, for example, is responsible for taking the data from the Data Engine and rendering the visualisation.

#### Other Performance Tuning and Optimisations:

There are additional features you can use to optimise performance beyond the basic configuration described above. The optimisations described below are applicable to both local

File Store and External File Store deployments.

- **Extract Query Load Balancing:** To determine where to route the extract query, Data Engine uses a server health metric – the amount of resources Data Engine is consuming and the load from other Tableau processes that may be running on the same node. In addition to evaluating system resources, whether an extract already exists in memory on the node is also taken into account to make sure an extract query is sent to the node that has the most available resources to process the query. This results in more efficient memory and disk utilisation, and extracts are not duplicated in memory across nodes. See the Extract Query Load Balancing help article for more details.

*The extract query load balancing feature is enabled by default in Tableau Server version 2020.2 and later.*

- **Workload optimisations using node roles:** With Backgrounder and File Store node roles, server administrators have more flexibility and control over which nodes should be dedicated for running extract queries and extract refreshes. As mentioned in the topology diagram above, certain Data Engine nodes are dedicated to processing extract queries and run only the File Store and Data Engine processes. Node Roles are available with Advanced Management. For more information on node roles, see Workload Management through Node Roles.

The diagram below uses the same topology as the basic configuration described above but with the node roles.

| External Load Balancer |                       |        |                     |                        |                 |                 |
|------------------------|-----------------------|--------|---------------------|------------------------|-----------------|-----------------|
| Process                | Node 1 (Initial Node) | Node 2 | Node 3              | Node 4                 | Node 5 (DE)     | Node 6 (DE)     |
| Cluster Controller     | ✓                     | ✓      | ✓                   | ✓                      | ✓               | ✓               |
| Gateway                | ✓                     | ✓      | ✓                   |                        |                 |                 |
| Application Server     | ✓                     | ✓      |                     |                        |                 |                 |
| VizQL Server           | ✓ ✓                   | ✓ ✓    |                     |                        |                 |                 |
| Cache Server           | ✓ ✓                   | ✓ ✓    |                     |                        |                 |                 |
| Search & Browse        | ✓                     | ✓      |                     |                        |                 |                 |
| Backgrounder           |                       |        | ✓ ✓ Extract refresh | ✓ ✓ No Extract refresh |                 |                 |
| Data Server            | ✓ ✓                   | ✓ ✓    | ✓ ✓                 |                        |                 |                 |
| Data Engine            | ✓                     | ✓      | ✓                   | ✓                      | ✓               | ✓               |
| File Store             | ✓                     |        | ✓                   |                        | ✓ Extract query | ✓ Extract query |
| Repository             | ✓                     | ✗      |                     |                        |                 |                 |

- **Extract Refreshes Backgrounder node role:** By setting Node 3 to extract-refreshes Backgrounder node role, only incremental refreshes, full refreshes and encryption/decryption jobs will run on this node. By setting Node 4 to no-extract-refreshes Backgrounder node role, all background jobs other than extract refreshes will run on this node. Data Server and Gateway help the extract refresh jobs when using federated and shadow extracts. For more information on Backgrounder node roles, see File Store node roles.

Additionally, since Node 1 also has the Repository and File Store processes, all of the data needed to perform a backup exist on Node 1, which can improve backup performance.

*The Backgrounder node roles are available with Advanced Management in Tableau Server version 2019.3 and later.*

- **Extract Queries File Store node role:** Node 5 and 6, which are the **dedicated** Data Engine nodes, have the extract-queries File Store node role to ensure they only process queries for viz loads, subscriptions and data-driven alerts.
- **Extract Queries Interactive File Store node role:** For dedicated Data Engine nodes, which have extract-queries File Store node role, server administrators can further

isolate the interactive and scheduled workloads to run on specific **dedicated** Data Engine nodes. This is useful for times when there are a lot of users interacting and loading workbooks during high-volume subscription times. For example, let's say there are 1000 subscriptions scheduled for 8 AM on a Monday morning. At the same time, many users are also loading dashboards at the beginning of their day. The combined volume of subscription and user queries can result in users experiencing slower, more variable workbook load times. With the extract-queries-interactive File Store node role, you can designate dedicated Data Engine nodes to only accept queries for interactive users (the ones who are looking at their screens waiting). These dedicated Data Engine nodes that are prioritised for interactive workloads would be protected from the high volume of competing subscription jobs and provide more consistent query times. Additionally, Server Admins can use this node role to better plan for growth since they can add dedicated Data Engine nodes for interactive and scheduled workloads independently. For more information, see File Store node roles.

*The File Store node roles are available with Advanced Management in Tableau Server version 2020.4 and later.*

- **Optimisations using External File Store:** This feature allows you to use a network share as the storage for File Store instead of using the local disk on a Tableau Server node. By having the storage on a centralised location, you can significantly reduce the amount of network traffic spent on replicating data between the File Store nodes. For example, in the case when File Store is using a local disk, when a 1 GB extract is refreshed using local File Store, the 1 GB of data is replicated across the network to all nodes that are running the File Store process. In the case where Tableau Server is configured with External File Store, the 1 GB extract only needs to be copied to the network share once and all File Store nodes can access that single copy. The centralisation of storage also reduces the total amount of local storage needed on File Store nodes.

Additionally, Tableau Server backups leverage snapshot technology to significantly reduce the time to complete a backup.

While you don't need a dedicated Data Engine node configuration to gain the benefits of External File Store, the additional workload management features with File Store node role and the Extract Query Interactive node role can be used together. See the [Tableau Server External File Store](#) topic for more details.

*External File Store is available with Advanced Management in Tableau Server version 2020.1 and later.*

## When to Add Nodes and Reconfigure

Tableau Server can scale up and out as your needs and requirements evolve. Here are some guidelines to help you figure out whether it's time to add more nodes to your system, reconfigure the server, or both:

- **More than 100 concurrent users:** If your deployment is user-intensive (>100 simultaneous viewers), it's important to have enough VizQL processes – but not so many that they exceed your hardware's capacity to handle them. Also, enabling the Tableau Server [Guest User account](#) can increase the number of potential simultaneous viewers beyond the user list you may think you have. The administrative view can help you gauge this. For more information, see [Actions by Specific User](#).
- **Heavy use of extracts and frequent extract refreshes:** Extracts can consume a lot of memory and CPU resources. There's no one measurement that qualifies a site as extract-intensive. Having just a few, extremely large extracts could put your site in this category, as would having very many small extracts. Sites where extracts are frequently refreshed (for example, several times a day) are often helped by more emphasis on the background process, which handles refresh tasks. Use the [Background Tasks for Extracts](#) administrative view to see your current refresh rate. Extract heavy sites benefit from isolating the Background process on its own machine. For more information, see the [two-node configuration in the Recommended Baseline Configurations](#) topic.



- **Query heavy environments:** If you are experiencing slow query performance for Workbooks that use extracts, isolating nodes that handle queries on extracts from VizQL processes can improve and stabilise performance. For more information, see [Optimise for Extract Query-Heavy Environments](#).
- **Downtime potential:** If your server system is considered mission critical and requires a high level of availability, you can configure it so there's redundancy for the server processes that handle extracts, the repository and the gateway.

## Performance Recording

This section describes how to create performance recordings and use the results to improve workbook performance. With performance recordings, you can view how long workbook events take. For example, you can see how long it takes to connect to a data source, run a query, render data and more.

### Create a Performance Recording

The Performance Recording feature in Tableau records performance information about key events as you interact with a workbook. You can then view performance metrics in a workbook that Tableau creates to analyse and troubleshoot different events that are known to affect performance:

- Query execution
- Compiling query
- Geocoding
- Connections to data sources
- Layout computations
- Extract generation

- Blending data
- Server rendering (Tableau Server only)

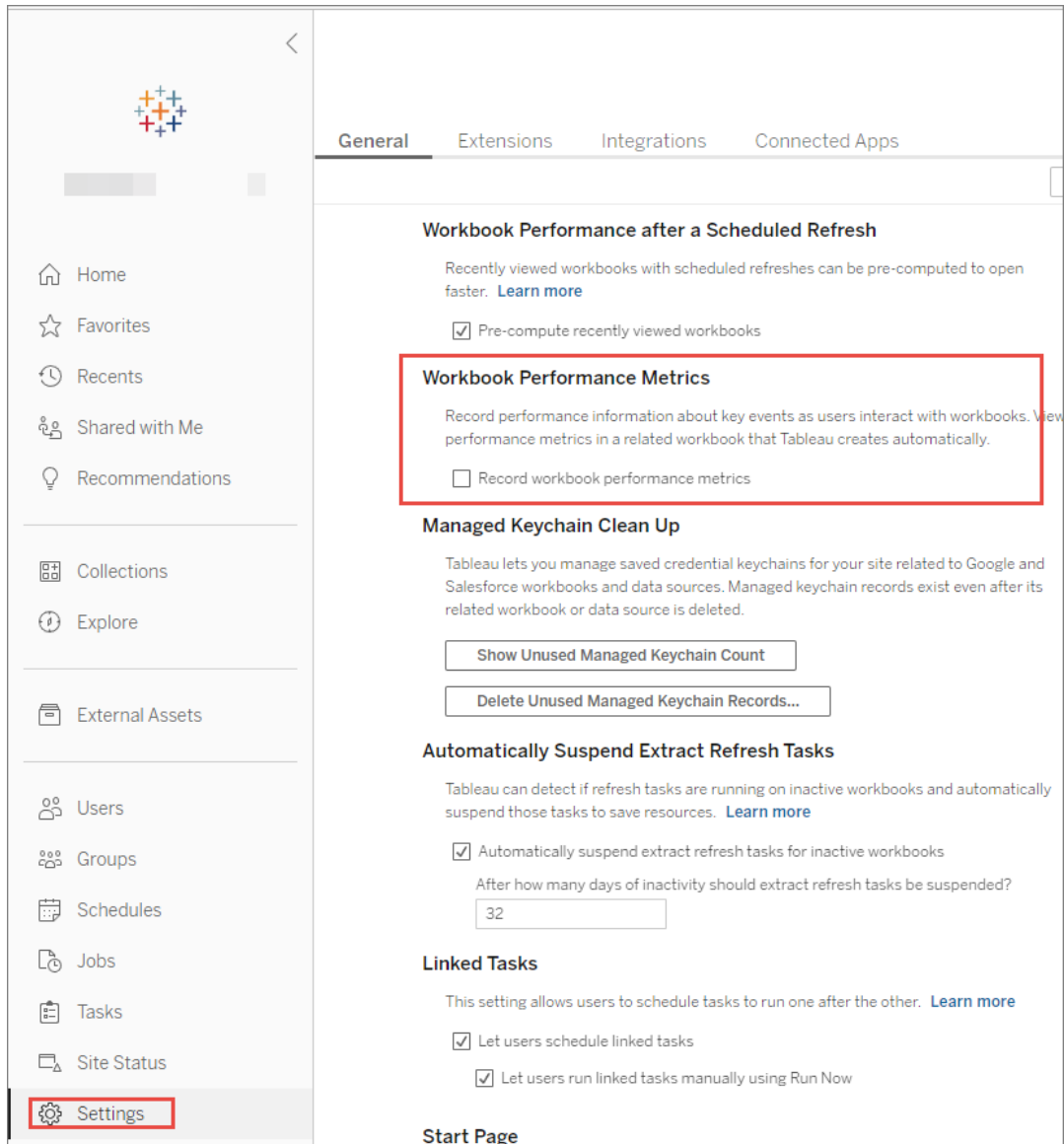
Tableau support may ask that you create a performance workbook as they work with you to diagnose performance issues.

Looking for Tableau Server on Linux? See [Create a Performance Recording](#).

### Enable Performance Recording for a Site

By default, performance recording is not enabled for a site. A server administrator can enable performance recording site by site.

1. Navigate to the site for which you want to enable performance recording.
2. Click **Settings**:



3. Under Workbook Performance Metrics, select **Record workbook performance metrics**.
4. Click **Save**.

## Start a Performance Recording for a View

1. Open the view for which you want to record performance.

When you open a view, Tableau Server appends ":iid=<n>" after the URL. This is a session ID. For example:

```
http://10.32.139.22/#/views/Coffee_Sales2013/USSalesMarginsByAreaCode?:iid=1
```

2. Type `:record_performance=yes&` at the end of the view URL, immediately before the session ID. For example:

```
http://10.32.139.22/#/views/Coffee_Sales2013/USSalesMarginsByAreaCode?:record_performance=yes&:iid=1
```

3. Click the **Refresh** button in the toolbar.
4. Load the view.

## View a Performance Recording

1. Click **Performance** to open a performance workbook. This is an up-to-the-minute snapshot of performance data. You can continue taking additional snapshots as you continue working with the view; the performance data is cumulative.
2. Move to a different page or remove `:record_performance=yes` from the URL to stop recording.

## Interpret a Performance Recording

Create a recording to evaluate the performance of your workbook. After you have completed the recording, you can download the resulting workbook and open it in Tableau Desktop for analysis.

A performance recording workbook contains two main dashboards: Performance Summary and Detailed Views. The Performance Summary dashboard provides a high-level overview of the most time-consuming events. The Detailed Views dashboard provides a lot more detail

and is intended to be used by advanced users when building workbooks. The **Detailed Views** dashboard is only visible when the performance recording workbook is opened using Tableau Desktop.

For information on how to create a performance recording in Tableau Server, see [Create a Performance Recording](#).

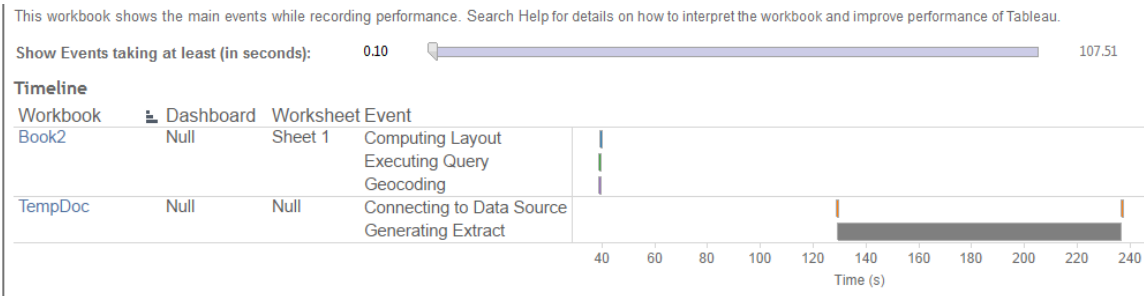
### Performance Summary

The **Performance Summary** dashboard contains three views: **Timeline**, **Events** and **Query**.

#### Timeline

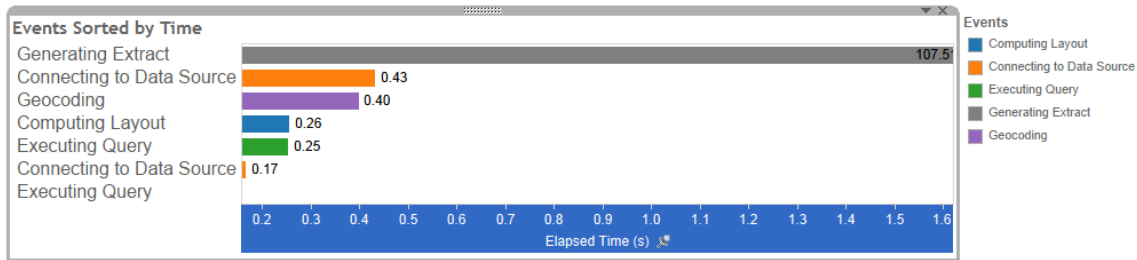
The uppermost view in the performance summary recording dashboard shows the events that occurred during recording, arranged chronologically from left to right. The bottom axis shows elapsed time since Tableau started, in seconds.

In the Timeline view, the **Workbook**, **Dashboard** and **Worksheet** columns identify the context for events. The **Event** column identifies the nature of the event, and the final column shows each event's duration and how it compares chronologically to other recorded events:



#### Events

The middle view in a performance summary dashboard shows the events, sorted by duration (greatest to least). Events with longer durations can help you identify where to look first if you want to speed up your workbook.



Different colours indicate different types of events. The range of events that can be recorded is:

- Computing layouts

If layouts are taking too long, consider simplifying your workbook.

- Connecting to data source

Slow connections could be due to network issues or issues with the database server.

- Compiling query

This event captures the amount of time spent by Tableau in generating the queries. Long compile query times indicate that the queries generated are complex. The complexity may be due to too many filters, complex calculations or generally due to a complex workbook. Examples of complex calculations include, lengthy calculations, LOD calculations or nested calculations. Try simplifying the workbook, using action filters or moving calculations to the underlying database.

- Executing query
  - For live connections, if queries are taking too long, it could be because the underlying data structure isn't optimised for Tableau. Consult your database server's documentation. As an alternative, consider using an extract to speed performance.

## Tableau Server on Windows Help

- For extracts, if queries are taking too long, review your use of filters. If you have a lot of filters, would a context filter make more sense? If you have a dashboard that uses filters, consider using action filters, which can help with performance.

- Generating extract

To speed up extract generation, consider only importing some data from the original data source. For example, you can filter on specific data fields, or create a sample based on a specified number of rows or percentage of the data.

- Geocoding

To speed up geocoding performance, try using less data or filtering out data.

- Blending data

To speed up data blending, try using less data or filtering out data.

- Server rendering

You can speed up server rendering by running additional VizQL Server processes on additional machines.

## Query

If you click on an **Executing Query** event in either the **Timeline** or **Events** section of a performance summary dashboard, the text for that query is displayed in the Query section.

If you are connected to a published data source, the query text is displayed in XML. If you are connected to the data source directly, the query is displayed in SQL like shown below:

### Query

```
SELECT "State"."ID" AS "ID",  
       "StateSynonyms"."Name" AS "State_Name",  
       "State"."ParentID" AS "State_ParentID"  
FROM "StateSynonyms"  
INNER JOIN "State" ON (("State"."ID" = "StateSynonyms"."ParentID") AND ("State"."MapCode" = "StateSynonyms"."MapCode"
```

If it makes sense, you can use the query text to work with your database team on optimising at the database level. Sometimes the query is truncated and you'll need to look in the Tableau log to find the full query. Most database servers can give you advice about how to optimise a query by adding indexes or other techniques. See your database server documentation for details.

Sometimes for efficiency, Tableau combines multiple queries into a single query against the data. In this case, you may see an **Executing Query** event for the Null worksheet and zero queries being executed for your named worksheets.

### Detailed Timeline

This view is the detailed version of the **Timeline** view that shows all events and separating individual items that were grouped in the **Timeline** view. It is intended to be used by advanced users during workbook designs.

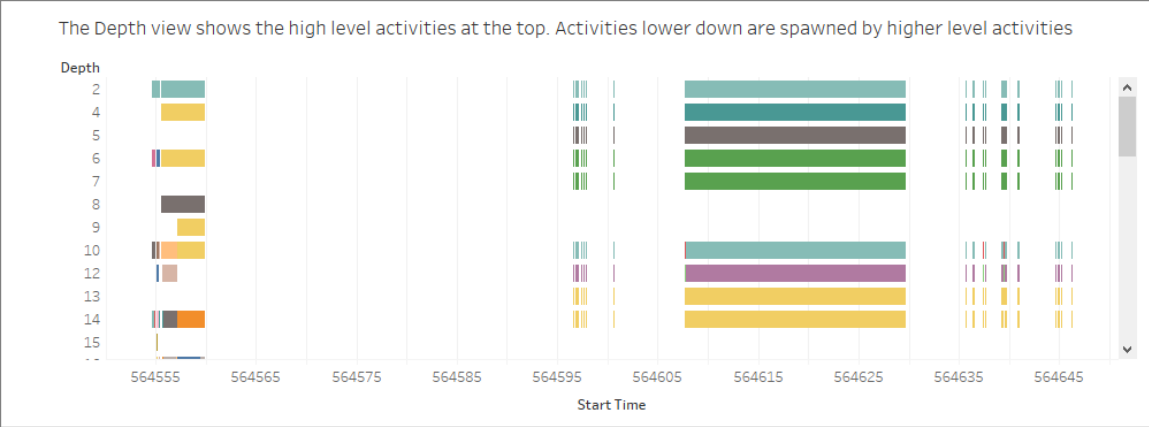
### Detailed Views

The **Detailed Views** dashboard contains **Depth**, **Exclusive CPU**, **Inclusive CPU** and **Elapsed Time** views.

#### Depth

The **Depth** view is the uppermost view in the **Detailed Views** dashboard and provides insight into what happens when a request is made. This view is the most useful when filtered to a single user request. Examples of user requests are: loading a view, selecting a mark or changing a filter.





Each bar on the depth view represents a single activity. An activity is a unit of work that is done as part of processing a user request. A single user request results in multiple activities. The length of each bar on the depth view is proportional to the elapsed time for the activity that the bar represents.

High level activities appear at the top of the view. Activities lower down are child activities generated by high level activities.

Hovering over each bar provides additional details about the activity and also highlights the corresponding row in the **CPU** and **Elapsed Time** view described in the next section.

In order to narrow down on what parts of the request took the most time, investigate long running activities at the highest levels.

CPU and Elapsed Time

The **CPU** and **Elapsed Time** views appear lowermost in the **Detailed Views** dashboard. You can toggle between **Exclusive CPU**, **Inclusive CPU** and **Elapsed Time** views by clicking on the radio buttons.

Select a View

☒ Exclusive CPU

☐ Inclusive CPU

☐ Elapsed Time

- **Exclusive CPU time** is useful for identifying activities that consume majority of the CPU

- **Inclusive CPU time** is useful for identifying high level activities that consume majority of the CPU (either themselves or due to activities that they sponsor)

- **Elapsed time** is useful for identifying activities that took the most wall clock time

While the **Depth** view can help in quick visual identification of long running activities, it may not necessarily highlight activities that happen multiple times with each instance taking a small amount of time. The **Exclusive CPU**, **Inclusive CPU** and the **Elapsed Time** views provide aggregate statistics for each activity. The number of times an activity took place is shown in the **Count** column and the total amount of time taken by a single activity is shown using the bar chart.

Sometimes for efficiency, Tableau combines multiple queries into a single query against the data. In this case, you may see an **Executing Query** event for the Null worksheet and zero queries being executed for your named worksheets.

## Performance Monitoring Tools

This topic describes external resources that you can use to monitor and tune performance.

Tableau Server includes several tools that you can use to monitor server performance and health. For more information about these tools, see [Performance Monitoring Overview](#).

**Disclaimer:** This topic includes information about third-party and community supported products. Please note that while we make every effort to keep references to third-party and community content accurate, the information we provide here might change without notice. For the most up-to-date information, please consult the documentation for products referenced here. To learn more about community supported tools, see [Support levels for IT and developer tools](#).

- **TabJolt.** A load and performance testing tool that you can use to understand how Tableau Server scales with your workloads, in your environment, and to inform your scalability and capacity needs. Here are some key use cases for when you would use TabJolt:
  - To establish a baseline for server performance and test deployments before pushing them to production environments.

- In a new Tableau Server, to help understand how the new server scales in your environment, specifically to your hardware and workload?
- Before upgrading to understand the new version will scale in your environment.
- To find the best server deployment configuration, given your hardware, workbooks and environments.
- **Replayer**. A tool that can replay log-based real user traffic from a Tableau Server against any other server or configuration. It replays Tableau Server single- or multi-user sessions. Here are some ways that Replay can be used:
  - Playback specific Tableau Server sessions, and filter the session based upon start time or RequestID.
  - Use it to simulate load conditions so that you can test how to scale and balance your Tableau Server installations.
  - Perform regression testing by running and comparing end-to-end user scenarios for Tableau Server upgrades.
  - Capture and report HTTP exceptions that occur in a single-user session.
  - Replay a defect, so that you can troubleshoot and verify that it is fixed.
- **Scout**. An exploratory tool that captures performance metrics across any workbooks on both Tableau Desktop and Tableau Server Here are some ways that Scout can be used:
  - Find slow workbooks on Server.
  - Validate performance improvements or regressions after making server configuration or topology changes.
  - Validate that workbooks and dashboards are loading properly after upgrading to

new Tableau Server.

- Validate that workbooks are still working properly after data source changes.
- **TabMon**. A monitoring tool that uses Windows Performance Monitor and Java Management Extensions to record performance data about Tableau Server to a PostgreSQL database.
- **Microsoft System Center**. A set of server management products for monitoring, configuration, automation, and more.
- **Sitescope**. An agentless application monitoring tool.
- **Zabbix**. An open-source, real-time monitoring tool.
- **Splunk**. A tool for monitoring and analysing machine data, including logs.
- **Graylog**. An open-source log management tool.

## Configure Client-Side Rendering

When you navigate to a view in Tableau Server, the processing required to display the view, called *rendering*, can be performed by either your client device or Tableau Server. The choice depends on the complexity of the view, which is determined by the number of marks, rows, columns and more. If a view is less complex, it's faster for a client device to render the view. If a view is more complex, it's faster to send a request to Tableau Server and take advantage of the server's greater computing power.

**Note:** If a view uses the polygon mark type or the page history feature, server-side rendering is always performed, even if client-side rendering is enabled.

## Supported browsers

Client-side rendering is supported in Internet Explorer version 9.0 or higher, Firefox, Chrome, and Safari. All of these web browsers include the HTML 5 `<canvas>` element, which client-

side rendering requires.

Client-side rendering is also supported by the Tableau Mobile app.

## Configure the complexity threshold for computers and mobile devices

Because computers have more processing power than mobile devices, Tableau Server performs more client-side rendering on computers than on mobile devices.

As a server administrator, you can configure when client-side rendering happens on computers and mobile devices by adjusting the complexity threshold for each. For example, you might lower the threshold for mobile devices if you notice that views display slowly on them. Or, you might increase the threshold to reduce the number of requests to Tableau Server.

By default, the complexity threshold for computer web browsers is 100. To adjust the complexity threshold for computers, use the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold -v  
[new value]
```

By default, the complexity threshold for mobile devices is 60. To adjust the complexity threshold for mobile devices, use the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold_mobile  
-v [new value]
```

For example, to change the mobile threshold to 40, you might enter the following command:

```
tsm configuration set -k vizqlserver.browser.render_threshold_mobile  
-v 40
```

For more information on how to use `tsm option set`, see `tsm configuration set Options`.

## Disable client-side rendering

Client-side rendering is enabled by default and is recommended to improve the performance of views. However, you might want to disable client-side rendering temporarily for testing or if

your server is being accessed primarily by computers or mobile devices with very little processing power.

Use the following command to disable client-side rendering:

```
tsm configuration set -k vizqlserver.browser.render -v false
```

For more information on how to use tsm option set, see [tsm configuration set Options](#).

## Testing with the URL Parameter

To test server-side rendering on a session basis, type `? :render=false` at the end of the view's URL. For example:

```
http://localhost/views/Supplies/MyView?:render=false
```

If client-side rendering is disabled on Tableau Server, enter `? :render=true` to enable it for the session:

```
http://localhost/views/Supplies/MyView?:render=true
```

You can also test particular complexity thresholds on individual views to see if it's appropriate to adjust the server-wide threshold for your server and network conditions. For example, you may find that lower complexity (such as 80) or higher complexity (such as 120) tipping points result in more responsiveness to user interactions. To test a threshold, you can keep the server's default configuration (client-side-rendering enabled) and enter the test threshold number at the end of the view's URL. For example:

```
http://localhost/views/Supplies/MyView?:render=80
```

## View Acceleration

Administrators and workbook owners who have Creator or Explorer licences can accelerate workbooks. Administrators can suspend individual views or turn off acceleration for their site. View Acceleration loads views faster by pre-computing and fetching the workbook's data in a background process. There are two potential bottlenecks when loading a view:

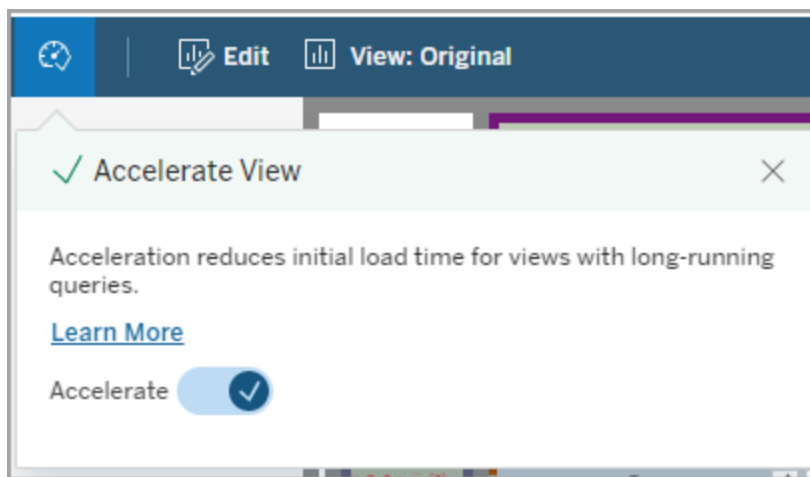
1. Querying (fetching data from the data source).
2. Rendering (creating the visuals, such as drawing shapes or rendering a map).

The time it takes to load a workbook depends on the combined time it takes to do these two steps. However, not all views can be accelerated. View Acceleration improves the performance of the first step (querying). If the view is loading slowly for reasons other than querying, View Acceleration won't improve the workbook's performance.

When users create custom views on top of an accelerated view, the ten most used custom views are precomputed automatically. These accelerated custom views don't count against the view limit. Custom views that haven't been accessed in the last 14 days won't be accelerated. If you directly accelerate a custom view, both the original view and the custom view are accelerated.

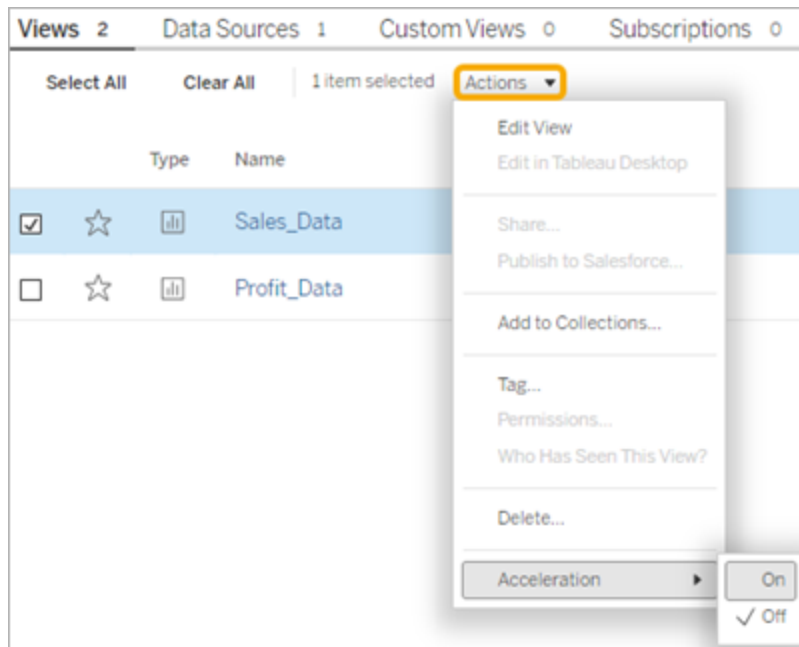
## Accelerate your view

1. Sign in to a site on Tableau Cloud or Tableau Server.
2. From the Home or Explore page, navigate to the view you want to accelerate.
3. Choose the **Accelerate** icon, and select the switch to **Accelerate**.

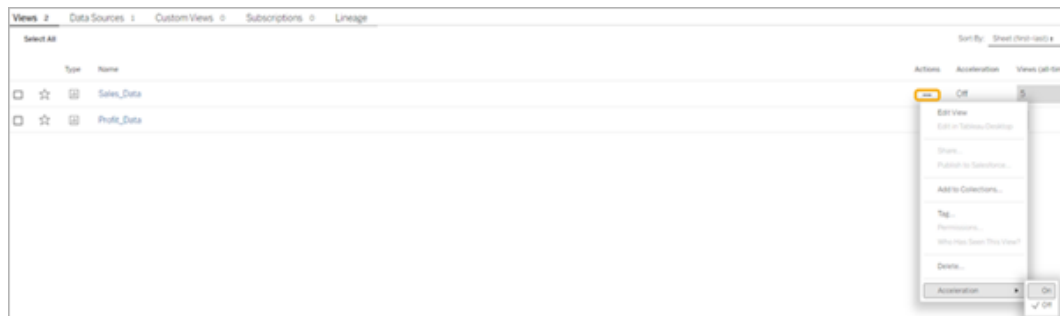


You can also accelerate views from the workbook page in one of three ways:

1. Select the desired view and choose **Acceleration** > **On** from the **Actions** menu.

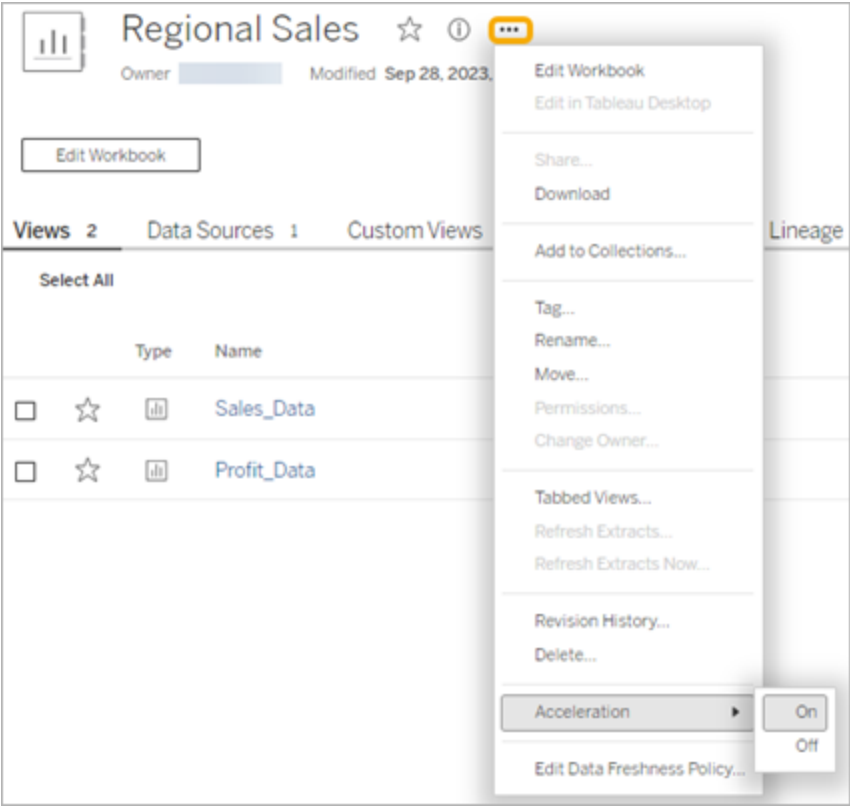


2. Select the **More options(...)** menu for the desired view and choose **Acceleration** > **On**.





3. To accelerate all views in the workbook, choose **Acceleration > On** from the **More options (...)** menu.



**Note:** View Acceleration isn't available in Tableau Desktop.

## Understand why View Acceleration is unavailable, suspended or ineffective

View Acceleration is unavailable

There are a few scenarios in which acceleration isn't available for a view.

| Issue                                                                           | Resolution                                                                                                                                                                       |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The view doesn't have historical data for the time required to execute queries. | Every time a view loads, it takes a few minutes for the viz data to be available. For a newly created view, load the view and wait a few minutes before trying to accelerate it. |

|                                                                                             |                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The historical time taken to execute queries for the view is less than 2 seconds.           | Acceleration isn't supported for such views because acceleration won't significantly improve the performance of the view.                                                                                                              |
| The view doesn't have embedded credentials.                                                 | To precompute the data, Tableau needs to automatically connect to the data source in the background without any user interaction. As a result, View Acceleration is only supported for workbooks with embedded connection credentials. |
| The view has user-based functions, or the view has a data source with user-based functions. | Currently, Tableau doesn't support accelerating such views. Examples of user-based functions are USERDOMAIN() and USERNAME().                                                                                                          |
| The view's owner is inactive.                                                               | To precompute the data, the owner must be an active user. Tableau doesn't support accelerating a view if its owner is inactive. <a href="#">Change the ownership</a> to an active user.                                                |
| The view's data freshness policy is less than 2 hours.                                      | Cost can be high for accelerating views that are refreshed so frequently, and Tableau doesn't want to overload your site performance. For more information, see <a href="#">Set a Data Freshness Policy</a> .                          |
| The site has reached the limit for the number of views that can be accelerated.             | <a href="#">Update site settings</a> to increase the maximum number of views that can be accelerated, or choose No limit.                                                                                                              |

View Acceleration is suspended

There are a few scenarios in which acceleration is suspended.

| Issue                                  | Resolution                                                  |
|----------------------------------------|-------------------------------------------------------------|
| The view's acceleration was suspended. | <a href="#">Re-enable acceleration for the view</a> .       |
| There are background accel-            | If the jobs fail regularly, the view is auto-suspended. The |

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| eration jobs running to pre-compute the data for the view. | <p>jobs may fail if:</p> <ul style="list-style-type: none"> <li>• A view's credentials have expired. <a href="#">Update the view's credentials</a>.</li> <li>• The owner of the view becomes inactive. <a href="#">Change the ownership</a> to an active user.</li> <li>• The view's data source was deleted. Contact the view's owner to update the data source.</li> <li>• The job to precompute the data takes too long and times out. View Acceleration has a maximum runtime of 30 minutes. Contact the view's owner to optimise the workbook.</li> </ul> |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### View Acceleration is ineffective

View Acceleration reduces the time it takes to execute queries of a view. If the time taken to execute queries isn't the bottleneck for the viz load time, you won't notice a significant improvement in performance during a viz load. Likewise, a view usually has many queries. You can't accelerate queries with transient functions, such as `now()` or using relative date filters. If a view has a long-running query with transient functions, you won't notice an improvement in performance during a viz load.

## Refresh accelerated views

### Event-based refresh of accelerated views

In workbooks that have an extract, all accelerated views are refreshed when the extract refresh completes. When a workbook is republished or renamed, all accelerated views in the workbook are refreshed.

### Schedule-based refresh of accelerated views

Schedules for refreshing accelerated views can only be configured if a workbook has at least one live data source.

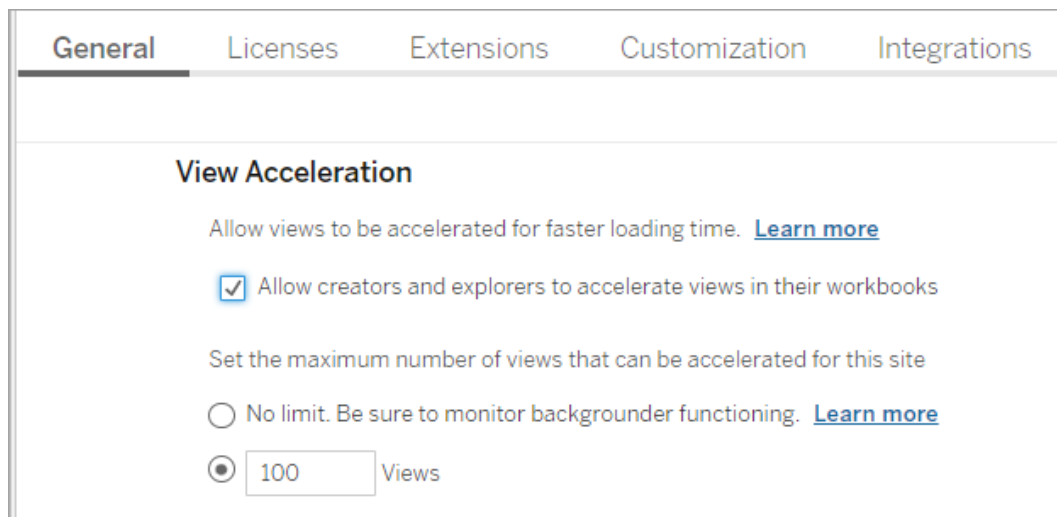
Accelerated views for workbooks utilising live data sources are refreshed based on the workbook's data freshness policies. If there isn't a schedule set for refreshing the data, the default

data freshness policy is used. For more information, see [Edit a workbook data freshness policy](#).

## Manage View Acceleration on your site

By default, View Acceleration is allowed.

1. Sign in to your site on Tableau Server.
2. From the left pane, choose **Settings**.
3. From the **General** tab, scroll to the **View Acceleration** section.
4. Select the tick box to allow creators and explorers to accelerate views in their workbooks. Clear the tick box to turn off View Acceleration for the site.
5. Enter the maximum number of views that can be accelerated for your site, or choose **No limit**.



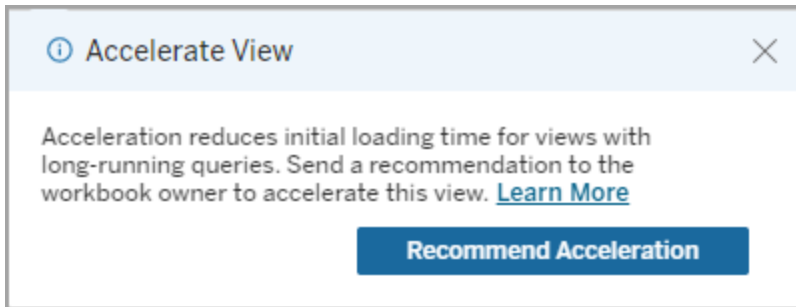
The screenshot shows the 'General' tab of the Tableau Server settings. The 'View Acceleration' section is expanded, showing the following options:

- A heading 'View Acceleration' with a subtext 'Allow views to be accelerated for faster loading time. [Learn more](#)'.
- A checked checkbox labeled 'Allow creators and explorers to accelerate views in their workbooks'.
- A subtext 'Set the maximum number of views that can be accelerated for this site'.
- A radio button labeled 'No limit. Be sure to monitor backgrounder functioning. [Learn more](#)'.
- A selected radio button next to a text input field containing '100' and the label 'Views'.

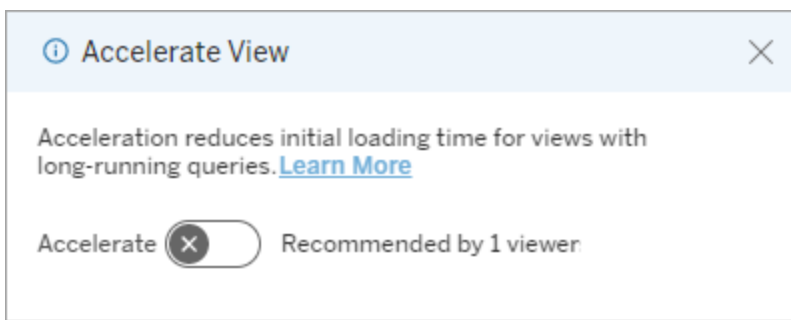
## Accelerate recommended views

Based on a workbook's query time and usage, Tableau sometimes recommends acceleration to improve the performance of slower and more popular views and dashboards. If acceleration is available for a view, users can recommend acceleration for a view once every 30 days.

When a user visits a view, they'll see the option to Recommend Acceleration to the site admin or workbook owner.



When the site admin or workbook owner visits the same view, they'll see the option to accelerate the view, and they'll see how many users have recommended acceleration.



#### Manage Views recommended for acceleration

As a site admin, you can see when Tableau has recommended acceleration for a view:

1. Sign in to your Tableau site.
2. From the left pane, choose **Tasks**.
3. From the **Acceleration status** column, check for views with a **Recommended** status.  
You can also use the **Filter** in the right-side pane to filter for views with a **Recommended** status.

Personalised recommendations for acceleration as a workbook owner or admin:

1. Sign in to your Tableau site.
2. From the top-right of the page, choose the account menu icon.
3. Select **My Content**.
4. Select the **Performance** tab.
5. From the **Actions** column, choose **Accelerate**.

## Automatically suspend acceleration to save resources

To conserve resources, administrators can automatically suspend acceleration for views that are consistently failing. Administrators can set a threshold for the number of times an acceleration task can fail per day, week or month before the acceleration is automatically suspended.

1. Sign in to your Tableau site.
2. From the left pane, choose **Settings**.
3. From the **General** tab, scroll to the **View Acceleration** section.
4. Set the maximum number of failures allowed per day, week or month.
5. Choose **Save**.

**View Acceleration**

Allow views to be accelerated for faster loading time. [Learn more](#)

☒ Allow creators and explorers to accelerate views in their workbooks

Set the maximum number of views that can be accelerated for this site. [Learn more](#)

☐ No limit. Be sure to monitor background functioning.

☒ Limit to  Views

Automatically suspend accelerated views to save resources.

☒ Automatically suspend after  failed accelerations per Week ▼

## View and manage accelerated workbooks

1. Sign in to your Tableau site.
2. From the left pane, choose **Tasks**.
3. Select the **Accelerated Views** tab.
4. Choose the **Actions** menu (...) to Resume or Suspend Acceleration for the selected

view or views.

|                                   |                                             |              |     |                 |          |          |                 |                     |         |
|-----------------------------------|---------------------------------------------|--------------|-----|-----------------|----------|----------|-----------------|---------------------|---------|
| Extract Refreshes 1               |                                             | Flows 0      |     | Subscriptions 0 |          | Alerts 0 |                 | Accelerated Views 4 |         |
| Select All                        |                                             |              |     |                 |          |          |                 |                     |         |
| ↓ View name                       | Actions                                     | Workbook     |     |                 | Location | Owner    | Views (1 month) |                     | Average |
| <input type="checkbox"/> Sheet 24 | ...                                         | single_query |     |                 | Default  | Jane     | 0               |                     |         |
| <input type="checkbox"/> Sheet 1  | Resume Acceleration<br>Suspend Acceleration |              | ive | Default         | Jane     | 0        |                 |                     |         |

## Manage View Acceleration notifications

Administrators can manage whether to receive notifications for views that are automatically suspended.

1. Sign in to your Tableau site.
2. From the left pane, choose **Settings**.
3. From the **General** tab, scroll to the **Manage Notifications** section.
4. To receive notifications for views that are automatically suspended, tick the box for **View Acceleration**.
5. Choose **Save**.

When views are automatically suspended, notifications are sent to site and server administrators. The notification includes information about why the view was suspended and the time that the view was suspended. Select the notification to go to the **Accelerated Views** tab of the **Tasks** page. From this page, administrators can filter the Acceleration Status to find views that were automatically suspended.

## Understand user context for precomputation

Precomputation for accelerated workbooks is performed with the user context of only one user. This user is either:

- The owner of the workbook (if there are no user filters in the workbook or data source, or if there are user filters on the data source but the data source is a published data source).
- or-

- The user that was selected for thumbnail generation the last time the workbook was published (if there are user filters on the workbook and the data source isn't a published data source).

## Understand the cost of View Acceleration

Enabling this feature increases the computation load and number of jobs on Tableau Server backgrounder processes because View Acceleration fetches the required data from data sources in a background process. A background job to precompute the data of an enabled workbook is run if any of the following happen:

- The workbook and published data source are republished (this includes the web-authoring save).
- An extract used by the workbook is refreshed.

Administrators should consider those costs before enabling View Acceleration for many workbooks or scheduling acceleration jobs too frequently.

- Workbooks that are being heavily edited and republished might not be suitable because each republish triggers a pre-computation. We recommend acceleration for workbooks that are published for consumption.
- If a workbook uses multiple extracts, their refresh triggers pre-computation of the data. Thus, frequent extract refreshes for enabled workbooks could cause a spike in backgrounder job load, especially given that, by design, View Acceleration jobs are run after the successful extract refresh.
- The precomputed data for workbooks is stored as materialised views in Hyper.

## Extract Query Load Balancing

In Tableau Server version 2020.2 and later, load balancing for extract-based queries has improved and may result in faster load times for extract-based dashboards. Large deployments that are extract heavy and have a high volume of dashboard loads will probably see the most improvement, particularly if they have Hyper running on standalone nodes. Smaller deployments where Hyper is running on nodes that are shared with other server processes may also see performance improvements.



Hyper logs a server health metric about the amount of resources Hyper is consuming and also takes into account load from other Tableau processes that may be running on the same server node. Based on this information, extract queries will be sent to a node that has available resources to process the query. In addition to evaluating system resources, the load balancer improves the chance that the node you are routed to has the extract already cached. This reduces the number of duplicate extracts across nodes and improves memory and I/O usage.

To use this feature, the Cache Server process must be active. For more information, see [Tableau Server Cache Server](#). If Cache Server process is not enabled, load balancing will automatically revert to the previous functionality.

This feature is turned on by default. To disable it, use the following tsm commands:

```
tsm configuration set -k hyper_standalone.consistent_hashing.enabled  
-v false
```

```
tsm configuration set -k hyper_standalone.health.enabled -v false
```

Apply the changes using the following tsm command: `tsm pending-changes apply`

For more information, see [tsm configuration set Options](#).

# Monitoring Tableau Server

You can configure SMTP and alerts and subscriptions to aid in monitoring Tableau Server.

## Configure SMTP Setup

Tableau Server can email server administrators about system failures, and email server users about subscribed views and data-driven alerts. First, however, you need to configure the SMTP server that Tableau Server uses to send email. After configuring SMTP, complete the steps to configure notifications ([Configure Server Event Notification](#)), then when you start or restart the server, it will trigger an email notification, which confirms that you have set up notifications correctly.

Configuring SMTP requires that you restart Tableau Server services.

## Secure SMTP

To enable and configure TLS for SMTP, you must use the TSM CLI as described in this topic. Tableau Server only supports STARTTLS (Opportunistic or Explicit TLS).

If your organisation does not use public certificates for verifying TLS connections, then you can upload a private certificate to Tableau Server to verify trusted connections. For more information, see the `tsm security custom-cert add` command.

You may also configure SMTP TLS for encryption-only by disabling the certificate validation process. For more information, see the section, *Configuration file reference*, in the *Use the TSM CLI* tab below.

## Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850`. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click **Notifications** on the **Configuration** tab and click **Email Server**.
3. Enter the SMTP configuration information for your organisation:

## Tableau Server on Windows Help

The screenshot shows the 'CONFIGURATION' tab in the Tableau Server interface. Under the 'Notifications' section, the 'Email Server' sub-tab is active. The 'Configure email server' section contains several input fields: 'SMTP server address' (smtp.example.lan), 'Username' (tableau-notify@example.lan), 'Password' (masked with dots), 'Port Number' (25 (Default)), 'Send all emails from' (no-reply@example.lan), 'Send server health email to' (tableau-health@example.lan), and 'Tableau Server URL' (https://tableau.example.lan). There are also instructions for each field, such as 'Type an email address that all emails will be sent from' and 'Choose a footer link to embed in all email alerts and subscriptions'. At the bottom, there are 'Cancel' and 'Save Pending Changes' buttons.

4. Click **Save Pending Changes** after you've entered your configuration information.
5. Click **Pending Changes** at the top of the page:



6. Click **Apply Changes and Restart**.
7. Run the `tsm email test-smtp-connection` to view and verify the connection configuration. See `tsm email test-smtp-connection`.

## Use the TSM CLI

For the initial configuration of SMTP, we recommend that you use the configuration file template below to create a json file. You can also set any single configuration key listed below with the syntax described in `tsm configuration set`.

1. Copy the following json template to a file.

**Important:** The template below includes common options for most deployments. After you copy the template to a text file, you must edit the option values for your SMTP server requirements. You may need to remove or add options. See the reference section that follows for more information about all supported SMTP key options.

```
{
  "configKeys": {
    "svcmonitor.notification.smtp.server": "SMTP server host
name",
    "svcmonitor.notification.smtp.send_account": "SMTP user name",
    "svcmonitor.notification.smtp.port": 443,
    "svcmonitor.notification.smtp.password": "SMTP user account
password",
    "svcmonitor.notification.smtp.ssl_enabled": true,
    "svcmonitor.notification.smtp.from_address": "From email
address",
    "svcmonitor.notification.smtp.target_addresses": "To email
address1,address2",
    "svcmonitor.notification.smtp.canonical_url": "Tableau Server
URL"
  }
}
```

2. Run the `tsm settings import -f file.json` to pass the json file with the appropriate values to Tableau Services Manager to configure Tableau Server for SMTP. Tableau Services Manager will validate the entity values.
3. Run the `tsm pending-changes apply` command to apply the changes. See `tsm pending-changes apply`.

4. Run the `tsm email test-smtp-connection` to view and verify the connection configuration. See `tsm email test-smtp-connection`.

### SMTP CLI configuration reference

This table lists all of the options that can be used to configure SMTP with TSM CLI.

| Option                                                  | Description                                                                                                   |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <code>svc-monitor.notification.smtp.server</code>       | Address of SMTP server.<br><br>Example:<br><br>"svc-monitor.notification.smtp.server":<br>"mail.example.com"  |
| <code>svc-monitor.notification.smtp.send_account</code> | User name for SMTP account.                                                                                   |
| <code>svc-monitor.notification.smtp.port</code>         | Port number for SMTP server. The default is 25.                                                               |
| <code>svc-monitor.notification.smtp.password</code>     | Password for SMTP server account.<br><br>Example:<br><br>"svc-monitor.notification.smtp.password": "password" |
| <code>svc-monitor.notification.smtp.ssl_</code>         | Specifies whether the connection to the SMTP server is encrypted. The default is false.                       |

| Option                                                               | Description                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>enabled</code>                                                 |                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>svc-monitor.notification.smtp.ssl_required</code>              | <p>If enabled, Tableau Server will refuse to connect to SMTP servers without using TLS. The <code>svc-monitor.notification.smtp.ssl_enabled</code> option must also be set to true.</p> <p>The default is false.</p>                                                                                                                                                              |
| <code>svc-monitor.notification.smtp.ssl_check_server_identity</code> | <p>If set to true, Tableau Server will check the SMTP server identity as specified by <a href="#">RFC 2595</a>. These additional checks based on the content of the server's certificate are intended to prevent man-in-the-middle attacks.</p> <p>The default is false.</p>                                                                                                      |
| <code>svc-monitor.notification.smtp.ssl_trust_all_hosts</code>       | <p>When using TLS, trust certificates from all mail servers, ignoring the validity of the certificate's chain of trust. By setting this key to true, TLS will be used only to encrypt the traffic to the SMTP host.</p> <p>The default is false.</p>                                                                                                                              |
| <code>svc-monitor.notification.smtp.ssl_ciphers</code>               | <p>The default and supported sets of cipher suites are defined by the version of JDK that is installed with Tableau Server. See the section below, <a href="#">TLS ciphers</a>, for a list of supported and default ciphers.</p> <p>To update the cipher suites used by Tableau Server for SMTP TLS connections, enter a white space-separated list of cipher suites for this</p> |

| Option                                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           | <p>value. For example, "TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256 TLS_DHE_DSS_WITH_AES_128_GCM_SHA256 TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384".</p>                                                                                                                                                                                                                                                                                                                                                |
| <pre>svc- mon- itor.notification.smtp.ssl_ versions</pre> | <p>The default TLS versions enabled on this version of Tableau Server are TLSv1, TLSv1.1, TLSv1.2 and TLSv1.3.</p> <p>TLS version support is defined by the version of JDK that is installed with Tableau Server.</p> <p>Supported versions of TLS are SSLv2Hello, SSLv3, TLSv1, TLSv1.1, TLSv1.2, TLSv1.3.</p> <p>To update the versions used by Tableau Server for SMTP TLS connections, enter a white space-separated list of versions for this value. For example, "TLSv1.2 TLSv1.3".</p> |
| <pre>svc- mon- itor.notification.smtp.from_ address</pre> | <p>Email address that will send an notification if there's a system failure. The email address must have valid syntax (for example, ITalerts@bigco.-com or noreply@mycompany), but it does not have to be an actual email account on Tableau Server. (Some SMTP servers may require an actual email account, however.)</p> <div data-bbox="760 1541 1360 1682"> <p><b>Note:</b> You can override the system-wide email address on a per-site basis. For more</p> </div>                       |

| Option                                                                          | Description                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                 | <p>information, see <a href="#">What is a site</a>.</p> <p>Example:</p> <pre>"svcmonitor.notification.smtp.from_address": "donot-reply@example.com"</pre>                                                                                                                                                    |
| <pre>svc-<br/>mon-<br/>itor.no-<br/>tification.smtp.target_<br/>addresses</pre> | <p>Email address to receive notifications. If email notifications are enabled, you need to include at least one address. Separate multiple addresses with commas.</p> <p>Example:</p> <pre>"svc-<br/>monitor.notification.smtp.target_<br/>addresses": "iluvdata@example.com"</pre>                          |
| <pre>svc-<br/>mon-<br/>itor.no-<br/>tification.smtp.canonical_<br/>url</pre>    | <p>URL of the Tableau Server. Enter <code>http://</code> or <code>https://</code>, followed by the name or IP address of the Tableau server. Used in the footer of subscription email.</p> <p>Example:</p> <pre>"svc-<br/>monitor.notification.smtp.canonical_<br/>url": "http://myserver.example.com"</pre> |

## TLS ciphers

The following is a list of TLS ciphers that are supported by the JDK that is included with Tableau Server. In this version of Tableau Server, all of these ciphers are enabled by default. You can specify a custom list of ciphers for your SMTP configuration by entering a white-



space separated list with the option, `svcmonitor.notification.smtp.ssl_ciphers`, as described in the table above.

|                                        |                                         |
|----------------------------------------|-----------------------------------------|
| TLS_RSA_WITH_AES_128_CBC_SHA256        | TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384    |
| TLS_DHE_DSS_WITH_AES_256_GCM_SHA384    | TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256    |
| TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384   | TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA    |
| TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA    | TLS_RSA_WITH_AES_256_CBC_SHA256         |
| TLS_RSA_WITH_AES_128_GCM_SHA256        | TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384 |
| TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256   | TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 |
| TLS_DHE_DSS_WITH_AES_128_CBC_SHA256    | TLS_DHE_DSS_WITH_AES_256_CBC_SHA        |
| TLS_DHE_RSA_WITH_AES_128_CBC_SHA256    | TLS_DHE_RSA_WITH_AES_256_CBC_SHA256     |
| TLS_RSA_WITH_AES_256_GCM_SHA384        | TLS_EMPTY_RENEGOTIATION_INFO_SCSV       |
| TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384 | TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA    |
| TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA     | TLS_DHE_DSS_WITH_AES_256_CBC_SHA256     |
| TLS_RSA_WITH_AES_256_CBC_SHA           | TLS_ECDHE_ECDSA_WITH_AES_128_           |

|                                         |                                        |
|-----------------------------------------|----------------------------------------|
|                                         | CBC_SHA256                             |
| TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256  | TLS_DHE_RSA_WITH_AES_256_CBC_SHA       |
| TLS_DHE_DSS_WITH_AES_128_GCM_SHA256     | TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256  |
| TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384   | TLS_ECDH_RSA_WITH_AES_128_CBC_SHA      |
| TLS_DHE_RSA_WITH_AES_256_GCM_SHA384     | TLS_DHE_RSA_WITH_AES_128_CBC_SHA       |
| TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256   | TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA     |
| TLS_DHE_RSA_WITH_AES_128_GCM_SHA256     | TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256 |
| TLS_ECDH_RSA_WITH_AES_256_CBC_SHA       | TLS_DHE_DSS_WITH_AES_128_CBC_SHA       |
| TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA     | TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384  |
| TLS_RSA_WITH_AES_128_CBC_SHA            | TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384 |
| TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 | TLS_AES_256_GCM_SHA384                 |
| TLS_AES_128_GCM_SHA256                  |                                        |

## Configure Server Event Notification

A Tableau Services Manager (TSM) administrator can configure Tableau Server to allow notifications for the following events:

- Content updates
  - Extract failures (enabled by default)
  - Subscription views for users (disabled by default)
- Server health monitoring
  - Server status changes (disabled by default)
  - Desktop Licence reporting (disabled by default)
- Drive space
  - Email alerts when disk space crosses or remains below pre-configured thresholds (disabled by default)
  - Recording usage history (enabled by default)

**Note:** You need to configure SMTP before you can configure subscriptions or notifications. For more information, see [Configure SMTP Setup](#).

### Use the TSM web interface

1. Open TSM in a browser:

`https://<tsm-computer-name>:8850.`

For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click **Notifications** on the **Configuration** tab and click **Events**.
3. Configure notification settings for your organisation:
  - Content updates

- **Send emails for extract refresh failures**

When this option is enabled (the default), a server administrator can configure email notifications to be sent when extract refreshes fail. These

messages are configured at the site level, so even if this option is enabled, messages are not sent unless the **Send email to data source and workbook owners when scheduled refreshes fail** option is enabled for a site (this is enabled by default). For details, see [Enable Extract Refresh Scheduling and Failure Notification](#).

- **Allow users to receive email for views that they have subscribed to**

When this option is enabled (by default is it disabled), a server administrator can configure a site to send subscription email. These email messages are configured at the site level and can only be configured when this option is enabled. For details, see [Set Up a Site for Subscriptions](#).

When users subscribe to a workbook or view, a snapshot of the view is emailed to them on a scheduled basis, so they can see the latest updates without having to sign into Tableau Server.

To allow users to attach PDF renderings on subscription emails, select **Let users add attachments to subscribed views**.

- Server health monitoring

- **Send emails for Tableau Server process events (up, down and fail-over)**

Tableau Server sends an email message when the data engine, file store, gateway or repository server processes stop or restart, or when the initial Tableau Server node stops or restarts.

If you are running a single-server installation (all processes on the same computer), health alerts are only sent when Tableau Server is up. No "down" alerts are sent. If you are running a distributed installation that's configured for failover, a DOWN alert means that the active repository or a data engine instance has failed and the subsequent UP alert means that

the passive instance (repository) or second instance (data engine) of that process has taken over.

**Note:** Tableau Server is designed to be self-correcting. If a service or process stops responding or goes down, Tableau Server attempts to restart it. This can take 15 to 30 minutes to complete. Because of this, reacting immediately to service or process alerts can be counter-productive, especially in an installation with redundant services that can handle requests while one restarts.

- **Enable Tableau Desktop Licence reporting**

Licence reporting data originates in Tableau Desktop and is sent to Tableau Server. When this option is enabled, Tableau Server will generate and display the administrative report for Desktop Licence reporting. For information on the report, see Desktop Licence Usage.

- **Drive space**

Enable notifications (alerts) for remaining disk space on your Tableau Server.

- **Send emails when unused drive space drops below thresholds**

You can configure Tableau Server to send email notifications when disk space usage on any node crosses a threshold, or remains below the threshold. And you can configure how often threshold notifications are sent.

There are two thresholds you must set, **Warning threshold** and **Critical threshold**. Thresholds are expressed in percentage of disk

space remaining. The critical threshold must be less than the warning threshold.

You also specify the **Send threshold alert every** option. This determines how often, in minutes, warning and critical notifications should be sent. The default value is 60 minutes.

- **Record disk space usage information and threshold violations for use in custom administrative views**

When you configure Tableau Server to record disk space usage, information about free disk space is saved in the repository and you can view the usage history using the Administrative Views.

4. Click **Save Pending Changes** after you've entered your configuration information.
5. Click **Pending Changes** at the top of the page:



6. Click **Apply Changes and Restart**.

## Use the TSM CLI

The various notification values described above can be set individually with the `tsm configuration set` command. Alternatively, you can construct a json file and pass all configuration values in one operation. Both methods are described in this section.

### Set notification values individually

The following table shows the key/value pairs that map to the notification events described earlier in this topic. Use the `tsm configuration set` command with the following syntax to set a single key/value pair:

```
tsm configuration set -k <config.key> -v <config_value>
```

For example, to enable job failure notifications, run the following command:

```
tsm configuration set -k backgrounder.notifications_enabled -v true
```

| Notification option                                         | Key                                         | Value                          |
|-------------------------------------------------------------|---------------------------------------------|--------------------------------|
| Extract failures or Flow run failures                       | backgrounder.notifications_enabled          | true   false                   |
| Enable subscription views for user                          | subscriptions.enabled                       | true   false                   |
| Enable PDF attachments for subscriptions                    | subscriptions.attachments_enabled           | true   false                   |
| Maximum attachment size (MB) for subscription notifications | subscriptions.max_attachment_size_megabytes | integer value, default is 150  |
| Server status changes                                       | svcmonitor.notification.smtp.enabled        | true   false                   |
| Licence reporting                                           | features.DesktopReporting                   | true   false                   |
| Remaining space thresholds: enable email notifications      | storage.monitoring.email_enabled            | true   false                   |
| Remaining space thresholds: warn-                           | storage.monitoring.warning_percent          | integer value, for example, 20 |

|                                                 |                                                        |                                            |
|-------------------------------------------------|--------------------------------------------------------|--------------------------------------------|
| ing percentage                                  |                                                        |                                            |
| Remaining space thresholds: critical percentage | <code>storage.monitoring.critical_percent</code>       | integer value, for example, 15             |
| Set email interval                              | <code>storage.monitoring.email_interval_min</code>     | integer value, in minutes, for example, 25 |
| Record usage history                            | <code>storage.monitoring.record_history_enabled</code> | true   false                               |

After you are done setting values, you must run the following command:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Set all notification values with a single json file

To make all notifications settings with a single configuration, you can pass a json file.

Copy and edit the following template to create a file for your configuration.

```
{
  "configKeys": {
    "backgrounder.notifications_enabled": true,
    "subscriptions.enabled": true,
    "subscriptions.attachments_enabled": true,
    "subscriptions.max_attachment_size_megabytes": 150,
    "svcmonitor.notification.smtp.enabled": true,
```



## Tableau Server on Windows Help

```
"features.DesktopReporting": true,  
"storage.monitoring.email_enabled": true,  
"storage.monitoring.warning_percent": 20,  
"storage.monitoring.critical_percent": 15,  
"storage.monitoring.email_interval_min": 25,  
"storage.monitoring.record_history_enabled": true  
}  
}
```

After you have saved the file, pass it with the following command:

```
tsm settings import -f <path-to-file.json>
```

To apply changes, run the following command:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Maintenance

You should perform regular maintenance on Tableau Server, such as creating backups, synchronising Active Directory groups and removing unneeded files.

## Backup and Restore

A Tableau Server administrator should perform regular database maintenance, monitor disk usage on the server, clean up unnecessary files to free up space on the server and back up Tableau Server and its data. Taking these steps can help ensure that Tableau Server runs with maximum efficiency.

You can use the Tableau Services Manager (TSM) command line tool to back up and restore your Tableau data. Tableau data includes data extract files, as well as Tableau Server's own PostgreSQL database, which stores workbook and user metadata and server configuration data. Tableau Server log files capture activity and can help you diagnose problems. Logs are written to folders on the server and you can archive and remove them to save disk space.

**Note:** You can use the `tsm maintenance restore` command to restore Tableau Server backups created using `tabadmin backup` and `tsm maintenance backup`. Database backups made in other ways, and virtual machine snapshots are not valid sources for restoring Tableau Server.

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

### Platform compatibility

You can use a backup created with Tableau Server on Linux to restore Tableau Server on Windows version 2018.2 and later.



You cannot use a backup created with Tableau Server on Linux to restore earlier versions of Tableau Server on Windows (version 2018.1 and earlier).

You can use a backup created with Tableau Server on Windows (version 2018.2 and earlier) to restore Tableau Server on Linux. For more information about restoring a Windows backup on Tableau Server on Linux, see [Migrate Tableau Server from Windows to Linux](#).

## Disk Space Usage for Backup and Restore

The free disk space required to create a backup varies depending on the amount of data in the Tableau Server repository and file store services, and their collocation with the tabadmincontroller service. During backups, the background tasks for cleaning up old extracts are temporarily paused. This means that, for the duration of the backup, extract refreshes will leave extra files in place, adding to disk space usage. If your backup takes a long time, or if your organisation uses many extracts that are regularly updated, this can result in a significant amount of temporary disk space usage. These temporary files will be removed after the backup is complete.

The following table lists the disk space requirements for backup based on whether the node hosts the repository, file store, controller or some combination of them. In multi-node Tableau Server environments, you need to estimate the required disk space on each node.

| Repository                                                                          | File Store                                                                          | Controller | Disk Space Required                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                                     |            | <p>3x repository data + 250 MB</p> <p>To obtain an estimate of the repository data, check the size of &lt;data directory&gt;/pgsql/data/base directory.</p> <p>To obtain the exact size of the repository data, open the backup file and use the size of the workgroup.pg_dump file.</p> |
|                                                                                     |  |            | 1.5x file store data                                                                                                                                                                                                                                                                     |

|   |   |   |                                                                                                                            |
|---|---|---|----------------------------------------------------------------------------------------------------------------------------|
|   |   |   | To obtain an estimate of file store data (extracts, flows, etc.), check the size of <data directory>/dataengine directory. |
|   |   | ✓ | 3x repository data + 250 MB + 2.5x file store data                                                                         |
| ✓ | ✓ |   | 3x repository data + 250 MB + 1.5x file store data                                                                         |
|   | ✓ | ✓ | 3x repository data + 250 MB + 1.5x file store data                                                                         |
| ✓ |   | ✓ | 3x repository data + 250 MB + 2.5x file store data                                                                         |
| ✓ | ✓ | ✓ | 3x repository data + 250 MB + 1.5x file store data                                                                         |

### Restore disk space requirements

You must have adequate disk space for the database restore process to run successfully.

To restore Tableau Server:

- On controller nodes, you need free space equal to at least the size of the backup archive.
- On repository nodes, you need free space equal to at least three times the size of the repository data in the backup archive, plus 250 MB, plus the size of the postgresql data directory.
- On file store nodes, you need free space equal to at least twice the size of the dataengine folder in the backup archive.

## Best Practices for Backing Up Tableau Server

We recommend following these security and performance best practices.

### Protect backup file

While configuration secrets are encrypted when stored on disk internally, when these configurations are exported to a backup file, some secrets are written into the file in plain text. It is up to the administrator to take measures to protect the backup file. There are a variety of options available:

- Write the file to an encrypted file system.
- Write the file to a disk that is physically protected and restricted to specific users.
- Encrypt the backup file.

### Maximise backup efficiency

There are several ways you can maximise backup efficiency. Your environment can impact how effective each of these is, so test with your data to see what works best.

#### **Optimising with topology configurations:**

- Co-locating File Store on the same node as the Administration Controller can reduce the length of time it takes to back up Tableau Server by reducing or eliminating the need to transfer data between nodes during the backup process. This is especially true if your organisation uses many extracts.
- Co-locating the repository (pgsql) with the Administration Controller node can also help to reduce back up time, but the time savings is less significant than that of the File Store.

The Administration Controller is usually on the initial node, unless you have had an initial node failure and moved the controller to another node.

#### **Optimising with backup strategies:**

Backup is a resource intensive process. If possible, doing your backups during off peak hours is a generally a good strategy. But this however, depends on your requirements and how often Tableau Server data is updated and what your restore requirements. For a detailed explan-

ation of backup and disaster recovery, see [Tableau Server Disaster Recovery](#). Here are some backup strategies and adopt them to your requirements

- **Type of storage:** Solid State disks are recommended in general for backups. SSD helps make your backups faster and complete sooner compared to traditional spinning disks.
- **Backup compression:** You have the option of running your backups with or without compression. When you do your backup with compressions, your backup size will be comparatively smaller, but you may see a slower performance. So if your goal is more focused on speed, choose the `--skip-compression` option:

Use the `--skip-compression` option when backing up Tableau Server. This creates the backup without using compression, and results in a larger backup file but can reduce the amount of time it takes for the backup to complete. For more information, see [tsm maintenance backup](#).

- **Snapshot backup:** This option is only available if you have configured your Tableau Server with External File Store. Although the performance of snapshot backups depend on the type of network attached storage, in general snapshot backups are faster than the traditional Tableau Server backups. For more information see, [Tableau Server External File Store](#).

## Perform a Full Backup and Restore of Tableau Server

You can use the following steps to back up your Tableau Server deployment. Specifically, these steps describe how to recover a clone of a server from a collection of backup data and assets.

**Note:** The backup process can take a long time to run. Since no other jobs can be run while backup is running, we recommend that you run backup during non-business hours.

### Backup data types

There are two types of backup data that Tableau Server can generate. We recommend performing regular backups of each type in case you need to restore a server in a recovery scenario:

- **Data managed by Tableau Server:** consists of the Tableau PostgreSQL database or repository, and File Store, which contains workbook and user metadata, data extract files and site configuration data. When you use TSM to create a backup, all of this data is saved in a single file with a .tsbak extension. This data is backed up with the `tsm maintenance backup` command.

**Note:** When an external File Store is configured, you cannot use the `tsm maintenance backup` command to back up Tableau Server Data. For information on how to back up this data, see [Backup and Restore with External File Store](#).

- You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.
- You can only restore a backup file to a version of Tableau Server version that is the same or newer than the version the backup was created on. You cannot restore to an older version of Tableau.
- **Important:** If you perform Blue/Green upgrades or manually upgrade Tableau Server 2021.4 (or earlier) using the [tsm maintenance \(backup and restore\)](#) method, you must enable `legacy-identity-mode` before you can restore to Tableau Server 2022.1 (or later). For more information, see [Troubleshoot Issues with the Identity Migration](#).
- Beginning with version 2022.3, backups created using `tabadmin` ("pre-TSM backups") are not supported. You cannot restore a pre-TSM backup to Tableau Server version 2022.3 or later.

- Configuration and Topology data: includes most of the server configuration information required to fully recover a server. SMTP, alerting, some authentication assets, are all examples of configuration data that are exportable for backup. Topology data defines how your Tableau Server processes are configured in both single-server and multiple node deployments. Configuration and topology data is backed up with the `tsm settings export` command.

**Note:** You can change the file path used by the `tsm maintenance backup` command from the default value. For more information, see [tsm File Paths](#).

### Backup assets that require a manual process

Some configuration data is not included in the `tsm settings export` command and must therefore be documented and restored manually. The following configuration data is excluded from the `tsm settings export` operation. Your backup maintenance process should include documenting the following Tableau Server configuration data:

- System user accounts. Tableau Server setup uses an unprivileged user account, `NetworkService`. This account is used to access Tableau Server resources. If you have not changed this account, then you do not need to document it.
- Coordination Service deployment configuration. If you are running a multinode cluster, document which nodes are running the Coordination Services process. To view process configuration on your nodes, run `tsm topology list-nodes -v`.
- Customisation settings. If your organisation uses custom header or sign-in logos for Tableau Server web pages, you should include a copy of those assets with your backup portfolio. See [tsm customise](#).
- Most authentication assets. While the locations for files may be included in an exported `settings.json` file, most certificate files, key files, keytab files or other authentication-related assets are not backed up by TSM. Verify that any of these assets you are trying to move won't need to be recreated.



There are three exceptions:

- The public certificate and private key for the internal PostgreSQL database (if enabled) are backed up.
- The certificate and key for external SSL are backed up and included in the configuration data.
- The custom certificate installed by `tsm security custom-cert add` (if added) is backed up.

However, all other authentication-related assets are not backed up. For example, if you have enabled access to the PostgreSQL database with the `tsm data-access repository-access enable` command, be sure to document the name/password pairs for each account you've configured. These credentials are not backed up. The certificate and key for mutual SSL are not included in the back up.

- LDAP assets. Keytab files, configuration files, and or other LDAP-related assets are not backed up by TSM.

Internal server secrets and repository passwords are crypto-related configurations that are not exported. However, you do not need to document configuration values. New secrets will be created as part of the restoration process when you initialise the new instance.

### Backing up Tableau Server for recovery

Tableau Server includes commands that you run to generate backup data for Tableau Server.

Before backing up Tableau Server, verify that permissions are configured correctly for the following scenarios:

- Tableau Server installed on non-default drive: If you have installed Tableau Server on a non-default drive or folder, then you will need to manually configure permissions for the Network Service account. You may also need to configure additional permissions for the Run As service account. See [Installing in a non-default location](#).
- When backing up Tableau Server on Windows to a network drive, the Machine account must have write access to the network share where the backup files are written (this is

not normally the case and you are responsible for configuring this if you want to back the server up to a network share).

To back up server topology and configuration data, use the `tsm settings` command.

1. Topology and configuration data are included when you run the `tsm settings export` command. The data is exported as a json file. Specify the name and location of the json file by running the following command:

```
tsm settings export -f <filename>.json
```

**Note:** Because the backup contains secrets, we recommend that you encrypt the backup and store it in a secure place. For more information about Tableau Server secrets, see [Manage Server Secrets](#).

2. Back up repository and File Store data. Repository data is backed up with the `tsm maintenance backup` command. Specify the name and location of the backup file by running the following command:

```
tsm maintenance backup -f <filename>.tsbak -d
```

The backup file is assembled in a temporary location in the data directory and then written to the directory defined in the TSM `basefilepath.backupstore` variable. By default:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\<filename>.tsbak
```

For more information about where backup files are written and how to change that location, see [tsm File Paths](#). **Note:** Even when you change the backup location, the backup process uses a temporary location in the data directory to assemble the backup file.

**Note:** When File Store is configured external to Tableau Server you cannot use the `tsm maintenance backup` command to backup Tableau Server Data. For more information on how to backup this data, see [Backup and Restore with External File Store](#).

## Restoring core Tableau Server functionality

The procedure below uses the assets from the previous two sections to rebuild a Tableau Server in a recovery scenario.

**Note:** If you need to restore only the repository on an otherwise functional Tableau Server, see [Restore from a Backup](#). If you are running a distributed deployment, and your initial node has failed, see [Recover from an Initial Node Failure](#).

You must have the following assets ready:

- **Topology and configuration data:** This is the json file that is generated by the `tsm settings export` command.
- **Repository backup file:** This is the file with a `.tsbak` extension that is generated by the `tsm maintenance backup` command.

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

When you use `tsm maintenance restore` to restore your Tableau data, data extract files and the contents of the PostgreSQL database are overwritten with the content in the backup file (`.tsbak`). If you are running a distributed installation of Tableau Server, perform the restore on the node running the TSM Controller (this is usually the initial node).

- Backup assets: These assets include the list of documented configurations as noted in the previous section.

## To restore a standalone Tableau Server

1. On the computer where you want to restore Tableau Server, Install TSM. If your organisation used non-default system user accounts, as described in an early section of this topic, then you must specify the users during this step.
2. Activate and Register Tableau Server.
3. (Optional). Configure the local firewall. See "Local firewall configuration" in Before you install....
4. (Optional). Verify LDAP.
5. Initialise Tableau Server. See Configure Initial Node Settings.
6. Import topology and configuration data. Copy the topology and configuration json backup file to the computer. Import the json file by running the following command:

```
tsm settings import -f <filename>.json
```

7. (Optional). Apply pending changes. At a command prompt, run:

```
tsm pending-changes apply
```

8. Restart Tableau Server. At a command prompt, run:

```
tsm restart
```

9. Restore repository data. See Restore from a Backup.

## To restore a Tableau Server cluster

## Tableau Server on Windows Help

1. On the initial node, Install TSM. If your organisation used non-default system user accounts, as described in an early section of this topic, then you must specify the users during this step.
2. On the initial node, Activate and Register Tableau Server.
3. (Optional). On the initial node, configure the local firewall. See "Local firewall configuration" in Before you install....
4. On the initial node verify LDAP (optional), and initialise Tableau Server. See Configure Initial Node Settings.
5. On the initial node, run `tsm topology nodes get-bootstrap-file --file <path\file>.json`.
6. Copy the bootstrap.json file to all additional nodes in the cluster.
7. On each additional node in the cluster, install the Tableau Server package.
8. On the initial node, run `tsm topology list-nodes -v` and ensure that the node names have not changed from exported topology settings. *If the node names have changed, topology settings should be manually updated with new names, or the processes should be manually configured.*
9. The Cluster Controller process is required on every node and needs to be added explicitly. From the initial node, add an instance of the Cluster Controller to each additional node, where `<nodeID>` is the ID of one of the additional nodes. Add the process to each node separately. In this example we are adding the Cluster Controller to nodes 2 and 3:

```
tsm topology set-process -n node2 -pr clustercontroller -c 1
tsm topology set-process -n node3 -pr clustercontroller -c 1
tsm pending-changes apply
```

10. From the initial node, Deploy a Coordination Service Ensemble. The ensemble configuration must match your previous configuration.
11. On the initial node, import topology and configuration data. Copy the topology and configuration json backup file to the computer. Import the json file by running the following command:

```
tsm settings import -f <filename>.json
```

12. On the initial node, apply pending changes. At a command prompt, run:

```
tsm pending-changes apply
```

13. On the initial node, restart Tableau Server. At a command prompt, run:

```
tsm restart
```

14. On the initial node, restore repository data. See [Restore from a Backup](#).

### Restore other functionality

If the previous server was configured with the following features, then you will need to re-enable and reconfigure them on the restored server:

- Authentication solutions: OpenID, external SSL, and trusted authentication. See [Authentication](#).
- Site customisations: See [tsm customise](#).
- Enable access to PostgreSQL repository: See [tsm data-access repository-access enable](#).

### Reencrypt Extracts After Restore

Optionally, if you are using the extract encryption at rest feature, after the backup is restored, you can reencrypt the extracts using different encryption keys. See [Extract Encryption at Rest](#).

Run `tabcmd reencryptextracts <site-name>` to reencrypt extracts on a given site. For more information, see `reencryptextracts`. Run this command on every site where you are storing encrypted extracts. Depending on the number of encrypted extracts on the site, this operation could consume significant server processing load. Consider running this operation outside of business hours.

## Back up Tableau Server Data

Regularly backing up Tableau Server is an important step in proper administration and maintenance of your server. You can use the `tsm maintenance restore` command to restore Tableau Server backups created using the `tsm maintenance backup` command. Database backups made in other ways, and virtual machine snapshots are not valid sources for restoring Tableau Server, so it is critical that you have an up-to-date backup.

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

Looking for Tableau Server on Linux? See [Back Up Tableau Server Data](#).

Tableau Server data includes data extract files, as well as the Tableau PostgreSQL database, which contains workbook and user metadata and configuration data. When you use TSM to create a backup, all of this data is saved in a single file with a `.tsbak` extension. If you are running a distributed installation of Tableau Server data from all the nodes is backed up.

The frequency of your backups depends on your environment, including how much use your server gets and how much and frequently the content and users change. Any changes or updates that happen after your backup will be lost if there is a system failure and you need to restore Tableau Server. The more activity there is, the more often you need to back the server up.


In addition to regular backups, you should *always* create a backup before upgrading to a new version of Tableau Server. The upgrade process does not create a backup except when the version of PostGRES is being updated, and then the upgrade process creates a PostGRES-only backup to be used internally.

To help protect against data loss, after you create the backup, you should store the .tsbak file on a computer that is not a part of your Tableau Server installation.

### Disk Space Usage for Backup

The free disk space required to create a backup varies depending on the amount of data in the Tableau Server repository and file store services, and their collocation with the tabadmincontroller service. During backups, the background tasks for cleaning up old extracts are temporarily paused. This means that, for the duration of the backup, extract refreshes will leave extra files in place, adding to disk space usage. If your backup takes a long time, or if your organisation uses many extracts that are regularly updated, this can result in a significant amount of temporary disk space usage. These temporary files will be removed after the backup is complete.

The following table lists the disk space requirements for backup based on whether the node hosts the repository, file store, controller or some combination of them. In multi-node Tableau Server environments, you need to estimate the required disk space on each node.

| Repository                                                                          | File Store | Controller | Disk Space Required                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |            |            | <p>3x repository data + 250 MB</p> <p>To obtain an estimate of the repository data, check the size of &lt;data directory&gt;/pgsql/data/base directory.</p> <p>To obtain the exact size of the repository data, open the backup file and use the size of the workgroup.pg_</p> |



|   |   |   |                                                                                                                                                        |
|---|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |   |   | dump file.                                                                                                                                             |
|   | ✓ |   | 1.5x file store data<br><br>To obtain an estimate of file store data (extracts, flows, etc.), check the size of <data directory>/dataengine directory. |
|   |   | ✓ | 3x repository data + 250 MB + 2.5x file store data                                                                                                     |
| ✓ | ✓ |   | 3x repository data + 250 MB + 1.5x file store data                                                                                                     |
|   | ✓ | ✓ | 3x repository data + 250 MB + 1.5x file store data                                                                                                     |
| ✓ |   | ✓ | 3x repository data + 250 MB + 2.5x file store data                                                                                                     |
| ✓ | ✓ | ✓ | 3x repository data + 250 MB + 1.5x file store data                                                                                                     |

### Optimising Tableau Server Backup

There are several ways you can maximise backup efficiency. Your environment can impact how effective each of these is, so test with your data to see what works best.

#### Optimising with topology configurations:

- Co-locating File Store on the same node as the Administration Controller can reduce the length of time it takes to back up Tableau Server by reducing or eliminating the need to transfer data between nodes during the backup process. This is especially true if your organisation uses many extracts.
- Co-locating the repository (pgsql) with the Administration Controller node can also help to reduce back up time, but the time savings is less significant than that of the File Store.

The Administration Controller is usually on the initial node, unless you have had an initial node failure and moved the controller to another node.

### Optimising with backup strategies:

Backup is a resource intensive process. If possible, doing your backups during off peak hours is a generally a good strategy. But this however, depends on your requirements and how often Tableau Server data is updated and what your restore requirements. For a detailed explanation of backup and disaster recovery, see [Tableau Server Disaster Recovery](#). Here are some backup strategies and adopt them to your requirements

- **Type of storage:** Solid State disks are recommended in general for backups. SSD helps make your backups faster and complete sooner compared to traditional spinning disks.
- **Backup compression:** You have the option of running your backups with or without compression. When you do your backup with compressions, your backup size will be comparatively smaller, but you may see a slower performance. So if your goal is more focused on speed, choose the `--skip-compression` option:

Use the `--skip-compression` option when backing up Tableau Server. This creates the backup without using compression, and results in a larger backup file but can reduce the amount of time it takes for the backup to complete. For more information, see [tsm maintenance backup](#).

- **Snapshot backup:** This option is only available if you have configured your Tableau Server with External File Store. Although the performance of snapshot backups depend on the type of network attached storage, in general snapshot backups are faster than the traditional Tableau Server backups. For more information see, [Tableau Server External File Store](#).

Create a backup using the TSM command line interface (CLI)

Use the `tsm maintenance backup` command to create a backup of the data managed by Tableau Server. This data includes data extract files and the Tableau PostgreSQL database,

which contains workbook and user metadata.

Before backing up Tableau Server, verify that permissions are configured correctly for the following scenarios:

- Tableau Server installed on non-default drive: If you have installed Tableau Server on a non-default drive or folder, then you will need to manually configure permissions for the Network Service account. You may also need to configure additional permissions for the Run As service account. See [Installing in a non-default location](#).
- When backing up Tableau Server on Windows to a network drive, the Machine account must have write access to the network share where the backup files are written (this is not normally the case and you are responsible for configuring this if you want to back the server up to a network share).

To back up server configuration data, use the `tsm settings` command. When you use the `tsm maintenance backup` command, the current date is appended to the backup file:

```
tsm maintenance backup -f <backup_file> -d
```

For more information, see [tsm maintenance backup](#).

### Create a pre-upgrade backup

You should always create a backup before upgrading Tableau Server. You can create a backup while Tableau Server is running and minimise the amount of time the server is unavailable during upgrade. The process for creating a pre-upgrade backup is the same as for creating regular backups, with one additional consideration for distributed installations.

**Note:** Uninstall Tableau Server from any nodes that you are not including in your new installation to avoid conflicts between the older nodes and the new installation.

## Backups during upgrades

During a Tableau Server upgrade, when necessary, a temporary backup of the database may be created to allow for migrations that occur as part of upgrades. This is done during the upgrade and in most cases has no noticeable impact to the upgrade process. In certain special cases there can be additional impacts:

- Upgrades to Tableau Server 2022.1 (or later) from version 2021.4 (or earlier) – If you perform Blue/Green upgrades or manually upgrade Tableau Server 2021.4 (or earlier) using the **tsm maintenance (backup and restore)** method, you must enable `legacy-identity-mode` before you can restore to Tableau Server 2022.1 (or later). For more information, see Troubleshoot Issues with the Identity Migration.
- Major version postgresql updates – If an upgrade includes a major version update to the database used for the Tableau repository, the internal upgrade backup is done without compression to save time. This requires additional temporary disk space during the upgrade process.

Tableau Server versions that include a major version database update; 2020.4.

## Scheduling and Managing Backups

Beginning in 2020.4.0, you can use tsm commands to schedule a backup. You need to do this from the command line (there is no TSM UI to schedule backups). The `tsm maintenance backup` command allows you to create and update backup schedules. The `tsm schedules` commands give you the ability to view, delete, pause, resume, and update schedules.

To schedule a backup:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm maintenance backup -f <backup-file> -sr <recurrence> -st
<time-to-run> -sd <days-to-run> -sn <schedule-name>
```

## Tableau Server on Windows Help

For example, to create a backup schedule named "monthly-backup" that runs on the 15th of each month at 2 am and generates a file called `<yyyy.mm.dd.hh.mm>-ts-mid_month_backup.tsbak`:

```
tsm maintenance backup -f ts-mid_month_backup -sr monthly -st 02:00 -sd 15 -sn monthly-backup
```

To view a scheduled backup:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm schedules list
```

You can sort the schedules by scheduled run time, earliest to latest, or by name using the `--next-run` or `--schedule-name` options. You can alternately display details for a single schedule using the `--schedule-id` option. When you view a single schedule you see additional details about it, including when it was created, how many times it has run, and specific options used when it is run. Job options are shown in JSON format as "Job args".

To update a scheduled backup:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm schedules update --schedule-id <ID> --schedule-time <time-to-run> --schedule-recurrence <frequency> --schedule-days <day-to-run>
```

**Note:** To add or change a name, use the `tsm-maintenance-backup` command.

To suspend or resume a backup schedule:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run one of the following commands:

- To suspend a schedule:

```
tsm schedules suspend --schedule-id <scheduleID>
```

- To resume a suspended schedule:

```
tsm schedules resume --schedule-id <scheduleID>
```

### Script the backup process

If you back up often, you might want to create a script that performs the backup and related tasks for you. These tasks include:

- Clean up files and folders before running the backup.
- Running the backup itself.
- Copying the backup file to a separate computer for safekeeping.

This section discusses `tsm` commands you can use together to perform a backup and related tasks.

**Note:** TSM is a batch file. To run `tsm` commands in another batch file, use the `call` command. For example "`call tsm maintenance ziplogs`". Doing this will return control to the batch file. You also need to authenticate to TSM before issuing any commands. For more information, see [Authenticating with tsm CLI](#).

For additional information about scripting TSM commands, see the [Tableau Community Forums](#).

## Tableau Server on Windows Help

### Remove log files and clear temporary folders

You can clean old Tableau Server log file and temporary files to reduce the time it takes to create a backup, and to ensure the backup file is as small as possible.

To clean log files older than a few days, run the following command:

```
tsm maintenance cleanup
```

### Run the backup

**Note:** When backing up Tableau Server on Windows to a network drive, the Machine account must have write access to the network share where the backup files are written (this is not normally the case and you are responsible for configuring this if you want to back the server up to a network share).

To create the backup, use the `tsm maintenance backup` command:

```
tsm maintenance backup --file <backup_file> --append-date
```

Note the following about the command:

- Add `--append-date` to the command to include the date in the backup file name.
- The backup file is assembled in a temporary location in the data directory and then written to the directory defined in the TSM `basefilepath.backupstore` variable. By default:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\<filename>.tsbak
```

For more information about where backup files are written and how to change that location, see [tsm File Paths](#). **Note:** Even when you change the backup location, the backup process uses a temporary location in the data directory to assemble the backup file.

Copy the backup file to another computer

As a best practice, after the backup is created, copy the backup file to another location that is separate from Tableau Server.

## Restore from a Backup

Use the `tsm maintenance restore` command to restore your Tableau Server data. You might do this if you had a system failure and need to restore your data, if you need to switch back to a previous version of Tableau Server (for example, if there is a problem with an upgrade), or if you are moving Tableau Server to new hardware. You can use the `tsm maintenance restore` command to restore Tableau Server backups created using `tabadmin backup` and `tsm maintenance backup`.

### Limitations when restoring Tableau Server

- If you perform Blue/Green upgrades or manually upgrade Tableau Server 2021.4 (or earlier) using the **tsm maintenance (backup and restore)** method, you must enable `legacy-identity-mode` before you can restore to Tableau Server 2022.1 (or later). For more information, see [Troubleshoot Issues with the Identity Migration](#).
- Database backups made in other ways, and virtual machine snapshots are not valid sources for restoring Tableau Server.
- When you use `tsm maintenance restore` to restore your Tableau data, data extract files and the contents of the PostgreSQL database are overwritten with the content in the backup file (`.tsbak`). If you are running a distributed installation of Tableau Server, perform the restore on the node running the TSM Controller (this is usually the initial node).
- You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised



with local authentication.

- You can only restore a backup file to a version of Tableau Server version that is the same or newer than the version the backup was created on. You cannot restore to an older version of Tableau.
- Beginning with version 2022.3, backups created using `tabadmin` ("pre-TSM backups") are not supported. You cannot restore a pre-TSM backup to Tableau Server version 2022.3 or later.
- During restore, the restore process will initiate a full re-indexing of the content and external assets managed by Tableau Server. This process consumes CPU resources which may be noticeable during backup and restore.

### Restore Tableau Server from a backup file

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

1. (Optional) Copy the `.tsbak` file to the default file location.

The `restore` command expects a backup file in the directory defined in the TSM `base-filepath.backuprestore` variable. By default:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\
```

For more information about file paths and how to change them, see [tsm File Paths](#).

**Note:** If you are restoring a backup that was copied into the backups folder, ensure that the Run As service account, which can be found in TSM Web UI under **Security**, has at least Read access to the backup file. Otherwise, the restore process may not be able to unzip the backup file and the restore will fail.

2. Stop the server. At a command prompt, type:

```
tsm stop
```

3. Restore from a backup file. At a command prompt, type:

```
tsm maintenance restore --file <file_name>
```

In the above line, replace `<file_name>` with the name of the backup file you want to restore from.

4. Restart the server:

```
tsm start
```

## Server Maintenance

As an administrator, you will want to check the status of the server, analyse and monitor the activity on the server, manage scheduled tasks or perform certain maintenance activities such as clearing saved data connection passwords. In addition, there are several settings that you may want to specify to customise the user experience for people using the server. You can do some of these tasks from the General page of the Status page and others from the Settings page.

### View Server Process Status

You can view server process status by running a TSM CLI command or by accessing TSM Web UI or Admin pages on Tableau Server.

## Tableau Server on Windows Help

### Viewing process status with TSM CLI

Run the following command:

```
tsm status -v
```

This command outputs all of the processes that are configured on the instance and their corresponding status.

### Viewing process status in web UI

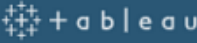
There are two locations in Tableau Server or Tableau Services Manager (TSM) where administrators can view the state of Tableau processes. You may be able to access one or both of these locations, depending on how your account and server are set up. Most of the process status information that displays is duplicated on both Status pages. This section explains each page, and identifies what is unique for each one.

**Note** The status pages displayed in both web UI locations show a subset of the total processes configured on a given node. To view all processes, you must run the TSM CLI command, `tsm status -v`.

- The Tableau Services Manager (TSM) status page is accessible in TSM and can be viewed by TSM administrators. You must be able to log into TSM to see this page. For information about signing into TSM, see [Sign in to Tableau Services Manager Web UI](#).
- The Tableau Server status page appears in the Tableau Server web UI and is accessible by Tableau Server administrators. This page includes Tableau Server processes, along with links to troubleshooting documentation if a process is not running as expected. If you hover your mouse pointer over the status indicator for a process, a tooltip shows the node name and the port the process is running on. The Tableau Server status page does not show TSM processes. For information about signing into Tableau Server as an administrator, see [Sign in to the Tableau Server Admin Area](#).

## Tableau Services Manager (TSM) Status page

The TSM Status page shows you the state of server processes, including TSM Controller and Licence Server. These two processes do not display on the Tableau Server Status page.

|  <span>STATUS</span> <span>MAINTENANCE</span> <span>CONFIGURATION</span> |         |       |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|
| Process                                                                                                                                                   | node1   | node2 | node3 |
| Gateway                                                                                                                                                   | ✓       | ✓     | ✓     |
| Application Server                                                                                                                                        | ✓       | ✓     | ✓ ✓   |
| Interactive Microservice Container                                                                                                                        | ✓       | ✓     | ✓     |
| VizQL Server                                                                                                                                              | ✓ ✓ ✓ ✓ | ✓     | ✓ ✓   |
| Cache Server                                                                                                                                              | ✓ ✓     | ✓     | ✓ ✓   |
| Cluster Controller                                                                                                                                        | ✓       | ✓     | ✓     |
| Search & Browse                                                                                                                                           | ✓       |       | ✓     |
| Backgrounder                                                                                                                                              | ✓ ✓     | ✓ ✓   | ✓ ✓   |
| Non-Interactive Microservice Container                                                                                                                    | ✓       | ✓     | ✓     |
| Data Server                                                                                                                                               | ✓ ✓     | ✓ ✓   | ✓     |
| Data Engine                                                                                                                                               | ✓       | ✓     | ✓     |
| File Store                                                                                                                                                | ✓       | ✓     | ✓     |
| Repository                                                                                                                                                | ✓       |       | ✓     |
| Tableau Prep Conductor                                                                                                                                    |         |       |       |
| Ask Data                                                                                                                                                  | ✓       | ✓     | ✓     |
| Elastic Server                                                                                                                                            | ✓       |       |       |
| TSM Controller                                                                                                                                            | ✓       |       |       |
| License Server                                                                                                                                            | ✓       |       |       |
| <input type="button" value="Refresh Status"/>                                                                                                             |         |       |       |

Possible status indicators are listed at the bottom of the table:

Tableau Server on Windows Help

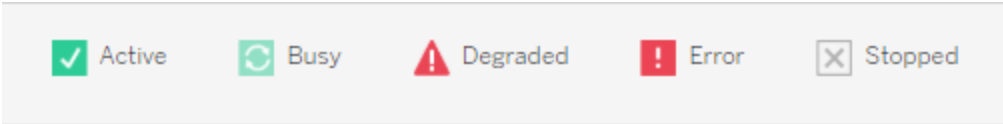


Tableau Server Status page

+ a b | e a u

Content

Users

Groups

Schedules

Tasks

Status

...

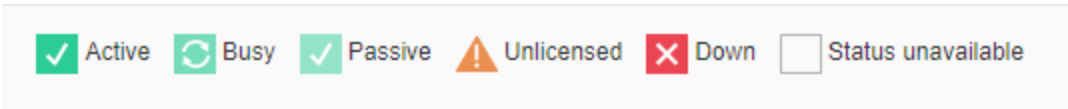
Server Status

Process Status

The real-time status of processes running in Tableau Server.

| Process            | OPENVM-QKRAFPE9 | OPENVM-28P7I269 | OPENVM-QKRAFPEL |
|--------------------|-----------------|-----------------|-----------------|
| Cluster Controller | ✓               | ✓               | ✓               |
| Gateway            | ✓               | ✓               | ✓               |
| Application Server | ✓               | ✓               | ✓               |
| VizQL Server       | ✓✓✓✓            | ✓✓              | ✓✓              |
| Cache Server       | ✓✓              | ✓✓              | ✓✓              |
| Search & Browse    | ✓               | ✓               | ✓               |
| Backgrounder       | ✓✓              | ✓✓              | ✓✓              |
| Data Server        | ✓✓              | ✓✓              | ✓✓              |
| Data Engine        | ✓               | ✓               | ✓               |
| File Store         | ✓               | ✓               |                 |
| Repository         | ✓               |                 |                 |

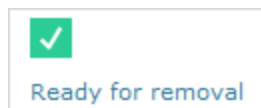
Possible status indicators are listed at the bottom of the table:



When Tableau Server is functioning properly, most processes will show as Active, Busy or Passive (Repository):

- **Active** – The process is functioning as intended. See File Store in Troubleshoot Server Processes for details on possible active states.
- **Busy** – The process is completing some task. See File Store and Repository in Troubleshoot Server Processes for more information.
- **Passive** – The repository is in passive mode, or a process cannot receive traffic. See Repository and Index and Search Server in Troubleshoot Server Processes for more information.
- **Unlicensed** – The process is unlicensed.
- **Down** – The process is down. The implications of this differ depending on the process.
- **Status unavailable** – Tableau Server is unable to determine the status of the process.

If there is additional information, a message displays below the status icon and links to appropriate documentation:



**Note:** Tableau Server is designed to be self-correcting. If a service or process stops responding or goes down, Tableau Server attempts to restart it. This can take 15 to 30 minutes to complete. Because of this, reacting immediately to service or process alerts can be counter-productive, especially in an installation with redundant services that can handle requests while one restarts.

For more information about troubleshooting process status, see Troubleshoot Server Processes.

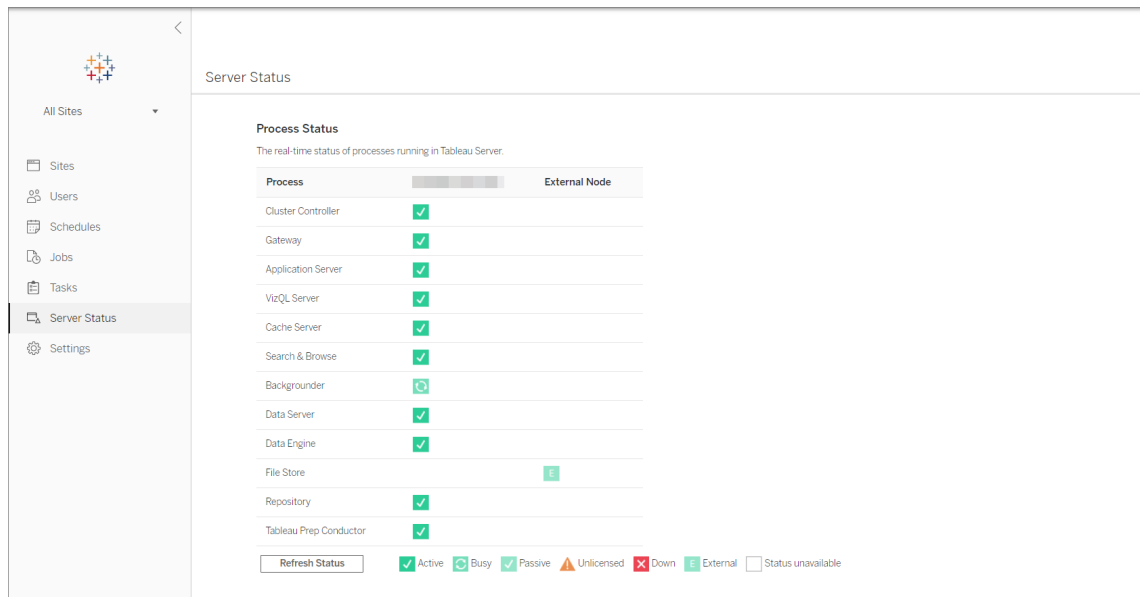
### External Node

Some processes can be configured external to Tableau Server. For example, File Store can be configured on a SAN or NAS, the repository can be deployed to an AWS RDS instance. In such cases, the Tableau Server Status page will show these processes on **External Node** with status **E**, and the Tableau Services Manager (TSM) status page will show these processes on **external** with a tick to indicate that the process is configured externally.

**Tableau Server Manager (TSM) status page showing File Store as configured external to Tableau Server:**

| + a b l e a u                           |       |          | STATUS   | MAINTENANCE | CONFIGURATION |
|-----------------------------------------|-------|----------|----------|-------------|---------------|
| Process                                 | node1 | external |          |             |               |
| Gateway                                 | ✓     |          |          |             |               |
| Application Server                      | ✓     |          |          |             |               |
| Interactive Microservice Container      | ✓     |          |          |             |               |
| VizQL Server                            | ✓     |          |          |             |               |
| Cache Server                            | ✓     |          |          |             |               |
| Cluster Controller                      | ✓     |          |          |             |               |
| Search & Browse                         | ✓     |          |          |             |               |
| Backgrounder                            | 🔄     |          |          |             |               |
| Non-Interactive Microservice Container  | ✓     |          |          |             |               |
| Data Server                             | ✓     |          |          |             |               |
| Data Engine                             | ✓     |          |          |             |               |
| File Store                              |       | ✓        |          |             |               |
| Repository                              | ✓     |          |          |             |               |
| Tableau Prep Conductor                  | ✓     |          |          |             |               |
| Ask Data                                | ✓     |          |          |             |               |
| Elastic Server                          | ✓     |          |          |             |               |
| Messaging Service                       | ✓     |          |          |             |               |
| Data Source Properties Service          | ✓     |          |          |             |               |
| Internal Data Source Properties Service | ✓     |          |          |             |               |
| TSM Controller                          | ✓     |          |          |             |               |
| License Server                          | ✓     |          |          |             |               |
| Refresh Status                          |       |          | ✓ Active | 🔄 Busy      | ⚠ Degraded    |
|                                         |       |          | ! Error  | ✖ Stopped   |               |

**Tableau Server status page showing File Store as configured external to Tableau Server:**



## Access Status Remotely

**Note:** The information in this article refers to the Tableau Server status page. For information about the Tableau Server status page and the TSM status page, see [View Server Process Status](#).

You must be a Tableau Server administrator to see the Server Status page, but you can grant remote access to other computers to allow access to a machine-readable (XML) version of the Status table by non-admin users and by computers other than the initial Tableau Server node. One reason you might do this is as part of a remote monitoring process.

To grant remote access to Tableau Server status:

1. Open a command prompt as an administrator and type the following:

```
tsm configuration set -k wgserver.systeminfo.allow_referrer_ips
-v <ip address>
```

In the above command, <ip address> is the IPv4 address of the computer for which you want to enable remote access to the Tableau Server status XML.



For example:

```
tsm configuration set -k wgserver.systeminfo.allow_referrer_ips  
-v 10.32.139.31
```

If you are enabling remote access for more than one computer, use commas to separate each IP address.

```
tsm configuration set -k wgserver.systeminfo.allow_referrer_ips  
-v 10.32.139.31,10.32.139.35
```

Commit the configuration change:

```
tsm pending-changes apply
```

2.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

Now, users of computers with the IP addresses that have been added can view Tableau process status by entering the URL `http://<server>/admin/systeminfo.xml` in a browser or from a command line (for example, `curl http://j-smith/admin/systeminfo.xml`).

If Tableau Server has been configured to work with a load balancer or proxy server, use the hostname or IP address of the initial Tableau Server node to access the XML version of the status page.

For details on the XML that is returned, see [Get Process Status as XML](#).

### Get Process Status as XML

To get a machine-readable version of the server process status, that is, a version of the status formatted in XML, use the following URL:

`http://my_tableau_server/admin/systeminfo.xml`

You must be signed in to Tableau Server to view the machine-readable process status, or have [enabled remote access](#).

The server returns a status report similar to the following:

```
<systeminfo xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <machines>
    <machine name="my_tableau_server">
      <repository worker="my_tableau_server:8060" status="Active" preferred="false"/>
      <dataengine worker="my_tableau_server:27042" status="Active"/>
      <applicationserver worker="my_tableau_server:8600" status="Active"/>
      <apiserver worker="my_tableau_server:8000" status="Active"/>
      <vizqlserver worker="my_tableau_server:9100" status="Active"/>
      <dataserver worker="my_tableau_server:9700" status="Active"/>
      <backgrounder worker="my_tableau_server:8250" status="Active"/>
      <gateway worker="my_tableau_server:80" status="Active"/>
      <searchandbrowse worker="my_tableau_server:11000" status="Active"/>
      <cacheserver worker="my_tableau_server:6379" status="Active"/>
      <filestore worker="my_tableau_server:9345" status="Active"
pendingTransfers="0" failedTransfers="0" syncTimestamp="2015-02-27T20:30:48.564Z"/>
      <clustercontroller worker="my_tableau_server:12012" status="Active"/>
      <coordination worker="my_tableau_server:12000" status="Active"/>
    </machine>
  </machines>
  <service status="Active"/>
</systeminfo>
```

### Status values in the XML

- **<process> worker** – The name of the node running the process and the port the process is using.
- **Status** – The status of the process on the node. Possible values are: `Active`, `Passive`, `Unlicensed`, `Busy`, `Down`, `ReadOnly`, `ActiveSyncing`, `StatusNotAvailable`, `StatusNotAvailableSyncing`, `NotAvailable`, `DecommissionedReadOnly`, `DecomisioningReadOnly`, and `DecommissionFailedReadOnly`
- **pendingTransfers** – A count of the workbook or data source extracts the node needs to get to be fully synced. These represent items that were published to this file store node, and items that were published to other file store nodes and need to be copied to this node.
- **failedTransfers** – A count of the workbooks or data sources that did not transfer successfully to this file store node during the last automated job. The automated job normally runs about every 15 to 30 minutes, but may take longer when transferring a large number of extracts or large extracts.

Failed transfers do not necessarily indicate a problem with Tableau Server. The recurring automated job will normally transfer files that failed during the previous sync. Reasons for failed file transfers are listed in the logs.

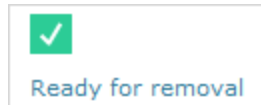
- **syncTimestamp** – The time in UTC of the last automated job that ran and synchronised files.

### Troubleshoot Server Processes

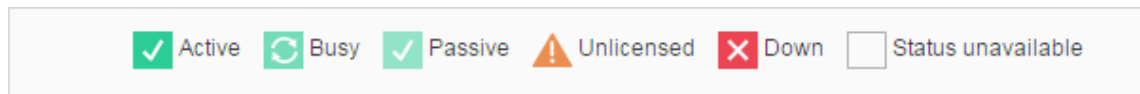
**Note:** The information in this article refers to the Tableau Server status page. For information about the Tableau Server status page and the TSM status page, see [View Server](#)


## Process Status.

When Tableau Server is functioning properly, processes will show as Active, Busy or Passive (Repository). If there is additional information, a message appears below the status icon:



Possible status indicators are:



If you are seeing multiple  **Status: Down** messages, verify that the Run As service account password has not expired. If the password has expired, you must update it in Tableau Server, see [Updating the Run As service account password](#). Permission changes related to the Run As service account may also cause multiple service failures, see [Verify Folder Permissions](#).

**Note:** Tableau Server is designed to be self-correcting. If a service or process stops responding or goes down, Tableau Server attempts to restart it. This can take 15 to 30 minutes to complete. Because of this, reacting immediately to service or process alerts can be counter-productive, especially in an installation with redundant services that can handle requests while one restarts.

The following sections provide troubleshooting recommendations for status messages that you may see.

### Cluster Controller

This message will only display if you have more than two nodes.

 **Status: Down; Message: "Node degraded"**

## Tableau Server on Windows Help

One or more of the following are true:

- Repository on the node is stopped.
- Node cannot respond to failover elsewhere on the cluster.
- If Tableau Server is configured for high availability and this is the active repository, fail-over to the second repository occurs.
- No status available for repository or file store on this node.


No action is necessary unless the cluster controller is regularly down or is down for an extended period of time.

If that occurs, take the following actions, in order, until the problem is resolved:

1. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
2. Restart Tableau Server.
3. If Cluster Controller continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.

### File Store

File Store status only reflects the state of the File Store when the page was loaded.

An active status () with no message indicates that no extracts were being synchronised when the page was loaded. It is possible that the recurring "catch-all" job is running and synchronising extracts.



**Status: Busy; Message: "Synchronising"**

"Synchronising" usually indicates that extracts were being synchronised across File Store nodes when the page was loaded.

However, the "synchronising" message is also returned following installation (both single-node and multi-node). After Tableau has initialised, the status should disappear within 15 or 20 minutes.



**Status: Down; "Data Extracts unavailable"**

On a single-node installation: "Data Extracts unavailable" indicates that existing extracts may be available but publish/refresh will fail. On multi-node installations, this message indicates that extract synchronisation will fail for this node.

No action is necessary unless the File Store is regularly down or is down for an extended period of time.

If that occurs, take the following actions, in order, until the problem is resolved:

1. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
2. Restart Tableau Server.
3. If File Store continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.



#### **Status: Busy; "Decommissioning"**

This message indicates that this File Store is in read-only mode and that any unique files on this node are being replicated to other File Store nodes.

To remove this node, wait until the status message changes to "Ready for removal".



#### **Status: Active; "Ready for removal"**

This message indicates that the File Store is in read-only mode.

You can safely stop (`tsm stop`) the cluster and remove File Store processes, or remove entire node.



#### **Status: Active; "Decommission failed"**

This message indicates that the File Store is in read-only mode and that at least one unique file failed to replicate to another File Store node.

To resolve a failed decommissioning:

## Tableau Server on Windows Help

1. Run the `tsm topology filestore decommission` command again.
2. Check disk space on other File Store nodes. Decommissioning will fail if another File Store node does not have enough space to store all the extracts.
3. Check the `tsm.log` file on the initial node and additional nodes for errors.
4. Stop Tableau Server (`tsm stop`) and then try running the `tsm topology filestore decommission` command again.
5. Put the File Store node back into read/write mode (`tsm topology filestore recommission`), collect logs and then contact Support.
6. With Support: copy and merge the `extracts` directory from this File Store node to the same directory on another File Store node.

### Index and Search Server



**Status: Passive; Message: n/a**

In multi-node environments, a passive status indicates that the node is working as intended but cannot join the cluster and receive traffic.

To get the Index and Search Server process to active status:

1. Use the `tsm topology set-process` command to remove passive Index and Search Server processes from the nodes.

```
tsm topology set-process -n <Node> -pr indexandsearchserver -c
0
```

2. Apply the changes (`tsm pending-changes apply`).
3. Restart Tableau Server (`tsm restart`).
4. Use the `tsm topology set-process` command to add the Index and Search Server process to nodes one at a time.

```
tsm topology set-process -n <Node> -pr indexandsearchserver -c
1
```

5. Apply the changes (`tsm pending-changes apply --ignore-warnings`).
6. Restart Tableau Server (`tsm restart`).

7. Use the `tsm status` command to check the status of `indexandsearchserver` on affected nodes.

## Repository

### **Status: Busy; Message: "Setting up"**

The "Setting up" message indicates one or more of the following states:

- Passive repository is being synchronised with active repository.
- Repository is not ready to handle failover.
- Repository may have gotten more than two minutes behind active repository and is being setup again (this is faster than waiting for a sync).
- Failover occurred and this former active repository is rejoining the cluster.

Wait until the repository status message changes to "Passive".

If this message does not appear, or if it is taking a long time:

1. Check disk space and free space if possible.
2. Check cluster controller logs for errors.
3. Restart node.

### **Status: Busy; Message: "Synchronising"**

Repository is synchronising, for example after a failover.

### **Status: Down; Message: n/a**

When the Repository shows a status of down and there is no message, then the Repository is in one of the following states:

- If the installation is configured for high availability, failover of the repository occurred.
- Processes are restarting with updated database connection configurations after failover.
- If another active repository is not available, Tableau Server is down.

Take these actions in order until a step resolves the problem:



## Tableau Server on Windows Help

1. Wait several minutes for cluster controller to attempt to restart.
2. Restart Tableau Server (`tsm restart`).
3. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
4. Restart Tableau Server.
5. If repository continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.



**Status: Passive; Message: n/a**

A passive status with no message indicates that the node is working as intended and that it is ready for failover if needed.

### VizQL Server



**Status: Unlicensed; Message: n/a**

For information about unlicensed status for a VizQL Server process, see [Handle an Unlicensed Server Process](#).

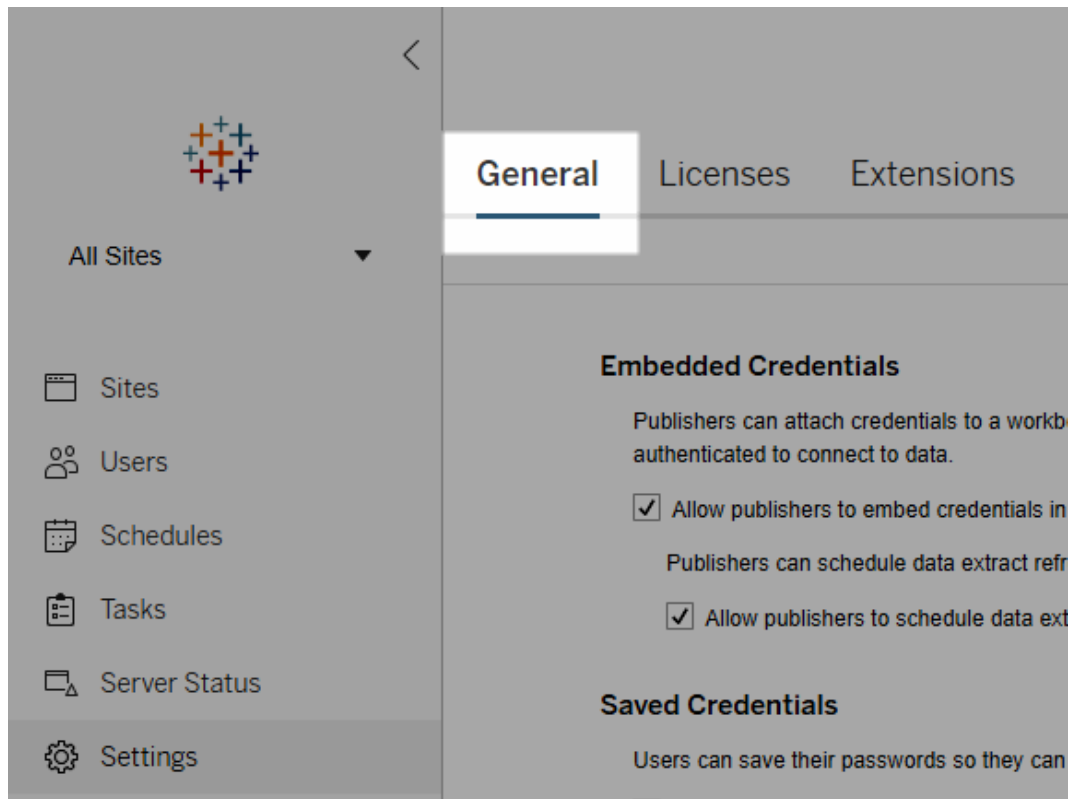
## Clear Saved Data Connection Passwords

As the administrator, if you enable users to save data source passwords, server users can save data source passwords across multiple visits and browsers so they are not prompted for their credentials each time they connect to a data source.

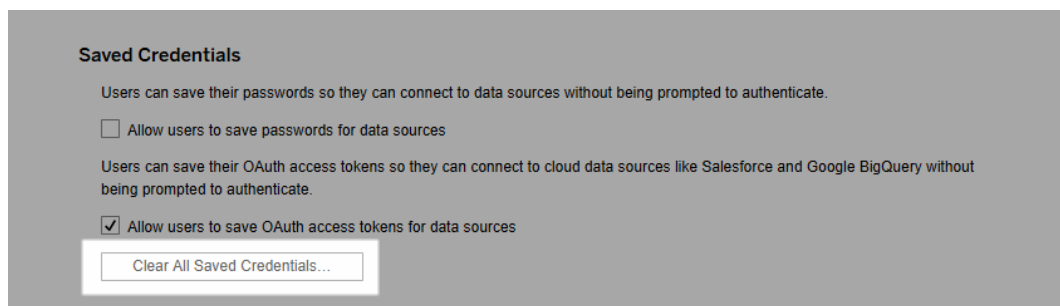
You can reset the data source passwords for all Tableau Server users. Doing this forces them to sign in to the data sources the next time they visit a view that requires database authentication. Server users can also clear their saved data connection passwords on an individual basis using their User Preferences page.

To clear saved data connection passwords for all server users:

1. In a single-site server, click **Settings > General**. On a multi-site server, select **Manage all sites**, then click **Settings > General**.



2. Under Saved Credentials, click **Clear All Saved Credentials**.



## Synchronise External Directory Groups on the Server

As a server administrator, you can synchronise all external directory (such as Active Directory) groups (that have been configured on Tableau Server) on a regular schedule or on-demand on the **General** tab of the **Settings** page for the server.

The screenshot shows the 'Active Directory Synchronization' settings page. At the top, there is a title 'Active Directory Synchronization' and a link 'Manage the synchronization of all Active Directory groups. Learn more'. Below this, it says 'Last synchronized: (Server time)' and a link 'View synchronization activity'. There is a button 'Synchronize All Groups...'. A checkbox 'Synchronize Active Directory groups on a regular schedule' is checked. Under 'Frequency', there are four radio buttons: 'Hourly', 'Daily' (which is selected), 'Weekly', and 'Monthly'. To the right of the radio buttons, there is a time picker showing 'at 12 : 00 AM'.

**Note:** In the context of user and group synchronisation, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronisation features in Tableau Server function seamlessly with properly configured LDAP directory solutions.

Before you begin

Before synchronising groups as described in this topic, you must first import the external directory group into Tableau Server. See [Create Groups via Active Directory](#).

Synchronise external directory groups on a schedule

1. **Single-site:** Click **Settings> General**.

**Multisite:** In the site menu, click **Manage All Sites** and then click **Settings> General**.

2. Scroll down the page to **Active Directory Synchronisation**, and then select **Synchronise Active Directory groups on a regular schedule**.

**Active Directory Synchronization**

Manage the synchronization of all Active Directory groups. [Learn more](#)

Last synchronized: (Server time)

[View synchronization activity](#)

[Synchronize All Groups...](#)

☒ Synchronize Active Directory groups on a regular schedule

Frequency: ☐ Hourly ☒ Daily ☐ Weekly ☐ Monthly

at 12 : 00 AM

3. Select the frequency and time of synchronisation.
4. Click **Save**.

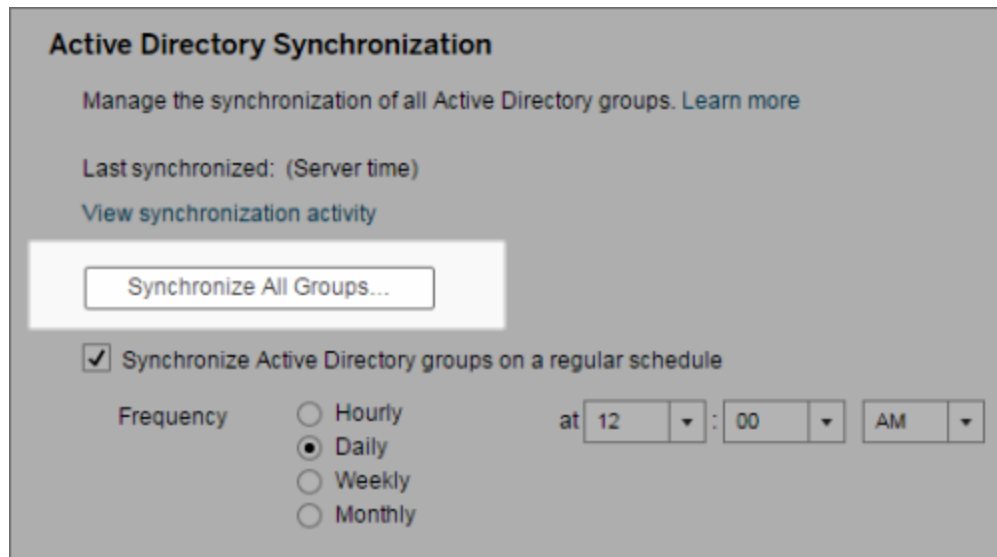
**Note:** Beginning in versions 2021.1.23, 2021.2.21, 2021.3.20, 2021.4.15, 2022.1.11, 2022.3.3 and 2023.1, a default time limit of 4 hours limits how long a scheduled group synchronisation can take before it is cancelled. A server administrator can change this time limit if your scheduled synchronisation is of very large groups, or taking longer than the default. For more information, see [Synchronise All Active Directory Groups on a Schedule](#) and `backgrounder.timeout.sync_ad_group`.

Synchronise all external directory groups on demand

At any time, you can synchronise external directory (such as Active Directory) groups with Tableau Server to ensure that new users and changes in the external directory are reflected in all external directory groups on Tableau Server.

1. **Single-site:** Click **Settings> General**.

**Multisite:** In the site menu, click **Manage All Sites**, and then click **Settings> General**.



2. Under **Active Directory Synchronisation**, click **Synchronise All Groups**.

View synchronisation activity

You can view the results of synchronisation jobs in the **Background Tasks for Non Extracts** administrative view. **Queue Active Directory Groups Sync** is the task that queues and indicates the number of **Sync Active Directory Group** tasks to be run.

1. **Single-site**: Click **Status**.  
  
**Multisite**: In the site menu, click **Manage All Sites** and then click **Status**.
2. Click the **Background Tasks for Non Extracts** link.
3. Set the **Task** filter to include **Queue Active Directory Groups Sync** and **Sync Active Directory Group**.

You can quickly navigate to this administrative view by clicking the **View synchronisation activity** link in the **Settings** page for the server.

Set the minimum site role for users in an external directory group

In the **Groups - Details** page, you can set the minimum site role for group users to be applied during Active Directory synchronisation.

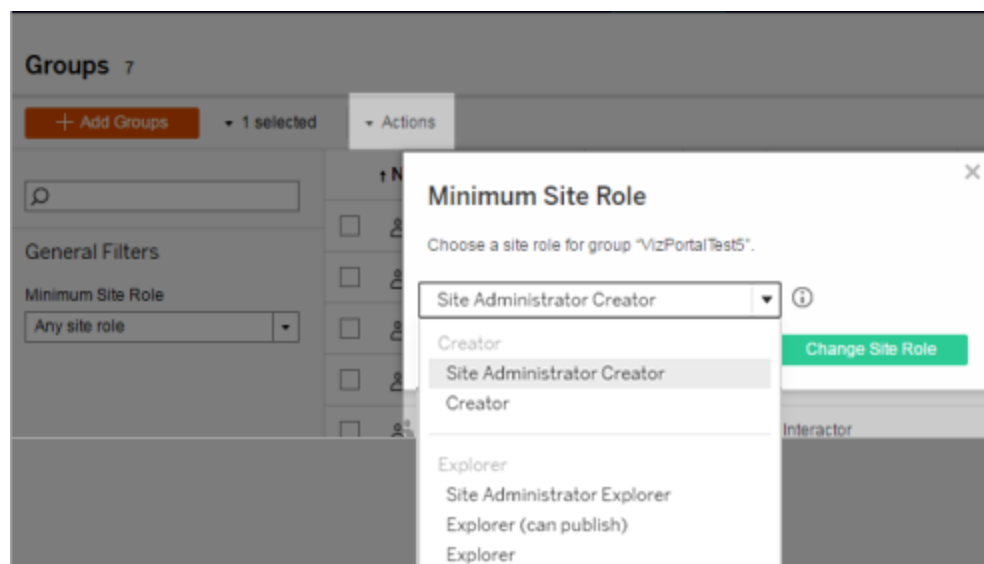
This setting does not run synchronisation; instead, it sets the minimum site role to applied to the group every time synchronisation runs. The result is that when you synchronise external directory groups, new users are added to the site with the minimum site role. If a user already exists, the minimum site role is applied if it gives the user more access in a site. If you don't set a minimum site role, new users are added as **Unlicensed** by default.

**Note:** A user's site role can be promoted but never demoted based on the minimum site role setting. If a user already has the ability to publish, that ability will always be maintained. For more information on minimum site role, see Site roles and Active Directory import and synchronisation.

1. In a site, click **Groups**.
2. On the Groups page, select a group.

Click **Actions > Minimum Site Role**.

3. Select the minimum site role, and then click **Change Site Role**.



What happens when users are removed in the source external directory?

Users cannot be automatically removed from the Tableau Server through an external directory sync operation. Users that are disabled, deleted or removed from groups in the external directory remain on Tableau Server so that administrators can audit and reassign the user's content before removing the user's account completely. For more information, see Sync behaviour when removing users from Active Directory.

Improving group synchronisation performance

External directory synchronisation is performed by the backgrounder process. The Backgrounder process is the same process that is used for managing and creating extracts, and is also used to generate subscription content. In large organisations with dynamic group membership and heavy extract usage, the external directory group synchronisation process may be disruptive. We recommend running group synchronisation during non-business hours.

By default, the Backgrounder process performs synchronisation in a serial operation. This means that each group is synchronised, one after the other, in a single Backgrounder process. If you are running multiple instances of Backgrounder processes either on a single Tableau Server or across a distributed deployment, consider enabling parallel processing for external directory synchronisation. When parallel Backgrounder processing is enabled, the group synchronisation is distributed across multiple Backgrounder processes for better performance.

To enable parallel backgrounder processing for group synchronisation, open TSM CLI and enter the following commands:

```
tsm configuration set -k backgrounder.enable_parallel_adsync -v true  
  
tsm pending-changes apply
```

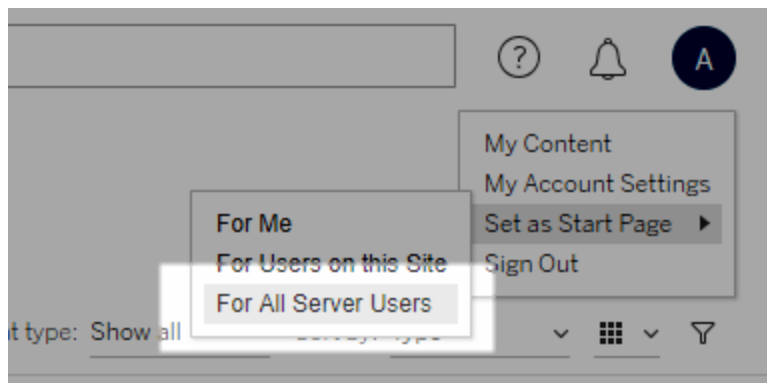
## Set the Default Start Page for All Users

In a new deployment, when users sign in to the Tableau Server web authoring environment, they are taken to the Home screen, which displays a role-based welcome banner. Home also displays recent views, favourites and the site's most-viewed content. As the server administrator, you can change users' default landing page at the server and site level. For example,

you can show all workbooks, and when the user signs in, they see the workbooks they have access to.

To set the default start page for all users

1. Display the page or filtered view you want to be the default page users see when they sign in to the site.
2. Select your profile icon in the upper right area of the page.
3. To set the start page for:
  - All users on a site: click **Set as Start Page** and **For Users on this Site**.
  - All users on the server: click **Set as Start Page** and **For All Server Users**.



### User-set start pages and hierarchy

Users can set their own start pages from their profile icon, and can reset their start pages in their account settings (for information, search for “Access Your Profile and Account Settings” in the online Tableau Server Help for your operating system).

If a user sets their own start page, it will override any start page set by a server administrator. The next time that user signs in, they will land on the start page they've set. If a server administrator sets start pages for both a server and a site, users will default to the start page set for themselves (if any), then the site start page, then the server start page. If neither a user or an administrator has set a start page, users will default to Home.



## Access Sites from Connected Clients

By default, Tableau Server allows users to access a site directly from a Tableau *client*. It allows this access after the user provides credentials the first time they sign-in from the client. A client in this case is a Tableau application or service that can exchange information with Tableau Server. Examples of Tableau clients include Tableau Desktop, Tableau Prep Builder and Tableau Mobile.

Tableau Server establishes a *connected client* by creating a secure refresh token that uniquely identifies a user when the user signs in from the client.

## Disable Automatic Client Authentication

After Tableau connected clients (e.g., Tableau Desktop, Tableau Mobile, Tableau Prep Builder, etc.) and personal access tokens (PATs) successfully sign in to Tableau Server, they are automatically authenticated in the future. Both connected client sessions and PATs are managed by refresh tokens.

By default, refresh tokens reset after a year. If a refresh token has not been used in 14 days, then it will expire. As a server administrator, you can change these values by setting the `refresh_token.absolute_expiry_in_seconds` and `refresh_token.idle_expiry_in_seconds` options. See [tsm configuration set Options](#).

As a Tableau Server administrator you can also disable automatic authentication for connected clients. In this case, session expiration is solely governed by Tableau Server session behaviour, which manages web authoring sessions. See [10. Verify session lifetime configuration](#). Web authoring sessions are not considered a "connected client", and they do not use refresh tokens.

To immediately disconnect connected clients from Tableau Server and require users to sign in every time they connect:

1. Sign in to Tableau Server as a server administrator.
2. In the site menu, click **Manage All Sites**, and then click **Settings > General**.

3. Under **Connected Clients**, clear the **Let clients to automatically connect to Tableau Server** check box.
4. Click **Save** button at the top or bottom of the page.

**Note:** This setting described above only applies to connected clients and does not affect the creation and redemption of PATs.

## Remove Unneeded Files

As a best practice, you should regularly monitor disk space usage on your server. If the Tableau Server computer runs low on disk space, the impact to can be significant, including ultimately causing a failure. If you determine that space is getting low, you can archive any you want to save, and purge unneeded files, freeing up space for Tableau.

### Monitoring disk space usage

There are several things you can do to monitor disk space usage:

- **Notifications:** You can configure Tableau Server to send notifications when disk space reaches predetermined levels. For more information, see [Configure Server Event Notification](#).
- **Administrative views:** You can use a pre-built administrative view to help monitor disk space usage. For more information, see [Server Disk Space](#).

### Reducing disk space usage

To make more disk space available, you can take the following steps:

- **Archive log files:** Tableau Server generates log files when running. These can be helpful in troubleshooting issues, and when you are working with Tableau Support, but you do not need to leave them in place indefinitely. To save disk space without losing logs, you can archive them with the `tsm maintenance ziplogs` command, and then copy the ziplogs archive to a computer that is not part of the Tableau installation for safe keeping. For more information, see [Log File Snapshots \(Archive Logs\)](#).

- **Clean up unwanted files:** After archiving any logs you want to save, use the `tsm maintenance cleanup` command to remove log files older than seven days, temporary files and, optionally, rows from the `http_requests` table in the Tableau Server repository. You should run the cleanup command regularly. For more information about which files are removed, see [tsm maintenance cleanup](#).
- **Remove other files:** Over time Tableau Server can generate files that do not need to be left in place. In addition to the files mentioned above, be aware of files like old backups from previous versions. Tableau Server backup files have a `.tsbak` extension. We strongly recommend regularly backing up Tableau, and saving the backup files to a computer that is not part of the Tableau Server installation for safe keeping, but once you save the file in another location, you can delete it from the Tableau computer. For more information on backup files, including how to create them and where they are saved, see [Back up Tableau Server Data](#).

## Server Settings (General and Customisation)

The following settings are available on the **General** and **Customisation** pages in **Server - Settings**.

Many of these settings move from the Server Settings page to the Site Settings page when there is more than one site on the server. These are marked with "Moves to Site Settings on multi-site servers."

### General

Setting	Description
<b>Site Name and ID</b>  Moves to Site Settings on multi-site servers.	<p>Specifies the site name seen in the user interface and the ID seen in the site URL. (If you are editing the Default site, you cannot change the ID.)</p> <p>You can't change the “#/site” portion of the URL (for example, <code>http://localhost/#/site/sales</code>). In multi-site server environments, these segments appear in the URL for sites other than the Default site.</p>

<p><b>Storage</b></p> <p>Moves to Site Settings on multi-site servers.</p>	<p>Select either <b>Server Limit</b> or <b>GB</b>, and for the latter, enter the number of gigabytes you want as a limit for storage space for published workbooks, extracts and other data sources.</p> <p>If you set a server limit and the site exceeds it, publishers will be prevented from uploading new content until the site is under the limit again. Server administrators can track where the site is relative to its limit using the Max Storage and Storage Used columns on the Sites page.</p>
<p><b>Revision History</b></p> <p>Moves to Site Settings on multi-site servers.</p>	<p>Specifies the number of previous versions of workbooks, flows and data sources that are stored on the server.</p>
<p><b>Managing Users</b></p> <p>Moves to Site Settings on multi-site servers.</p>	<p>Determines whether only server administrators can add and remove users and change their site roles, or whether site administrators can too.</p> <p>If you allow site administrators to manage users, specify how many users they can add to the site by selecting one of the following:</p> <ul style="list-style-type: none"> <li>• Server Limit adds the number of available server seat licences. For a server with core-based licensing, there is no limit.</li> <li>• Site Limit lets site administrators add users up to a limit you specify.</li> <li>• Site Role Limit lets site administrators add users of each site role up to the licence limit you specify for the site.</li> </ul> <p>For more information, see <a href="#">View Server Licences</a>.</p>
<p><b>Web Authoring</b></p>	<p>Controls whether browser-based authoring is enabled for the site. When web authoring for workbooks is dis-</p>

Moves to Site Settings on multi-site servers.	<p>abled, users can't create or edit published workbooks from the server web environment but instead must use Tableau Desktop to republish the workbook. When web authoring for flows is disabled, users can't create or edit published flows from the server web environment but instead must use Tableau Prep Builder to re-publish the flow.</p> <p>For more information, see <a href="#">Set a Site's Web Authoring Access and Functions</a> in Tableau Cloud Help.</p>
<b>Tableau Prep Conductor</b>  Moves to Site Settings on multi-site servers.	<p>Controls whether users with appropriate permissions can schedule and monitor flows. Tableau Prep Conductor is part of Tableau Data Management. For more information, see <a href="#">About Tableau Prep Conductor</a>.</p>
<b>Tableau Catalog</b>  Moves to Site Settings on multi-site servers.	<p>Turns off Catalog capabilities when Tableau Server or a Tableau Cloud site is licensed with Data Management. For more information, see <a href="#">Disable Catalog</a>.</p>
<b>Email Settings</b>  Moves to Site Settings on multi-site servers.	<p>Specifies the From address and message footer seen in automatic emails for alerts and subscriptions.</p>
<b>Workbook Performance after a Scheduled Refresh</b>  Moves to Site Settings on multi-site servers.	<p>Pre-computes recently viewed workbooks with scheduled refreshes to open them faster. For more information, see <a href="#">Configure Workbook Performance after a Scheduled Refresh</a>.</p>
<b>Workbook Performance Metrics</b>  Moves to Site Settings on multi-site servers.	<p>Lets site users collect metrics on how workbooks perform, such as how quickly they load To initiate recording, users must add a parameter to the workbook's URL. For more information, see <a href="#">Create a Performance Recording</a>.</p>

<b>Managed Keychain Clean Up</b>  Moves to Site Settings on multi-site servers.	Lets site administrators manage saved credential keychains for OAuth connections on the site. For more information, see <a href="#">OAuth Connections</a> .
<b>Automatically Suspend Extract Refresh Tasks</b>  Moves to Site Settings on multi-site servers.	To save resources, Tableau can automatically suspend extract refresh tasks for inactive workbooks. This feature applies only to refresh schedules that run weekly or more often. For more information, see <a href="#">Automatically Suspend Extract Refreshes for Inactive Workbooks</a> in Tableau Cloud Help.
<b>User Visibility</b>  Moves to Site Settings on multi-site servers.	Controls what user and group names are visible to other users. For more information, see <a href="#">Manage User Visibility</a> in Tableau Cloud Help.
<b>Availability of Ask Data</b>  Moves to Site Settings on multi-site servers.	Controls whether Ask Data is enabled or disabled by default for data sources. Ask Data lets users query data using conversational language and automatically see visualisations. For more information, see <a href="#">Automatically Build Views with Ask Data</a> in Tableau user Help.
<b>Availability of Explain Data</b>  Moves to Site Settings on multi-site servers.	Controls whether site users with the appropriate permissions can run Explain Data and authors can access Explain Data Settings. For more information, see <a href="#">Control Access to Explain Data</a> . To learn more about Explain Data, see <a href="#">Discover Insights Faster with Explain Data</a> .
<b>Automatic Access to Metadata about Databases and Tables</b>  Moves to Site Settings on multi-site servers.	Automatically grants users certain capabilities to external assets using derived permissions. For more information, see <a href="#">Turn off derived permissions</a> in Tableau Cloud Help.
<b>Sensitive Lineage Data</b>  Moves to Site Settings on multi-	Specifies whether sensitive lineage data should be obfuscated or filtered when users don't have the appropriate

site servers.	permissions to related metadata. For more information, see <a href="#">Sensitive lineage data</a> .
<b>Extract Encryption at Rest</b>  Moves to Site Settings on multi-site servers.	Lets you encrypt .hyper extracts while they are stored on Tableau Server. Server administrators can enforce encryption of all extracts on their site or allow users to encrypt all extracts associated with particular published workbooks or data sources. For more information, see <a href="#">Extract Encryption at Rest</a> .
<b>Tableau Mobile</b>  Moves to Site Settings on multi-site servers.	<ul style="list-style-type: none"> <li>• Enable offline previews  Controls whether offline previews are generated for display when users access the site on Tableau Mobile. For more information, see <a href="#">Manage Tableau Mobile Data on Devices</a> in the Tableau Mobile Deployment Guide.</li> <li>• Enable app lock  Requires a biometric method or device passcode for users to open the site on Tableau Mobile. For more information, see <a href="#">Enable App Lock for Added Security</a> in the Tableau Mobile Deployment Guide.</li> </ul>
<b>Sharing</b>  Moves to Site Settings on multi-site servers.	Allows users to share items directly with other users. When an item is shared, the recipients get a notification and the item is added to their Shared with Me page. If this is not enabled, users can only copy a link to share. For more information, see <a href="#">Share Web Content</a> in Tableau user Help.
<b>Comments</b>  Moves to Site Settings on multi-site servers.	Controls whether users can add remarks in a Comments side pane for each view and @mention other Tableau users to notify them via email. For more information, see

	<a href="#">Comment on Views</a> in Tableau user Help.
<b>Data-Driven Alerts</b>  Moves to Site Settings on multi-site servers.	Lets users automatically receive emails when data reaches key thresholds. For more information, see <a href="#">Send Data-Driven Alerts</a> in Tableau user Help.
<b>Tagging</b>  Moves to Site Settings on multi-site servers.	Specifies the number of tags that users can add to items. The default limit is 50 tags, and the maximum is 200. For more information, see <a href="#">Use Tags</a> .
<b>Recommendations for Views</b>  Moves to Site Settings on multi-site servers.	Controls whether recommendations show on the site and whether the names of users who have looked at recommended items show on recommendation tooltips. <div> <p><b>Note:</b> If you use Tableau Server, your administrator can disable Recommendations.</p> </div>
<b>Request Access</b>  Moves to Site Settings on multi-site servers.	Lets users send access requests to content or project owners. For more information, see <a href="#">Let Site Users Request Access to Content</a> in Tableau Cloud Help.
<b>Cross-Database Joins</b>  Moves to Site Settings on multi-site servers.	Determines where the join process happens when joining data from multiple sources. For more information, see <a href="#">Combine Tables from Different Databases</a> in Tableau user Help.
<b>Metrics Content Type</b>  Moves to Site Settings on multi-site servers.	Controls whether metrics are available on the site. When enabled, users can create metrics from views and metrics appear as a content type. When disabled, metrics won't appear on the site or continue to sync; however, you can re-enable the feature to bring back previously created metrics. For more information, see "Set Up for Metrics" in <a href="#">Tableau Cloud Help</a> or <a href="#">Tableau Server Help</a> .



	<p><b>Retirement of the legacy metrics feature</b></p> <p>Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see <a href="#">Create Metrics with Tableau Pulse</a> to learn about the new experience and <a href="#">Create and Troubleshoot Metrics (Retired)</a> for the retired feature.</p>
<p><b>Site Time Zone for Extracts</b></p> <p>Moves to Site Settings on multi-site servers.</p>	<p>The default time zone for extract-based data sources in a site is Coordinated Universal Time (UTC). Site administrators can set a different time zone. For more information, see <a href="#">Set the Site Time Zone for Extracts</a> in Tableau Cloud Help.</p>
<p><b>Run Now</b></p> <p>On multi-site servers, this appears on both Server Settings (at bottom of page) and Site Settings.</p>	<p>Server administrators can use this setting to allow or block users from manually running extract refreshes, flow runs and subscriptions. This setting can be applied at the server level to include all the sites on Tableau Server or applied at the site level to include only specific sites.</p> <ul style="list-style-type: none"> <li>• By default, this option is set to allow users to run jobs manually. Untick the box to prevent users from running jobs manually.</li> <li>• This applies only to jobs that are manually initiated by a user from the web interface, REST API calls or tabcmd commands. Jobs initiated from scheduled tasks will continue to run at the schedule time and will not be affected.</li> <li>• Select <b>Run Now</b> to allow users to change the con-</li> </ul>

	nection type (Live/Extract) of data sources on the web.
<b>Manage Notifications</b>  Moves to Site Settings on multi-site servers.	Controls how site users can receive notifications for events such as extract jobs and flow runs or when another user shares content with them or mentions them in a comment. Notifications can be seen in their Tableau site via the notification centre or sent by email. When a notification is enabled, users can configure their notification preferences on their Account Settings page.
<b>Flow Subscriptions</b>  Moves to Site Settings on multi-site servers.	Controls whether flow owners can schedule and send emails with flow output data to themselves and others. When you allow flow subscriptions, you can control whether flow output data is included in the subscription email and whether flow output files are attached to the email. For more information, see <a href="#">Notify Users of Successful Flow Runs</a> .
<b>Web Page Objects</b>  Moves to Site Settings on multi-site servers.	Controls whether these dashboard objects can display target URLs. For more information, see <a href="#">Security for Web Page objects</a> in Tableau user Help.
<b>Personal Space</b>  Moves to Site Settings on multi-site servers.	Allows Creator and Explorer site users to create and save content to a private Personal Space. When Personal Space is turned on, you can set user storage limits. For more information, see <a href="#">Create and Edit Private Content in Personal Space</a> .
<b>Collections</b>  Moves to Site Settings on multi-site servers.	Controls whether collections are available. When you turn on collections, users can create collections to organise content and browse collections made available by other users. For more information, see <a href="#">Organise Items in a Collection</a> .
<b>OAuth Clients Registry</b>	For a subset of connectors, you can register a custom OAuth client for the site to override an OAuth client that

	has been configured for the server. By registering a custom OAuth client, you enable new and existing connections to use the site-level OAuth client instead of the server-wide OAuth client. For more information, see <a href="#">Configure a custom OAuth for a site</a> .
<b>View Acceleration</b>	Controls whether Creator and Explorer site users can accelerate the views in their workbooks for faster loading times. When you allow view acceleration, you can set a maximum number of views to be accelerated, and you can choose to automatically suspend acceleration for views that repeatedly fail the acceleration task. For more information, see <a href="#">View Acceleration</a> .
<b>Start Page</b>	Links to the server's current default start page for all users. For more information on how to change the default start page, see <a href="#">Set the Default Start Page for All Users</a> . Individual users will be able to override this setting (search for "Access Your Profile and Account Settings" in the Tableau Server Help for details).
<b>Guest Access</b>	<p>Allows users to view and interact with embedded views without having to sign in to a Tableau Server account. Permission can be assigned to the Guest User account to control the interactivity allowed for each view. This option is only available if you have a core-based server licence.</p> <p>This option can be used with <b>Enable automatic logon</b>, an option you can select during <a href="#">Setup</a>.</p>
<b>Embedded Credentials in Content</b>	<ul style="list-style-type: none"> <li>Let publishers embed credentials in a data source, flow or workbook</li> </ul> <p>Allows publishers to attach passwords to published workbooks or flows that will automatically</p>

	<p>authenticate web users to connect to data sources. The passwords are attached to workbooks or flow inputs and are only accessible on the server. For example, when a workbook is opened in Tableau Desktop, users still need to enter a username and password to connect to the data source. When this setting is turned off, all existing embedded passwords are saved but are not used for authentication. If you turn the setting back on, users won't have to re-embed the passwords.</p> <ul style="list-style-type: none"> <li>• Let publishers schedule flow runs and extract refreshes</li> </ul> <p>Allows publishers to assign workbooks or flows to schedules. This option is only available if <b>Let publishers embed credentials in a data source, flow or workbook</b> is enabled. When this setting is enabled, Tableau Desktop users will see scheduling options in the Publish dialog box.</p>
<b>Sign-In Customisation</b>	<p>Add a custom note to the server sign in page. The Sign In setting lets you add text. You can optionally add a URL to make the text a link. This note will also appear if a user receives a sign in error.</p> <p>Custom notes do not display on Tableau Mobile. If Tableau Server is configured with <b>identity pools</b>, the Sign In Customisation note appears on both the Tableau Server landing page below all sign-in options and on the page where your initial pool (TSM configured) users enter their username and password.</p>

	<p>To set a custom note, sign in to a site on Tableau Server. On the left-side navigation pane, select <b>Manage all sites</b> from the drop-down site list. Select <b>Settings</b> and add a message to <b>Sign In Customisation</b>.</p> <p>For more information, see <a href="#">Customise Your Server</a>.</p>
<b>Recommendations Training Schedule</b>	<p>Recommendations take two forms: recommendations for data sources and tables (for Tableau Desktop) and recommendations for views (for Tableau Server). Recommendations are based on the popularity of content and on content used by other users determined to be similar to the current user.</p> <p>The training schedule controls how often the server checks for new content and new usage information to keep the recommendations up to date. New content includes new and updated data sources and workbooks. New usage information includes information such as "Laura Rodriguez used the Food Catering data source" and "Henry Wilson accessed the Monthly Sales view".</p> <p>If you notice an impact on server performance, schedule this process to occur at a time when the server load is low. To track performance impact, look for the "Recommendations Trainer" or "View Recommendations Trainer" tasks in the Background Tasks for Non Extracts view.</p> <p>If you want to disable Recommendations, change the <b>tsm configuration set</b> option "recommendations.enabled" to false. If you want to disable only recommendations for views, change the option "recommendations.vizrecs.enabled" to false.</p>

<b>Connected Clients</b>	Controls whether mobile users must sign in and provide their credentials every time they connect to Tableau Server, or if users can connect with their devices to Tableau Server without providing credentials after they authenticate their device successfully the first time. For more information, see <a href="#">Disable Automatic Client Authentication</a> .
<b>Language and Locale</b>	Controls the language used for the server user interface and the locale used for views. Individual users can override this setting on their Account Settings page. Also, web browser settings are evaluated first to determine which language and locale should be used. For more information, see <a href="#">Language and Locale for Tableau Server</a> .
<b>Saved Credentials for Data Sources</b>	<ul style="list-style-type: none"> <li>Let users save passwords for data sources</li> </ul> <p>Allows users to choose "Remember my password" and save data source passwords across multiple visits, browsers, and devices. (By default, users can choose to "Remember my password until I sign out," which lets them save their password only for a single browser session.)</p> <p>As an administrator, you can <b>clear all saved passwords</b> at any time. In addition, users can clear their own saved passwords.</p> <ul style="list-style-type: none"> <li>Let users save OAuth access tokens for data sources</li> </ul> <p>Allows users to store access tokens with their user preferences. Access tokens are provided by cloud data sources that support OAuth connections, and</p>

	<p>they are used instead of user names and passwords to grant access to the data.</p> <p>For more information, see <a href="#">OAuth Connections</a></p>
<p><b>Linked Tasks</b></p> <p>On multi-site servers, this appears on both Server Settings and Site Settings.</p>	<p>Server administrators can use this setting to enable users to schedule flow tasks to run one after the other. They can also enable users to trigger the scheduled flow tasks to run using <b>Run Now</b>.</p> <p>This setting can be applied at the server level to include all the sites on Tableau Server. The setting can be disabled at the site level to include only specific sites.</p> <p>If the setting is turned off after linked tasks are scheduled, any tasks that are running will complete and the scheduled linked tasks are hidden and no longer show on the <b>Scheduled Tasks</b> tab.</p> <p>For more information, see <a href="#">Schedule linked tasks</a>.</p>
<p><b>Flow Parameters</b></p> <p>On multi-site servers, this appears on both Server Settings and Site Settings.</p>	<p>Enables users to schedule and run flows that include parameters.</p> <p>Administrators can also enable flow parameters to accept any value. If this option is enabled, any flow user can enter any value in a parameter, potentially exposing data that the user should not have access to.</p> <p>Parameters can be entered in an input step for file name and path, table name or when using custom SQL queries, in an output step for file name and path and table name, and in any step type for filters or calculated values.</p>

	<p>Flow parameter settings can be applied at the server level to include all sites on Tableau Server. The settings can be disabled at the site level to include only specific sites.</p> <p>For more information about using parameters, see <a href="#">Create and Use Parameters in Flows</a> in the Tableau Prep help.</p>
<p><b>Active Directory Synchronisation</b></p> <p>Only appears when server is configured for AD identity store.</p>	<p>Controls the synchronisation of all Active Directory groups in Tableau Server based on a schedule that you specify after you select the option <b>Synchronise Active Directory groups on a regular schedule</b>. For more information, see Synchronise External Directory Groups on the Server.</p>
<p><b>Reset to Default Settings</b></p>	<p>Returns any server settings described here that have been changed since setup back to their original state.</p>
<p><b>Assertions for Group Membership</b></p> <p>On multi-site servers, this appears on both Server Settings and Site Settings pages.</p>	<p>Enables local group membership to be controlled and managed by the IdP or through the connected app by dynamically asserting group membership when a user authenticates to Tableau Server. Requires additional configuration in the SAML assertion or JSON web token (JWT). For more information, see Dynamic group membership using assertions.</p> <p><b>Note:</b> This server-wide setting must be enabled to allow the site-level setting to be enabled.</p>
<p><b>Group Sets</b></p> <p>Moves to site Settings on multi-site servers.</p>	<p>Enables the <b>Group Sets</b> page and the ability to create group sets. Group sets can be used by certain users (server admins, site admins, project owners and content owners) to apply permission rules that require users to be members of all groups in the group set to access content whose permissions are dependent on the group set.</p>



	For more information, see <a href="#">Work with Group Sets</a>
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Customisation

Setting	Description
<b>Welcome Banner</b>	<p>Add a custom message to the welcome banner on the home page for all server users to see. The custom message can contain up to 240 characters of text and hyperlinks as well as one paragraph break. Administrators can also disable the default Tableau welcome banner for the server.</p> <p>For more information, see <a href="#">Customise Your Server</a>.</p>

Mobile

Setting	Description
<b>Tableau Mobile</b>	
App Lock	Requires a biometric method or device passcode for users to open this site on Tableau Mobile. For more information, see <a href="#">Enable App Lock for Added Security</a> in the Tableau Mobile Deployment Guide.
Offline Previews	Controls whether offline previews are generated for display when users access the site on Tableau Mobile. For more information, see <a href="#">Manage Tableau Mobile Data on Devices</a> in the Tableau Mobile Deployment Guide.
<b>Mobile Security Policies</b>	Some security policies are enabled automatically and cannot be disabled. Mobile security policies are not available for MAM versions of Tableau Mobile.
Added in version 2023.1.0	<b>Note:</b> Mobile Security policies configured at the site level

override Server-level Mobile Security policies.

Jailbreak Detection	Controls whether a Tableau Mobile app user with a device that has been "jailbroken" or "rooted" is allowed to access content on Tableau, and what level of response occurs when a jailbroken or rooted device is detected. For more information, see Tableau Mobile App Security Settings.
Malware Detection (Android only)	Controls whether malware detection is enabled for mobile devices and what level of response occurs when malware is detected. For more information, see Tableau Mobile App Security Settings.
Maximum Days Offline Without Policy Refresh	Controls whether there is a maximum number of days a mobile device can be offline and still use the app. For more information, see Tableau Mobile App Security Settings.
Prevent Debugging	Controls whether debuggers are prevented on mobile devices. For more information, see Tableau Mobile App Security Settings.
Screen Sharing and Screen-shots (Android only)	Controls whether a Tableau Mobile user is able to take screenshots or use screen sharing while in the app. For more information, see Tableau Mobile App Security Settings.

## Stop or Restart the Tableau Server Computer

As a best practice, you should *always* stop Tableau Server before you stop or restart the computer it is running on. This is true whether you are running Tableau on virtual machines (VMs), or on dedicated hardware. You should never turn off a computer without first stopping Tableau Server. Shutting down the computer while Tableau is running can cause problems restarting Tableau Server, and may result in unexpected results.

To be safe, follow these steps, whether you have a scripted process to shut down your systems, or manually shut down your computers:

1. Stop Tableau Server.

You can do this either from the command line, using the `tsm stop` command, or from the TSM Web UI, by clicking **Tableau Server is running**, and selecting **Stop Tableau Server**.

**Note:** Some TSM processes will continue to run, even after you stop Tableau Server. This is normal, and you can go ahead and stop your computer. The running services are designed to shut themselves off when the computer is stopped.

2. Once Tableau is stopped, stop your computer.
3. When you are ready, restart your computer. This might be after you have completed planned maintenance, or after leaving the computer off for some extended period of down time.
4. Start Tableau Server.

You can do this either from the command line, using the `tsm start` command, or from the TSM Web UI, by clicking **Tableau Server is stopped**, and selecting **Start Tableau Server**.

TSM will start automatically when the computer starts, so you can run `tsm` commands even though Tableau Server is stopped.

## tsm Command Line Reference

The topics in this section include reference content for Tableau Services Manager (TSM) command line interface (CLI) to support Tableau Server.

TSM is used to manage installation and configuration of Tableau Server. To learn more about TSM, see [Tableau Services Manager Overview](#).

You can automate the installation and configuration tasks supported by the TSM CLI using the TSM API. To learn more about the prerelease (Alpha) TSM API, see [Tableau Services Manager API](#).

## Using the tsm CLI

You can run tsm commands on the initial node (the node where TSM is installed), or on any additional node in the cluster.

To run tsm commands, you need to open Windows Command Prompt. Do not use PowerShell to run tsm commands. Using PowerShell can cause unexpected behaviour.

1. Open Windows Command Prompt with an account that is a member of the Administrators group on a node in the cluster.
2. Run the command you want. If you are running the command from a node other than the initial node, include the `-s` option to specify the URL of the initial node by name (not IP address), and include the TSM port, 8850.

To see the version of TSM and Tableau Server from the initial node:

```
tsm version
```

To see the version of TSM and Tableau Server from an additional node:

```
tsm version -s https://<initial_node_name>:8850
```

For example:

```
tsm version -s https://myTableauHost:8850
```

## Authenticating with tsm CLI

Beginning in the 2019.2 release of Tableau Server, running tsm commands will not require you to enter a password if the following are true:

- The account you are running commands with is a member of the TSM-authorized group, which is the local Administrators group on the Windows computer.
- You are running commands locally on the Tableau Server that is running the Tableau Server Administration Controller service. By default, the Tableau Server Administration Controller service is installed and configured on the initial node in a distributed deployment.

## Logging into tsm CLI locally

If you are running tsm commands on the local computer with user account that is a member of a TSM-authorized group, then you will not need to specify a password. In this case, just run the command, for example:

```
tsm version
```

## Logging into tsm CLI remotely

If you are running TSM commands from a node in a cluster where the Tableau Server Administration Controller service is not running, then you must authenticate a session with the Tableau Server Administration Controller service on the remote computer before you can run commands. For example, run the following command:

```
tsm login -s <server_name> -u <account_name>
```

Where `<server_name>` is the name of the node where the Tableau Server Administration Controller service is running and `<account_name>` is an account that is a member of a TSM-authorized group.

After running this command, you will be prompted for a password. After the account has been authenticated, you can run TSM commands.

## Scripting and automating with tsm CLI

TSM is a batch file. To run TSM commands in another batch file, use the `call` command. For example "`call tsm maintenance ziplogs`". Doing this will return control to the batch file.

To run automation on a Tableau Server without a password in the script file, run the script on the initial node and with an account in the proper TSM-authorized group. See the "Authenticating" section above.

## Viewing help content in the shell

To view minimal help content from a command line, use the `tsm help category`.

### Synopsis

```
tsm help [category] [command]
```

### Commands

```
tsm help
```

Help for all tsm commands

```
tsm help <category>
```

Show help for a specific command category. For example, `tsm help authentication`.

```
tsm help <category> <command>
```

Show help for a specific command. For example, `tsm help authentication open-id`.

```
tsm help commands
```

List all top-level commands or categories.

### Categories

## tsm authentication

You can use the `tsm authentication` commands to enable, disable, and configure user authentication options for Tableau Server.

- `identity-migration`
- `kerberos`
  - `configure`
  - `disable`
  - `enable`
- `legacy-identity-mode`
  - `enable`
  - `disable`
- `list`
- `mutual-ssl`
  - `configure`
  - `disable`
  - `enable`
- `openid`
  - `configure`
  - `disable`
  - `enable`
  - `get-redirect-url`
  - `map-claims`
- `pat-impersonation`
  - `disable`
  - `enable`
- `saml`
  - `configure`
  - `disable`
  - `enable`
  - `export-metadata`
  - `map-assertions`

- **sitesaml**
  - disable
  - enable
- **sspi**
  - disable
  - enable
- **trusted**

## tsm authentication identity-migration configure

Change the default job settings for the identity migration. For more information, see [Manage the Identity Migration](#).

### Synopsis

```
tsm authentication identity-migration configure -job-run-time
```

```
tsm authentication identity-migration configure -rate
```

### Options

```
-j, --job-run-time <number>
```

Optional.

Determines the longest allowable time, in minutes, the scheduled migration job can run for. Default value is 120 minutes.

```
-r, --rate <number>
```

Optional.

Determines the number of requests during a migration job that can run per second. Default value is 5 requests per second.



## **tsm authentication kerberos <commands>**

Enable, disable, and configure Kerberos user authentication on Tableau Server. See [Configure Kerberos](#).

### **Synopsis**

```
tsm authentication kerberos configure --keytab-file <keytab_
file.keytab> [global options]
```

```
tsm authentication kerberos enable [global options]
```

```
tsm authentication kerberos disable [global options]
```

### **Options for kerberos configure**

**-kt, --keytab-file <keytab\_file.keytab>**

Required.

Specifies the service .keytab file used for requests to the KDC.

## **tsm authentication legacy-identity-mode <commands>**

Enable or disable legacy identity store mode that might be required during the identity migration. Review the [Unable to restore backup](#) section to determine when to use this command.

For more information, see [About the Identity Migration](#).

### **Synopsis**

```
tsm authentication legacy-identity-mode enable
```

```
tsm authentication legacy-identity-mode disable
```

## **tsm authentication list**

List the server's existing authentication-related configuration settings.

## Synopsis

```
tsm authentication list [--verbose][global options]
```

## Options

**v, --verbose**

Optional.

Show all configured parameters.

## tsm authentication mutual-ssl <commands>

Enable, disable, and configure mutual SSL for user authentication on Tableau Server. To learn more about mutual SSL, see [Configure Mutual SSL Authentication](#).

Before you enable mutual SSL, you must enable and configure SSL for external communication. For information, see [Configure SSL for External HTTP Traffic to and from Tableau Server](#).

## Synopsis

```
tsm authentication mutual-ssl configure [options] [global options]
```

```
tsm authentication mutual-ssl disable [global options]
```

```
tsm authentication mutual-ssl enable [global options]
```

## Options

**-cf, --ca-cert <certificate-file.crt>**

Optional.

Specifies the location and file name for the certificate file. The file must be a valid, trusted certificate from a Certificate Authority (for example, Verisign).

**-fb, --fallback-to-basic <true | false>**

Optional.

Specifies whether Tableau Server should accept user name and password for authentication if SSL authentication fails.

Default value is `false`, to indicate that when configured for mutual SSL, Tableau Server does not allow a connection when SSL authentication fails. However, Tableau Server accepts username and password authentication from REST API clients, even if this option is set to `false`.

```
-m, --user-name-mapping <upn | ldap | cn>
```

Optional.

Specifies the user name syntax (UPN, LDAP or CN) to retrieve from identity store or directory. The syntax must match the format for Subject or Subject Alternative Name on the user certificate.

```
-rf, --revocation-file <revoke-file.pem>
```

Optional.

Specifies the location and file name for the certificate revocation list file. This file can be a `.pem` or `.der` file.

## tsm authentication openid <commands>

Enable, disable, and configure OpenID Connect (OIDC) user authentication on Tableau Server.

### Synopsis

```
tsm authentication openid configure [options] [global options]
```

```
tsm authentication openid disable [global options]
```

```
tsm authentication openid enable [global options]
```

```
tsm authentication openid get-redirect-url [global options]
```

```
tsm authentication openid map-claims [options] [global options]
```

### Options for openid configure

**Note:** Options must be set during initial configure, or during reconfigure. Individual options cannot be set separately.

```
-a, --client-authentication <string>
```

Required.

Specifies custom client authentication method for OpenID Connect.

To configure Tableau Server to use the Salesforce IdP, set this value to `client_secret_post`.

```
-cs, --client-secret <string>
```

Required.

Specifies the provider client secret. This is a token that is used by Tableau to verify the authenticity of the response from the IdP. This value is a secret and should be kept securely.

```
-cu, --config-url <url>
```

Required.

Specifies location of the provider configuration discovery document that contains OpenID provider metadata. If the provider hosts a public JSON file, use `--config-url`. Otherwise, specify a path on the local computer and file name using `--metadata-file` instead.

```
-mf, --metadata-file <file-path>, --config-file <config-file.json>
```

Optional.

Specifies the local path to the static OIDC discovery JSON document.

`-i, --client-id <client-id>`

Required.

Specifies the provider client ID that your IdP has assigned to your application.

`-id, --ignore-domain <true | false>`

Optional. Default: `false`

Set this to `true` if the following are true:

- You are using email addresses as usernames in Tableau Server
- You have provisioned users in the IdP with multiple domain names
- You want to ignore the domain name portion of the `email` claim from the IdP

Before you proceed, review the user names that will be used as a result of setting this option to `true`. User name conflicts may occur. In the case of a user name conflict, the risk of information disclosure is high. See Requirements for Using OpenID Connect.

`-if, --iframed-idp-enabled <true | false>`

Optional. Default: `false`

Specifies if the IdP is allowed inside of an iFrame. The IdP must disable clickjack protection to allow iFrame presentation.

`-ij, --ignore-jwk <true | false>`

Optional. Default: `false`

Set this to `true` if your IdP does not support JWK validation. In this case, we recommend authenticating communication with your IdP using mutual TLS or another network layer security protocol.

`-r, --return-url <return-url>`

The URL of your server. This is typically is the public name of your server, such as "http://example.tableau.com".

`-sn, --custom-scope-name <string>`

Optional.

Specifies a custom scope user-related value that you can use to query the IdP. See Requirements for Using OpenID Connect.

#### Options for openid map-claims

Use these options to change the default OIDC claims Tableau Server will use when communicating with your IdP. See Requirements for Using OpenID Connect.

`-i, --id <string>`

Optional. Default: `sub`

Change this value if your IdP does not use the `sub` claim to uniquely identify users in the ID token. The IdP claim that you specify should contain a single, unique string.

`-un, --user-name <string>`

Optional. Default: `email`

Change this value to the IdP claim that your organisation will use to match user names as stored in Tableau Server.

#### `tsm authentication pat-impersonation <commands>`

Enable and disable personal access token impersonation for administrators on Tableau Server.

For more information about personal access token impersonation, see Personal Access Tokens.

### Synopsis

```
tsm authentication pat-impersonation disable [global options]
```

```
tsm authentication pat-impersonation enable [global options]
```

To view whether personal access token impersonation is enabled, run the following command:

```
tsm authentication list
```

### tsm authentication saml <commands>

Configure Tableau Server to support single-sign on using the SAML 2.0 standard, enable or disable SAML for a site, map assertion attribute names between Tableau Server and the identity provider (IdP).

#### Available commands

```
tsm authentication saml configure [options] [global options]
```

```
tsm authentication saml disable [options] [global options]
```

```
tsm authentication saml enable [options] [global options]
```

```
tsm authentication saml export-metadata [options] [global options]
```

```
tsm authentication saml map-assertions [options]
```

### tsm authentication saml configure

Configure the SAML settings for the server. Specify the SAML certificate and metadata files, provide additional required information, set additional options.

If you are configuring SAML for the first time or have previously disabled it, you must run this command with `tsm authentication saml enable`. For more information, see [Configure Server-Wide SAML](#).

### Synopsis

```
tsm authentication saml configure [options] [global options]
```

## Options

`-e, --idp-entity-id <id>`

Required for initial SAML configuration; otherwise optional. IdP entity ID value.

Typically this is the same as the Tableau Server return URL (specified in the `--idp-return-url` parameter). The entity ID that you enter is used as a base for generating site-specific entity IDs. For example, if you enter the following:

`http://tableau-server`

A site configured for SAML might display the following entity ID:

`http://tableau-server/samlservice/public/sp/metadata?alias=48957410-9396-430a-967c-75bdb6e002a0`

To find the entity ID of a site, go to the **Settings** page of the site and select the **Authentication** tab. When SAML is enabled, the entity ID is shown under the first step for configuring site-specific SAML, exporting metadata.

`-r, --idp-return-url <idp-return-url>`

Required for initial SAML configuration; otherwise optional. The SAML return URL configured in the IdP. This is typically the Tableau Server external URL; for example, `https://tableau-server`.

### Notes

- `http://localhost` does not work for an external server.
- Adding a trailing slash to the URL (`https://tableau-server/`) is not supported.

`-i, --idp-metadata <idp-metadata.xml>`

Required for initial SAML configuration; otherwise optional. Provide the location and name of the XML metadata file you exported from the IdP settings.



## Tableau Server on Windows Help

For example, C:\ProgramData\Tableau\Tableau Server-\data\saml\<metadata-file.xml>

-cf, --cert-file <certificate.crt>

Required for initial SAML configuration; otherwise optional. The location and file name for the x509 certificate file for SAML. For requirements for the certificate file, see SAML Requirements.

For example, C:\ProgramData\Tableau\Tableau Server-\data\saml\<file.crt>

-kf, --key-file <certificate.key>

Required for initial SAML configuration; otherwise optional. Location and name of the key file that goes along with certificate.

For example, C:\ProgramData\Tableau\Tableau Server-\data\saml\<file.key>

-a, --max-auth-age <max-auth-age>

Optional. Default value is -1 (beginning in Tableau Server version 2020.4.15, 2021.1.12, 2021.2.9, 2021.3.8, 2021.4.4, 2022 and later). Previous default value was 7200 (2 hours).

The maximum number of seconds allowed between a user's authentication and processing of the AuthNResponse message.

We recommend you keep this default value, which disables the check for maximum authentication age. If this value is different from your IdP, users signing in to Tableau Server can see a sign-in error. For more information about this error, see the [Intermittent Error "Unable to Sign In" with SAML SSO on Tableau Server](#) article in the Tableau Knowledge Base.

-d, --desktop-access <enable | disable>

Optional. Default value is enable.

This option only applies to server-wide SAML. Use SAML to sign in to the server from Tableau Desktop. If single sign-on from Tableau client applications does not work with your IdP, you can set this to `disable`.

`-m, --mobile-access <enable | disable>`

Optional. Default value is enable.

Allow using SAML to sign in from older versions of Tableau Mobile app. Devices running Tableau Mobile app version 19.225.1731 and higher ignore this option. To disable devices running Tableau Mobile app version 19.225.1731 and higher, disable SAML as a client login option on Tableau Server.

`-so, --signout <enable | disable>`

Optional. Enabled by default.

Enable or disable SAML sign out for Tableau Server.

`-su, --signout-url <url>`

Optional. Enter the URL to redirect to after users sign out of the server. By default this is the Tableau Server sign-in page. You can specify an absolute or a relative URL.

### Example

```
tsm authentication saml configure --idp-entity-id https://tableau-
server --idp-metadata "C:\ProgramData\Tableau\Tableau Server-
\data\saml\<metadata.xml>" --idp-return-url https://tableau-server
--cert-file "C:\ProgramData\Tableau\Tableau Server-
\data\saml\<file.crt>" --key-file "C:\ProgramData\Tableau\Tableau
Server\data\saml\<file.key>"
```

## tsm authentication saml enable and saml disable

Enable or disable server-wide SAML authentication. In this context, all sites and users that you enable for SAML go through a single identity provider.

### Synopsis

```
tsm authentication saml enable [global options]
```

```
tsm authentication saml disable [global options]
```

## tsm authentication saml export-metadata

Export the Tableau Server .xml metadata file that you will use to configure the SAML IdP.

### Synopsis

```
tsm authentication saml export-metadata [options] [global options]
```

### Options

`-f, --file [/path/to/file.xml]`

Optional.

Specifies the location and file name in which the metadata will be written. If you don't include this option, `export-metadata` saves the file to the current directory, and names it `samlmetadata.xml`.

`-o, --overwrite`

Optional.

Overwrites an existing file of the same name specified in `-f`, or of the default name if `-f` is not included. If a file specified in `-f` exists, and `-o` is not included, the command does not overwrite the existing file.

## tsm authentication saml map-assertions

Maps attributes between the IdP and Tableau Server. Provide the name that the IdP uses for the attribute specified in each argument.

### Synopsis

```
tsm authentication saml map-assertions --user-name <user-name>
[global options]
```

### Options

```
-r, --user-name <user-name-attribute>
```

Optional. The attribute in which the IdP stores the user name. On Tableau Server, this is the same as the display name.

```
-e, --email <email-name-attribute>
```

Do not use. This option is not supported by Tableau.

```
-o, --domain <domain-name-attribute>
```

Optional. The attribute in which the IdP stores the domain name. Use this option if you add users from a domain that's different from the domain of the Tableau Server computer. For more information, see [When running multiple domains](#).

```
-d --display-name <display-name-attribute>
```

Do not use. This option is not supported by Tableau.

### Example for saml map-assertions

```
tsm authentication saml map-assertions --user-name=<sAMAccountName>
--domain=<FQDM> or tsm authentication saml map-assertions --user-name-
e=jnguyen --domain=example.myco.com
```

## tsm authentication sitesaml enable and sitesaml disable

Set the server to allow or disallow SAML authentication at the site level. Enabling site-specific SAML gives you access to the **Settings > Authentication** tab in the Tableau Server web UI. The **Authentication** tab contains the site-specific SAML configuration settings.

Use the `sitesaml enable` command with `saml configure` if you haven't yet configured the server to allow site-specific SAML. For more information, see [Configure Site-Specific SAML](#).

### Synopsis

```
tsm authentication sitesaml enable [global options]
```

```
tsm authentication sitesaml disable [global options]
```

## tsm authentication sspi <commands>

This command will only work on Tableau Server running on Windows. If you attempt to enable SSPI on Tableau Server on Linux, an error will be returned.

Enable or disable automatic sign-in using Microsoft SSPI.

If you use Active Directory for authentication, you can optionally enable automatic logon, which uses Microsoft SSPI to automatically sign in your users based on their Windows username and password. This creates an experience similar to single sign-on (SSO).

Do not enable SSPI if you plan to configure Tableau Server for SAML, trusted authentication, a load balancer or for a proxy server. SSPI is not supported in these scenarios.

### Synopsis

```
tsm authentication sspi disable [global options]
```

```
tsm authentication sspi enable [global options]
```

As with all authentication commands, you must run `tsm pending-changes apply` after running this command.

## tsm authentication trusted <commands>

Configure trusted authentication (trusted tickets) for user authentication on Tableau Server.

### Synopsis

```
tsm authentication trusted configure [options] [global options]
```

### Options

`-th, --hosts <string>`

Optional.

Specifies the trusted host names (or IPv4 addresses) of the web servers that will be hosting pages with Tableau content.

For multiple values, enter the names in a comma-separated list where each value is encapsulated in double-quotes.

For example:

```
tsm authentication trusted configure -th "192.168.1.101",  
"192.168.1.102", "192.168.1.103"
```

or

```
tsm authentication trusted configure -th "webserv1", "web-  
serv2", "webserv3"
```

`-t, --token-length <integer>`

Optional.

Determines the number of characters in each trusted ticket. The default setting of 24 characters provides 144 bits of randomness. The value can be set to any integer between 9 and 255, inclusive.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm configuration

You can use the `tsm configuration` commands to get, set, and update configuration key values.

### "Unknown key" responses

Certain configuration keys will return an "Unknown key" response when you attempt to get their current value, or set a new value. If this happens, verify that you have the key spelled correctly, including proper capitalisation. To change the value, use the `--force-keys` option on the `tsm configuration set` command. For a list of configuration keys you can change, see [tsm configuration set Options](#).

### "Null" value responses

Certain configuration keys have a specific default value but will return a "Null" response when you attempt to get their current value. These keys use a default that is derived from the Tableau Server code. If a key is listed as having a specific default in [tsm configuration set Options](#) and the `tsm configuration get` command returns "Null" for the current value, the default value is determined by code running Tableau Server. You can set the key value using `tsm configuration set`, but this is not necessary unless you want to change the value.

- `tsm configuration get`
- `tsm configuration list-dynamic-keys`
- `tsm configuration set`



## tsm configuration get

View the current server configuration and topology.

### Synopsis

```
tsm configuration get --key <config.key> [global options]
```

### Option

**-k, --key**

Required.

Get the current value of the specified configuration key.

## tsm configuration list-dynamic-keys

View all the configuration keys that can be configured dynamically (without restarting Tableau Server).

### Synopsis

```
tsm configuration list-dynamic-keys [global options]
```

## tsm configuration set

Set or import server configuration or topology.

Quotes around the `<config.key>` and the `<config_value>` are optional unless there are spaces, in which case you must use quotes around the key or value.

**Note:** After setting a configuration key value you must apply the pending configuration changes using `tsm pending-changes apply`. Until you do, the new value will not be used by Tableau or show up in the results of a `tsm configuration get` command.

You can view pending changes using `tsm pending-changes list`. For more information, see `tsm pending-changes`.

## Synopsis

```
tsm configuration set --key <config.key> --value <config_value>
[global options]
```

## Options

`-k, --key <config.key>`

Required.

Configuration key.

`-v, --value <config_value>`

Required. Beginning in the March maintenance releases (versions 2021.2.10, 2021.3.9, 2021.4.5), if you do not include this option, you will be prompted for the value.

Configuration value.

`-d`

Optional.

Reset the configuration value to its default.

`-frc, --force-keys`

Optional.

Force a key to be added to configuration even if it did not previously exist.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm configuration set Options

Below is a list of configuration options or keys that you can set with the `tsm configuration set` command. In many cases you can find out the current value of a configuration key with the `tsm configuration get` command.

This list is not intended to be an exhaustive list of Tableau Server configuration settings. It represents a subset of configuration keys that can be set by server administrators. Finally, some keys used internally by Tableau Server do not appear in this list.

**Note:** Configuration keys are case-sensitive.

## Using the tsm CLI

You can run `tsm` commands on the initial node (the node where TSM is installed), or on any additional node in the cluster.

To run `tsm` commands, you need to open Windows Command Prompt. Do not use PowerShell to run `tsm` commands. Using PowerShell can cause unexpected behaviour.

1. Open Windows Command Prompt with an account that is a member of the Administrators group on a node in the cluster.
2. Run the command you want. If you are running the command from a node other than the initial node, include the `-s` option to specify the URL of the initial node by name (not IP address), and include the TSM port, 8850.

To see the version of TSM and Tableau Server from the initial node:

```
tsm version
```

To see the version of TSM and Tableau Server from an additional node:

```
tsm version -s https://<initial_node_name>:8850
```

For example:

```
tsm version -s https://myTableauHost:8850
```

## Basic Use of tsm configuration keys

### Setting a configuration key

```
tsm configuration set -k <config.key> -v <config_value>
```

In some cases, you must include the `--force-keys` option to set a configuration value for a key that has not been set before. For more information, see "Unknown key" responses.

After setting a configuration key value you must apply the pending configuration changes using `tsm pending-changes apply`. Until you do, the new value will not be used by Tableau or show up in the results of a `tsm configuration get` command. You can view pending changes using `tsm pending-changes list`. For more information, see `tsm pending-changes`.

### Resetting a configuration key to default

To reset a configuration key back to its default value, use the `-d` option:

```
tsm configuration set -k <config.key> -d
```

### Viewing the current value of a configuration key

To see what a configuration key is currently set to, use the `configuration get` command:

```
tsm configuration get -k <config.key>
```

There are two special cases that will not return a useful current value for a key:

- In certain cases, you cannot get a configuration value for a key that has not been explicitly set. Instead the `tsm configuration get` command will return an "Unknown key" response. For more information, see "Unknown key" responses.

- For certain keys with predefined default values, the `tsm configuration get` command will return a "Null" response. For more information, see "Null" value responses.

## Configuration Keys

`adminviews.disabled`

Default value: `false`

Disables access to the Tableau Administrative views. By default, access to views is enabled (this option is set to "false").

`api.server.enabled`

**Version:** Deprecated in version 2023.1. You cannot disable the REST API in version 2023.1 and later.

Default value: `true`

Allows access to the [Tableau Server REST API](#).

By default, this functionality is enabled. We strongly recommend that you maintain this setting. Disabling the REST API will disrupt the functionality of a broad range of Tableau features. It will not improve performance or enhance security. If you choose to disable the REST API on your Tableau Server installation, test the functionality you require carefully.

Functionality impacted by disabling the REST API includes:

- Search
- Favourites
- Collections
- Content Management Tool (CMT)
- Resource Monitoring Tool (RMT)
- Personal Spaces

`auditing.enabled`

Default value: `true`

Allows access to the PostgreSQL (Tableau Server's own database) historical auditing tables.

`backgrounder.default_run_now_priority`

Default value (integer): 0

This setting controls what priority is assigned to run now jobs, with 0 being the highest priority. Values should be specified should be in the range of 0 – 100.

`backgrounder.enable_parallel_adsync`

**Version:** Added in version 2018.3.6

Default value: `false`

Controls whether parallel processing of external directory group synchronisation jobs is allowed when there are multiple backgrounders. By default a scheduled synchronisation of external directory groups is handled serially, by a single backgrounder. Set this to `true` to enable parallel processing on multiple backgrounder instances.

`backgrounder.externalquerycachewarmup.enabled`

**Version:** Deprecated in version 2023.1. To improve view load times for workbooks, allow View Acceleration on your site instead.

Default value: `false`

Controls the caching of workbook query results after scheduled extract refresh tasks.

`backgrounder.externalquerycachewarmup.view_threshold`

**Version:** Deprecated in version 2023.1. To improve view load times for workbooks, allow View Acceleration on your site instead.

Default vaule: `2.0`

The threshold for caching workbook query results after scheduled extract refresh tasks. The threshold is equal to the number of views that a workbook has received in the past seven days divided by the number of refreshes scheduled in the next seven days.

The following two *backgrounder* command options determine how long a flow task can run before the flow background task is cancelled. These two commands together determine the total timeout value for flow tasks.

`backgrounder.extra_timeout_in_seconds`

Default value: 1800

The number of seconds beyond the setting in `backgrounder.querylimit` before a background job is cancelled. This setting makes sure that a stalled job does not hold up subsequent jobs. The setting applies to processes listed in `backgrounder.timeout_tasks`. 1,800 seconds is 30 minutes.

`backgrounder.default_timeout.run_flow`

Default value: 14400

The number of seconds before a flow run task is cancelled. 14,400 seconds is 4 hours.

`backgrounder.failure_threshold_for_run_prevention`

Default value: 5

The number of consecutive failures of a subscription, extract or flow run job before that job is suspended. Suspending continuously failing jobs helps preserve backgrounder resources for other jobs. To disable suspension of failing background tasks, set this to `-1`.

`backgrounder.log.level`

**Version:** Added in version 2020.3.0.

Default value: `info`

The logging level for the backgrounder process. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).



`backgrounder.querylimit`

Default value: `7200`

Longest allowable time, in seconds, for completing a single extract refresh job. 7200 seconds = 2 hours.

**Note:** If a background job reaches this time limit, it may continue to run for an additional several minutes while being cancelled.

`backgrounder.restrict_serial_collections_to_site_level`

Default value: `false`

In Tableau Server, you can schedule extract refreshes, subscriptions or flows to run periodically. These scheduled items are referred to as tasks. The Backgrounder process initiates unique instances of these tasks to run them at the scheduled time. The unique instances of the tasks that are initiated as a result are referred to as jobs.

This setting affects schedules that are configured to run serially. By default, when a schedule is configured to run serially, all jobs using that schedule will run serially. When this setting is set to `true`, jobs running on different sites can run in parallel. Jobs for scheduled tasks on the same site will continue to run serially.

The example below illustrates this scenario:

Tableau Server includes a schedule named "Daily" to run jobs every day at 7 am. The "Daily" schedule is configured to run serially. Site "HR" and site "Payroll" each have multiple scheduled tasks that use the schedule, "Daily". When this setting is set to `true`, jobs for these scheduled tasks on Site "HR" can run in parallel with jobs on site "Payroll", whereas jobs on the same site will still only run serially.

`backgrounder.notifications_enabled`

Default value: `true`

Controls whether extract refresh and flow run alerts are enabled for all sites on the server. By default alerts are enabled. To disable the alerts for all sites on a server, set this to `false`.

Extract alerts can be enabled or disabled on a site basis by site administrators in site settings, or at the user level in user settings.

`backgrounder.sort_jobs_by_type_schedule_boundary_heuristics_milliSeconds`

Default value: 60000

Controls the time window that identifies backgrounder jobs which are determined to have the same scheduled start time.

The backgrounder process orders work that is scheduled at the same time to be executed by job type, running the fastest category of jobs first: Subscriptions, then Incremental Extracts, then Full Extracts.

Jobs are batched to determine which jobs are scheduled at the “same time”. A value 60,000 milliseconds (the default) indicates jobs for schedules starting within a 1 minute window should be classified in the same batch and so are ordered by type within that batch.

`backgrounder.subscription_failure_threshold_for_run_prevention`

Default value: 5

Determines the number of consecutive subscription failures that must occur before alerting for a condition is suspended. When set to the default of 5, alerting is suspended after 5 consecutive subscription failures. A value of `-1` will allow notification email to continue indefinitely. This threshold is server-wide, so applies to all subscriptions defined on the server.

`backgrounder.subscription_image_caching`

Default value: `true`

Controls whether backgrounder will cache images that are generated for subscriptions. Cached images do not have to be regenerated each time so caching improves subscription

performance. By default image caching is enabled. To disable image caching for all sites on a server, set this to `false`.

`backgrounder.timeout_tasks`

Default value: The default value may be different, depending on your version of Tableau Server. To see the default value list for your version of Tableau, run the `tsm configuration get` command:

```
tsm configuration get -k backgrounder.timeout_tasks
```

The list of tasks that can be cancelled if they run longer than the combined values in `backgrounder.querylimit` and `backgrounder.extra_timeout_in_seconds`. The list of tasks is delimited with commas. The default list represents all the possible values for this setting.

`backgrounder.timeout.single_subscription_notify`

**Version:** Added in version 2021.2.

Default Value: 1800 seconds (30 minutes)

This is the maximum allowable time specified in seconds for completing a single subscription job.

`backgrounder.timeout.sync_ad_group`

**Version:** Added in version 2021.1.23, 2021.2.21, 2021.3.20, 2021.4.15, 2022.1.11, 2022.3.3, 2023.1.

Default Value: 14400 seconds (4 hours)

This is the maximum allowable time, specified in seconds, for completing an Active Directory group sync. This applies to *scheduled* group synchronisations done by the backgrounder service and prevents long-running syncs from running indefinitely. This does not impact group synchronisations done using the Tableau Server UI or the REST API.

`backgrounder.vInstances_max_overflow_queue_size`

**Version:** Added in version 20221.2.

Default Value: 1000

The maximum number of jobs that can be in the secondary queue. A secondary queue is created when the number of jobs running is at the set concurrency limit. The default maximum is set to 1000 jobs – meaning if there are more than 1000 jobs when the concurrency limit is hit, anything more than 1000 jobs will not be queued. Use the `backgrounder.vInstance_max_overflow_queue_size tsm` command to make changes to the overflow maximum queue size.

The values should be specified in whole numbers.

`backup.zstd.thread_count`

**Version:** Added in version 2021.1.0. This key is dynamically configurable. For more information, see [Tableau Server Dynamic Topology Changes](#)

Default value: 2

The number of threads that should be used when creating a backup.

Increasing this number can improve backup performance, but we recommend thread count not exceed the number of logical processors on the Tableau Server computer, up to four.

`basefilepath.backuprestore`

**Default value:** `C:\ProgramData\Tableau\Tableau Server-\data\tabsvc\files\backups\`

The location in which the `tsm maintenance backup` command creates the backup. This is also the location where the backup file must be when restored using the `tsm maintenance restore` command or the `tsm maintenance send-logs` command. After setting this, you should run the `tsm maintenance validate-backup-basefilepath` command (available in version 2022.1 and later) to verify that permissions are set properly for the location. For more information, see [tsm File Paths](#).

## Tableau Server on Windows Help

`basefilepath.log_archive`

**Default value:** `C:\ProgramData\Tableau\Tableau Server-\data\tabsvc\files\log-archives\`

The location in which the `tsm maintenance ziplogs` command creates the zipped archive. For more information, see [tsm File Paths](#).

`basefilepath.site_export.exports`

**Default value:** `C:\ProgramData\Tableau\Tableau Server-\data\tabsvc\files\siteexports\`

The location in which the `tsm sites export` command creates the export file. For more information, see [tsm File Paths](#).

`basefilepath.site_import.exports`

**Default value:** `C:\ProgramData\Tableau\Tableau Server-\data\tabsvc\files\siteimports\`

The location in which the `tsm sites import` command expects the import file to be located. For more information, see [tsm File Paths](#).

`clustercontroller.log.level`

**Version:** Added in version 2020.3.0.

**Default value:** `info`

The logging level for Cluster Controller. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`clustercontroller.zk_session_timeout_ms`

**Default value:** `300000`

The length of time, in milliseconds, that Cluster Controller will wait for the Coordination Service (ZooKeeper), before determining that failover is required.

`dataAlerts.checkIntervalInMinutes`

Default value: 60

The frequency, in minutes, at which Tableau Server checks to determine if data-alert conditions are true.

(The server also checks whenever extracts related to data alerts are refreshed.)

`dataAlerts.retryFailedAlertsAfterCheckInterval`

Default value: `true`

Determines how often Tableau Server rechecks failing data alerts. When set to `true`, the server rechecks failing alerts at the frequency defined by `dataAlerts.checkIntervalInMinutes`. When set to `false`, the server rechecks failing alerts every five minutes, more quickly notifying alert recipients if data conditions have changed, but reducing server performance.

(The server also checks whenever extracts related to data alerts are refreshed.)

`dataAlerts.SuspendFailureThreshold`

Default value: 350

Determines the number of consecutive data alert failures that must occur before alerting for a condition is suspended. When set to the default of 350, alerting is suspended after roughly two weeks of alerts. This threshold is server-wide, so applies to any data alert defined on the server.

`databaseservice.max_database_deletes_per_run`

**Version:** Added in version 2021.2.

Default value: null

Use this option to adjust the maximum number of embedded external assets (databases and tables) that can be deleted each time the background process, controlled by `features.DeleteOrphanedEmbeddedDatabaseAsset`, runs. If this option is left empty, the default maximum number of embedded external assets that can be deleted is 100.

For more information, see `features.DeleteOrphanedEmbeddedDatabaseAsset`.

`dataserver.log.level`

**Version:** Added in version 2020.3.0.

Default value: `info`

The logging level for Data Server. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`dataserver_<n>.port`

Port that the data server instance (specified by "<n>") runs on.

`elasticserver.vmopts`

**Version:** Added in version: 2019.1. Removed: 2022.1

**This configuration option is not valid for Tableau Server versions 2022.1 and later.** For Tableau Server versions 2022.1 and later, use `indexandsearchserver.vmopts` configuration option

Default value: `"-Xmx<default_value> -Xms<default_value>"`

The default value varies based on the amount of system memory. The JVM maximum heap size is scaled to be 3.125% of the total system RAM.

Controls the Elastic Server heap size. Because the default value scales automatically, use this option to override the default value only when absolutely necessary. Append the letter 'k' to the value to indicate kilobytes, 'm' for megabytes or 'g' to indicate gigabytes. As a general rule, set

initial heap size (`-Xms`) equal to the maximum heap size (`-Xmx`) to minimise garbage collections.

`excel.shadow_copy_all_remote.enabled`

**Version:** Added in versions 2019.1.5, 2019.2.1.

Default value: `false`

Controls whether Tableau Server creates a "shadow copy" of a shared Excel spreadsheet (`.xlsx` or `.xlsm`) that is being used as a live data source. When enabled, this option prevents Excel users from seeing a "Sharing Violation Error" and a message that the file is "currently in use". This option can have a performance impact with large Excel files. If Excel users do not need to edit the shared file, you do not need to enable this option.

**Note:** Tableau Server always attempts to create a shadow copy of a `.xls` file. This option does not change that behaviour.

`extractservice.command.execution.timeout`

**Version:** Added in version 2021.4.

Default value: `7200` seconds

Sets the timeout value for VConn extract refresh run time.

**Example:** `tsm configuration set -k extract-service.command.execution.timeout -v <timeout_in_seconds> --force-keys`

**Note:** You must use the `--force-keys` option to change this value.

`features.ActiveMQ`

**Version:** Added in version 2021.4.



Default value: `true`

Controls whether Tableau Server uses the Apache ActiveMQ service (Tableau Server Messaging Service) for the internal messaging mechanism.

`features.DeleteOrphanedEmbeddedDatabaseAsset`

**Version:** Added in version 2021.2.

Default value: `true`

Controls a background process, for Tableau Catalogue (or Tableau Metadata API), that deletes embedded external assets (databases and tables) that are no longer associated with downstream Tableau content. This process runs every day at 22:00:00 UTC (coordinated universal time) and can delete a maximum of 100 external assets each day until there are no remaining external assets without connections to downstream Tableau content. You can set this option to `false` to stop this process from running. Alternatively, you can also adjust the maximum number of external embedded assets that can be deleted using `dataservice.max_database_deletes_per_run`.

For more information see, [Troubleshoot missing content](#).

`features.DesktopReporting`

Default value: `false`

Controls whether Desktop Licence Reporting is enabled on the server. When set to `false` (the default), no Administrative Views related to desktop licences are available. Set this to `true` to enable licence reporting and to make licence usage and expiration Administrative Views visible on the Server Status page. **Note:** Desktop Licence Reporting must be enabled on the client (Tableau Desktop) in order for information to be reported to Tableau Server.

`features.IdentityMigrationBackgroundJob`

**Version:** Added in version 2022.1. Default value was changed to `false` in versions 2021.4.22, 2022.1.18, 2022.3.10, 2023.1.6 and 2023.3.

Default value: `false`

Controls the process that performs the identity migration. When set to `true`, the identity migration runs in existing deployments immediately after upgrading Tableau Server to version 2022.1 (or later) and restoring a backup of Tableau Server version 2021.4 (or earlier). Set to `false` (default) to disable the identity migration.

For example, to start the identity migration, run the following:

```
tsm configuration set -k features.IdentityMigrationBackgroundJob -v
true
```

For more information, see [About the Identity Migration](#).

**Note:** If the identity migration is disabled, Tableau Server cannot use the Identity Service to store and manage user identity information. Using the Identity Service is a prerequisite for certain capabilities like [identity pools](#).

`features.IdentityPools`

**Version:** Added in version 2023.1

Default value: `false`

A component of the identity pools capability that needs to be enabled if you perform a new Tableau Server installation. Requires `feature.NewIdentityMode` and `wgserver.authentication.legacy_identity_mode.enabled`. Set to `true` to enable identity pools. Set to `false` (default) to disable identity pools.

For example, to enable identity pools, run the following:

```
tsm configuration set -k features.IdentityPools -v true
tsm configuration set -k features.NewIdentityMode -v true
tsm configuration set -k wgserver.authentication.legacy_identity_
mode.enabled -v false
tsm pending-changes apply
```

For more information, see [Troubleshoot identity pools](#).

## Tableau Server on Windows Help

`features.MessageBusEnabled`

**Version:** Added in version 2019.4.

Default value: `true`

Controls whether Tableau Server uses the new internal messaging mechanism.

`features.NewIdentityMode`

**Version:** Added in version 2022.1

Default value: `false`. The default value was changed from `true` to `false` in 2023.1.6.

A prerequisite of the identity pools capability. Requires `wgserver.authentication.legacy_identity_mode.enabled` to be set to `false` to enable identity pools. Set to `true` to disable identity pools.

```
tsm configuration set -k features.IdentityPools -v true
tsm configuration set -k features.NewIdentityMode -v true
tsm configuration set -k wgserver.authentication.legacy_identity_mode.enabled -v false
tsm pending-changes apply
```

For more information, see [Troubleshoot identity pools](#).

`features.PasswordlessBootstrapInit`

Default value: `true`

Controls whether Tableau Server allows embedded credentials in bootstrap files. When enabled (the default), embedded credentials are included in the bootstrap file unless you specify that they should not be included. Set this to `false` if credentials should never be included in any bootstrap file you generate. For more information on generating bootstrap files, see `tsm topology nodes get-bootstrap-file`.

This option was added beginning with Tableau Server version 2019.3.

features.PasswordReset

Default value: `false`

Applies only to servers that use local authentication. Set to `true` to let users reset their passwords with a "Forgot password" option on the sign-in page.

filestore.empty\_folders\_reaper.enabled

**Version:** Added in 2020.x (2020.1.14, 2020.2.11, 2020.3.6, 2020.4.2) and 2021.1.x. The default value was changed to `true` in 2021.2.

Default value: `true`

Enables the job that "reaps" (removes) empty Filestore folders.

filestore\_empty\_folders\_reap.frequency\_s

**Version:** Added in 2020.x (2020.1.14, 2020.2.11, 2020.3.6, 2020.4.2).

Default value: 86400 (24 hours)

Specifies, in minutes, how often to run the job that removes empty Filestore folders.

features.Hyper\_DisallowTDEPublishing

**Version:** Defaults to `true` beginning in version 2023.1.0

Default value: `true`

Specifies if users can upload .tde format files. This format was replaced by .hyper format beginning in version of 10.5 of Tableau Server but were not blocked from upload. The files were automatically converted to .hyper format if one of several actions were performed. For more information, see Extract Upgrade to .hyper Format.

filestore.log.level

features.Hyper\_DisallowTDEPublishing

**Version:** Added in version 2020.3.0

## Tableau Server on Windows Help

Default value: `info`

The logging level for File Store. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`filestore.reapemptyfoldersholdoffms`

**Version:** Added in 2020.x (2020.1.14, 2020.2.11, 2020.3.6, 2020.4.2). This is not yet available in 2021.1.

Default value: `300000` (5 minutes)

Specifies in milliseconds, the amount of time to wait before removing empty Filestore folders.

`floweditor.max_datafile_upload_size_in_kb`

**Version:** Added in version 2020.4

Default value: `1048576`

For Tableau Prep flow web authoring, the maximum size of delimited text files (for example, CSV or TXT) that can be uploaded to Tableau Server.

`gateway.external_url`

**Version:** Added in version 2023.1

Default value: Null

Required when OpenID Connect (OIDC) authentication is configured in TSM during Tableau Server setup or with identity pools. Specifies the Tableau Server URL used by the identity provider (IdP) to redirect users who authenticate into Tableau. The gateway external URL is the same URL that you specified as the redirect URL with your IdP, which is used for matching purposes.

For example, to redirect the IdP associated with OIDC authentication configuration to your Tableau Server, <http://myco>, run the following command:

```
tsm configuration set -k gateway.external_url -v http://myco
```

```
gateway.http.cachecontrol.updated
```

Default value: `false`

The Cache-Control HTTP header specifies whether the client browser should cache content sent from Tableau Server. To disable caching of Tableau Server data on the client, set this option to `true`.

```
gateway.http.hsts
```

Default value: `false`

The HTTP Strict Transport Security (HSTS) header forces browsers to use HTTPS on the domain where it is enabled.

```
gateway.http.hsts_options
```

Default value: `"max-age=31536000"`

By default, HSTS policy is set for one year (31536000 seconds). This time period specifies the amount of time in which the browser will access the server over HTTPS.

```
gateway.httpd.loglevel
```

**Version:** Added in 2021.3.0.

Default value: `notice`

Specifies the logging level for the Gateway (Apache HTTPD server). By default, this is set to `notice`. Other options include `debug`, `info`, `warning`, `error`. If you change the logging level, be aware of potential impact to disk space usage and performance. As a best practice, return the logging level to the default after you have gathered the information you need. For detailed information on Apache logging, see the [Apache HTTP documentation](#).

```
gateway.httpd.shmcb.size
```

**Version:** Added in 2021.4

Default value: 2048000

Specifies the amount of memory in bytes for the circular buffer when using the `shmcb` storage type. This configuration key doesn't apply when using the `dbm` storage type.

`gateway.htpd.socache`

**Version:** Added in 2021.4

Default value: `shmcb`

Specifies the storage type of the global/inter-process SSL Session Cache. By default, this is set to `shmcb`, with another configurable option `dbm`. For more information about `shmcb` and `dbm` storage types, see [SSLSessionCache Directive](#) on the Apache website.

`gateway.http.request_size_limit`

Default value: 16380

The maximum size (bytes) of header content that is allowed to pass through the Apache gateway on HTTP requests. Headers that exceed the value set on this option will result in browser errors, such as HTTP Error 413 (Request Entity Too Large) or authentication failures.

A low value for `gateway.http.request_size_limit` can result in authentication errors. Single sign-on solutions that integrate with Active Directory (SAML and Kerberos) often require large authentication tokens in HTTP headers. Be sure to test HTTP authentication scenarios before deploying into production.

We recommend setting `tomcat.http.maxrequestsize` option to the same value that you set for this option.

`gateway.http.x_content_type_nosniff`

Default value: `true`

The X-Content-Type-Options response HTTP header specifies that the MIME type in the Content-Type header should not be changed by the browser. In some cases, where MIME type is not specified, a browser may attempt to determine the MIME type by evaluating the

characteristics of the payload. The browser will then display the content accordingly. This process is referred to as "sniffing". Misinterpreting the MIME type can lead to security vulnerabilities. The X-Content-Type-Options HTTP header is set to 'nosniff' by default with this option.

gateway.http.x\_xss\_protection

Default value: `true`

The HTTP X-XSS-Protection response header is sent to the browser to enable cross-site scripting (XSS) protection. The X-XSS-Protection response header overrides configurations in cases where users have disabled XSS protection in the browser. The X-XSS-Protection response header is enabled by default with this option.

gateway.log.level

**Version:** Added in version 2020.3.0.

Default value: `info`

The logging level for Gateway. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

gateway.public.host

Default value: `<hostname>`

The name (URL) of the server, used for external access to Tableau Server. If Tableau Server is configured to work with a proxy server or external load balancer, it is the name entered in a browser address bar to reach Tableau Server. For example, if Tableau Server is reached by entering `tableau.example.com`, the name for `gateway.public.host` is `tableau-example.com`.

gateway.public.port

Default value: `80` (`443` if SSL)



Applies to proxy server environments only. The external port the proxy server listens on.

`gateway.slow_post_protection.enabled`

Default value: `true`

When enabled, this can provide some help in protecting against slow POST (Denial-of-Ser-vice) attacks by timing out POST requests that transfer data at extremely slow rates.

**Note:** This will not eliminate the threat of such attacks, and could have the unintended impact of terminating slow connections.

`gateway.slow_post_protection.request_read_timeout`

Default value: `header=10-30,MinRate=500 body=30,MinRate=500`

When enabled by the preceding option, `gateway.slow_post_protection.enabled`, this option sets the Apache `httpd` `ReadRequestTimeout`. The `httpd` directive is documented at [Apache Module `mod\_reqtimeout`](#). The primary use of this option is as a defence for the Slowloris attack. See the Wikipedia entry, [Slowloris \(computer security\)](#).

**Note:** Older versions use a default value: `header=15-20,MinRate=500 body=y=10,MinRate=500`

`gateway.timeout`

Default value: `7200`

Longest amount of time, in seconds, that the gateway will wait for certain events before failing a request (7200 seconds = 2 hours).

`gateway.trusted`

Default value: IP address of proxy server machine

Applies to proxy server environments only. The IP address(es) or host name(s) of the proxy server.

gateway.trusted\_hosts

Default value: Alternate names of proxy server

Applies to proxy server environments only. Any alternate host name(s) for the proxy server.

hyper.file\_partition\_size\_limit

Default value: 0

When set to 0, the size is set to unlimited and will use all the disk space that is available.

This option is used to set the disk space limit for a query that spools to disk. If your disk space usage by the spool.<id>.tmp file is higher than where you need it to be for your environment, it means that queries are spooling and taking up disk space. Use this option to limit the amount of disk space that any one query can use. The spool.<id>.tmp file can be found in the temp folder of the user account running Tableau Server. You can specify this value in K(KB), M (MB), G(GB) or T(TB) units. For example, you can specify the size limit as 100 G when you want to limit the disk space usage to 100 GB.

For more information about spooling see the Memory and CPU Usage section in Tableau Server Data Engine.

hyper.global\_file\_partition\_size\_limit

Default value: 0

When set to 0, the size is set to unlimited and will use all the disk space that is available.

This option is used to set the disk space limit for all queries that spool to disk. If your disk space usage by the spool.<id>.tmp file is higher than where you need it to be for your environment, it means that queries are spooling and taking up disk space. The spool.<id>.tmp file can be found in the temp folder of the user account running Tableau Server. Use this option to limit the amount of disk space in sum total that all queries use when spooling to disk. You can specify this value in K(KB), M(MB), G(GB) or T(TB) units. For example, you can specify the size limit as 100 G when you want to limit the disk space usage to 100 GB. Tableau recommends that you start with this configuration when fine tuning your spooling limits.

## Tableau Server on Windows Help

For more information about spooling see the Memory and CPU Usage section in Tableau Server Data Engine.

`hyper.enable_accesspaths_symbolic_canonicalization`

Default value: `false`

On Windows OS systems, in order to resolve symlinks, Hyper needs to have access to the directory where extracts are stored and all its parent directories. If this is not the case, you may see an error message in the Hyper log that says: **Unable to obtain canonical path for**

```
//dirA/subdir/myextract.hyper ... Access is denied.
```

In such cases, you can set this to `true` so Data Engine (Hyper) will not try to resolve symlinks when using canonical paths.

**Note:** Setting the value to `true` also implies that Hyper can no longer guarantee to guard against a potential attacker who manages to place a symlink to escape the allowed set of directories which Hyper is configured to allow access to.

`hyper.log_queries`

Default value: `true`

When set to `true`, query information is logged.

By default query information is logged. If however you find that the log files are too large for the amount of disk space available, you can set it to `false` to disable logging query information.

Tableau recommends leaving this configuration set to `true`.

`hyper.log_query_cpu`

Default value: `false`

Use this setting to log how much time each query takes and the CPU usage.

`hyper.log_timing`

Default value: `false`

This setting is useful to find out more information about the queries, like compilation and parsing times. By default this setting is disabled. You can turn this by setting the value to `true` to collect more details about your queries. Note, however that this will increase the size of your data engine log files (`\logs\hyper`).

`hyper.log_troublesome_query_plans`

Default value: `true`

When set to `true`, logs query plans of query that are identified as problematic. Queries that are either cancelled, running slower than 10 seconds, or if the queries are spooling to disk fall into this category. The information in the logs can be useful to troubleshoot problematic queries. You can change the setting to `false` if you are concerned about the size of the logs.

`hyper.memory_limit`

Default value: 80%

Controls the maximum amount of memory used by Hyper. Specify the number of bytes. Append the letter 'k' to the value to indicate kilobytes, 'm' to indicate megabytes, 'g' to indicate gigabytes or 't' to indicate terabytes. For example, `hyper.memory_limit="7g"`. Alternatively, specify the memory limit as a percentage of the overall available system memory. For example, `hyper.memory_limit="90%"`.

`hyper.memtracker_hard_reclaim_threshold`

Default value: 80%

This setting only applies to Windows. Hyper keeps decompressed and decrypted parts of the extract in memory to make subsequent accesses faster. This setting controls when worker threads will start writing this data out to a disk cache to reduce memory pressure. If given as a percentage, the value is interpreted as a percentage of the overall `hyper.memory_limit` setting. For example, `hyper.memtracker_hard_reclaim_threshold="60%"`.

Absolute values can be specified as 'k' (kilobytes), 'm' (megabytes), 'g' (gigabytes) or 't' (terabytes). For example, `hyper.memtracker_hard_reclaim_threshold="10g"`. The value should be larger than the `hyper.memtracker_soft_reclaim_threshold`.

`hyper.memtracker_soft_reclaim_threshold`

Default value: 50%

This setting only applies to Windows. When interacting with a Hyper file, Hyper will write out some data for caching or persisting the data. Windows has the special behaviour that it locks freshly written data into memory. To avoid swapping, we force out the data when Hyper reaches the configured limit for the reclaim threshold. When the soft reclaim threshold is reached, Hyper will try to reclaim cached data in the background to attempt to stay below the reclaim threshold. In situations where swapping would happen otherwise, triggering reclamation in Hyper can lead to a better outcome. Therefore, if your Tableau Server installation experiences a lot of swapping, this setting can be used to attempt to reduce the memory pressure.

Specify the number of bytes. Append the letter 'k' to the value to indicate kilobytes, 'm' to indicate megabytes, 'g' to indicate gigabytes or 't' to indicate terabytes. Alternatively, specify the value as a percentage of the overall configured memory for Hyper. For example, `hyper-.memtracker_soft_reclaim_threshold="20%"`.

`hyper.network_threads`

Default value: 150%

Controls the number of network threads used by Hyper. Specify either the number of network threads (for example, `hyper.network_threads=4`) or specify the percentage of threads in relation to the logical core count (for example, `hyper.network_threads="300%"`).

Network threads are used for accepting new connections and sending or receiving data and queries. Hyper uses asynchronous networking, so many connections can be served by a single thread. Normally, the amount of work that is done on network threads is very low. The one exception is opening databases on slow file systems, which can take a long time and block the network thread. If connection times are slow when you try to view or edit dashboards that

use extracts and have not been used in a while and you frequently see “asio-continuation-slow” messages in the Hyper log and long “construct-protocol” times to Hyper in the Tableau log, try to increase this value.

`hyper.objectstore_validate_checksums`

Default value: `false`

A boolean setting that controls file integrity checks in Hyper. When set to `true`, Hyper will check the data in an extract file when it is first accessed. This allows silent corruption and corruption that would crash Hyper to be detected. In general, it is advisable to turn this setting on except for installations with very slow disks where it could cause performance regressions.

`hyper.query_total_time_limit`

Default value: 0 (which means unlimited)

Sets an upper bound on the total thread time that can be used by individual queries in Hyper. Append 's' to the value to indicate seconds, 'min' to indicate minutes or 'h' to indicate hours.

For example, to restrict all queries to a total time usage of 1500 seconds of total thread time, run the following command:

```
tsm configuration set -k hyper.query_total_time_limit -v 1500s
```

If a query runs longer than the specified limit, the query will fail and an error will be returned. This setting allows you to automatically control runaway queries that would otherwise use too many resources.

Hyper executes queries in parallel. For example, if a query executes for 100 seconds and during this time is running on 30 threads, the total thread time would be 3000 seconds. The thread time of each query is reported in the Hyper log in the “query-end” log entries in the “total-time” field.

`hyper.session_memory_limit`

Default value: 0 (which means unlimited)

## Tableau Server on Windows Help

Controls the maximum memory consumption that an individual query can have. Specify the number of bytes. Append the letter 'k' to the value to indicate kilobytes, 'm' to indicate megabytes, 'g' to indicate gigabytes or 't' to indicate terabytes.

For example, to set the memory limit to 900 megabytes, run the following command:

```
tsm configuration set -k hyper.session_memory_limit -v 900m.
```

Alternatively, to specify the session memory limit as a percentage of the overall available system memory run the following command:

```
tsm configuration set -k hyper.session_memory_limit -v 90%.
```

Lowering this value can help when a query is using excessive amounts of memory and making other queries fail over a long period of time. By lowering the limit, the single big query would fail (or resort to spooling if spooling isn't turned off) and not have a negative impact on other queries.

hyper.srm\_cpu\_limit\_percentage

Default value (in percent): 75

Specifies the maximum hourly average CPU usage permitted by Hyper. If exceeded, Data Engine will restart itself to minimise impact to other processes on the computer.

By default Data Engine will restart itself if it averages more than 75% usage of CPU over an hour. This value should not be changed except when working with Tableau Support, or if you are running Data Engine on a dedicated server node. If Data Engine is running on a dedicated node, you can safely increase this value to 95 percent to take full advantage of available computer hardware. For details on running Data Engine on a dedicated node, see [Optimise for Extract Query-Heavy Environments](#).

To increase this to 95%:

```
tsm configuration set -k hyper.srm_cpu_limit_percentage -v 95 --  
force-keys
```

```
tsm pending-changes apply
```

To reset this to the default of 75%:

```
tsm configuration set -k hyper.srm_cpu_limit_percentage -v 75 --
force-keys
```

```
tsm pending-changes apply
```

`hyper_standalone.consistent_hashing.enabled`

Default value: `true`

Improves the chance that the extract for a query is already cached. If the node with the extract cached cannot support additional load, you will be routed to a new node and the extract will be loaded into cache on the new node. This results in better system utilisation because extracts are only loaded into memory if there is load that justifies the need.

`hyper_standalone.health.enabled`

Default value: `true`

Switches the load balancing metric from random selection to picking the Data Engine (Hyper) node based on a health score that is made up of a combination of current Hyper activity and system resource usage. Based on these values, the load balancer will pick the node that is most capable of handling an extract query.

`hyper.temp_disk_space_limit`

Default value: `100%`

Sets the upper limit of disk space at which Hyper will stop allocating space for temporary files. This setting can help to stop the hard disk from filling up with temporary files from Hyper and running out of disk space. If disk space reaches this threshold, Hyper will attempt to recover automatically without administrator intervention.



Specify it as percentage of the overall available disk space to be used. For example, `hyper-temp_disk_space_limit="96%"`. When set to 100%, all of the disk space that is available can be used.

For Data Engine to start, the configured amount of disk space must be available. If not enough disk space is available, you will see a Data Engine log entry that says, “Disk limit for temporary files has been reached. Please free up disk space on the device. See the Hyper log for more information: No space left on device”.

`hyper.hard_concurrent_query_thread_limit`

Default value: 150%

Use this option to set the maximum number of threads Hyper should use for running queries. Use this when you want to set a hard limit on the CPU usage. Specify either the number of threads or specify the percentage of threads in relation to the logical core count. Hyper will most likely not use more resources than are configured by this setting but Hyper background and network threads are not affected by this setting (though they tend to not be CPU intensive).

It is important to consider that this setting controls the number of concurrent queries that can be executed. So, if you decrease this setting, the chance of queries needing to wait for currently running queries to complete increases, which may affect workbook load times.

`hyper.soft_concurrent_query_thread_limit`

Default value: 100%

Use this option to specify the number of threads that a single query can be parallelised across if sufficiently many threads are available given the `hard_concurrent_query_thread_limit` setting. Specify either the number of threads or specify the percentage of threads in relation to the logical core count.

To illustrate this, here is a simplified example:

Let's say you set this value to 10 threads, this means queries can be parallelised up to 10 threads. If only 2 queries are running, the remaining 8 threads are used to parallelise the 2 queries.

The *hyper.hard\_concurrent\_query\_thread\_limit*, and *hyper.soft\_concurrent\_query\_thread\_limit* options work together to give you some options to manage your CPU usage while maximising available CPU resources to complete queries faster. If you don't want the Data Engine to use all the available CPU on the machine, change it to less than 100% to a percentage that is optimal for your environment. The soft limit is a way for you to limit CPU usage but allow it to go beyond the soft limit up to the hard limit if necessary.

**Note:** The *hyper.hard\_concurrent\_query\_thread\_limit* and *hyper.soft\_concurrent\_query\_thread\_limit* options replace *hyper.num\_job\_worker\_threads* and *hyper.num\_task\_worker\_threads* options available in Tableau Server versions 2018.3 and earlier, and are retired and no longer available. For information on the *hyper.num\_job\_worker\_threads* and *hyper.num\_task\_worker\_threads*, see [tsm configuration set Options](#).

`hyper.use_spooling_fallback`

Default value: `true`

When set to `true`, it allows spooling to disk when querying extracts exceeds set RAM usage (80% of installed RAM). In other words, it allows Hyper to execute a query using the disk if it exceeds RAM usage.

Tableau recommends that you use the default setting. You can turn this off by setting the value to `false` if you are concerned about disk usage. If you turn this setting off, queries that use more than 80% of installed RAM will be cancelled. Spooling queries usually take substantially longer to finish.

For more information about spooling see the Memory and CPU Usage section in Tableau Server Data Engine.

indexandsearchserver.vmopts

**Version:** Added in version: 2022.1.

**Default value:** "-Xmx<default\_value> -Xms<default\_value>"

The default value is based on the amount of system memory and is 3.125% of the total system RAM.

Controls the Index and Search Server heap size. Because the default value scales automatically, use this option to override the default value only when absolutely necessary. Append the letter 'k' to the value to indicate kilobytes, 'm' for megabytes or 'g' to indicate gigabytes. As a general rule, set initial heap size (-Xms) equal to the maximum heap size (-Xmx) to minimise garbage collections.

jmx.security.enabled

**Version:** Added in version: 2022.1.

**Default value:** false

JMX is disabled by default, so secure JMX is also disabled. If you are enabling JMX, we strongly recommend you enable secure JMX.

This is set to `true` and turns secure JMX on with SSL and basic username/password authentication for readonly access when you run the `tsm maintenance jmx enable` command and answer `y` when prompted to enable security features for JMX:

```
tsm maintenance jmx enable
```

```
We do not recommend you enable JMX unsecured on a production environment. Would you like to enable security features for JMX?
```

```
(y/n): y
```

jmx.ssl.enabled

**Version:** Added in version: 2022.1.

**Default value:** true

Enforces SSL for JMX. This option defaults to `true` but has no effect unless `jmx.security.enabled` is also set to `true`. To enable JMX security, run the `tsm maintenance jmx enable` command. Answer `y` when prompted to leave SSL enabled, or `n` to disable SSL:

```
tsm maintenance jmx enable
...
Would you like to enable SSL?
(y/n): n
```

`jmx.ssl.require_client_auth`

**Version:** Added in version: 2022.1.

Default value: `false`

This is set to `true` when you run the `tsm maintenance jmx enable` command and answer `y` when prompted to require client authentication (mTLS):

```
tsm maintenance jmx enable
...
Would you like to require client authentication (mTLS)?
(y/n): y
```

To complete configuration you must have a client cert and place this in the correct location on your client computer.

`jmx.ssl.user.name`

**Version:** Added in version: 2022.1.

Default value: `tsmjmxuser`

This is set when you install or upgrade Tableau Server.

`jmx.ssl.user.password`

**Version:** Added in version: 2022.1.

## Tableau Server on Windows Help

Default value: <generated>

This is set when you install or upgrade Tableau Server.

jmx.user.access

**Version:** Added in version: 2022.1.

Default value: readonly

You can change this to `readwrite` when you run the `tsm maintenance jmx enable` command and answer `y` when prompted to add `readwrite` access:

```
tsm maintenance jmx enable
...
JMX access is readonly by default. Would you like to add readwrite
access?
(y/n): y
```

licensing.login\_based\_licence\_management.default\_requested\_duration\_seconds

Default value: 0

Set to the duration (in seconds) that a user's login-based licence can be offline with no connection to Tableau Server before they are prompted to activate again. This duration is always refreshed when Tableau Desktop is in use and can connect to Tableau Server.

licensing.login\_based\_license\_management.enabled

Default value: true

Set to true to enable login-based licence management. Set to false to disable login-based licence management.

**Note:** In order to use login-based licence management, you must activate a product key that is enabled for login-based licence management. You can use the `tsm licenses list` to see which product keys have login-based licence management enabled.

licensing.login\_based\_licence\_management.max\_requested\_duration\_seconds

Default value: 7776000

Set to the maximum duration (in seconds) that a user's login-based licence can be offline with no connection to Tableau Server before they are prompted to activate Tableau again. The maximum value is 7776000 seconds (90 days). This duration is always refreshed when Tableau Desktop is in use and can connect to Tableau Server.

maestro.app\_settings.sampling\_max\_row\_limit

Default value: 1000000

Sets the maximum number of rows for sampling data from large data sets with Tableau Prep on the web.

maestro.input.allowed\_paths

Default value: ""

By default, access to any directory will be denied, and only publishing to Tableau Server with content that is included in the tflx file is allowed.

A list of allowed network directories for flow input connections. You must enable Tableau Prep Conductor to schedule flows on your Tableau Server. For more information, see Tableau Prep Conductor.

The following rules apply and must be considered when configuring this setting:

- Paths should be accessible by Tableau Server. These paths are verified during server startup and at flow run time.
- Network directory paths have to be absolute and cannot contain wildcards or other path traversing symbols. For example `\\myhost\myShare\*` or `\\my-host\myShare*` are invalid paths and would result in all the paths as disallowed. The correct way to allowlist any folder under *myShare* would be `\\myhost\myShare` or `\\myhost\myShare\.`

**Note:** The `\\myhost\myShare` configuration will not allow `\\myhost\myShare1`. In order to safe list both of these folders, one would have to safe list them as `\\myhost\myShare; \\myhost\myShare1`.

- The value can be either `*`, to allow any network directory, or a list of network directory paths, delimited by `“;”`.
- No local directory paths are allowed even when the value is set to `*`.

Important:

This command overwrites existing information and replaces it with the new information you provided. If you want to add a new location to an existing list, you must provide a list of all the locations, existing and the new one you want to add. Use the following commands to see the current list of input and output locations:

```
tsm configuration get -k maestro.input.allowed_paths  
tsm configuration get -k maestro.output.allowed_paths
```

For more information and details about configuring allowed directories for flow input and output connections, see Step 4: Safe list Input and Output locations.

`maestro.output.allowed_paths`

Default value: `""`

By default, access to any directories will be denied.

A list of allowed network directories for flow output connections. You must enable Tableau Prep Conductor to schedule flows on your Tableau Server. For more information, see Tableau Prep Conductor.

The following rules apply and must be considered when configuring this setting:

- Paths should be accessible by Tableau Server. These paths are verified during server startup and at flow run time.
- Network directory paths have to be absolute and cannot contain wildcards or other path traversing symbols. For example `\\myhost\myShare\*` or `\\my-host\myShare*` are invalid paths and would result in all the paths as disallowed. The correct way to allowlist any folder under *myShare* would be `\\myhost\myShare` or `\\myhost\myShare\.`

**Note:** The `\\myhost\myShare` configuration will not allow `\\my-host\myShare1`. In order to safe list both of these folders, one would have to safe list them as `\\myhost\myShare; \\myhost\myShare1`.

- The value can be either `*`, to allow any network directory, or a list of network directory paths, delimited by `“,”`.
- No local directory paths are allowed even when the value is set to `*`.

**Note:** If a path is both on the flows allowed list and `internal_disallowed` list, `internal_disallowed` takes precedence.

For more information and details about configuring allowed directories for flow input and output connections, see Step 4: Safe list Input and Output locations.

`maestro.output.write_to_mssql_using_runas`

**Version:** Added in version: 2022.3.1

Default value: `false`

When enabled, flow outputs published to Tableau Server are allowed write access to a Microsoft SQL Server database using Run As credentials. The credentials used by the Run As service account must have write permission to the database. Evaluate your security and



deployment requirements before enabling the `maestro.output.write_to_mssql_using_runas` setting. For more information, see [Run As Service Account](#).

**Note:** This command requires the `--force-keys` option. For example: `tsm configuration set -k maestro.output.write_to_mssql_using_runas -v true --force-keys`.

`maestro.sessionmanagement.maxConcurrentSessionPerUser`

Default value: 4

Sets the maximum number of flow web editing sessions that a user can have open at one time.

`metadata.ingestor.blocklist`

Default value: null

When configured, Tableau Catalogue blocks specified content from being ingested. To specify which content to block, you must identify the blocklist values, which is a combination of both the site ID, content type and content ID of the content you want to block, from the server “non-interactive” log files. Blocklist values must be separated by a comma.

**Important:** You should only use this option when directed to do so by Tableau Support.

For example, you can use the `tsm configuration set --force-keys -k metadata.ingestor.blocklist` to block ingestion of a combination of data sources, workbooks and flows using the following command:

```
tsm configuration set --force-keys -k metadata.ingestor.blocklist -v
"sites/1/datasources/289, sites/2/datasources/111, sites/1/-
workbooks/32, sites/3/workbooks/15, sites/1/flows/13, sites/1/-
flows/18"
```

To validate blocked content, review the server “noninteractive” log files for the following events:

- Skipping ingestion for
- Successfully updated blocklist to

For example:

```
Skipping ingestion for contentType [Workbook], contentId
[sites/1/datasources/289], siteDisabled [false], swallowEvent
[false], contentBlocked [true]
```

```
Skipping ingestion for contentType [Workbook], contentId [sites/3/-
workbooks/15], siteDisabled [false], swallowEvent [false], con-
tentBlocked [true]
```

and

```
Successfully updated blocklist to: [sites/1/datasources/289,
sites/1/workbooks/32, sites/2/datasources/111]
```

**metadata.ingestor.pipeline.throttleEventsEnable**

Default value: `false`

Controls whether indexing of new and updated content, also called eventing, is regulated across all sites on the server. By default, event throttling is turned off. To turn on event throttling, change this setting to `true` using the following command:

```
tsm configuration set -k metadata.in-
gestor.pipeline.throttleEventsEnable -v true --force-keys
```

For more information about event throttling, see [Enable Tableau Catalog](#).

**metadata.ingestor.pipeline.throttleLimit**

Default value: `20`

When event throttling is enabled, this is the maximum number of new and updated content items that can be indexed during a specified period of time. Once the specified limit is reached for a specific item, indexing is deferred.

## Tableau Server on Windows Help

By default, the limit is set to 20 and can't be set to lower than 2. You can use the following command to change the limit:

```
tsm configuration set -k metadata.ingestor.pipeline.throttleLimit -v 25 --force-keys
```

Throttled events can be identified in the server "noninteractive" log files as `ingestor event flagged for removal by throttle filter`.

`metadata.ingestor.pipeline.throttlePeriodLength`

Default value: 20

When event throttling is enabled, this is the period of time, in minutes, a specified maximum number of new and updated content items can be indexed. Once the specified time is reached, indexing of any additional new and updated content is deferred.

By default, the time is set to 30 minutes. You can use the following command to change the time:

```
tsm configuration set -k metadata.ingestor.pipeline.throttlePeriodLength -v PT45M --force-keys
```

`metadata.query.limits.time`

Default value: 20

This is the longest allowable time, in seconds, for a Catalogue or Metadata API query to run before a timeout occurs and the query is cancelled. Tableau recommends incrementally increasing the timeout limit to *no more than* 60 seconds using the following command:

```
tsm configuration set -k metadata.query.limits.time -v PT30S --force-keys
```

**Important:** This option should be changed only if you see the error described here, Timeout limit and node limit exceeded messages. Increasing the timeout limit can utilise more CPU for longer, which can impact the performance of tasks across Tableau Server. Increasing the

timeout limit can also cause higher memory usage, which can cause issues with the interactive microservices container when queries run in parallel.

`metadata.query.limits.count`

Default value: 20000

This is the number of objects (which can loosely map to the number of query results) that Catalogue can return before the node limit is exceeded and the query is cancelled. Tableau recommends incrementally increasing the timeout limit, to *no more than* 100,000 using the following command:

```
tsm configuration set -k metadata.query.limits.count -v 3000 --
force-keys
```

**Important:** This option should be changed only if you see the error described here, Timeout limit and node limit exceeded messages. Increasing the node limit can cause higher memory usage, which can cause issues with the interactive microservices container when queries run in parallel.

`metadata.query.throttling.enabled`

Version: Added in version 2023.3

Default value: `true`

Controls whether **Metadata API** query throttling is enabled. Metadata API query throttling is a feature designed to prevent a server's API responses from negatively impacting overall performance. When set to `true` (the default), if a request to the Metadata API exceeds the defined threshold, a `RATE_EXCEEDED` error is returned.

If Metadata API users are seeing frequent `RATE_EXCEEDED` errors, an administrator can try to adjust throttling using the `metadata.query.throttling.tokenRefilledPerSecond` and `metadata.query.throttling.queryCostCapacity` settings. Alternatively, the administrator can disable throttling entirely by setting the `metadata.query.throttling.enabled`

value to `false`. Doing so would prevent the performance-protecting benefits of the feature, however.

`metadata.query.throttling.queryCostCapacity`

Version: Added in version 2023.3

Default value: 20000000

A number representing the capacity that the **Metadata API** has for answering queries. Each request to the Metadata API has a calculated cost that is subtracted from this number when it's executed. (Using a token bucket model, this is the maximum amount of tokens that can be in the bucket.)

If Metadata API users are seeing frequent `RATE_EXCEEDED` errors, an administrator can adjust throttling settings. They should adjust `metadata.query.throttling.tokenRefilledPerSecond` and test the results before trying to adjust

`metadata.query.throttling.queryCostCapacity`. Alternatively, the administrator can disable throttling entirely by setting `metadata.query.throttling.enabled` to `false`. Doing so would prevent the performance-protecting benefits of the feature, however.

`metadata.query.throttling.tokenRefilledPerSecond`

Version: Added in version 2023.3

Default value: 5555

A number representing the amount of **Metadata API** query capacity that's regenerated every second. (Using a token bucket model, this is the number of tokens that are put into the bucket every second.)

If Metadata API users are seeing frequent `RATE_EXCEEDED` errors, an administrator can adjust throttling settings. They should adjust `metadata.query.throttling.tokenRefilledPerSecond` and test the results before trying to adjust

`metadata.query.throttling.queryCostCapacity`. Alternatively, the administrator

can disable throttling entirely by setting `metadata.query.throttling.enabled` to `false`. Doing so would prevent the performance-protecting benefits of the feature, however.

`metricservices.checkIntervalInMinutes`

**Version:** Retired in version 2024.2.

Default value: 60

Controls the interval, in minutes, between refreshes for metrics that rely on live data sources. A metric refreshes when the server checks for new data via the metric's connected view.

`metricservices.enabled`

**Version:** Added in version: 2022.3. Retired in version 2024.2.

Default value: `true`

When set to `false`, the metrics content type is disabled for all sites on a server. For more information, see [Disable metrics for a server](#).

### Retirement of the legacy metrics feature

Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.

`metricservices.failureCountToWarnUser`

**Version:** Retired in version 2024.2.

Default value: 10

Controls the number of consecutive refresh failures that must occur before the metric owner is warned. When set to the default of 10, a metric refresh must fail 10 times in a row before the owner is sent a notification about the failure.

`metricsservices.maxFailedRefreshAttempts`

**Version:** Retired in version 2024.2.

Default value: 175

Controls the number of consecutive refresh failures that must occur before a metric refresh is suspended.

`mobile.deep_linking.on_prem.enabled`

Default value: `true`

Controls whether links to Tableau Server are treated as deep links by the Tableau Mobile app. When set to `true`, links to supported content types open in the app. When set to `false`, links open in the mobile browser. For more information see, [Control deep linking for Tableau Mobile](#).

`monitoring.dataengine.connection_timeout`

Default value: 30000

The length of time, in milliseconds, that Cluster Controller will wait for the data engine, before determining that a connection timeout occurred. The default is 30,000 milliseconds (30 seconds).

`native_api.allowed_paths`

Default value: ""

**Note:** In Tableau Server releases (including maintenance releases) before October 2023, this setting was configured to allowed access to all paths by default.

Use this setting to specify an allowlist for access to files stored on Tableau or on remote shares. This scenario allows authorised Tableau Server users to build workbooks that use files on the server as file-based data sources (such as spreadsheets).

This setting allows you to limit access only to those directories that you specify. The Run As Service Account access is therefore limited to the directory paths where you host data files.

`tsm configuration set -k native_api.allowed_paths -v "path"`, where *path* is the directory to add to the allowlist. All subdirectories of the specified path will be added to the allowlist. If you want to specify multiple paths, separate them with a semicolon, as in this example:

```
tsm configuration set -k native_api.allowed_paths -v "c:\data-sources;\\HR\data"
```

**Important:** Make sure the file paths you specify in this setting exist and are accessible by the system account.

`native_api.connection.limit.<connection class>`

Set parallel query limit for the specified data source (connection class). This overrides the global limit for the data source.

`native_api.connection.globallimit`

Default value: 16

Global limit for parallel queries. Default is 16 except for Amazon Redshift which has a default of 8.

`native_api.ExplainDataEnabled`

Default value: `true`



This option controls whether Explain Data is enabled or disabled for the server. For more information about Explain Data, see [Get Started with Explain Data](#) in the Tableau Help.

This option was added beginning with Tableau Server version: 2019.3.

`native_api.force_alternative_federation_engine`

Default value: `false`

Override the operation restrictions when joining data from a single file connection and a single SQL database connection. Set this option to `True` to force Tableau to process the join using the live database connection.

`native_api.ProtocolTransitionLegacyFormat`

Default value: `false`

Use the legacy name format for constrained delegation.

The name format was changed in version 10.1 to allow cross-domain protocol transition (S4U). If this causes problems with existing configurations and you don't need cross-domain protocol transition, configure Tableau Server to use the old behaviour by setting this to `true`.

`native_api.InitializeQueryCacheSizeBasedOnWeights`

Default value: `True`

Controls whether the query cache size is initialised automatically based on the amount of available system memory. The query cache consists of the logical query cache, metadata cache and native query cache. By default, this functionality is enabled.

`native_api.QueryCacheMaxAllowedMB`

The maximum size of the query cache in megabytes. This value varies based on the amount of system memory. The query cache consists of the logical query cache, metadata cache and native query cache. Use the table below to determine your default value:

System Memory	Default Value for Tableau	Default Value for Tableau
---------------	---------------------------	---------------------------

	Server	Desktop
64 GB and more	3200 MB	1600 MB
From 32 GB to 64 GB	2400 MB	1200 MB
From 16 GB to 32 GB	1600 MB	800 MB
16 GB and less	800 MB	400 MB

`native_api.LogicalQueryCacheMaxAllowedWeight`

Default value: 70

The weight of logical query cache size limit in the total query cache size.

`native_api.MetadataQueryCachMaxAllowedWeight`

Default value: 4

The weight of metadata query cache size limit in the total query cache size.

`native_api.NativeQueryCacheMaxAllowedWeight`

Default value: 26

The weight of native query cache size limit in the total query cache size.

`native_api.QueryCacheEntryMaxAllowedInPercent`

Default value: 60

Specifies the maximum size of query results that can be put into the query cache. It is set as the percentage of the total query cache size. For example, if the logical query cache size is 100 MB and `native_api.QueryCacheEntryMaxAllowedInPercent` is set to 60 percent, then only query results that are smaller than 60 MB can be put into the logical query cache.

`native_api.UserInfoInGeneratedSQLEnabled`

Default value: `false`

Determines whether **query tagging** is enabled for all content on a Tableau Server. When true, queries sent from Tableau to customer SQL databases will include metadata about the source of the query. The resulting content in customer database logs can be used for troubleshooting performance or other issues.

`nlp.concepts_shards_count`

Default value: 1

**Note:** The default shard count value is sufficient for most Tableau Server installations.

Controls the number of data shards for the Concepts index of Ask Data, field names, field synonyms and analytical terms stored in shards in:

- The Index and Search Server for 2022.1 and later versions.
- Elastic Server for 2019.1 - 2021. 4

The shard count partitions the search index to reduce total index size, which may improve the performance of Ask Data's semantic parser. Adjusting the shard count is another performance enhancement measure that you can take along with increasing the heap size through `elasticserver.vmopts` or `indexandsearchserver.vmopts`, depending on the version of Tableau Server that you are running.

Tableau recommends increasing the shard count by 1 for every 50 GB. To reduce the number of times you need to adjust the shard count, calculate the total index size by adding 50% to the current index. For example, if the total index size is less than 50 GB, then 1 shard is sufficient. Actual performance will vary depending on the server, the rate at which the index size grows and other factors.

- 0 to 50 GB: 1
- 50 GB to 100 GB: 2

- 100 GB to 150 GB: 3

You can use the following command to increase the Concepts index shard count from default to 2:

```
tsm configuration set -k nlp.concepts_shards_count -v 2
```

nlp.values\_shards\_count

Default value: 1

Controls the number of data shards for the Concepts index of Ask Data, field names, field synonyms and analytical terms stored in shards in:

- The Index and Search Server for 2022.1 and later versions.
- Elastic Server for 2019.1 - 2021. 4

The shard count partitions the search index to reduce total index size, which may improve the performance of Ask Data's semantic parser. Adjusting the shard count is another performance enhancement measure that you can take along with increasing the heap size through `elasticserver.vmopts` or `indexandsearchserver.vmopts`, depending on the version of Tableau Server that you are running.

Tableau recommends increasing the shard count by 1 for every 50 GB. To reduce the number of times you need to adjust the shard count, calculate the total index size by adding 50% to the current index. For example, if the total index size is less than 50 GB, then 1 shard is sufficient. Actual performance will vary depending on the server, the rate at which the index size grows and other factors.

- 0 to 50 GB: 1
- 50 GB to 100 GB: 2
- 100 GB to 150 GB: 3

You can use the following command to increase the Values index shard count from default to 2:

```
tsm configuration set -k nlp.values_shards_count -v 2
```

## Tableau Server on Windows Help

`nlp.defaultNewSiteAskDataMode`

Default value: `disabled_by_default`

Use this option to set the initial value of the Ask Data Mode when a site is created. For more information see [Disable or Enable Ask Data for a Site](#).

Valid options are `disabled_by_default` and `disabled_always`.

This option was added beginning with Tableau Server versions: 2019.4.5, 2020.1.3.

`noninteractive.vmopts`

Default value: `"-XX:+UseConcMarkSweepGC -Xmx<default_value>g -XX:+ExitOnOutOfMemoryError"`

The default value varies based on the amount of system memory. The JVM maximum heap size is scaled to be 6.25% of the total system RAM.

This option controls the JVM maximum heap size for Tableau Catalogue ingestion. Because the default value scales automatically, use this option to override the default value only when absolutely necessary by modifying the `-Xmx<default_value>g` argument. For example, you can use the following command to increase the max heap size to 2 GB:

```
tsm configuration set -k noninteractive.vmopts -v "-XX:+UseConcMarkSweepGC -Xmx2g -XX:+ExitOnOutOfMemoryError"
```

For more information, see [Memory for non-interactive microservice containers](#).

`pgsql.port`

Default value: 8060

Port that PostgreSQL listens on.

`pgsql.preferred_host`

Specifies the computer name of the node with the preferred repository installed. This value is used if the `--preferred` or `-r` option is specified with the `tsm topology failover-repository` command.

Example:

```
tsm configuration set -k pgsql.preferred_host -v "<host_name>"
```

**Note:** The `host_name` is case-sensitive and must match the node name shown in the output of `tsm status -v`.

`pgsql.ssl.ciphersuite`

Default value: `HIGH:MEDIUM:!aNULL:!MD5:!RC4`

Specifies the cipher algorithms that are allowed for SSL for the Repository.

For acceptable values and formatting requirements, see [ssl\\_ciphers](#) on the Postgres website.

`pgsql.ssl.max_protocol_version`

Default value: `TLSv1.3`

Sets the maximum SSL/TLS protocol version to use when connecting to the repository over SSL.

Valid values: `TLSv1`, `TLSv1.1`, `TLSv1.2`, `TLSv1.3`

`pgsql.ssl.min_protocol_version`

Default value: `TLSv1.2`

Sets the minimum SSL/TLS protocol version to use when connecting to the repository over SSL.

Valid values: `TLSv1`, `TLSv1.1`, `TLSv1.2`, `TLSv1.3`

`pgsql.verify_restore.port`

Default value: 8061

Port used to verify the integrity of the PostgreSQL database. See tsm maintenance backup for more information.

`ports.blocklist`

**Version:** Added in version 2021.1

Default value: no ports blocked in the range used for automatic port assignment.

Used to specify ports within the port assignment range that should not be used by Tableau when dynamically assigning ports. This is useful when you know that another application is using a port within the range. Separate multiple ports with commas, for example:

```
tsm configuration set -k ports.blocklist -v 8000,8089, 8090
```

For more information on using the `ports.blocklist` key, see [Blocking specific ports within the range](#)

`recommendations.enabled`

Default value: `true`

Controls the recommendations feature, which powers recommendations for data sources and tables (for Tableau Desktop) and recommendations for views (for Tableau Server). Recommendations are based on the popularity of content and on content used by other users determined to be similar to the current user.

`recommendations.vizrecs.enabled`

Default value: `true`

Controls recommendations for views for Tableau Server users. This option is a child of `recommendations.enabled` and will have no effect if the parent option is set to false. When the parent option is set to true, and this option is set to false, data sources and tables will still be

recommended to Tableau Desktop users, but recommendations for views on Tableau Server will be disabled.

`redis.max_memory_in_mb`

Default value: 1024

Specifies the size in megabytes of the cache server external query cache.

`refresh_token.absolute_expiry_in_seconds`

Default value: 31536000

Specifies the number of seconds for absolute expiration of refresh tokens and personal access tokens (PATs).

Refresh tokens are used by connected clients (Tableau Desktop, Tableau Prep Builder, Tableau Mobile, etc.) for authentication to Tableau Server after initial sign-in.

To remove limits set the value to `-1`. To disable refresh tokens and PATs, see [Disable Automatic Client Authentication](#).

`refresh_token.idle_expiry_in_seconds`

Default value: 1209600

Specifies the number of seconds when idle refresh tokens expire. The refresh tokens are used by connected clients (Tableau Desktop, Tableau Prep Builder, Tableau Mobile, etc.) for authentication to Tableau Server after initial sign-in. To remove limits set the value to `-1`.

`refresh_token.max_count_per_user`

Default value: 24

Specifies the maximum number of refresh tokens that can be issued for each user. If the maximum number of user sessions is not enough, increase this value or set it to `-1` to entirely remove this refresh token limit.



`rsync.timeout`

Default value: `600`

Longest allowable time, in seconds, for completing file synchronisation (600 seconds = 10 minutes). File synchronisation occurs as part of configuring high availability, or moving the data engine and repository processes.

`schedules.display_schedule_description_as_name`

Default value: `false`

Controls whether a schedule name displays when creating a subscription or extract refresh (the default), or the "schedule frequency description" name describing the time and frequency of the schedule displays. To configure Tableau Server to display timezone-sensitive names for schedules, set this value to `true`.

When true, the "schedule frequency description" is also displayed after the schedule name on the schedule list page.

`schedules.display_schedules_in_client_timezone`

Default value: `true`

Shows the "schedule frequency description" in the timezone of the user when true (uses the client browser timezone to calculate the "schedule frequency description").

`schedules.ignore_extract_task_priority`

Default value (boolean): `False`

This setting controls whether or not task priority is considered for determining the job rank which determines when to pull jobs off the queue. Setting this to `true` disables editing the task priority on tasks, and only schedule priority will be considered for determining the job rank.

`searchserver.connection_timeout_milliseconds`

**Version:** Added in version 2019.1. Deprecated in version 2022.3. Retired in version 2023.3.

Default value, in milliseconds: 100000

Specifies, in milliseconds, the amount of time Search & Browse clients will wait to establish a connection to the Search & Browse server.

On especially busy Tableau Server computers, or if you see log errors "Failed zookeeper health check. Refusing to start SOLR." increase this value.

For more information, see Client session timeouts.

searchserver.index.bulk\_query\_user\_groups

**Version:** Retired in version 2022.3.

Default value: `true`

Specifies whether querying of site users is done in bulk when importing or deleting users with a CSV file. When set to `true` (the default), indexing is done as in bulk.

searchserver.javamemopts

**Version:** Added in version 2019.1. Retired in 2023.3

Default value: `-Xmx512m -Xms512m -XX:+ExitOnOutOfMemoryError -XX:-UsePerfData`

Determines JVM options for SOLR.

Of all configurable options, the maximum heap memory, configured by the `-Xmx` parameter, is the most important when tuning the searchserver. In most cases this should be set as high as is possible, up to 24 GB, based on available physical memory on the Tableau Server computer. To change only the max heap memory, specify the entire default string but only change the value for `-Xmx`.

Valid values for `-Xmx` depend on available memory on the Tableau Server computer, but cannot be greater than 24 GB. For more information, see Search & Browse Max Heap Memory.

## Tableau Server on Windows Help

`searchserver.startup.zookeeper_healthcheck_timeout_ms`

**Version:** Added in version 2020.1. Retired in version 2023.3.

Default value, in milliseconds: 300000

Specifies, in milliseconds, the amount of time Tableau Server should wait for a successful Zookeeper health check on startup.

On especially busy Tableau Server computers, or if you see log errors "Failed zookeeper health check. Refusing to start SOLR." increase this value.

For more information, see Zookeeper connection health check timeout at startup.

`searchserver.zookeeper_session_timeout_milliseconds`

**Version:** Retired in version 2022.3.

Default value, in milliseconds: 100000

Specifies, in milliseconds, the amount of time Search & Browse clients will wait to establish a connection to the Coordination Service (Zookeeper).

For more information, see Client session timeouts.

`ServerExportCSVMaxRowsByCols`

**Version:** Added in version 2020.3.

Default value: 0 (no limit)

Specifies the maximum number of cells of data that can be downloaded from View Data into a CSV file. By default, there is no limit. Specify the number of cells. For example to set a limit of 3 million:

```
tsm configuration set -k ServerExportCSVMaxRowsByCols -v 3000000
```

```
tsm pending-changes apply
```

`service.jmx_enabled`

Default value: `false`

Setting to `true` enables JMX ports for optional monitoring and troubleshooting.

`service.max_procs`

Default value: `<number>`

Maximum number of server processes.

`service.port_remapping.enabled`

Default value: `true`

Determines whether or not Tableau Server will attempt to dynamically remap ports when the default or configured ports are unavailable. Setting to `false` disables dynamic port remapping.

`session.ipsticky`

Default value: `false`

Makes client sessions valid only for the IP address that was used to sign in. If a request is made from an IP address different from that associated with the session token, the session token is considered invalid.

In certain circumstances – for example, when Tableau Server is being accessed by computers with known and static IP addresses – this setting can yield improved security.

**Note:** Consider carefully whether this setting will help your server security. This setting requires that the client have a unique IP address and an IP address that stays the same for the duration of the session. For example, different users who are behind a proxy might look like they have the same IP address (namely, the IP address of the proxy); in that case, one user might have access to another user's session. In other circumstances,

users might have a dynamic IP address, and their address might change during the course of the session. If so, the user has to sign in again.

`sheet_image.enabled`

Default value: `true`

Controls whether you can get images for views with the REST API. For more information, see [REST API Reference](#).

`ssl.ciphersuite`

Default

value: `HIGH:MEDIUM:!EXP:!aNULL:!MD5:!RC4:!3DES:!CAMELLIA:!IDEA:!SEED`

Specifies the cipher algorithms that are allowed for SSL for Gateway.

For acceptable values and formatting requirements, see [SSLCipherSuite](#) on the Apache website.

`ssl.client_certificate_login.blocklisted_signature_algorithms`

Default value:

- Version 2020.4.0:

```
shalwithrsaencryption,  
shalwithrsa
```

- Version 2020.4.1 and later:

```
shalwithrsaencryption,  
shalwithrsa,  
shalwithrsaandmgf1,  
shalwithdsa,  
shalwithecdsc
```

The default value blocks certificates with the SHA-1 signing algorithm. Specifies the client signing algorithms that are blocked for SSL. To disable blocking of all signature algorithms, run this key with an empty set of quotes.

For more information about this key, see the Knowledge Base article, [Mutual SSL Fails After Upgrading if Certificates Signed with SHA-1](#).

`ssl.client_certificate_login.min_allowed.elliptic_curve_size`

Default value: 256

Specifies the minimum elliptic curve size required for ECDSA client certificates that are authenticating with Tableau Server over mutual SSL. If a client presents an ECDSA client certificate that does not satisfy this minimum curve size, the authentication request will fail.

This option was introduced in Tableau Server version 2021.1.

`ssl.client_certificate_login.min_allowed.rsa_key_size`

Default value: 2048

Specifies the minimum key size for RSA client certificates that are authenticating with Tableau Server over mutual SSL. If a client presents an RSA client certificate that does not satisfy this minimum key size, the authentication request will fail.

This option was introduced in Tableau Server version 2021.1.

`ssl.protocols`

Default value: `all +TLSv1.2 -SSLv2 -SSLv3 -TLSv1.3`

Specifies the SSL protocols that Tableau Server supports for TLS connections for Gateway. Acceptable values derive from the [Apache SSLProtocol Directive](#). We recommend following SSL protocol configuration as described in Security Hardening Checklist.

`storage.monitoring.email_enabled`

Default value: `false`

Controls whether email notifications are enabled for server disk space monitoring. By default, email notifications are enabled. To enable notifications for disk space monitoring, set this to `true`.

SMTP must be configured for notifications to be sent. For details, see [Configure SMTP Setup](#).

`storage.monitoring.warning_percent`

Default value: 20

Warning threshold of remaining disk space, in percentage of total disk space. If disk space falls below this threshold, a warning notification is sent.

`storage.monitoring.critical_percent`

Default value: 10

Critical threshold of remaining disk space, in percentage of total disk space. If disk space falls below this threshold, a critical notification is sent.

`storage.monitoring.email_interval_min`

Default value: 60

How often, in minutes, that email notifications should be sent when disk space monitoring is enabled and a threshold is crossed.

`storage.monitoring.record_history_enabled`

Default value: `true`

Determines whether free disk space history is saved and available to view in Administrative Views. To disable history storage for monitoring, set `storage.monitoring.record_history_enabled` to `false`.

`subscriptions.enabled`

Default value: `false`

Controls whether subscriptions are configurable system-wide. See [Set Up a Site for Subscriptions](#).

`subscriptions.timeout`

Default value: `1800`

Length of time, in seconds, for a view in a workbook subscription task to be rendered before the task times out. If this time limit is reached while a view is being rendered, the rendering continues, *but any subsequent view in the workbook is not rendered*, and the job ends in error. In the case of a single-view workbook, this value will never result in the rendering being halted due to a timeout.

`svcmonitor.notification.smtp.enabled`

Default value: `false`

Controls whether email notifications are enabled for server process events. By default notifications are sent when processes go down, fail over or restart. To enable server process notifications, set this to `true`.

SMTP must be configured for notifications to be sent. For details, see [Configure SMTP Setup](#).

`svcmonitor.notification.smtp.mime_use_multipart_mixed`

**Version:** Added in version: 2020.1.8, 2020.2.5, 2020.3.1

Default value: `false`

Controls whether subscription HTML MIME attachments are sent as *multipart/related* (the default) or *multipart/mixed*.

In rare cases, email clients may not properly parse emails sent by Tableau Server. Many times this can be fixed by setting this property to `true`. Known clients include iOS Mail and Microsoft Outlook (when paired with Exchange S/MIME encryption).



`tabadmincontroller.auth.expiration.minutes`

Default value: 120

Controls how long session cookies are valid. By default this is set to 120 minutes. This value also determines how long the embedded credentials in a node bootstrap file are valid. For more information, see [tsm topology nodes get-bootstrap-file](#).

`tdsservice.log.level`

**Version:** Added in version 2020.3.0

Default value: `info`

The logging level for the Data Source Properties service. This is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`tomcat.http.maxrequestsize`

Default value: 16380

The maximum size (bytes) of header content that is allowed to pass through the Apache gateway on HTTP requests. Headers that exceed the value set on this option will result in browser errors, such as HTTP Error 413 (Request Entity Too Large) or authentication failures.

A low value for `tomcat.http.maxrequestsize` may result in authentication errors. Single sign-on solutions that integrate with Active Directory (SAML and Kerberos) often require large authentication tokens in HTTP headers. Be sure to test HTTP authentication scenarios before deploying into production.

We recommend setting `gateway.http.request_size_limit` option to the same value that you set for this option.

`tomcat.http.proxyHost`

Specifies forward proxy host name for OpenID requests to the IdP. See [Configure Tableau Server for OpenID Connect](#).

`tomcat.http.ProxyPort`

Specifies forward proxy port for OpenID requests to the IdP. See [Configure Tableau Server for OpenID Connect](#).

`tomcat.https.proxyHost`

Specifies forward proxy host name for OpenID requests to the IdP. See [Configure Tableau Server for OpenID Connect](#).

`tomcat.https.ProxyPort`

Specifies forward proxy port for OpenID requests to the IdP. See [Configure Tableau Server for OpenID Connect](#).

`tomcat.https.port`

Default value: 8443

SSL port for Tomcat (unused).

`tomcat.server.port`

Default value: 8085

Port that tomcat listens on for shutdown messages.

`tomcat.useSystemProxies`

Default value: `false`

Specifies whether tomcat components (OpenID) require access to the forward proxy configuration on the local Windows operating system. See [Configure Tableau Server for OpenID Connect](#).

`tomcatcontainer.log.level`

Default value: `info`

The logging level for microservices in the Interactive Microservice Container and Non-Interactive Microservice Container. This is dynamically configurable starting in version 2020.4, so if you are only changing this, you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`tsm.log.level`

Default value: `info`

Logging level for TSM services. These logs include information that can be useful if you have problems with TSM services: Administration Agent, Administration Controller, Client File Service, Cluster Controller, Service Manager and Licence Service. This configuration key does not change the logging level for Coordination Service or for maintenance processes. For more information, see [Change Logging Levels](#) and [Tableau Server Processes](#).

`tsm.controlapp.log.level`

Default value: `info`

Logging level for `control_<app>` services. These logs include information that can be useful if you are running into problems starting or reconfiguring a TSM or Tableau Server process. For more information, see [Change Logging Levels](#).

`usernotifications.reap_after_days`

Default value: `30`

Number of days after which a user notification will be deleted from the server.

`vizportal.adsync.update_system_user`

Default value: `false`

Specifies whether email addresses and display names of users are changed (even when changed in Active Directory) when an Active Directory group is synchronised in Tableau Server. To ensure that user email addresses and display names are updated during syn-

chronisation, set `vizportal.adsync.update_system_user` to `true`, and then restart the server.

`vizportal.alwaysUseEmbeddedShareLinks`

**Version:** Added in version 2021.3.0

Default value: `false`

Specifies whether the **Copy Link** option should include the "embed=y" parameter. Starting in version 2019.4, by default, it does not include this parameter. Setting this configuration key to `true` changes the behaviour so that the "embed=y" parameter is included. For details about using the **Copy Link** option to share links for embedding in web pages, see [Embed Views into Webpages](#) in the Tableau Desktop and Web Authoring Help.

`vizportal.art_skip_list`

**Version:** Added in version 2024.2.

Default value: `null`

Use this configuration key to specify aspects of Tableau Server functionality that do not use Activity and Resource Tracing (ART) and will generate large amounts of unnecessary data while ART is enabled.

This key is used together with `vizportal.log_art_java` and `vizportal.enable_art` for troubleshooting issues with Application Server (VizPortal). When set to [need info here about what it gets set to.] To learn how to use this configuration setting, see [Troubleshooting problems with Application Server](#).

`vizportal.commenting.delete_enabled`

Default value: `true`

When set to `true`, lets users delete comments on views. You can delete a comment if you created it, are the content owner, a project leader with an appropriate site role or are an admin-

istrator. To learn which site roles are required for full project leader access, see Project-level administration.

`vizportal.csv_user_mgmt.index_site_users`

**Version:** Deprecated in version 2022.3. Retired (removed entirely) in version 2023.3.

Default value: `true`

Specifies whether indexing of site users is done user by user when importing or deleting users with a CSV file. When set to `true` (the default) indexing is done as each user is added or deleted. To delay the indexing of the site users until after the entire CSV file has been processed, set this to `false`.

`vizportal.csv_user_mgmt.bulk_index_users`

**Version:** Deprecated in version 2022.3. Retired (removed entirely) in version 2023.3.

Default value: `false`

Specifies whether indexing of site users is done in bulk when importing or deleting users with a CSV file. When set to `false` (the default), indexing is done individually. To have the indexing done in bulk after the CSV file has been processed, set this to `true`.

`vizportal.enable_art`

**Version:** Added in version 2024.2.

Default value: `false`

This configuration key is used together with `vizportal.log_art_java` and `vizportal.art_skip_list` for troubleshooting issues with Application Server (VizPortal). When set to `true`, this enables Activity and Resource Tracing in Application Server. To learn how to use this configuration setting, see Troubleshooting problems with Application Server.

`vizportal.log_art_java`

**Version:** Added in version 2024.2.

Default value: `false`

This configuration key is used together with `vizportal.enable_art` and `vizportal.art_skip_list` for troubleshooting issues with Application Server (VizPortal). When set to true, this enables Activity and Resource Tracing in Application Server. To learn how to use this configuration setting, see [Troubleshooting problems with Application Server](#).

`vizportal.log.level`

Default value: `info`

The logging level for vizportal Java components. Logs are written to `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizportal\*.log`.

Set to `debug` for more information. Using the debug setting can significantly impact performance, so you should only use this setting when directed to do so by Tableau Support.

Beginning with version 2020.4.0, this is dynamically configurable, so if you are only changing this, you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`vizportal.oauth.connected_apps.max_expiration_period_in_minutes`

**Version:** Added in version 2021.4.

Default value: `10`

The maximum period of time, in minutes, the JSON web token (JWT) is valid. At the time the JWT is verified, Tableau Server checks that the time period specified in the JWT doesn't exceed this default value. This setting is used when a Tableau-connected app has been configured on Tableau Server using the [Tableau REST API](#).

For example, to change maximum period to 5 minutes, run the following command:

```
tsm configuration set -k vizportal.oauth.external_authorization_
server.max_expiration_period_in_minutes -v 5
```

vizportal.oauth.external\_authorization.enabled

**Version:** Added in version 2021.4.

Default value: `false`

In Tableau Server 2024.2 and later, the **Enable connected apps** option is enabled for Tableau Server. In Tableau Server 2023.2 and earlier, it is specified whether the **Enable OAuth Access for Embedding Content** option is enabled for Tableau Server.

Use this option to register an external authorisation server (EAS) with Tableau Server so that you can enable application integration. For more information, see [Configure Connected Apps with OAuth 2.0 Trust](#).

To enable this option, run the following command:

```
tsm configuration set -k vizportal.oauth.external_authorization.enabled -v true
```

vizportal.oauth.external\_authorization\_server.blocklisted\_jws\_algorithms

**Version:** Added in version 2021.4.

Default value: `ES256K`

When an external authorisation server (EAS) is registered or connected app is configured, you can use this command to specify the signing algorithm used in JSON web token (JWT) header. For more information, see [Configure Connected Apps with OAuth 2.0 Trust](#) or [Use Tableau Connected Apps for Application Integration](#).

For example, if needed, you might run the following command to remove the algorithm:

```
tsm configuration set -k vizportal.oauth.external_authorization_server.blocklisted_jws_algorithms -v
```

**Important:** The example command above allows unsafe signing algorithms and should only be used to troubleshoot errors.

vizportal.oauth.external\_authorization\_server.issuer

**Version:** Added in version 2021.4.

Default value: `null`

Required. Use this command to specify the issuer URL. The issuer URL is required to register the external authorisation server (EAS) with Tableau Server. For more information, see [Configure Connected Apps with OAuth 2.0 Trust](#).

For example, if your EAS is Okta, you might run a command similar to the following:

```
tsm configuration set -k vizportal.oauth.external_authorization_
server.issuer -v "https://dev-12345678.okta.-
com/oauth2/abcdefgh9abc8eFghi76j5"
```

vizportal.oauth.external\_authorization\_server.jwks

**Version:** Added in version 2021.4.

Default value: `null`

When an external authorisation server (EAS) is registered, you can use this command to specify the JSON web key set (JWKS) URL. The JWKS URL is required if the identity provider (IdP) doesn't expose the external authorisation server metadata endpoint.

For example, if your IdP is Amazon Cognito, you might run a command similar to the following:

```
tsm configuration set -k vizportal.oauth.external_authorization_
server.jwks -v "https://cognito-idp.us-west-2.amazonaws.com/us-
west-2_Ab129faBb/.well-known/jwks.json"
```

vizportal.oauth.external\_authorization\_server.max\_expiration\_period\_in\_minutes

**Version:** Added in version 2021.4.

Default value: `10`



The maximum period of time, in minutes, the JSON web token (JWT) is valid. At the time the JWT is verified, Tableau Server checks that the time period specified in the JWT doesn't exceed this default value. This setting is used when an EAS has been registered with Tableau Server. For more information, see [Configure Connected Apps with OAuth 2.0 Trust](#).

For example, to change maximum period to 5 minutes, run the following command:

```
tsm configuration set -k vizportal.oauth.external_authorization_server.max_expiration_period_in_minutes -v 5
```

`vizportal.openid.client_authentication`

Specifies custom client authentication method for OpenID Connect.

To configure Tableau Server to use the IdPs that require the `client_secret_post`, set this value to `client_secret_post`.

An example would be when connecting to the Salesforce IDP, which requires this.

`vizportal.openid.essential_acr_values`

**Version:** Added in version 2020.4.

Specifies a list of authentication context class reference (ACR) values to provide the OpenID Connect IdP as an essential claim request. The IdP is responsible for ensuring that authentication meets the expected criteria. If the `vizportal.openid.essential_acr_values` configuration key is populated, Tableau Server acts as the relying party and will inspect the ACR claim in the token response. Tableau Server will only warn if the ACR claim doesn't match the expected configuration key value.

To set this option, enter the ACR values in order of preference, enclosed by double-quotes. You must separate multiple values by a comma and space, as in this example:

```
tsm configuration set -k vizportal.openid.essential_acr_values -v "value1, value2"
```

`vizportal.openid.full_server_request_logging_enabled`

Default value: `false`

Specifies whether to do full logging of OpenID activity.

Set this to `true` when troubleshooting OpenID Connect issues to gather more detailed logs and allow you to better troubleshoot.

As with all logging-related configurations, we recommend that after you have finished troubleshooting and collecting logs, you reset this key to its default (`false`). This limits the amount of information logged and keeps the log file sizes to a minimum.

`vizportal.openid.voluntary_acr_values`

**Version:** Added in version 2020.4.

Specifies a list of authentication context class reference (ACR) values to provide the OpenID Connect IdP as a voluntary claim request. The IdP is responsible for ensuring that authentication meets the expected criteria. If the `vizportal.openid.voluntary_acr_values` configuration key is populated, Tableau Server acts as the relying party and will inspect the ACR claim in the token response. The authentication request will fail if the ACR claim is missing or the provided claim value doesn't match the expected configuration key value.

To set this option, enter the ACR values in order of preference, enclosed by double-quotes. You must separate multiple values by a comma and space, as in this example:

```
tsm configuration set -k vizportal.openid.voluntary_acr_values -v  
"value1, value2"
```

`vizportal.rest_api.cors.allow_origin`

Specifies the origins (sites) that are allowed access to the REST API endpoints on Tableau Server when `vizportal.rest_api.cors.enabled` is set to `true`. You can specify more than one origin by separating each entry with a comma (,).

## Tableau Server on Windows Help

```
tsm configuration set -k vizportal.rest_api.cors.allow_origin -v  
https://mysite, https://yoursite
```

If `vizportal.rest_api.cors.enabled` is `false`, the origins listed by this option are ignored. For more information, see [Enabling CORS on Tableau Server](#).

**Note:** You can use an asterisk (\*) as a wild card to match all sites. This is not recommended as it allows access from any origin that has access to the server and can present a security risk. Do not use an asterisk (\*) unless you fully understand the implications and risks for your site.

`vizportal.rest_api.cors.enabled`

Default value: `false`

Controls whether Tableau Server allows Cross Origin Resource Sharing (CORS). When set to `true`, the server allows web browsers to access the [Tableau REST API](#) endpoints. You can use this option and the REST API to create custom portals. By default, this functionality is not enabled. To specify which origins (sites) have access, use the `vizportal.rest_api.-cors.allow_origin` option. Only the origins specified with this option are allowed to make requests to the Tableau Server REST API. For more information, see [Enabling CORS on Tableau Server](#).

`vizportal.site_user_group_count_enabled`

**Version:** Added in version 2022.3.5 and later, 2023.1.0 and later.

Default value: `false`

Controls whether Site Users page will include a column showing the group count for each user.

`vizqlserver.allow_insecure_scripts`

Default value: `false`

Allows a workbook to be published to the server from Tableau Desktop, and to be opened from the server, even if the workbook contains SQL or R expressions that are potentially unsafe (for example, a SQL expression that could potentially allow SQL injection). When this setting is `false` (the default), publishing a workbook or opening it from the server results in an error message, and the workbook is blocked. Before you set this value to `true` review the Knowledge Base article, [Blocking or Allowing Insecure Scripts in Tableau Server](#).

`vizqlserver.browser.render`

Default value: `true`

Views under the threshold set by `vizqlserver.browser.render_threshold` or `vizqlserver.browser.render_threshold_mobile` are rendered by the client web browser instead of by the server. See [Configure Client-Side Rendering](#) for details.

`vizqlserver.browser.render_threshold`

Default value: 100

The default value represents a high level of complexity for a view displayed on a PC. Complexity factors include number of marks, headers, reference lines and annotations. Views that exceed this level of complexity are rendered by the server instead of in the PC's web browser.

`vizqlserver.browser.render_threshold_mobile`

Default value: 60

The default value represents a high level of complexity for a view displayed on a tablet. Complexity factors include number of marks, headers, reference lines and annotations. Views that exceed this level of complexity are rendered by the server instead of in the tablet's web browser.

`vizqlserver.clear_session_on_unload`

Default value: `false`

Determines whether or not VizQL sessions are kept in memory when a user navigates away from a view or closes their browser. The default value (`false`) keeps sessions in memory. To close VizQL sessions on leaving a view or closing a browser, set this to `true`.

`vizqlserver.force_maps_to_offline`

**Version:** Added in version 2020.4.0.

Default value: `false`

Determines whether Tableau Server runs in offline mode for maps. This is useful in disconnected environments where access to the internet and the map server is restricted. To enable offline mode for maps, set this value to `true`. For more information about installing and configuring Tableau Server in an environment without internet access, see [Install Tableau Server in a Disconnected \(Air-Gapped\) Environment](#).

`vizqlserver.geosearch_cache_size`

Default value: 5

Sets the maximum number of different geographic search locale/language data sets that can be loaded into server memory at the same time. When the server receives a geographic search request for locale/language data set that is not in memory, it will load the set into memory. If loading the data set will exceed the specified limit, the least recently used locale/language data set is cleared from memory so the requested one can be loaded. The minimum value is 1. Each cache takes approximately 60 MB in memory (so if you set this to 10, the memory usage would be 600 MB (60 \* 10)).

`vizqlserver.initialsql.disabled`

Default value: `false`

Specify whether to ignore initial SQL statements for all data sources. Set this to `true` to ignore initial SQL:

```
tsm configuration set -k vizqlserver.initialsql.disabled -v true
```

`vizqlserver.log.level`

Default value: `info`

The logging level for vizportal Java components. Logs are written to `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver\*.log`.

Set to `debug` for more information. Using the debug setting can significantly impact performance, so you should only use it when directed to do so by Tableau Support.

Beginning with version 2020.3.0, this is dynamically configurable, so if you are only changing this you do not have to restart Tableau Server. For more information, see [Change Logging Levels](#).

`vizqlserver.NumberOfWorkbookChangesBetweenAutoSaves`

Default value: `5`

Auto recover configuration for web authoring. Specifies the number of changes that a user must make to trigger auto save. Take care when changing this value. Auto recover functionality may impact the performance of web authoring and other viz-related operations on Tableau Server. We recommend tuning this value by making incremental adjustments over time.

`vizqlserver_<n>.port`

The port a VizQL server instance (specified by "<n>") is running on.

`vizqlserver.protect_sessions`

Default value: `true`

When set to `true`, prevents VizQL sessions from being reused after the original user signs out.

`vizqlserver.querylimit`

Default value: `1800`

## Tableau Server on Windows Help

Longest allowable time for updating a view, in seconds. 1800 seconds = 30 minutes. This configuration option impacts VizQL Server and Data Server.

`vizqlserver.RecoveryAttemptLimitPerSession`

Default value: 3

Auto recover configuration for web authoring. The maximum number of attempts to recover the same session. Take care when changing this value. Auto recover functionality may impact the performance of web authoring and other viz-related operations on Tableau Server. We recommend tuning this value by making incremental adjustments over time.

`vizqlserver.session.expiry.minimum`

Default value: 5

Number of minutes of idle time after which a VizQL session is eligible to be discarded if the VizQL process starts to run out of memory.

`vizqlserver.session.expiry.timeout`

Default value: 30

Number of minutes of idle time after which a VizQL session is discarded.

`vizqlserver.sheet_image_api.max_age_floor`

Default value: 1

The amount of time, in minutes, to cache images that are generated by the Query View Image method of the REST API. For more information, see the [REST API Reference](#) in the REST API help.

`vizqlserver.showdownload`

Default value: `true`

Controls the display of the **Tableau Workbook** option of the Download menu in views. When set to `false`, the Tableau Workbook option is unavailable.

**Note:** This setting does not remove the option for users in Web Edit mode.

vizqlserver.showshare

Default value: `true`

Controls the display of Share options in views. To hide these options, set to false.

**Note:** Users can override the server default by setting the "showShareOptions" JavaScript or URL parameter.

vizqlserver.url\_scheme\_allowlist

Specifies one or more URL schemes to allow (safe list) when using [URL actions](#) on views and dashboards. The schemes `http`, `https`, `gopher`, `mailto`, `news`, `sms`, `tel`, `tsc` and `tsl` are allowed (safe listed) by default. This command can contain multiple comma and space-separated values, as in this example:

```
tsm configuration set -k vizqlserver.url_scheme_whitelist -v
scheme1, scheme2
```

The values you specify overwrite previous settings. Therefore, you must include the full list of schemes in the `set` command. (You cannot amend the list of schemes by running the `set` command repeatedly.)

vizqlserver.web\_page\_objects\_enabled

Default value: `true`

Controls whether Web Page objects in dashboards can display target URLs. To prevent web pages from appearing, set to false.

vizqlserver.WorkbookTooLargeToCheckpointSizeKiB

Default value: `5120`



## Tableau Server on Windows Help

Auto recover configuration for web authoring. Size limit (KB) for a workbook that will auto save. Workbooks larger than this value will not be auto-saved. Take care when changing this value. Auto recover functionality may impact the performance of web authoring and other viz-related operations on Tableau Server. We recommend tuning this value by making incremental adjustments over time.

**Note:** Older versions of Server use a default value: 1024

vizqlserver.workflow\_objects\_enabled

Default value: `true`

Determines whether the Tableau External Actions Workflow object can be added to dashboards.

webdataconnector.refresh.enabled

Deprecated. Use `tsm data-access web-data-connectors allow` instead.

Determines whether extract refreshes for web data connectors (WDCs) are enabled in Tableau Server. To disable refresh for all WDCs, set the value for this key to `false`, as shown below:

```
tsm configuration set --key webdataconnector.refresh.enabled --value false
```

To learn more, see [Web Data Connectors in Tableau Server](#).

webdataconnector.allowlist.fixed

Deprecated. Use `tsm data-access web-data-connectors add` instead.

Specifies one or more web data connectors (WDCs) that can be used by to access data connections that are accessible over HTTP or HTTPS. This command is formatted as JSON data on a single line, with all double-quotes (") escaped using a backslash (\).

For example to add a San Francisco Film Locations WDC to the safe list:

```
tsm configuration set --key webdataconnector.whitelist.fixed --
value "'{\\"https://tableau.data.world:443\\": {\\"properties\\": {
\\"secondary_whitelist\\": [\\"(https://data.world/)(.*)\\"] } } }'"
```

To learn more, see [Web Data Connectors in Tableau Server](#).

`webdataconnector.enabled`

Deprecated. Use `tsm data-access web-data-connectors allow` instead.

Default value: `true`

When set to `true`, you can use `tsm` commands to manage web data connectors on the server.

`webdataconnector.allowlist.mode`

Default value: `mixed`

Determines how Tableau Server can run web data connectors. Supported modes are:

- `mixed`. Users can run connectors that are on an allowlist (safe list) of URLs. This mode originally also allowed users to run WDCs that had been imported. Importing WDCs is no longer supported.
- `fixed`. Users can run connectors that are on an allowlist (safe list) of URLs.
- `insecure`. Users can run any connector.

**Important:** Use the `insecure` option *only* for development and testing. Because connectors run custom code, running connectors that have not been vetted can pose a security threat.

`wgserver.audit_history_expiration_days`

Default value: `183`

Specifies the number of days after which historical events records are removed from the PostgreSQL database (the Tableau Server database).

`wgserver.authentication.legacy_identity_mode.enabled`

**Version:** Added in version 2022.1

Default value: `false` for Tableau Server 2022.1 and later. For pre-2022.1 Tableau Server deployments upgraded to 2022.1 or later, default value is `true`.

Set to `false` to use identity pools.

For more information, see Troubleshoot identity pools.

`wgserver.authentication.identity_pools.default_pool_description`

**Version:** Added in version 2023.1

Default value: Null

Optionally, you can add a description for the initial pool (TSM configured) to the Tableau Server landing page and is visible to all users. When one or more identity pools are created, this description is added below the primary sign-in option and can be used to help guide users that belong to the initial pool (TSM configured) to the correct sign-in option.

For example, to add a “Regular employees sign in here” description, you can use the following command:

```
tsm configuration set -k wgserver.authentication.identity_pools.default_pool_description -v "Regular employees sign in here"
```

**Note:** The initial pool (TSM configured) description is different from the Sign-In Customisation note. The Sign In Customisation note is displayed on the Tableau Server landing page below all sign-in options and on the page where your initial pool (TSM configured) users enter their username and password.

`wgserver.change_owner.enabled`

Default value: `true`

Controls whether the ownership of a workbook, data source or project can be changed. Other options include `false` and `adminonly`.

`wgserver.clickjack_defense.enabled`

Default value: `true`

When set to `true`, helps prevents a malicious person from "clickjacking" a Tableau Server user. In a clickjack attack, the target page is displayed transparently over a second page, and the attacker gets the user to click or enter information in the target page while the user thinks he or she is interacting with the second page.

For more information, see Clickjack Protection.

`wgserver.domain.accept_list`

**Version:** This was added in version 2020.4.0 and replaces `wgserver.domain.whitelist`.

Default value: `null`

Allows connection from Tableau Server to secondary Active Directory domains. A secondary domain is one that Tableau Server connects to for user synchronisation, but is a domain where Tableau Server is not installed. Tableau Server will attempt to connect to secondary domains for user and group synchronisation. In some cases, Tableau Server may be unable to connect to the secondary domain, which will result in the error, "Domain not in accept list (errorCode=101015)."

Setting the `wgserver.domain.accept_list` option is required by a fix for the security vulnerability, [\[Important\] ADV-2020-003: Tableau Server Forced Authentication](#). As of February 2020, the fix for this vulnerability is included in all latest versions and maintenance releases of Tableau Server.

To set this option, enter the secondary domain enclosed by double-quotes. Multiple domains must be separated by a comma and a space. For example, `tsm configuration set -k wgserver.domain.accept_list -v "example.org, domain.com"`.

## Tableau Server on Windows Help

Wildcard functionality is not supported. For example, if Tableau connects to `sub-1.example.org` and `sub2.example.org`, then both domains must be added.

Updating the `wgserver.domain.accept_list` option overwrites the existing value. Therefore, if you are adding a new domain to an existing set of domains stored in the value, include all existing domains with the new domain when you set the option. You can retrieve the full list of existing domains by running `tsm configuration get -k wgserver.domain.accept_list`.

`wgserver.domain.allow_insecure_connection`

Default value: `False`

This setting only applies to Windows. This option specifies whether Tableau Server will connect to Active Directory over an unencrypted channel. The default value, `False`, enforces an encrypted channel. If the LDAP channel is not encrypted, then Tableau Server will not connect to Active Directory.

Your Active Directory infrastructure should manage certificates and trust with domain-joined computers. As such, the channel communication between Tableau Server and Active Directory resources should be encrypted. We do not recommend allowing unencrypted communications with Active Directory, as this configuration is vulnerable to man-in-the-middle attacks.

If you are upgrading to Tableau Server 2021.2 or later and your LDAP channel is not encrypted, upgrade will fail. You can run this command to allow an insecure connection on older versions of Tableau Server before you upgrade. If you are running this command on a version prior to 2021.2, you must include the `--force-keys` option with the command.

`wgserver.domain.fqdn`

Default value: value of `%USERDOMAIN%`

The fully qualified domain name of the Active Directory server to use.

`wgserver.domain.password`

Default value: `null`

Specifies password for the user account that is used for LDAP connection. See External Identity Store Configuration Reference.

`wgserver.domain.username`

Default value: `null`

Specifies name for the user account that is used for LDAP connection. See External Identity Store Configuration Reference.

`wgserver.domain.allowlist`

**Important:** This key has been deprecated as of version 2020.4.0. Use `wgserver.domain.accept_list` instead.

Default value: `null`

Allows connection from Tableau Server to secondary Active Directory domains. A secondary domain is one that Tableau Server connects to for user synchronisation, but is a domain where Tableau Server is not installed. Tableau Server will attempt to connect to secondary domains for user and group synchronisation. In some cases, Tableau Server may be unable to connect to the secondary domain, which will result in the error, “Domain not in allowlist (errorCode=101015)”.

`wgserver.extended_trusted_ip_checking`

Default value: `false`

Enforces IP client matching for trusted ticket requests.

`wgserver.ignore_domain_in_username_for_matching`

**Version:** Added in versions 2021.4.21, 2022.1.17, 2022.3.9 and 2023.1.5

Default value: `false`

When you enable SAML, you can configure Tableau Server to ignore the domain portion of the SAML username attribute when matching the identity provider (IdP) user name to a user account on Tableau Server. You might ignore the domain portion of the username attribute when you already have users defined in Tableau Server that match the prefix portion of a username attribute but not the domain portion of the username attribute. For more information, see the [Ignore domain when matching SAML username attribute](#) section in the SAML Requirements topic.

For example, to ignore the domain name in the SAML username attribute, run the following command:

```
tsm configuration set -k wgserver.ignore_domain_in_username_for_matching -v true
```

**Important:**

- We do not recommend ignoring the domain name without taking precautions. Specifically, verify that user names are unique across the configured domains that you've created in your IdP.
- This command only works in Tableau Server deployments that are in `legacy-identity-mode` or deployments that have not been updated through the [identity migration](#) to use the Identity Service.

`wgserver.restrict_options_method`

Default value: `true`

Controls whether Tableau Server accepts HTTP OPTIONS requests. If this option is set to `true`, the server returns HTTP 405 (Method Not Allowed) for HTTP OPTIONS requests.

`wgserver.saml.blocklisted_digest_algorithms`

**Version:** Added in version 2021.1.

Default value: `SHA1`

Specifies the hashing algorithms that are not allowed for any relevant SAML certificate signatures or SAML assertion digest method or signature methods. When set, certificates or assertions that are signed & hashed with a blocklisted algorithm will be rejected and fail.

There are multiple places where SHA-1 could be used on both the Tableau and IdP side. For example:

- Certificates uploaded with TSM that are used by Tableau Server to sign the request that is sent to the IdP.
- Certificates in the IdP metadata used to verify the AuthnResponse (signature) received from the IdP using the public key in the Certificate.
- Incoming assertions signed and hashed with SHA-1 (DigestMethod set to SHA-1 and SignatureMethod set to SHA-1).

The default value was changed to `(SHA1` in Tableau Server 2021.2. For more information about upgrading to 2021.2 with SAML configured, see the Knowledge Base article, [Tableau Server Using SAML Authentication Fails to Start or Rejects Login After Upgrade to Tableau Server 2021.2](#).

`wgserver.saml.forceauthn`

**Version:** Added in version 2019.3.

Default value: `false`

When set to `true`, if the Tableau user session expires, Tableau Server will re-authenticate the user with the IdP. This option can also be used to ask the IdP to prompt the user for re-authentication, even if the user has an active IdP session.

`wgserver.saml.idpattribute.username`

Specifies the name of the attribute in which your SAML IdP stores usernames. By default, this is set to `username`. If the attribute name that your IdP uses contains spaces, enclose it in quotation marks. For more information, see [Configure Server-Wide SAML](#) or [Configure Site-Specific SAML](#).



## Tableau Server on Windows Help

`wgserver.saml.iframe_idp.enabled`

Default value: `false`

Default of false means that when users select the sign-in button on an embedded view, the IdP's sign-in form opens in a pop-up window.

When you set it to true, and a server SAML user who is already signed in navigates to a web page with an embedded view, the user will not need to sign in to see the view.

You can set this to true only if the IdP supports signing in within an iframe. The iframe option is less secure than using a pop-up, so not all IdPs support it. If the IdP sign-in page implements clickjack protection, as most do, the sign-in page cannot display in an iframe, and the user cannot sign in.

If your IdP does support signing in via an iframe, you might need to enable it explicitly. However, even if you can use this option, it disables Tableau Server clickjack protection for SAML, so it still presents a security risk.

`wgserver.saml.maxassertiontime`

Default value: `3000`

Specifies the maximum number of seconds, from creation, that a SAML assertion is usable.

`wgserver.saml.min_allowed.elliptic_curve_size`

Default value: `256`

**Version:** Added in version 2021.1 but did not include a default value. In 2021.2, the default value was set to `256`.

This option specifies the minimum allowed ECDSA curve size for the certificate used for SAML authentication. If you upload a certificate that has an ECDSA curve size less than 256, TSM will log an error when you apply changes.

If you are upgrading to Tableau Server 2021.2 or later and your SAML certificate uses an ECDSA curve size less than 256, Tableau Server will not start after upgrading. We recommend uploading a new certificate with 256 (or larger) ECDSA curve size before upgrading. Alternatively, you can run this command to set a lower ECDSA curve size on older versions (pre-2021.1) of Tableau Server before you upgrade. If you are running this command on a version prior to 2021.1, you must include the `--force-keys` option with the command. For more information about upgrading to 2021.2 with SAML configured, see the Knowledge Base article, [Tableau Server Using SAML Authentication Fails to Start or Rejects Login After Upgrade to Tableau Server 2021.2](#).

`wgserver.saml.min_allowed.rsa_key_size`

Default value: 2048

**Version:** Added in version 2021.1 but did not include a default value. In 2021.2, the default value was set to 2048.

This option specifies the minimum allowed RSA key length for the certificate used for SAML authentication. If you upload a certificate that has an RSA key length less than 2048, TSM will log an error when you apply changes.

To run SAML authentication with a 1024 RSA key length (not recommended), set this value to 1024.

If you are upgrading to Tableau Server 2021.2 or later and your SAML certificate uses a key length less than 2048, Tableau Server will not start after upgrading. We recommend uploading a new certificate with 2048 (or larger) key length before upgrading. Alternatively, you can run this command to set a lower key strength on older versions (pre-2021.1) of Tableau Server before you upgrade. If you are running this command on a version prior to 2021.1, you must include the `--force-keys` option with the command. For more information about upgrading to 2021.2 with SAML configured, see the Knowledge Base article, [Tableau Server Using SAML Authentication Fails to Start or Rejects Login After Upgrade to Tableau Server 2021.2](#).

## Tableau Server on Windows Help

`wgserver.saml.responseskew`

Default value: 180

Sets the maximum number of seconds difference between Tableau Server time and the time of the assertion creation (based on the IdP server time) that still allows the message to be processed.

`wgserver.saml.sha256`

Default value: `true`

When set to `true`, Tableau Server will hash message signatures and digests with SHA-256 in SAML assertions to the IdP. Set this option to `false` only if your IdP rejects assertions containing SHA-256 hashed content.

`wgserver.session.apply_lifetime_limit`

Default value: `false`

Controls whether there is a session lifetime for server sessions. Set this to `true` to configure a server session lifetime.

`wgserver.session.idle_limit`

Default value: 240

The number of minutes of idle time before a sign-in to the web application times out.

`wgserver.session.lifetime_limit`

Default value: 1440

The number of minutes a server session lasts if a session lifetime is set. The default is 1440 minutes (24 hours). If `wgserver.session.apply_lifetime_limit` is `false` (the default) this is ignored.

`wgserver.unrestricted_ticket`

Default value: `false`

Specifies whether to extend access to server resources for users authenticated by trusted tickets. Default behaviour allows users to access views only. Setting this to `true` allows users with valid trusted tickets to access server resources (projects, workbooks and so on) as if they had signed in using their credentials.

`workerX.gateway.port`

Default value: 80 (443 if SSL)

External port that Apache listens on for workerX (where a “worker” is the term used for subsequent server nodes in the cluster). `worker0.gateway.port` is Tableau Server’s external port. In a distributed environment, `worker0` is the initial Tableau Server node.

`workerX.vizqlserver.procs`

Default value: <number>

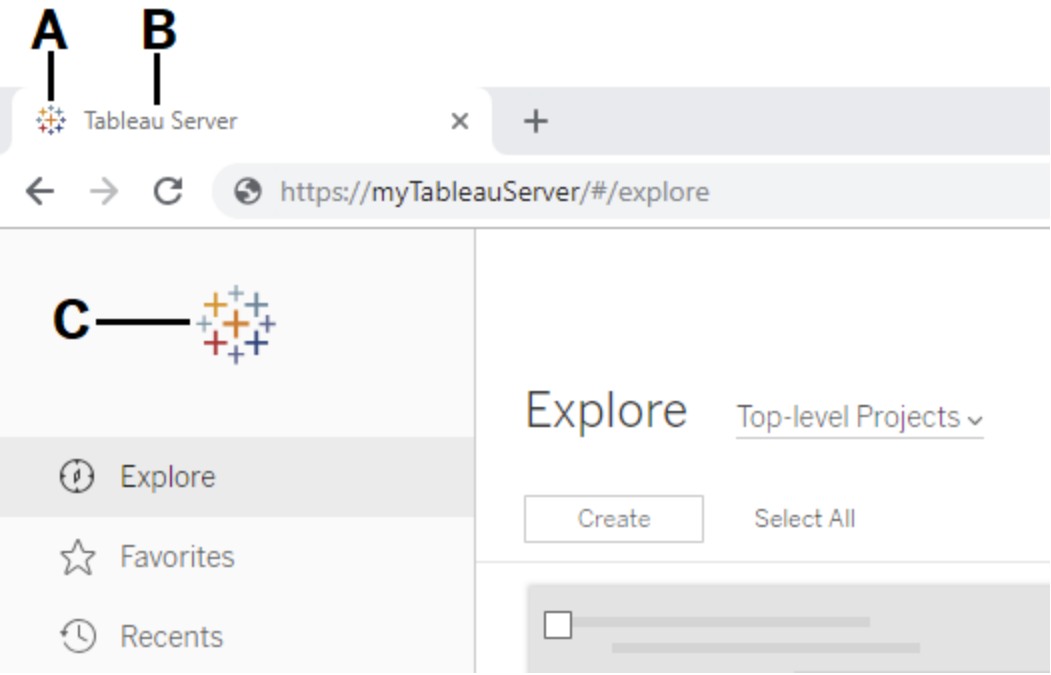
Number of VizQL servers.

`zookeeper.config.snapCount`

Specifies the number of transactions necessary to cause the Coordination Service to create a snapshot of the logs. By default this value is 100,000 transactions. If your Coordination Service is not writing enough transactions to result in snapshots, the automatic cleanup of snapshots older than five days will not take place, and you may lose disk space to the transaction logs. By default transaction logs and snapshots are created in the Tableau data directory.

## tsm customise

You can use the `tsm customize` command to customise the look and feel of the Tableau Server client browser experience.



Logo	Option flag	Minimum size/Maximum size, in pixels	Recommended size, in pixels
<b>A</b> - Window tab logo	cannot be changed	cannot be changed	cannot be changed
<b>B</b> - Server name	--server-name	does not apply	does not apply
<b>C</b> - Header logo	--header-logo	32 by 32 min, 160 by 160 max	48 by 48
<b>Not shown</b> - Sign in logo	--signin-logo	3000 by 3000 max	
Header logo/Sign in logo	--logo	32 by 32 min, 160 by 160 max	48 by 48
<b>Not shown</b> - Logo shown when navigation pane is minimised	--compact-logo	32 by 32 max	32 by 32

The image files you use should be in GIF, JPEG or PNG format.

The background colours on the header and sign in page are not the same. If you use the same image for both locations (if you use the `--logo` option, for example) your logo might look different depending on where it appears in the server interface.

As part of your disaster recovery plan, we recommend keeping a backup of the customisation image files in a safe location off of the Tableau Server. The image files that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the files are not stored in a recoverable format. See Tableau Server Client File Service.

## Synopsis

```
tsm customize [options] [global options]
```

After you run the `customize` command, you must run the following command to apply changes:

```
tsm pending-changes apply
```

## Options

**Note:** The path and image file name cannot include any spaces.

```
--compact-logo "<path-to-logo>"
```

Optional.

Specify a path to the image file that will be displayed when the navigation pane size is minimised. The maximum (and optimal) size is 32 by 32 pixels.

```
--header-logo "<path-to-logo>"
```

Optional.

Specify a path to the image file that will be displayed in the header only.

```
--logo "<path-to-logo>"
```

Optional.

Path to a single image file that will display for both the header and the sign-in window.

```
--restore-defaults
```

Optional.

Reset all customisation options to default install state.

```
--server-name <server_name>
```

Optional.

Server name that appears in the browser tab, tooltips and messages.

```
--signin-logo "<path-to-logo>"
```

Optional.

Specify a path to the image file that will be displayed for sign-in window only.

## Global options

```
-h, --help
```

Optional.

Show the command help.

```
-p, --password <password>
```

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

```
-s, --server https://<hostname>:8850
```

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

```
--trust-admin-controller-cert
```

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

```
-u, --username <user>
```

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm data-access

You can use the `tsm data-access` commands to configure data caching, enable or disable data repository access, enable SAML for single sign-on, and configure settings for Web Data Connectors (WDCs).



- caching
  - [data-access caching list](#)
  - [data-access caching set](#)
- repository
  - [repository-access disable](#)
  - [repository-access enable](#)
  - [repository-access list](#)
- set-saml-delegation
  - [set-saml-delegation configure](#)
  - [set-saml-delegation disable](#)
  - [set-saml-delegation enable](#)
- web-data-connectors
  - [web-data-connectors add](#)
  - [web-data-connectors allow](#)
  - [web-data-connectors delete](#)
  - [web-data-connectors list](#)

## tsm data-access caching list

Displays data connection caching settings. To learn more about data connection caching settings, see [Configure Data Cache](#).

### Synopsis

```
tsm data-access caching list [global options]
```

## tsm data-access caching set

Sets data connection caching settings. To learn more about data connection caching settings, see [Configure Data Cache](#).

### Synopsis

```
tsm data-access caching set [options] [global options]
```

## Options

`-r, --refresh-frequency`

Optional.

Sets the frequency to refresh cached data with a new query to the underlying data source. You can specify a number to define the maximum number of minutes that data should be cached. You can also specify **low** to cache and reuse data for as long as possible, or **always** (equivalent to **0**) to refresh data each time that a page is loaded. If this option is not specified, it defaults to **low**.

## tsm data-access repository-access disable

Disable external access to the Tableau PostgreSQL database for the default remote user.

This will not disable access from localhost.

## Synopsis

```
tsm data-access repository-access disable [options]
[global options]
```

## Options

`--repository-username <username>`

Required.

The username, either **tableau** or **readonly**, with access to the data repository.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1500 (25 minutes).

`--ignore-prompt`

Optional.

Suppress the prompt for restart and restart Tableau Server.

## tsm data-access repository-access enable

Enables access to the Tableau PostgreSQL database.

By default, PostgreSQL traffic uses port 8060 (TCP). If you are running a local firewall, be sure to allow traffic for this port. To change the PostgreSQL port, see [Ports that are not dynamically mapped](#).

### Synopsis

```
tsm data-access repository-access enable [options] [global options]
```

### Options

```
--repository-password <password>
```

Required.

Sets (or changes) the password to access the data repository for the specified username.

```
--repository-username <username>
```

Required.

The username, either **tableau** or **readonly**, with access to the data repository.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 1500 (25 minutes).

```
--ignore-prompt
```

Optional.

Suppress the prompt for restart and restart Tableau Server.

## **tsm data-access repository-access list**

Lists users who have access to the Tableau PostgreSQL database.

### **Synopsis**

```
tsm data-access repository-access list [global options]
```

## **tsm data-access set-saml-delegation configure**

Setup single sign-on for SAML SAP HANA so that Tableau Server functions as an Identity Provider (IdP) that provides single sign-on for users making SAP HANA data connections.

### **Synopsis**

```
tsm data-access set-saml-delegation configure [options]
[global options]
```

### **Options**

```
-kf, --cert-key <cert-key>
```

Optional.

The SAML certificate key file.

```
-cf, --cert-file <file-path>
```

Optional.

The location of the SAML certificate file.

```
-uf, --username-format <username-format>
```

Optional.

Username format. Valid format keys are: 'username', 'domain\_and\_username', and 'email'.

`-uc, --username-case <username-case>`

Optional.

Username case. Valid case keys are: 'lower', 'upper' and 'preserve'.

.

## **tsm data-access set-saml-delegation disable**

Disable single sign-on for SAML SAP HANA.

### **Synopsis**

```
tsm data-access set-saml-delegation disable [global options]
```

## **tsm data-access set-saml-delegation enable**

Enable single sign-on for SAML SAP HANA.

### **Synopsis**

```
tsm data-access set-saml-delegation enable [global options]
```

## **tsm data-access web-data-connectors add**

Add a web data connector (WDC) to the WDC safe list.

### **Synopsis**

```
tsm data-access web-data-connectors add [options] [global options]
```

### **Options**

`-n, --name <name>`

Required.

The name for the WDC that will be displayed in the Tableau Server data source list. This name must be enclosed in single quotes (') or double quotes ("). Use double quotes (") if the name includes a space.

`-sec, --secondary <secondary-URL-1>, <secondary-URL-2>`

Required if the WDC uses secondary domains.

A comma-delimited list of URLs that indicates which domains the connector can make requests to or receive data from, for example, external JavaScript libraries, REST APIs or local files. Do not enclose the URLs in quotes. To add an entire domain to this secondary safe list, you can use a wildcard expression `. *` at the end of the URL, as shown in the following example: `https://www.example.com/. *`

Note that on Windows, you could include parentheses `(. *)` around the wildcard, but it isn't necessary. On Linux, the parentheses will cause an error. Use `. *` as the wildcard.

If you don't know whether the WDC uses secondary domains, or what the secondary domains are, you might need to contact the WDC's developer. You can also choose to use `http://. *` and `https://. *` wildcard URLs to allow all domains. However, to increase security, we strongly recommend that you use more specific URLs.

`--url <URL>`

Required.

The URL for the WDC (formatted as `<scheme>://<host>:<port>/<path>`, for example `https://www.tableau.com:443/example/`). For many WDCs, the `<port>` value is 443, which is the default port used for HTTPS, but you can check the value for your connector by looking at the data source details on Tableau Server or Tableau Cloud. Note that you can't use a wildcard `(. *)` as part of the URL for the WDC.

## **tsm data-access web-data-connectors allow**

Enable or disable WDC refreshes. Also, enable or disable the use of WDCs on Tableau Server.

## Tableau Server on Windows Help

### Synopsis

```
tsm data-access web-data-connectors allow [options] [global options]
```

### Options

Use one or both options. At least one of `--refreshes` or `--type` is required.

```
-r, --refreshes <refreshes-allowed>
```

Optional if `--type` is specified.

Set to `false` to disallow WDC refreshes or `true` to allow WDC refreshes.

```
-t, --type <WDC-allowed>
```

Optional if `--refreshes` is specified.

Set to `none` to disallow the use of WDCs on Tableau Server (and omit WDCs from backups) or `all` to allow the use of WDCs.

## tsm data-access web-data-connectors delete

Delete a specified WDC, or all WDCs, from the Tableau Server safe list.

### Synopsis

```
tsm data-access web-data-connectors delete [options]  
[global options]
```

### Options

```
--all
```

Optional.

This option will delete all WDCs.

```
--url <URL>
```

Optional.

The URL for the WDC to delete.

## **tsm data-access web-data-connectors list**

List all WDCs currently on the safe list.

### **Synopsis**

```
tsm data-access web-data-connectors list [options] [global options]
```

### **Options**

#### **Global options**

**-h, --help**

Optional.

Show the command help.

**-p, --password <password>**

Required, along with **-u** or **--username** if no session is active.

Specify the password for the user specified in **-u** or **--username**.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

**-s, --server https://<hostname>:8850**

Optional.

Use the specified address for Tableau Services Manager. The URL must start with **https**, include port 8850, and use the server name not the IP address. For example



## Tableau Server on Windows Help

`https://<tsm_hostname>:8850`. If no server is specified,  
`https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm email

Use the `tsm email` command to view and test your SMTP configuration.

For more information about configuring SMTP, see [Configure SMTP Setup](#).

### tsm email test-smtp-connection

Run this command to test the SMTP connection. When run, TSM will attempt to establish a connection with the SMTP server that you have configured for Tableau Server. TSM will also return a connection status and the details of the SMTP configuration.

In some cases, the command will return a false-positive status. For example, if your Postfix SMTP server is set to require TLS, but Tableau Server is not configured for TLS, the connection is established and TSM will report a successful connection. However, in this scenario, Postfix actually rejects the email message after TSM has connected.

#### Synopsis

```
tsm email test-smtp-connection [global options]
```

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm initialise

You can use the `tsm initialize` command to initialise Tableau Server.

**Note:** You must apply or discard pending changes before running `tsm initialize` or the initialise will fail. Apply pending changes using the `tsm pending-changes apply` command. Discard any pending changes you do not want to apply using `tsm pending-changes discard`.

### Synopsis

```
tsm initialize [options] [global options]
```

### Options

`-r, --start-server`

Optional. Leave the server running after initialisation is complete.

### Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

```
-s, --server https://<hostname>:8850
```

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

```
--trust-admin-controller-cert
```

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

```
-u, --username <user>
```

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm jobs

You can use the `tsm jobs` commands to list, reconnect to and cancel jobs.

- `cancel`
- `list`
- `reconnect`

## tsm jobs cancel

Cancel a job on the server. Any job can be cancelled before it starts running (when queued). Only certain jobs can be cancelled when they are already running: Clean-up, Decommission File Store, Generate Backup, Restart Server, Start Server. For more information about cancelling jobs, see [Cancel TSM Jobs](#).

### Synopsis

```
tsm jobs cancel --id <jobID> [global options]
```

### Options

```
-i, --id <jobID>
```

Required.

Id of the job to cancel.

## tsm jobs list

List asynchronous jobs on the server.

### Synopsis

```
tsm jobs list [--status <status>] [global options]
```

### Options

```
-t, --status <status>
```

Optional.

Filter for jobs that match the given status.

## tsm jobs reconnect

Reconnect to an asynchronous job to display its progress. If no job id is specified, it reconnects to the latest job.

## Synopsis

```
tsm jobs reconnect[--id <jobID>] [global options]
```

## Options

`-i, --id <jobID>`

Optional.

Specifies the id of the job that should be reconnected.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm licences

You can use the `tsm licenses` commands to manage server licence tasks like activating or deactivating a Tableau Server product key on or offline, and getting associated files for offline activation or deactivation.

- `tsm licences activate`
- `tsm licences atr-configuration get`
- `tsm licences atr-configuration set`
- `tsm licences deactivate`
- `tsm licences get-offline-activation-file`
- `tsm licences get-offline-deactivation-file`
- `tsm licences list`
- `tsm licences refresh`

### tsm licences activate

Activates a Tableau Server product key.

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before running this command.

## Synopsis

```
tsm licenses activate --license-key <product-key> [global options]
```

## Options

`-f, --license-file <file.tlf>`

Required if doing offline activation.

Specifies the licence file (<file>.tlf) used for offline activation.

`-k, --licence-key <product-key>`

Required if activating a valid product key.

Specifies the product key to use for online activation.

`-t, --trial`

**Note:** This option is only available in versions earlier than 2023.3.0. For trial licensing with later versions, contact your account representative.

Required if activating a trial licence.

Activate a trial licence.

## tsm licences atr-configuration get

View the Server authentication-to-run (ATR) duration. The ATR duration is the length of time that Tableau Server is authorised to run before the licence must be renewed.

## Synopsis

```
tsm licenses atr-configuration get --duration [global options]
```



## Options

`--duration`

Displays the current authentication-to-run (ATR) in seconds. For example, 432000 (5 days).

## **tsm licences atr-configuration set**

Set the Server authentication-to-run (ATR) duration. The ATR duration is the length of time that Tableau Server is authorised to run before the licence must be renewed.

### Synopsis

```
tsm licenses atr-configuration set --duration <duration_in_seconds>  
[global options]
```

## Options

`--duration <duration_in_seconds>`

Sets the authorisation-to-run (ATR) duration (in seconds). For example, 432000 (5 days).

## **tsm licences deactivate**

Deactivates a Tableau Server product key either online or offline.

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before running this command.

### Synopsis

```
tsm licenses deactivate --license-key <product-key> [global options]
```

## Options

`-f, --license-file <return_file.tlr>`

Required if doing offline deactivation.

Specifies the licence file (<file>.tlf) used for offline deactivation.

`-k, --licence-key <product-key>`

Required if deactivating a product key.

Specifies the product key to use for online deactivation.

## tsm licences get-offline-activation-file

Generate an offline activate file to use for activating Tableau Server offline. To learn more, see [Activate Tableau Server Offline](#).

**Note:** You can only activate one product key at a time unless you're using Server ATR. With Server ATR, you can provide a comma-delimited list of product keys in the offline activation file to simultaneously activate multiple product keys.

## Synopsis

```
tsm licenses get-offline-activation-file --license-key <product-
key> --output-dir <path> [global options]
```

## Options

`-k, --licence-key <product-key>`

Required.

Specifies the product key to use for offline activation.

## Tableau Server on Windows Help

`-o, --output-dir <path>`

Required.

The location where the offline activation file should be saved. This location must exist.

### tsm licences get-offline-deactivation-file

Generate an offline deactivation file to use for deactivating Tableau Server offline. To learn more, see [Deactivate Tableau Server Offline](#).

#### Synopsis

```
tsm licenses get-offline-deactivation-file --license-key <product-key> --output-dir <path> [global options]
```

#### Options

`-k, --licence-key <product-key>`

Required.

Specifies the product key to use for offline deactivation.

`-o, --output-dir <path>`

Required.

The existing location where the offline deactivation file should be saved.

### tsm licences list

Lists licences that are activated on the Tableau Server deployment.

For example, a server with five Creator licences, five Explorer licenses, 100 Viewer licences and Data Management would provide command output similar to the following:

```
C:\Windows\system32>tsm licenses list
Number of product keys: 4
The following license keys will expire soon. Access renewal resources including information on how to renew your software or change your billing preferences here https://www.tableau.com/support/renew
TS9D-06E2-BEF8-89EA-38EE TSPR-3861-08B8-8C5A-C79D TS49-176C-E840-3410-5EAS TSQJ-09B8-5CF8-FD66-29AF
KEY          TYPE      CREATOR  EXPLORER  VIEWER    DATA MANAGEMENT ADD-ON  GUEST ACCESS LIC EXP  MAINT EXP  UPDATABLE  LBLM      SERVER MANAGEMENT ADD-ON
TS9D-06E2-BEF8-89EA-38EE Term      0         0         100      false      false      11/30/20  N/A       false      false      false
TSPR-3861-08B8-8C5A-C79D Term      0         0         0        true       false      11/30/20  N/A       false      false      false
TS49-176C-E840-3410-5EAS Term      0         5         0        false     false      11/30/20  N/A       false      false      false
TSQJ-09B8-5CF8-FD66-29AF Term      5         0         0        false     false      11/30/20  N/A       false      false      false
```

The following fields are returned:

- **KEY:** A globally unique 16-character string that identifies the licence.
- **TYPE:** Describes the type of licence
  - **Term:** Term licences map to a subscription schedule and must be renewed. The expiration date is listed under the LIC EXP field.
  - **Perpetual:** Perpetual licences are purchased once and do not need to be renewed but must be refreshed to update the MAINT EXP or maintenance expiration date.
  - **Cores:** Core licences are licences that map to the number of cores on the computers running specific Tableau Server services. Core licensing allows for a guest user access to views on the server or embedded on other web servers. Core licences also allow for unlimited Explorer and Viewer users.
- **CREATOR:** The number of Creator licences issued to the Tableau Server deployment.
- **EXPLORER:** The number of Explorer licences issued to the Tableau Server deployment.
- **VIEWER:** The number of Viewer licences issued to the Tableau Server deployment.
- **DATA MANAGEMENT:** Tableau Server is licensed with Data Management (True/False). See About Data Management.
- **GUEST ACCESS:** Tableau Server is licensed for a Guest User. See Guest User. The ability to leverage a Guest User requires Core licensing. See TYPE field.
- **LIC EXP:** The date that the licence expires and Tableau Server will stop working. Term licences expire. See TYPE field. Visit the Tableau [Customer Portal](#) to refresh licences.
- **MAINT EXP:** Applies only to legacy perpetual licences (TYPE = Perpetual). For Term licences, this field will output N/A. MAINT EXP displays the date that the maintenance contract for the Tableau Server deployment expires. To update the licence maintenance key see Refresh Expiration Date and Attributes for the Product Key. Visit the Tableau [Customer Portal](#) to view maintenance purchase history and to purchase additional maintenance.
- **UPDATABLE:** Specifies whether the licence is an updatable subscription licence (True/False).
- **LBLM:** Specifies if login-based licence management (LBLM) is enabled for the Tableau Server deployment (True/False). When enabled, LBLM allows users to log into Tableau Server to licence their instance of Tableau Desktop or Prep, rather than entering a product key. For more information about LBLM, see Login-based Licence Management.

- **SERVER MANAGEMENT:** Tableau Server is licensed for Advanced Management (formerly Server Management Add-on) (`True/False`). For more information about Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

## Synopsis

```
tsm licenses list [global options]
```

## tsm licences refresh

Update the maintenance expiration date of all product keys on Tableau Server.

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before running this command.

## Synopsis

```
tsm licenses refresh [global options]
```

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

```
-s, --server https://<hostname>:8850
```

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

```
--trust-admin-controller-cert
```

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

```
-u, --username <user>
```

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm login

Use the `tsm login` command to log in to Tableau Services Manager from a remote node.

If the account you are logged in as is a member of the TSM-authorized group, you do not need to provide credentials to run commands when running `tsm CLI` locally. For more information, see [Authenticating with tsm CLI](#).

### Synopsis

```
tsm login [global options]
```

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm logout

You can use the `tsm logout` command to log out of Tableau Services Manager (TSM).

### Synopsis

```
tsm logout [global options]
```

### Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port 8850, and use the server name not the IP address. For example



## Tableau Server on Windows Help

`https://<tsm_hostname>:8850`. If no server is specified,  
`https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm maintenance

You can use the `tsm maintenance` commands to manage server maintenance tasks like creating backups or restoring Tableau Server from a previously created backup.

- `tsm maintenance backup`
- `tsm maintenance cleanup`
- `tsm maintenance jmx`
  - `tsm maintenance jmx disable`
  - `tsm maintenance jmx enable`
- `tsm maintenance metadata-services`
  - `tsm maintenance metadata-services disable`
  - `tsm maintenance metadata-services enable`
  - `tsm maintenance metadata-services get-status`
- `tsm maintenance preflight-check`
  - `tsm maintenance preflight-check permissions`
  - `tsm maintenance preflight-check ports`

- tsm maintenance reindex-search
- tsm maintenance reset-searchserver
- tsm maintenance restore
- tsm maintenance send-logs
- tsm maintenance snapshot-backup (external file store)
  - tsm maintenance snapshot-backup complete
  - tsm maintenance snapshot-backup prepare
  - tsm maintenance snapshot-backup restore
- tsm maintenance validate-backup-basefilepath
- tsm maintenance validate-resources
- tsm maintenance ziplogs

## tsm maintenance backup

Creates a backup of the data managed by Tableau Server. This data includes the Tableau PostgreSQL database (the repository) which contains workbook and user metadata, and extract (.tde or .hyper) files. This data does not include configuration data. See [Perform a Full Backup and Restore of Tableau Server](#).

**Note:** Do not use this command on Tableau Server installations with External File Store. See [Backup and Restore with External File Store](#).

### Optimising with topology configurations:

- Co-locating File Store on the same node as the Administration Controller can reduce the length of time it takes to back up Tableau Server by reducing or eliminating the need to transfer data between nodes during the backup process. This is especially true if your organisation uses many extracts.
- Co-locating the repository (pgsql) with the Administration Controller node can also help to reduce back up time, but the time savings is less significant than that of the File Store.

## Tableau Server on Windows Help

The Administration Controller is usually on the initial node, unless you have had an initial node failure and moved the controller to another node.

The backup file is assembled in a temporary location in the data directory and then written to the directory defined in the TSM `basefilepath.backuprestore` variable. By default:

```
C:\ProgramData\Tableau\Tableau  
Server\data\tabsvc\files\backups\<filename>.tsbak
```

For more information about where backup files are written and how to change that location, see [tsm File Paths](#). **Note:** Even when you change the backup location, the backup process uses a temporary location in the data directory to assemble the backup file.

### Synopsis

```
tsm maintenance backup --file <backup_file> [options]  
[global options]
```

### Options

`-f, --file <backup_file>`

Required.

For more information about backing up the repository data, see [Back up Tableau Server Data](#) for more information.

`-d, --append-date`

Optional.

Append the current date to the end of the backup file name.

**Note:** Backups created using a schedule automatically include a date/time at the beginning of the backup file name. If you also use the `-d` option your file name will include the

date twice. For more information about scheduling backups, see [Scheduling and Managing Backups](#).

`-i, --description <string>`

Optional.

Include the specified description of the backup file.

`--ignore-prompt`

Optional. Added in version 2020.2.

Back up without prompting, even if the File Store is not on the same node as the Administration Controller (usually the initial node). Use this prompt if automating backups (for example, with scripts).

`-k, --skip-verification`

Optional.

Do not verify the integrity of the database backup.

`--multithreaded`

Optional. Added in version 2021.1

By default, a single thread is used when creating a Tableau Server backup. When this option is specified, a backup is created using multiple threads. Two threads are used by default, when this option is specified. You can change the number of threads used by setting the `backup.zstd.thread_count` configuration key.

`--override-disk-space-check`

Optional.

Attempt to create a backup even when there is a low disk space warning.

## Tableau Server on Windows Help

`-po, --pg-only`

Optional.

Generates only the repository backup.

`--request-timeout <timeout in seconds>`

Optional.

Number of seconds to wait for the command to finish. Default value is 86400 (1440 minutes).

`-sd, --schedule-days <day[,day]>`

Optional. Added in version 2020.4.

Days on which to run the schedule. Use 1-7 for weekly schedule (1 for Monday, 7 for Sunday), 1-31 for monthly schedules (if a month does not include the specified day, the last day of the month is used). Separate multiple values with commas.

`-si, --schedule-id <ID>`

Optional. Added in version 2020.4.

Specify the ID of an existing schedule you want to update.

`--skip-compression`

Optional.

Create a backup without using compression. This results in a larger backup file but can reduce the amount of time it takes to complete the backup. If using this in a multi-node installation, we strongly recommend you have a File Store instance configured on your initial node.

`-sn, --schedule-name <name>`

Optional. Added in version 2020.4.

Specify the name for a schedule you are creating or updating.

`-sr, --schedule-recurrence <frequency>`

Optional. Added in version 2020.4.

Frequency of schedule recurrence. Valid options are "daily", "weekly", or "monthly".

`-st, --schedule-time <HH:MM>`

Optional. Added in version 2020.4.

The time a schedule should be run, in 24-hour format: HH:MM.

## Examples

This example creates a backup called `ts_backup-<yyyy-mm-dd>.tsbak` in the `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\backups\` folder:

```
tsm maintenance backup -f ts_backup -d
```

This example creates a recurring weekly backup schedule named "weekly-saturday-backup" that runs every Saturday at noon and creates a backup called `<yyyy.mm.dd.hh.mm>-ts_saturday_backup.tsbak`:

```
tsm maintenance backup -f ts_saturday_backup -sr weekly -st 12:00 -sd 6 -sn weekly-saturday-backup
```

For more details on managing scheduled backups, see [Scheduling and Managing Backups](#).

## tsm maintenance cleanup

By default, the `tsm maintenance cleanup` command deletes temporary files and log files older than one day. Command options can modify retention length and which files are deleted.

The impact of this command depends on whether Tableau Server is running.

## Tableau Server on Windows Help

- If the server is running, most old files and `http_requests` table entries can be deleted, but any files in use (locked by the operating system) cannot be deleted, so temporary files and active log files are not removed. To delete temporary files and current log files, you must stop the server before running this command. To delete `http_requests` table entries, use the `-q` option.
- If the server is stopped `http_requests` entries cannot be deleted.

If you are running Tableau Server on a distributed deployment, run this command on the node that is running the Administration Controller (also referred to as the *TSM Controller*) process. By default and in most cases, the controller is on the initial node in the cluster.

### Synopsis

```
tsm maintenance cleanup [options] [global options]
```

### Options

`-a, --all`

Optional.

Perform all cleanup operations with default retention values. Equivalent to running the `cleanup` command with the following options: `-l -t -r -q -ic`.

`--http-requests-table-retention <# of days>`

Optional.

Default: 7 days

Specify the number of days of `http_requests` table entries that should be retained. Use this option with the `-q` option to specify the number of days of table entries to retain, overriding the default of 7 days. This option specifies table entry retention age but does not trigger actual deletion of table entries. Use this together with the `-q` option, which triggers deletion of entries.

`-ic, --sheet-image-cache`

Optional. Added in version 2019.4.

Clear the image cache. This cache can contain images for offline previews, snapshots for subscription email messages and subscription pdfs, as well as any images requested from the publish rest API endpoint (see [rest\\_api\\_ref.htm](#) for more information).

`-l, --log-files`

Optional.

Delete log files that are older than 1 day. Files in the subdirectories under `data\tabsvc\logs` will be deleted.

`--log-files-retention <# of days>`

Optional.

Default: 1 (24 hours)

Delete logs older than this number of days. Use this to override the default retention period of 1 day. This command does not apply to temporary files.

`-q, --http-requests-table`

Optional.

Delete old `http_requests` table entries. Tableau Server must be running for table entries to be deleted. This option is ignored if Tableau Server is stopped. This option can be used alone to specify deletion of entries older than the default retention period (7 days), or together with the `--http-requests-table-retention` to specify a non-default retention period.

**Note:** Deleting `http_requests` table entries permanently removes data that is available to custom administrative views. Be sure removing this data will not impact any custom views you need.

`-r, --redis-cache`



Optional.

Clear the Redis cache.

`--request-timeout <timeout in seconds>`

Optional.

Default: 3600

Wait the specified amount of time for the command to finish.

`-t, --temp-files`

Optional.

Delete all files and subdirectories in the following directories:

- `<install_dir>\ProgramData\Tableau\Tableau Server-\data\tabsvc\temp`: Only directories that are storing files for expired (not running) sessions are deleted.
- `<install_dir>\ProgramData\Tableau\Tableau Server-\data\tabsvc\httpd\temp`
- `<install_dir>\ProgramData\Tableau\Tableau Server\temp`

## Examples

This example cleans up all log files older than 2 days old:

```
tsm maintenance cleanup -l --log-files-retention 2
```

## tsm maintenance jmx disable

**Version:** Command added in version 2022.1.

Use the `tsm maintenance jmx disable` command to disable JMX on Tableau Server.

Running this command requires a restart of Tableau Server, including TSM services.

## Synopsis

```
tsm maintenance jmx disable [options] [global options]
```

## Options

```
--ignore-prompt
```

Optional.

Disable JMX without prompting.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance jmx enable

**Version:** Command added in version 2022.1.

Use the `tsm maintenance jmx enable` command to enable JMX on Tableau Server.

This command is interactive, prompting you for applicable options if you don't provide them as command line parameters.

This command requires a restart of Tableau Server, including TSM services.

## Synopsis

```
tsm maintenance jmx enable
```

## Options

```
--access <readonly | readwrite>
```

Optional.

Enable JMX with either readonly or readwrite access. Default is `readonly`.

`--ignore-prompt`

Optional.

Enable JMX without prompting for additional security options. This enables JMX with SSL and restarts Tableau Server if you do not include any other command options. For example:

```
tsm maintenance jmx enable --ignore-prompt
```

`--no-ssl`

Optional.

Enable JMX without SSL.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish.

`--ssl-client-auth`

Optional.

Enable JMX requiring client auth for SSL.

`--unsecured`

Optional.

Enable JMX with no security features enabled (this is not recommended). This is the equivalent of setting the `service.jmx_enabled` configuration key to `true` in pre-2022.1 versions.

## tsm maintenance metadata-services disable

**Version:** Command added in version 2019.3.

Use the `tsm maintenance metadata-services disable` command to disable the Tableau Metadata API.

Disabling the Metadata API stops continuous ingestion and indexing of information about the content on Tableau Server, deletes the index of information about the content published to Tableau Server and assets associated with that content, and disables the ability to both query the Metadata API and access Tableau Catalog.

Running this command stops and starts some services used by Tableau Server, which causes certain functionality, such as Recommendations, to be temporarily unavailable to your users.

### Synopsis

```
tsm maintenance metadata-services disable
```

### Option

```
--ignore-prompt
```

Optional.

Dismiss the confirmation prompt when disabling the Metadata API.

## tsm maintenance metadata-services enable

**Version:** Command added in version 2019.3.

Use the `tsm maintenance metadata-services enable` command to enable the Tableau Metadata API for Tableau Server.

If Tableau Server is licensed with the Data Management, enabling the Metadata API enables Tableau Catalog.

## Tableau Server on Windows Help

When enabling the Metadata API, information about the content on Tableau Server is ingested and then indexed to the Metadata API Store. The Metadata API can be used to query schema, lineage and user managed metadata about the content published to Tableau Server. After the Metadata API is enabled, metadata is continuously ingested and indexed until the Metadata API is disabled.

When running this command, keep the following in mind:

- This command stops and starts some services used by Tableau Server, which causes certain functionality, such as Recommendations, to be temporarily unavailable to your users.
- A new index of metadata is created and replaces the previous index every time this command is used.

For more information about the Tableau Catalog, see, [About Tableau Catalogue](#).

### Synopsis

```
tsm maintenance metadata-services enable
```

### Option

--ignore-prompt

Optional.

Dismiss the confirmation prompt when enabling the Metadata API.

## tsm maintenance metadata-services get-status

**Version:** Command added in version 2019.3.

Use the `tsm maintenance metadata-services get-status` command to get status information on Metadata Services.

Status on Metadata Services indicates if the Metadata API Store has been initialised or if the Tableau Metadata API is running or not.

## Synopsis

```
tsm maintenance metadata-services get-status
```

## tsm maintenance preflight-check permissions

**Version:** Command added for Tableau Server on Windows in version 2020.3.

Use the `tsm maintenance preflight-check permissions` command to verify the directory permissions.

## Synopsis

```
tsm maintenance preflight-check permissions [options]  
[global options]
```

## Option

`-d, --data-dir <data directory>`

Optional.

Specifies the data directory on which to verify permissions. If not included, the data directory is determined based on the current Tableau Server configuration.

`-i, --install-dir <install directory>`

Optional.

Specifies the install directory on which to verify permissions. If not included, the install directory is determined based on the current Tableau Server configuration.

`-n --nodes <nodeID,nodeID,...>`

Optional.

Node IDs of nodes to specifically include in the permissions check. If not specified, the check is performed on all nodes in the cluster.

## Tableau Server on Windows Help

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

```
-ru --runas-user <timeout in seconds>
```

Optional.

The Run As user name to verify permissions for. If not provided, the Run As user is determined from the current configuration.

## tsm maintenance preflight-check ports

**Version:** Command added for Tableau Server on Windows in version 2020.3.

Use the `tsm maintenance preflight-check ports` command to verify that ports are available for all currently installed services. Specify a service and port to verify the port is available for that service, even if the service is not currently installed.

### Synopsis

```
tsm maintenance preflight-check ports [options] [global options]
```

### Option

```
-a, --tabadminagent-addresses <hostname:port>
```

Optional.

Specifies the host and port on which to check for access to the Administration Agent. Addresses are formatted as `hostname:port`. Separate multiple addresses by commas if more than one is being checked. Use this option to see if a port is available before installing or changing ports.

```
-g, --gateway-addresses <hostname:port>
```

Optional.

Specifies the host and port on which to check for access for the Gateway service. Addresses are formatted as `hostname:port`. Separate multiple addresses by commas if more than one is being checked. Use this option to see if a port is available before installing or changing ports.

`-n --nodes <nodeID,nodeID,...>`

Optional.

Node IDs of nodes to run preflight check on. If not specified, the checks are performed on all nodes in the cluster.

`-r, --repository-addresses <hostname:port>`

Optional.

Specifies the host and port on which to check for access for the Repository service. Addresses are formatted as `hostname:port`. Separate multiple addresses by commas if more than one is being checked. Use this option to see if a port is available before installing or changing ports.

`-re --remote`

Optional.

Checks remote access to the Administration Agent from all nodes. This is not done by default.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish.

`-t, --tabadmincontroller-addresses <hostname:port>`

Optional.



Specifies the host and port on which to check for access for the Administration Controller. Addresses are formatted as `hostname:port`. Separate multiple addresses by commas if more than one is being checked. Use this option to see if a port is available before installing or changing ports.

## **tsm maintenance reindex-search**

Use the `tsm maintenance reindex-search` command to rebuild the search index.

### **Synopsis**

```
tsm maintenance reindex-search [options] [global options]
```

### **Option**

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## **tsm maintenance reset-searchserver**

**Version:** This command was retired (removed) in 2023.3.0 when Search and Browse (also called Search Server) was retired. Search and Browse has been replaced by Index and Search Server.

**Note:** Running this command on version 2023.3.0 or later will not do anything.

Resets the search server to a clean state, deleting search information and rebuilding the search index.

### **Synopsis**

```
tsm maintenance reset-searchserver [options] [global options]
```

## Option

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

**tsm maintenance restore**

Restore Tableau Server using the specified backup file. Restoring a backup file does not restore any configuration data. See [Perform a Full Backup and Restore of Tableau Server](#).

You can only restore from a backup that has the same type of identity store as the running server. For example, a backup from a server using local authentication can be restored to a Tableau Server initialised with local authentication, but a backup from a server using Active Directory authentication cannot be restored to a server initialised with local authentication.

Beginning with version 2022.3, backups created using tabadmin ("pre-TSM backups") are not supported. You cannot restore a pre-TSM backup to Tableau Server version 2022.3 or later.

## Synopsis

```
tsm maintenance restore --file <file_name> [--restart-server]
[global options]
```

## Options

```
-f, --file <file_name>
```

Required.

Specifies the backup file to restore from.

The `restore` command expects a backup file in the directory defined in the TSM `basefilepath.backuprestore` variable. By default:

## Tableau Server on Windows Help

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\
```

For more information about file paths and how to change them, see [tsm File Paths](#).

`-ak, --asset-key-file <file_name>`

Optional. Deprecated in version 2021.4.0.

Specify this option only if you are restoring from assets that were created by `tabadmin` on Tableau Server (versions 2018.1 and earlier).

Name of asset key file to restore from. The asset key file is created by the `tabadmin assetkeys` command. The file must be in the predefined backup/restore location on the server.

`-k, --skip-identity-store-verification`

Optional. Specify this option only if you are restoring from a backup file that was created by `tabadmin` on Tableau Server (versions 2018.1 and earlier).

Do not use this key in an attempt to change identity store type from Tableau Server that created original backup file. To change the identity store, see [Changing the Identity Store](#).

`-po, --pg-only`

Optional.

Restores only the repository.

`-r, --restart-server`

Optional.

Restart the server after the restore.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance send-logs

Upload the specified file to Tableau and associate it with a support case. To successfully upload files to Tableau, your Tableau Server must be able to communicate with the send-logs server at <https://report-issue.tableau.com>.

### Synopsis

```
tsm maintenance send-logs --case <case_number> --email <contact_email> --file <path/to/file> [global options]
```

### Options

```
-c, --case <case_number>
```

Required.

Support case number.

```
-e, --email <contact_email>
```

Required.

Contact email.

```
-f, --file <path/to/file>
```

Required.

Specifies the location and name of the log file archive to send.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance snapshot-backup complete

**Version:** Command added in version 2020.1 and only available when Tableau Server is configured for External File Store.

Complete the snapshot backup process on Tableau Server. Run this after you have taken a snapshot backup of your external storage.

The *tsm maintenance snapshot-backup prepare* and the *tsm maintenance snapshot-backup complete* commands are used to create a backup of Tableau Server data for Tableau Server installations that are configured with External File Store. For more information, see [Backup and Restore with External File Store](#)

### Synopsis

```
tsm maintenance snapshot-backup complete [options] [global options]
```

### Options

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance snapshot-backup prepare

**Version:** Command added in version 2020.1 and only available when Tableau Server is configured for External File Store.

Prepares for snapshot backup. Once the preparation step is complete, you may take a snapshot backup of your network storage.

The `tsm maintenance snapshot-backup prepare` and the `tsm maintenance snapshot-backup complete` commands are used to create a backup of Tableau Server data for Tableau Server installations that are configured with External File Store. For more information, see [Backup and Restore with External File Store](#)

### Synopsis

```
tsm maintenance snapshot-backup prepare [options] [global options]
```

### Options

```
--include-pg-backup
```

Optional. Added in version 2021.1. Prior versions always included a backup of the External Repository.

Optional.

A backup of the Repository is made and copied to the network share. This is only applicable to deployments where both External Repository and External File Store are configured. For more information, see [Backup and Restore with External File Store](#).

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

### `tsm maintenance snapshot-backup restore`

**Version:** Command added in version 2020.1 and only available when Tableau Server is configured for External File Store.

Restores the repository backup from the storage snapshot to Tableau Server.

For more information, see [Backup and Restore with External File Store](#).

### Synopsis

```
tsm maintenance snapshot-backup restore [options] [global options]
```

### Options

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance validate-backup-basefilepath

**Version:** Command added in version 2022.1.

Validate that the backup/restore base file path location has correct permissions to allow backup and restore functions to work properly. Run this after setting the basefilepath for backup and restore. For more information, see [Change the current file location](#).

### Synopsis

```
tsm maintenance validate-backup-basefilepath [options]  
[global options]
```

### Options

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance validate-resources

Validate workbooks and data sources for a site. Use this command before migrating a site, to detect issues with site resources such as workbooks and data sources that will cause a site import to fail. Some resource problems can be corrected by republishing from local sources. Other problems might require assistance from Tableau Support.

## Synopsis

```
tsm maintenance validate-resources --site-id <site ID>  
[global options]
```

## Options

```
-id, --site-id <site ID>
```

Required.

ID for the site whose resources you are validating.

```
-r, --repair
```

Optional.

Attempt to repair invalid resources. Those that cannot be repaired are noted in output.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish.

## tsm maintenance ziplogs

Use the `ziplogs` command to create an archive of Tableau Server log files.

## Synopsis

```
tsm maintenance ziplogs [options] [global options]
```

## Options

```
-a, --all
```

Optional.



## Tableau Server on Windows Help

Includes msinfo, netstat and latest dump. Equivalent of running the command with these options: `-mi -t -l`. Does not include PostgreSQL data.

`-d, --with-postgresql-data`

Optional.

Include the PostgreSQL data folder if Tableau Server is stopped or PostgreSQL dump files if Tableau Server is running. This flag is ignored for deployments running with a Tableau Server External Repository.

`--enddate "<mm/dd/yyyy H:mm>"`

Optional. Time option (H:mm) added in version 2021.4.0.

The last date of log files to be included. This option must be used with `--startdate` and cannot be used with `--minimumdate`. If this option is not specified, up to two days of logs will be included, starting at 00:00 GMT.

If you include the time option you must use quotes around date and time. The time option uses GMT. However, the resulting log files will be written using the local time zone of the Tableau Server machine.

Example: If the local time zone of the Tableau Server machine is PDT and you want the log files to begin at 7 a.m. PDT and end at 7 p.m. PDT on 28/07/2022, use the following:

```
tsm maintenance ziplogs -f logs.zip --startdate "07/28/2022
14:00" --enddate "07/29/2022 02:00"
```

`-f, --file <name>`

Optional.

Specify a name for the zipped archive file. If no name is provided the archive is created as `logs.zip`. The file is written to the directory defined in the TSM `basefilepath.log_archive` variable. By default:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\log-archives\
```

For more information about file paths and how to change them, see [tsm File Paths](#).

`-i, --description <string>`

Optional.

Include the specified description of the archive file.

`-l, --with-latest-dump`

Optional.

When any service crashes, Tableau Server generates a dumpfile. Set this option to include the most recent service crash dumpfile. If you do not set this option, then no dumpfile will be included in the resulting ziplog.

`-m, --minimumdate <mm/dd/yyyy>`

Optional.

Earliest date of log files to be included. If not specified, a maximum of two days of log files are included. Format of date should be "mm/dd/yyyy". This option cannot be used with `--startdate` and `--enddate` or `--all`.

`-mi, --with-msinfo`

Optional.

Include the msinfo32 report, with system information about OS, hardware, and running software.

`--nodes`

Optional. Added in version 2020.3.

## Tableau Server on Windows Help

Specify the nodes for which to create a ziplog file. If not specified, ziplog files are created for all nodes and saved to the initial node. Separate nodes with a comma. For example, to gather logs for nodes 2 and 4:

```
tsm maintenance ziplogs --nodes node2,node4
```

`-o, --overwrite`

Optional.

For an overwrite of an existing ziplog file. If a file of the same name already exists and this option is not used, the ziplogs command will fail.

By default the file is written to:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\log-archives\
```

For more information about file paths and how to change them, see [tsm File Paths](#).

`--request-timeout <seconds>`

Optional.

Number of seconds to wait for the command to finish. Default value is 7200 (120 minutes).

`--startdate "<mm/dd/yyyy H:mm>"`

Optional. Time option (H:mm) added in version 2021.4.0.

The last date of log files to be included. This option must be used with `--enddate` and cannot be used with `--minimumdate`. If this option is not specified, up to two days of logs will be included, starting at 00:00 GMT.

If you include the time option you must use quotes around date and time. The time option uses GMT. However, the resulting log files will be written using the local time zone of the Tableau Server machine.

Example: If the local time zone of the Tableau Server machine is PDT and you want the log files to begin at 7 a.m. PDT and end at 7 p.m. PDT on 28/07/2022, use the following:

```
tsm maintenance ziplogs -f logs.zip --startdate "07/28/2022
14:00" --enddate "07/29/2022 02:00"
```

`-t, --with-netstat-info`

Optional.

Include netstat information.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port 8850, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm pending-changes

Use the `tsm pending-changes` commands to apply, discard or view pending configuration and topology changes to Tableau Server.

Passwords and secrets that you enter during TSM configuration are encrypted after you save them. Secrets remain encrypted until, during and after you apply pending changes. For more information about secret storage, see [Manage Server Secrets](#).

- `tsm pending-changes apply`
- `tsm pending-changes discard`
- `tsm pending-changes list`

## tsm pending-changes apply

Use the `tsm pending-changes apply` command to apply pending configuration and topology changes to Tableau Server.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt.

### Synopsis

```
tsm pending-changes apply [global options]
```

### Options

`-iw, --ignore-warnings`

Optional.

Ignore warning level constraints.

`--ignore-prompt`

Optional.

Suppress the prompt for restart. This only suppresses the prompt. The restart behaviour is unchanged.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## tsm pending-changes discard

Use the `tsm pending-changes discard` command to discard pending configuration and topology changes to Tableau Server.

### Synopsis

```
tsm pending-changes discard [options] [global options]
```

### Options

```
--config-only
```

Optional.

Discard only pending configuration changes.

```
--topology-only
```

Optional.

Discard only pending topology changes.

## tsm pending-changes list

Lists pending configuration and topology changes to Tableau Server. Any changes that do not require a server restart will be listed as not requiring a restart. If none of the pending changes require a restart, a message displays saying the changes do not require a server restart. If any change in the list requires a restart, the entire list of pending changes will result in a restart. For more information on dynamic configuration or topology changes, see [Tableau Server Dynamic Topology Changes](#).

### Synopsis

```
tsm pending-changes list [options] [global options]
```

## Options

`--config-only`

Optional.

List only pending configuration changes.

`--topology-only`

Optional.

List only pending topology changes.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port 8850, and use the server name not the IP address. For example



## Tableau Server on Windows Help

`https://<tsm_hostname>:8850`. If no server is specified,  
`https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm register

You can use the `tsm register` command to register Tableau Server. This command lets you either display the registration file template (using the `--template` option) or provide the path to a completed registration file (using the `--file` option). You must use one of these two options when calling the `tsm register` command.

### Synopsis

```
tsm register --template | --file <registration-filename>  
[global options]
```

### Options

`--file <registration-filename>`

Required.

Path to the file that contains the registration data.

`--template`

Required.

Display registration filetemplate.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm reset

Use the `tsm reset` command to clear the initial admin user so that you can enter a new one. After you run `tsm reset` you must rerun the `tabcmd initialuser` command to create a new initial admin. The new name cannot be the same username as the previous admin user.

If your organisation is using Active Directory or LDAP for the Tableau identity store, the account and password you specify must match an account in the directory.

### Synopsis

```
tsm reset[option] [global options]
```

### Option

`-d, --delete-all-sessions`

Optional.

Delete all active user sessions when the server is reset.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm restart

You can use the `tsm restart` command to restart Tableau Server. The command stops the server if necessary, and then starts it.

### Synopsis

```
tsm restart [global options]
```

### Option

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

### Global options

```
-h, --help
```

Optional.

Show the command help.

```
-p, --password <password>
```

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm schedules

**Note:** These commands only apply to backup jobs scheduled using the `tsm maintenance backup` command. They do not apply to jobs run by the backgrounder (ex: extract refreshes, flows, subscriptions).

You can use the `tsm schedules` commands to manage scheduled backup jobs. To create a scheduled backup job, use the `tsm maintenance backup` command. For details, see [tsm maintenance backup](#). For more details on managing scheduled backups, see [Scheduling and Managing Backups](#).

- `tsm schedules delete`
- `tsm schedules list`
- `tsm schedules resume`
- `tsm schedules suspend`
- `tsm schedules update`

## `tsm schedules delete`

Delete the specified schedule.

### Synopsis

```
tsm schedules delete [-si <scheduleID> | -sn <scheduleName>]  
[global options]
```

### Options

`-si, --schedule-id <scheduleID>`

Required if `--schedule-name` is not used.

Id of the schedule to delete.

`-sn, --schedule-name <scheduleName>`

Required if `--schedule-id` is not used.

Name of the schedule to delete.

## `tsm schedules list`

List schedules on the server.

### Synopsis

```
tsm schedules list [--next-run | --schedule-id <scheduleID> | --  
schedule-name <scheduleName>] [global options]
```

## Options

`-nr, --next-run`

Optional.

Sort the schedules by their "next run" time, earliest to latest.

`-si, --schedule-id <scheduleID>`

Optional.

Id of the schedule to list the details of.

`-sn, --schedule-name <scheduleName>`

Optional.

Sort the schedules by their names, in alphabetical order.

## tsm schedules resume

Resume the specified suspended schedule.

### Synopsis

```
tsm schedules resume [-si <scheduleID> | -sn <scheduleName>]  
[global options]
```

## Options

`-si, --schedule-id <scheduleID>`

Required if `--schedule-name` is not used.

Id of the schedule to resume.



## Tableau Server on Windows Help

`-sn, --schedule-name <scheduleName>`

Required if `--schedule-id` is not used.

Name of the schedule to resume.

### **tsm schedules suspend**

Suspend the specified schedule.

#### Synopsis

```
tsm schedules suspend [-si <scheduleID> | -sn <scheduleName>]  
[global options]
```

#### Options

`-si, --schedule-id <scheduleID>`

Required if `--schedule-name` is not used.

Id of the schedule to suspend.

`-sn, --schedule-name <scheduleName>`

Required if `--schedule-id` is not used.

Name of the schedule to suspend.

### **tsm schedules update**

Update the specified schedule.

#### Synopsis

```
tsm schedules update[-si <scheduleID> -st <time_to_run> -sr <recur-  
rence_frequency> -sd <day-or-days>] [global options]
```

## Options

`-si, --schedule-id <scheduleID>`

Required.

Id of the schedule to update.

`-sr, --schedule-recurrence <frequency>`

Required.

Recurrence frequency of the schedule. Valid options are "daily", "weekly", or "monthly".

`-st, --schedule-time <HH:MM>`

Required.

The time a schedule should be run, in 24-hour format: HH:MM.

`-sd, --schedule-days <day[,day]>`

Optional.

Days on which to run the schedule. For weekly schedules, use 1-7 where 1 is Monday, and 7 is Sunday. For monthly schedules, use 1-31. If a day doesn't exist for a specific month (30 for February, for example) the last valid day of the month is used. Separate multiple values with commas.

## Global options

`-h, --help`

Optional.

Show the command help.

## Tableau Server on Windows Help

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm security

Use the `tsm security` commands to configure Tableau Server support for external (gateway) SSL or repository (Postgres) SSL. Repository SSL configuration includes the option to

enable SSL over direct connections from Tableau clients – including Tableau Desktop, Tableau Mobile, and web browsers – to the repository.

- [tsm security authorise-credential-migration](#)
- [tsm security cancel-credential-migrations](#)
- `tsm security custom-cert`
  - `tsm security custom-cert add`
  - `tsm security custom-cert delete`
  - `tsm security custom-cert list`
- `tsm security custom-indexandsearch-ssl`
  - `tsm security custom-indexandsearch-ssl add`
  - `tsm security custom-indexandsearch-ssl list`
- `tsm security custom-tsm-ssl`
  - `tsm security custom-tsm-ssl disable`
  - `tsm security custom-tsm-ssl enable`
  - `tsm security custom-tsm-ssl list`
- `tsm security external-ssl`
  - `tsm security external-ssl disable`
  - `tsm security external-ssl enable`
  - `tsm security external-ssl list`
- `tsm security kms`
  - `tsm security kms set-mode aws`
  - `tsm security kms set-mode azure`
  - `tsm security kms set-mode local`
  - `tsm security kms status`
- `tsm security maestro-rserve-ssl`
  - `tsm security maestro-rserve-ssl disable`
  - `tsm security maestro-rserve-ssl enable`
- `tsm security maestro-tabpy-ssl`
  - `tsm security maestro-tabpy-ssl disable`
  - `tsm security maestro-tabpy-ssl enable`
- `tsm security regenerate-internal-tokens`
- `tsm security repository-ssl`
  - `tsm security repository-ssl disable`
  - `tsm security repository-ssl enable`

- `tsm security repository-ssl get-certificate-file`
- `tsm security repository-ssl list`
- `tsm security rotate-coordination-service-secrets`
- As of the 2020.2 release, to configure Rserve and TabPy analytics extensions, use the Tableau Server admin pages. See [Configure Connections with Analytics Extensions](#).

## Prerequisites

Before you configure SSL, you must acquire certificates, and then copy them to the computer that runs the Tableau Server gateway process. Additional preparation is required for enabling direct connections from clients. To learn more, see the following articles:

[Configure SSL for External HTTP Traffic to and from Tableau Server](#)

[Configure SSL for Internal Postgres Communication](#)

For information about mutual (two-way) SSL, see [Configure Mutual SSL Authentication and `tsm authentication mutual-ssl` commands](#).

## `tsm security authorise-credential-migration`

Authorises a Tableau user to migrate embedded credentials from a Tableau Server installation to a Tableau Cloud site using Content Migration Tool. Both Tableau Server and Tableau Cloud must have an Advanced Management licence to migrate content. For more information, see [Migrate Workbooks and Data Sources with Embedded Credentials](#).

You can cancel authorization using the `tsm security cancel-credential-migrations` command.

### Synopsis

```
tsm security authorize-credential-migration --source-site-url-namespace <Tableau Server site ID> --destination-site-url-namespace
```

```
<Tableau Cloud site ID> --destination-server-url <Tableau Cloud  
site url> --authorized-migration-runner <username> --destination-  
public-encryption-key <public key>
```

## Options

`--source-site-url-namespace`

Required. Site ID of the Tableau Server site. The site ID is used in the URL to uniquely identify the site.

For example, a site named West Coast Sales might have a site ID of west-coast-sales.

`--destination-site-url-namespace`

Required. Site ID of the Tableau Cloud site. The site ID is used in the URL to uniquely identify the site.

`--destination-server-url`

Required. URL of the pod that your Tableau Cloud site is deployed to. The URL you specify must include a trailing slash (/).

Your pod is shown in the first portion of the site URL after signing in to Tableau Cloud. For example, `https://10az.online.tableau.com/` is the United States - West (10AZ) pod. For more information about pods, see the [Tableau Trust](#) page.

`--authorised-migration-runner`

Required. Username of the Tableau Server user authorised to migrate embedded credentials.

`--destination-public-encryption-key`

Required. Specify the public key generated on the Tableau Cloud site.

`--expiration-time-in-days`

Optional. Number of days before authorisation expires. Default value is 7 days.

### Example

The following example authorizes user “admin” to migrate workbooks and published data sources with embedded credentials from Tableau Server site “ExampleA” to Tableau Cloud site “ExampleB”. The authorisation will expire in 9 days.

```
tsm security authorize-credential-migration --source-site-url-namespace ExampleA --destination-site-url-namespace ExampleB --destinationServerUrl https://10ay.online.tableau.com/ --authorized-migration-runner admin --destination-public-encryption-key <public key> --expiration-time-in-days 9
```

## tsm security cancel-credential-migrations

Cancels granted authorisations for migrating embedded credentials using Content Migration Tool. For more information, see [Migrating Workbooks and Data Sources with Embedded Credentials](#).

### Synopsis

```
tsm security cancel-credential-migrations --source-site-url-namespace <Tableau Server site ID>
```

### Options

`--source-site-url-namespace`

Required. Site ID of the Tableau Server site. The site ID is used in the URL to uniquely identify the site.

For example, a site named West Coast Sales might have a site ID of west-coast-sales.

## tsm security custom-cert add

Adds a custom CA certificate to Tableau Server. This certificate is optionally used to establish trust for TLS communication between a SMTP server and Tableau Server.

If a custom certificate already exists, this command will fail. You can remove the existing custom certificate using the `tsm security custom-cert delete` command.

**Note:** The certificate that you add with this command may be used by other Tableau Server services for TLS connections.

As part of your disaster recovery plan, we recommend keeping a backup of the certificate file in a safe location off of the Tableau Server. The certificate file that you add to Tableau Server will be stored and distributed to other nodes by the Client File Service. However, the file is not stored in a recoverable format. See Tableau Server Client File Service.

### Synopsis

```
tsm security custom-cert add --cert-file <file.crt>  
[global options]
```

### Options

`-c, --cert-file <file.crt>`

Required. Specify the name of a certificate file in valid PEM or DER format.

## tsm security custom-cert delete

Removes the server's existing custom certificate. Doing this allows you to add a new custom certificate.

### Synopsis

```
tsm security custom-cert delete[global options]
```



## tsm security custom-cert list

List details of custom certificate.

### Synopsis

```
tsm security custom-cert list[global options]
```

## tsm security custom-indexandsearch-ssl add

Add custom certificates for Index and Search Server for Tableau Server 2023.1 and newer. The SSL implementation is based on Opensearch.org TLS implementation. See [Configuring TLS certificates](#) for more information.

```
--admin <file.crt>
```

Required.

Admin certificate file. Specify the path to a valid PEM-encoded x509 certificate with the extension .crt.

```
--admin-key <file.key>
```

Required.

Specify the path to a valid RSA or DSA private key file (PKXA #8), with the extension .key by convention.

```
-- ca <file.crt>
```

Required.

Trusted CA file. Specify the path to a valid PEM-encoded x509 certificate with the extension .crt.

```
--node <file.crt>
```

Required.

Node certificate file. Specify the path to a valid PEM-encoded x509 certificate with the extension .crt. This command will distribute this certificate to each node in the cluster. Use a wild card certificate to allow the full array of node Distinguished Names (DNs) in a single certificate.

```
-- node-key <file.key>
```

Required.

Specify the path to a valid RSA or DSA private key file (PKXA #8), with the extension .key by convention.

### Synopsis

```
tsm security custom-indexandsearch-ssl add --node <file.crt> --
admin <file.crt> --node-key <file.key> --admin-key <file.key> --ca
<file.crt> [parameters] [global options]
```

### tsm security custom-indexandsearch-ssl list

List details of Index and Search Server SSL custom certificate configuration.

### Synopsis

```
tsm security custom-indexandsearch-ssl list[global options]
```

### tsm security custom-tsm-ssl disable

Disable the custom SSL certificate for connections to TSM Controller. Revert back to an automatically-managed, self-signed certificate.

### Synopsis

```
tsm security custom-tsm-ssl disable [global options]
```

### tsm security custom-tsm-ssl enable

Enable the custom SSL certificate for connections to TSM Controller for Tableau Server 2023.1 and newer. If you have already enabled SSL and need to update an expired certificate, use this command.

```
-cf,--cert-file <file.crt>
```

Required.

Specify the path to a valid PEM-encoded x509 certificate with the extension .crt. The subject name on certificate must match host name or IP address of the Tableau computer where the Administration Controller is running. By default, the Administration Controller runs on the initial node of a Tableau Server deployment.

`-kf, --key-file <file.key>`

Required.

Specify the path to valid RSA or DSA private key file (PKXA #8), with the extension .key by convention. This key cannot be passphrase-protected.

`--chain-file <file.crt>`

Optional.

Specify the path to a certificate chain file (.crt)

The chain file is a concatenation of all the certificates that form the certificate chain for the server certificate.

All certificates in the file must be x509 PEM-encoded and the file must have a .crt extension (not .pem).

`--skip-validation`

Optional

Pass this option to skip certificate authority root verification.

### Synopsis

```
tsm security custom-tsm-ssl enable --key-file <file.key> --cert-file  
<file.crt> [global options]
```

### **tsm security custom-tsm-ssl list**

List details of TSM custom certificate configuration.

## Synopsis

```
tsm security custom-tsm-ssl list[global options]
```

## tsm security external-ssl disable

Removes the server's existing SSL configuration settings and stops encrypting traffic between external clients and the server.

## Synopsis

```
tsm security external-ssl disable [global options]
```

## tsm security external-ssl enable

Enable and specify certificate and key files for SSL over external HTTP communication.

## Synopsis

```
tsm security external-ssl enable --cert-file <file.crt> --key-  
file <file.key> [options] [global options]
```

## Options

`--cert-file <file.crt>`

Required. Specify the name of a valid PEM-encoded x509 certificate with the extension .crt.

`--key-file <file.key>`

Required. Specify a valid RSA or DSA private key file, with the extension .key by convention.

`--chain-file <chainfile.crt>`

Specify the certificate chain file (.crt)

A certificate chain file is required for Tableau Desktop on the Mac. In some cases, a certificate chain file may be required for Tableau Mobile.

Some certificate providers issue two certificates for Apache. The second certificate is a chain file, which is a concatenation of all the certificates that form the certificate chain for the server certificate.

All certificates in the file must be x509 PEM-encoded and the file must have a .crt extension (not .pem).

### `--passphrase`

Optional. Passphrase for the certificate file. The passphrase you enter will be encrypted while at rest.

**Note:** If you create a certificate key file with a passphrase, you cannot reuse the SSL certificate key for SAML.

### `--protocols <list protocols>`

Optional. List the Transport Layer Security (TLS) protocol versions you want to allow or disallow.

TLS is an improved version of SSL. Tableau Server uses TLS to authenticate and encrypt connections. Accepted values include protocol versions supported by Apache. To disallow a protocol, prepend the protocol version with a minus (-) character.

Default setting: "all, -SSLv2, -SSLv3"

This default explicitly does not allow clients to use SSL v2 or SSL v3 protocols to connect to Tableau Server. However, we recommend that you also disallow TLS v1 and TLS v1.1.

Before you deny a specific version of TLS, verify that the browsers from which your users connect to Tableau Server support TLS v1.2. You might need to preserve support for TLSv1.1 until browsers are updated.

If you do not need to support TLS v1 or v1.1, use the following command to allow TLS v1.2 (using the value `all`), and explicitly deny SSL v2, SSL v3, TLS v1, and TLS v1.1.

```
tsm security external-ssl enable --cert-file file.crt --key-file file.key --protocols "all -SSLv2 -SSLv3 -TLSv1 -TLSv1.1"
```

## **tsm security external-ssl list**

Displays a list of settings related to the configuration of gateway external SSL. The list includes the names of the certificate files in use, but not their location.

### **Synopsis**

```
tsm security external-ssl list [global options]
```

## **tsm security kms set-mode aws**

Set the KMS mode to AWS.

You will need the full ARN string from AWS KMS. This string is in the "General configuration" section of the AWS KMS management pages. The ARN is presented in this format:

`arn:aws:kms:<region>:<account>:key/<CMK_ID>`, for example, `arn:aws:kms:us-west-2:867530990073:key/1abc23de-fg45-6hij-7k89-110mn1234567`.

For more information, see [AWS Key Management System](#).

### **Synopsis**

```
tsm security kms set-mode aws --key-arn "<arn>" --aws-region "<region>" [global options]
```

### **Options**

`--key-arn`

Required. The `--key-arn` option takes a direct string copy from the ARN in the "General configuration" section of the AWS KMS management pages.

`--aws-region`

Required. Specify a region as shown in the Region column in the [Amazon API Gateway table](#).

### Example

For example, if your AWS KMS instance is running in `us-west-2` region, your account number is `867530990073`, and your CMK key is `1abc23de-fg45-6hij-7k89-110mn1234567`, then the command would be:

```
tsm security kms set-mode aws --aws-region "us-west-2" --key-arn
"arn:aws:kms:us-west-2:867530990073:key/1abc23de-fg45-6hij-7k89-
110mn1234567"
```

### `tsm security kms set-mode azure`

Set the KMS mode to Azure Key Vault.

**Note:** The KMS mode will display as "Azure Key Vault" when you run `tsm security kms status`, but you set it as "azure".

You will need the name of the Azure key vault and the name of the key in Azure.

For more information, see [Azure Key Vault](#).

### Synopsis

```
tsm security kms set-mode azure --key-name "<key_name>" --vault-name
"<vault_name>" [global options]
```

### Options

`--key-name`

Required. The name of the asymmetric key stored in the Azure Key Vault.

--vault-name

Required. Name of the Azure Key Vault.

### Example

For example, if your Azure Key Vault is named `tabsrv-keyvault` and your key is `tabsrv-sandbox-key01`, then the command would be:

```
tsm security kms set-mode azure --key-name "tabsrv-sandbox-key01" -
-vault-name "tabsrv-keyvault"
```

## tsm security kms set-mode local

Set or reset the KMS mode to local. Local is the default KMS mode. For more information, see [Tableau Server Key Management System](#).

### Synopsis

```
tsm security kms set-mode local [global options]
```

## tsm security kms status

View the status of KMS configuration. The status returned includes:

- Status: OK indicates that the KMS is accessible by Tableau, or by the controller node if a multi-node installation.
- Mode: Local, AWS or Azure Key Vault. Indicates what KMS mode is being used.
- Encrypt and decrypt master encryption key:

KMS stores a collection of master extract keys (MEKs). Each MEK has:

- An ID, for example, `8ddd70df-be67-4dbf-9c35-1f0aa2421521`
- Either a “encrypt or decrypt key” or “decrypt-only key” status. If a key is “encrypt or decrypt”, Tableau Server will encrypt new data with it. Otherwise, the key will only be used for decryption
- A creation timestamp, for example, “Created at: 2019-05-29T23:46:54Z.”



- First transition to encrypt and decrypt: a timestamp indicating when the key became an encrypt or decrypt key.
- Transition to decrypt-only: a timestamp indicating when the key transitioned to decrypt-only.

Other values returned depend on the KMS mode.

When the KMS mode is AWS, the following is returned:

- The ARN (ID) of the customer master key (CMK) .
- The region the CMK is in.
- The ID of the root master key (RMK) in use. The RMK is a key that is encrypted by the CMK. Tableau Server decrypts the CMK by making calls to AWS KMS. The RMK is then used to encrypt/decrypt the master extract key (MEK). The RMK can change, but there will be only one at a time.

When the KMS mode is Azure Key Vault, the following is returned:

- Vault name: The name of the Azure key vault.
- Azure Key Vault key name: The name of the key in the vault.

## Synopsis

```
tsm security kms status [global options]
```

## tsm security maestro-rserve-ssl disable

Disable the Rserve connection.

For more information, see [Use R \(Rserve\) scripts in your flow](#).

## tsm security maestro-rserve-ssl enable

Configure a connection between an Rserve server and Tableau Server version 2019.3 or later.

For more information, see [Use R \(Rserve\) scripts in your flow](#).

## Synopsis

```
tsm security maestro-rserve-ssl enable --connection-type <maestro-
rserve-secure | maestro-rserve> --rserve-host <Rserve IP address or
host name> --rserve-port <Rserve port> --rserve-username <Rserve
username> --rserve-password <Rserve password> --rserve-connect-
timeout-ms <Rserve connect timeout>
```

## Options

--connection-type

**Select** `maestro-rserve-secure` **to enable a secure connection or** `maestro-rserve` **to enable an unsecured connection. If you select** `maestro-rserve-secure`, **specify the certificate file path in the command line.**

--rserve-host

**Host**

--rserve-port

**Port**

--rserve-username

**Username**

--rserve-password

**Password**

--rserve-connect-timeout-ms

**The connect timeout in milliseconds. For example** `--rserve-connect-timeout-ms 900000`.

## tsm security maestro-tabpy-ssl disable

Disable the TabPy connection.

For more information, see [Use Python scripts in your flow](#).

## tsm security maestro-tabpy-ssl enable

Configure a connection between a TabPy server and Tableau Server version 2019.3 or later.

For more information, see [Use Python scripts in your flow](#).

### Synopsis

```
tsm security maestro-tabpy-ssl enable --connection-type <maestro-  
tabpy-secure | maestro-tabpy> --tabpy-host <TabPy IP address or host  
name> --tabpy-port <TabPy port> --tabpy-username <TabPy username> --  
tabpy-password <TabPy password> --tabpy-connect-timeout-ms <TabPy  
connect timeout>
```

### Options

`--connection-type`

Select `maestro-tabpy-secure` to enable a secure connection or `maestro-tabpy` to enable an unsecured connection. If you select `maestro-tabpy-secure`, specify the certificate file `-cf<certificate file path>` in the command line.

`--tabpy-host`

Host

`--tabpy-port`

Port

`--tabpy-username`

Username

`--tabpy-password`

Password

`--tabpy-connect-timeout-ms`

The connect timeout in milliseconds. For example `--tabpy-connect-timeout-ms 900000`.

## **tsm security regenerate-internal-tokens**

This command performs the following operations:

1. Stops Tableau Server if it is running.
2. Generates new internal SSL certificates for Postgres repository the search server.
3. Generates new passwords for all of the internally managed passwords.
4. Updates all Postgres repository passwords.
5. Generates a new encryption key for asset key management and encrypts the asset key data with the new key.
6. Generates a new encryption key for configuration secrets (master key) and encrypts the configuration with it.
7. Reconfigures and updates Tableau Server with all of these secrets. In a distributed deployment, this command also distributes the reconfiguration and updates across all nodes in the cluster.
8. Regenerates a new master key, adds it to the master keystore file, and then creates new security tokens for internal use.
9. Starts Tableau Server.

If you plan to add a node to your cluster after you have run this command, then you will need to generate a new node configuration file to update the tokens, keys, and secrets that are generated by this command. See [Install and Configure Additional Nodes](#).

For more information about internal passwords see [Manage Server Secrets](#).

### Synopsis

```
tsm security regenerate-internal-tokens [options] [global options]
```

### Options

```
--ignore-prompt
```

Optional.

Perform a restart (if necessary) without prompting. This option only suppresses the prompt. The restart behaviour is unchanged.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## tsm security repository-ssl disable

Stop encrypting traffic between the repository and other server components, and stop support for direct connections from Tableau clients.

### Synopsis

```
tsm security repository-ssl disable [global-options]
```

## tsm security repository-ssl enable

When the repository is local, it enables SSL and generates the server's .crt and .key files used for encrypted traffic between the Postgres repository and other server components.

Starting in version 2021.4, when using an external repository, imports the server's .crt and 'key files used to encrypt traffic between external PostgreSQL repository and Tableau Server components.

Enabling this also gives you the option to enable SSL over direct connections from Tableau clients to the server.

### Synopsis

```
tsm security repository-ssl enable [options] [global options]
```

### Options

`-i, --internal-only`

Optional. This option only applies when the repository is local to Tableau Server and is not configured externally to Tableau Server. This option should not be used for Tableau Server configured with External Repository.

When set to `--internal-only`, Tableau Server uses SSL between the repository and other server components, and it supports but does not require SSL for direct connections through **tableau** or **readonly** users.

If this option is not set, Tableau Server requires SSL for traffic between the repository and other server components, as well as for direct connections from Tableau clients (for connections through the **tableau** or **readonly** users).

When you specify this option, you must also complete the steps described in [Configure Postgres SSL to Allow Direct Connections from Clients](#).

`-c, --certificate`

Optional. Added in version 2021.4. This option is only applicable to Tableau Server configured with External Repository and can be used to enable or disable SSL connections post installation.

This option allows you to enable the use of SSL/TSL connections between Tableau Server and the External Repository. When using this option, provide the full path to the

SSL certificate file including the file name for the External Repository. This file is the same as the one used when enabling the external repository.

## tsm security repository-ssl get-certificate-file

Get the public certificate file used for SSL communication with the Tableau repository. SSL must be enabled for repository communication before you can retrieve a certificate. The certificate file is distributed automatically to internal clients of the repository in the Tableau Server cluster. To enable remote clients to connect over SSL to the repository, you must copy the public certificate file to each client.

This command works only for Tableau Server that uses a local Repository and will result in an error when Tableau Server is configured with an External Repository.

### Synopsis

```
tsm security repository-ssl get-certificate-file [global-options]
```

### Options

`-f, --file`

Required.

Full path and file name (with .cert extension) where the certificate file should be saved. If a duplicate file exists it will be overwritten.

## tsm security repository-ssl list

Returns the existing repository (Postgres) SSL configuration.

### Synopsis

```
tsm security repository-ssl list [global-options]
```

## tsm security rotate-coordination-service-secrets

**Version:** Added in version 2022.1

Generates new certificates, keys and trust stores used by the Coordination Service for secure connections.

## Synopsis

```
tsm security rotate-coordination-service-secrets [options]  
[global options]
```

## Options

```
--coord-svc-restart-timeout <seconds>
```

Optional.

Wait the specified number of seconds for Coordination Service to restart. Default: 1200 (20 minutes).

```
--ignore-prompt
```

Optional.

Perform a restart (if necessary) without prompting.

```
--request-timeout <seconds>
```

Optional.

Wait the specified number of seconds for the command to finish. Default: 1800 (30 minutes).

## Global options

```
-h, --help
```

Optional.

Show the command help.



## Tableau Server on Windows Help

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm settings

You can use the `tsm settings` commands to export (get) and import (set) configuration values.

- tsm settings clone
- tsm settings export
- tsm settings import

**Important:** The server configuration file referenced in this topic includes a copy of the master keystore file used for encrypting configuration secrets. We strongly recommend that you take additional measures to secure the node configuration file, using mechanisms as described in [Securing secrets for import and export operations](#).

## tsm settings clone

Create a "clone payload" that consists of the Tableau Server installation's configuration and topology (including external services and ports). This payload can be used to recreate an exact copy of the Server installation. This command is designed to work best with a Server installation that includes an external repository and external filestore. For details on using the clone payload to create a copy of an installation, see [Clone Tableau Server](#).

### Synopsis

```
tsm settings clone --output-directory <output-directory>  
[global options]
```

### Options

`-d, --output-directory <output-directory>`

Required.

Specifies the location to which the clone payload will be written.

## tsm settings export

Export the current server configuration and topology to a file.

## Tableau Server on Windows Help

The following files are not exported or imported with the `tsm settings import` or `tsm settings export` commands. You must manage these files manually:

- SAML certificate file
- SAML key file
- SAML IdP metadata file
- OpenID.static.file
- Kerberos.keytab file
- LDAP Kerberos keytab file
- LDAP Kerberos conf file
- Mutual SSL certificate file
- Mutual SSL revocation file
- Customisation header logo file
- Customisation sign-in logo file
- Customisation compact logo file

### Synopsis

```
tsm settings export --output-config-file <path/to/output_file.json>
[global options]
```

### Options

`-f, --output-config-file <file>`

Required.

Specifies the location and name of the file created by this operation.

## tsm settings import

Import server configuration or topology.

The following files are not exported or imported with the `tsm settings export` or `tsm settings import` commands. You must manage these files manually:

- SAML certificate file
- SAML key file
- SAML IdP metadata file

- OpenID.static.file
- Kerberos.keytab file
- LDAP Kerberos keytab file
- LDAP Kerberos conf file
- Mutual SSL certificate file
- Mutual SSL revocation file
- Customisation header logo file
- Customisation sign-in logo file
- Customisation compact logo file

### Synopsis

```
tsm settings import --import-config-file <path/to/import_file.json>
[global options]
```

### Options

```
-f, --import-config-file <FILE>
```

Required.

Path to input file.

```
--config-only
```

Optional.

```
--topology-only
```

Optional.

```
-frc, --force-keys
```

Optional.

Force a key to be added to configuration even if it did not previously exist.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm sites

You can use the `tsm sites` commands to export an existing site for import to a new site (also referred to as site migration), and to import the new site. An `unlock` command is available in case an error leaves a site locked.

The `tsm sites` commands will use your local file store to hold the export and import data. If you are running a multinode Tableau cluster, then you must run the `tsm sites` commands on a Tableau Server that is running the Data Engine process. For information about the Data Engine process and the processes that require it, see [Tableau Server Processes](#).

**Note:** When migrating sites between instances of Tableau Server, the target site must be on a version of Tableau Server that is the equal to or later than the version of Tableau Server for the source site. Both the source and target sites must be from supported versions of Tableau Server.

For comprehensive steps for migrating a site, see [Export or Import a Site](#).

- `tsm sites export`
- `tsm sites import`
- `tsm sites import-verified`
- `tsm sites unlock`

## tsm sites export

Export a specified Tableau Server site to a .zip file. You can export a site to archive its settings at a specific point in time, or to complete the first step of a site migration process.

**Note:** The `tsm sites import` and `tsm sites export` commands can leave a site in a locked state if an error occurs. To unlock a site, use the `tsm sites unlock` command.

## Synopsis

```
tsm sites export --site-id <source-siteID> --file <export-file>
[options] [global options]
```

## Options

`-f, --file <export-file>`

Required.

Specify the name of the file to which Tableau Server saves all of the site's information.

This file is generated to the directory defined in the TSM `basefilepath.site_export.exports` variable. By default:

```
C:\ProgramData\Tableau\Tableau Server-
\data\tabsvc\files\siteexports
```

For more information about file paths and how to change them, see [tsm File Paths](#).

`-id, --site-id <source-siteID>`

Required.

The site ID for the site you are exporting. You can get the site ID from the URL when you're signed in to the site from a web browser. For information about locating the site ID, see [Prepare the Source and Target Sites](#).

`-ow, --overwrite`

Optional.

Overwrite an export file of the same name that already exists.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 43200 (720 minutes).

## tsm sites import

This command uses the .zip file you created using `tsm sites export` to generate a set of .csv files that show how the exported source site settings will map to the new target site.

By default, the .zip file is generated and saved to the `siteexports` directory at:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\siteexports
```

Before you use this command, you must copy the .zip file to the directory in which Tableau will expect it. This location is defined in the TSM `basefilepath.site_import.exports` variable. By default, the import directory is:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\siteimports
```

For more information about file paths and how to change them, see [tsm File Paths](#).

**Note:** The `tsm sites import` and `tsm sites export` commands can leave a site in a locked state if an error occurs. To unlock a site, use the `tsm sites unlock` command.

## Synopsis

```
tsm sites import --file <export-file.zip> --site-id <target-siteID>
[options] [global options]
```



## Options

`-f, --file <export-file.zip>`

Required.

Name of the .zip file created by the `tsm sites export` process, and which you must copy to the import directory. By default:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteimports
```

`-id, --site-id <target-siteID>`

Required.

The site ID for the new site you are importing to (the target site). For information about locating the site ID, see [Prepare the Source and Target Sites](#).

`-c, --continue-on-ignorable-errors`

Optional.

Continue site import if errors occur which can be ignored. These errors can indicate issues with the import of a specific workbook or data source.

`-k, --no-verify`

Optional.

Skip verification of mapping files.

`-m, --override-schedule-mapper <mapping-file.csv>`

Optional.

Schedule mapping file to override the normal mapping by name.

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 7200 (120 minutes).

## tsm sites import-verified

Specify the directory that contains an exported site's .csv mapping files, to import to a new site. This is the final step of a site migration process.

### Synopsis

```
tsm sites import-verified --import-job-dir <importjob-directory> --
site-id <target-siteID> [options] [global options]
```

### Options

```
-id, --site-id <target-siteID>
```

Required.

The site ID for the new site you are importing to (the target site). For information about locating the site ID, see [Prepare the Source and Target Sites](#).

```
-w, --import-job-dir <importjob-directory>
```

Required.

The parent of the `mappings` directory that contains the .csv files from the exported (source) site. The name of this parent directory includes the import id and date and time. For example:

```
C:\ProgramData\Tableau\Tableau Server-
\data\tabsvc\files\siteimports\working\import_ff00_
20180102022014457
```

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 7200 (120 minutes).

## tsm sites unlock

Use this command to unlock a site.

### Options

`-id, --site-id <target-siteID>`

Required.

The site ID for the site you are unlocking. For information about locating the site ID, see [Prepare the Source and Target Sites](#).

`-d, --desired-state <state to leave unlocked site in>`

Optional.

The state the site should be left in after it is unlocked. Options are "active" and "suspended". The default is "active" if not specified.

For example:

```
tsm sites unlock -id mysite -d suspended
```

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 300 (5 minutes).

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm start

You can use the `tsm start` command to start Tableau Server. If the server is already running this command does nothing.

### Synopsis

```
tsm start [option][global options]
```

### Option

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

### Global options

```
-h, --help
```

Optional.

Show the command help.

```
-p, --password <password>
```

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm status

You can use the `tsm status` command to display the status of Tableau Server and individual services (processes) that run as part of Tableau Server.

### Synopsis

```
tsm status [global options]
```

### Options

`-v, --verbose`

Optional.

Display status for every node in the Tableau Server cluster.

`tsm status` will return one of these potential statuses for a Tableau Server node:

- **RUNNING:** The node is running without error statuses for any service or process.
- **DEGRADED:** The node is running with one or more primary services – such as the repository – in an error state. If you have a single instance of the Messaging service and it fails,
- **ERROR:** All primary services or processes are in an error state on the node.
- **STOPPED:** The node is stopped, with no error statuses.

When running `tsm status` with the `--verbose` option, TSM will return a status for each individual service (process). Possible status messages include:

- `is running:` The service is running.
- `status is unavailable:` The status cannot be determined – such as when services are starting up.
- `is in a degraded state:` The service is running, but returning errors. This status indicates the service failed to install properly, has not been configured or has failed in some way.
- `is in an error state:` The service is running, but returning errors. This status indicates the service failed to install properly, or has not been configured.
- `is synchronizing:` The File Store process is synchronising with another instance of File Store.
- `is decommissioning:` The File Store process is being decommissioned.
- `is running (Active Repository):` The active repository is running. This is the expected status.

- `is running (Passive Repository)`: The passive repository is running. This is the expected status when there are two repositories configured.
- `is stopped`: The service is stopped. This does not mean a service is in an error or problem state. Some services only run when needed (the Database Maintenance service for example).

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://localhost | dnsname:8850` is assumed.

`--trust-admin-controller-cert`

Optional.



## Tableau Server on Windows Help

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm stop

You can use the `tsm stop` command to stop Tableau Server. If Tableau Server is already stopped, this command does nothing.

### Synopsis

```
tsm stop [option] [global options]
```

### Options

`--ignore-node-status <nodeID>`

Optional.

Ignore the status for the specified node or nodes when determining if the server has stopped. Useful if removing a bad node. Separate multiple nodes with commas.

For example, if nodes 2, 3 and 5 are not properly responding: `tsm stop --ignore-node-status node2,node3,node5`

**Note:** Option added in version 2020.1

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port 8850, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm topology

Use the `tsm topology` commands to prepare File Store nodes for safe removal or to put them back into read-write mode. You can also initiate a repository failover, get a list of nodes or ports, get the bootstrap configuration file required to add additional nodes to your cluster, remove nodes, configure external repository and external File Store.

**Important:** When making changes to topology, you need to apply those pending changes for the changes to take effect. For more information, see `tsm pending-changes`.

- `cleanup-coordination-service`
- `deploy-coordination-service`
- `external-services`
  - `gateway`
    - `gateway disable`
    - `gateway enable`
    - `gateway update`
  - `list`
  - `repository`
    - `disable`
    - `enable`
    - `replace-host`
  - `storage (filestore)`
    - `storage disable`
    - `storage enable`
    - `storage switch-share`
- `failover-repository`

- `filestore`
  - `decommission`
  - `recommission`
- `list-nodes`
- `list-ports`
- `node-nickname`
  - `list`
  - `remove`
  - `set`
- `nodes`
  - `get-bootstrap-file`
- `remove-nodes`
- `set-node-role`
- `set-ports`
- `set-process`
- `toggle-coordination-service`

## `tsm topology cleanup-coordination-service`

**Note:** Beginning with version 2020.1.0, all coordination service ensemble commands require input for a "y/n" prompt confirming that a server restart will take place. To run these commands without input, include the `--ignore-prompt` option.

Use the `tsm topology cleanup-coordination-service` command to remove the non-production Tableau Server Coordination Service ensemble after you deploy a new ensemble. This command removes the old Coordination Service instances on all nodes in the non-production Coordination Service ensemble and is required after you deploy a new Coordination Service ensemble. To learn more about Coordination Service ensembles, see [Deploy a Coordination Service Ensemble](#).

In version 2020.1.0 and later, the `tsm topology deploy-coordination-service` command also removes the old ensemble. There is no need to run this command separately unless the deployment fails.

### Synopsis

```
tsm topology cleanup-coordination-service [option] [global options]
```

### Option

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 2700 (45 minutes).

## tsm topology deploy-coordination-service

**Note:** Beginning with version 2020.1.0, all coordination service ensemble commands require input for a "y/n" prompt confirming that a server restart will take place. To run these commands without input, include the `--ignore-prompt` option.

You can use the `tsm topology deploy-coordination-service` command to deploy the Tableau Server Coordination Service. This command deploys a Coordination Service ensemble, which is a set of Coordination Service instances that run on specified nodes in your server cluster. To learn more about Coordination Service ensembles, including how many nodes in your cluster should have a Coordination Service instance, see [Deploy a Coordination Service Ensemble](#).

In version 2020.1.0 and later, the `tsm topology deploy-coordination-service` command also removes the old ensemble. There is no need to run the `cleanup-coordination-service` command separately.

### Synopsis

```
tsm topology deploy-coordination-service --nodes <nodeID,nodeID,...>  
[option] [global-options]
```

## Options

`-n, --nodes <nodeID,nodeID,...>`

Required.

Node IDs of nodes to include in the new Coordination Service ensemble, separated by commas. You can specify 1, 3, or 5 Coordination Service nodes, depending on the total number of nodes in your cluster. For more information, see [The Coordination Service Quorum](#).

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 2700 (45 minutes).

## **tsm topology external-services gateway disable**

Disable all instances of Independent Gateway on Tableau Server.

### Synopsis

```
tsm topology external-services gateway disable [options] [global
options]
```

## Options

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 2700 (45 minutes).

## **tsm topology external-services gateway enable**

Enable instances of Independent Gateway on Tableau Server .

### Synopsis

```
tsm topology external-services gateway enable [options] [global options]
```

### Options

```
-c, --config <configuration-file>
```

#### Required

Specifies the name of the JSON file containing configuration details for all instances of Independent Gateway.

## tsm topology external-services gateway update

Use this command to update the configuration of Independent Gateway in Tableau Server. You need to do this if you add or remove additional instances of Independent Gateway, or if you upgrade Independent Gateway. Gather any changes on the Independent Gateway computers and update the configuration file before running this command.

### Synopsis

```
tsm topology external-services gateway update [option] [global options]
```

### Option

```
-c, --config <configuration-file>
```

#### Required

Specifies the name of the JSON file containing configuration details for all instances of Independent Gateway.

## tsm topology external-services list

Use the `tsm topology external-service-list` command to get a the service that is used for Tableau Server External Repository. For example, if you have configured Tableau Server to

use Amazon RDS, you will see the following message:

*These externally configured services are in use by Tableau Server:*

*-pgsql*

### Synopsis

```
tsm topology external-service list [global options]
```

### Option

There are no options for this command.

## tsm topology external-services repository disable -n nodeN

Use the `tsm topology external-services repository disable` command to stop using the external repository and reconfigure the installation to use a local repository. This will migrate the data to a local repository and configure Tableau Server to use the local repository.

### Synopsis

```
tsm topology external-services repository disable -n nodeN
```

### Option

`-n, --node-name <nodeID>`

Required.

Specifies the node ID of the node where the repository should be moved to.

**Important:** This does not stop or delete the RDS instance. For more information on how to delete an RDS instance, see [Deleting a DB Instance](#) on the AWS web site.

## tsm topology external-services repository enable

Use the `tsm topology external-services repository enable` command to configure Tableau Server to use an external repository. This command can be used during installation of a new Tableau Server to configure the external repository. If this command is run on an already



## Tableau Server on Windows Help

existing and running Tableau Server, it will migrate the data from the local node to the external repository and configure Tableau Server to use the external repository after the migration is complete.

### Synopsis

```
tsm topology external-services repository enable -f <filename>.json  
-c <ssl certificate file>.pem
```

### Options

**--f <file name>**

Required.

Full path and file name where the configuration file is saved. For more information, see [Re-Configure Tableau Server Repository](#).

**--c <ssl certificate file>**

Required for versions 2021.2 and 2021.2.1. Optional for versions 2021.2.2 and later.

For SSL configurations, download the certificate file and specify the file for use with this option.

1. **Amazon RDS:** See [Using SSL to Encrypt the Connection to a DB Instance](#).
2. **Azure Database:** See [Configure TLS connectivity for Azure Database for PostgreSQL](#).
3. **Stand-alone PostgreSQL Instance:** See [Configure SSL](#).

**--no-ssl**

Optional. This option is available in version 2021.2.2 and later.

This means SSL is not required when connecting to the External Repository. If you do not need to use encrypted connections, you must also configure the External Repository to allow unencrypted connections. When you use this option, connections will be encrypted if the external repository is configured to support TLS/SSL connections. Otherwise, Tableau Server will use non-encrypted connections.

Skips the check to see if the external repository is already configured for use with Tableau Server. This option is typically not recommended, as it may lead to the same repository being used by multiple Tableau Server installations, which can cause errors. This option may be useful for testing or disaster recovery purposes.

`--skip-state-check`

Optional. This option is available in version 2022.3.0 and later.

Skips the check to see if the external repository is already configured for use with Tableau Server. This option may be useful for testing or disaster recovery purposes but is not recommended for normal use, as it may result in the same repository being used by multiple Tableau Server installations.

## **tsm topology external-services repository replace-host**

This command updates Tableau Server configuration settings to use the specified external repository. Use the `tsm topology external-services repository replace-host` command to reconfigure Tableau Server to use the new external repository immediately without moving data to it from your current external repository. You may need to manually migrate the data. You should only do this after you have fully evaluated and understand the impact of the potential data loss.

This command can be used in the following scenarios:

- **Planned expiration of the SSL certificates used by RDS instances:** RDS instances need to be updated with the new certificates, and Tableau Server needs to be configured to use the new certificate file to connect to the RDS instance.
- **Disaster recovery:** Use this to connect to a new RDS instance in disaster recovery scenarios. For more information, see [Create a PostgreSQL DB Instance on AWS Relational Database Service \(RDS\)](#)

## Synopsis

```
tsm topology external-services repository replace-host -f <file-name>.json -c <ssl certificate file>.pem
```

## Options

-f <file name>

Required.

Full path and file name where the configuration file is saved. For more information, see [Re-Configure Tableau Server Repository](#).

-c <ssl certificate file>

Optional.

The certificate file is the certificate to be imported to allow connections to the instance. For RDS, this is the CA cert used to sign the certificate of the instance. This is usually the latest root certificate **rds-ca-XXXX-root.pem** file. Use this parameter to update Tableau server if the certificate has changed on the RDS instance.

For more information, see [Using SSL/TLS to Encrypt a Connection to a DB Instance](#).

For more information on how to get the .pem file, see [Using SSL to Encrypt a Connection to a DB Instance](#).

--ignore-prompt

Optional.

Run this command without prompts.

## tsm topology external-services storage disable

Configure Tableau Server to run File Store locally. Use this command to disable External File Store and move the File Store data to your Tableau Server.

## Synopsis

```
tsm topology external-services storage disable [options] [global
options]
```

## Options

```
-fsn <nodeID, nodeID, ...>
```

### Required

Specify the nodes that you want to configure File Store. You can specify more than one node. The data will be migrated to the first node in the list and then replicated to other nodes.

For more information, see Reconfigure File Store.

## tsm topology external-services storage enable

Configure Tableau Server with External File Store. External File Store uses SAN or NAS to store File Store data.

## Synopsis

```
tsm topology external-services storage enable [options] [global
options]
```

## Options

```
--network-share <network share path>
```

### Required

Specify the name and path of the network share you want to use for your External File Store.

For more information, see Reconfigure File Store.

## tsm topology external-services storage switch-share

Use this command to move your external services to a different network share. An example of this might be when your current network attached storage is at the end of life and you need to use a new network attached storage with new hardware. For more information, see [Reconfigure File Store](#).

### Synopsis

```
tsm topology external-services storage switch-share [option] [global options]
```

### Option

```
--network-share <network share path>
```

#### Required

Specify the path to the new network share that you want to switch to.

## tsm topology failover-repository

You can use the `tsm topology failover-repository` to manually initiate a repository failover from the current active repository to the second, passive repository.

The `tsm topology failover-repository` command is persistent. The failover repository remains the active repository until you issue the command again, or, if Tableau Server is configured for it, until automatic failover occurs. If you have a preferred active repository configured, use the `--preferred` option to switch back to that repository. For more information about configuring a preferred active repository, see [Tableau Server Repository](#). If Tableau Server is configured for high availability, failover of the repository is automatic when necessary. Use the failover-repository command to manually fail over the repository.

### Synopsis

```
tsm topology failover-repository --preferred | --target <node_id> [global options]
```

## Options

`-r, --preferred`

Required if `-t` or `--target` is not used.

Use the configured preferred node as the target for repository failover.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

`-t, --target <node_id>`

Required if `-r` or `--preferred` is not used.

The node id of the target node onto which failover will occur. Find the node id by using the `tsm topology list-nodes` command.

## tsm topology filestore decommission

You must use the `tsm topology filestore decommission` command to prepare a file store node or nodes for safe removal. This command puts the specified nodes into read-only mode and ensures there is no unique content on the specified nodes.

If decommissioning results in a single file store node, you must use the `--override` option or the decommission will fail.

### Synopsis

```
tsm topology filestore decommission --nodes <nodeID,nodeID,...>
[options] [global options]
```

## Options

`-n, --nodes <nodeID,nodeID,...>`

Required.

List of one or more nodes to decommission, specified by node ID and separated by commas.

`--delete-filestore`

Optional.

Forces the removal of the file store, even if it has not been decommissioned. You should only use this option if the node the file store is on is in an error state and decommissioning cannot be done. Any unique files on the node will be permanently deleted.

`-o, --override`

Optional.

Overrides warnings or failures that would normally occur if removing the target File Store node would reduce the number of remaining file store nodes to one. This option cannot be used with the `--delete-filestore` option.

`--request-timeout <timeout in seconds>`

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## **tsm topology filestore recommission**

Use the `tsm topology filestore recommission` command to revert any decommissioned nodes back to read-write mode.

## Synopsis

```
tsm topology filestore recommission --nodes <nodeID,nodeID,...>
[global options]
```

## Options

```
-n, --nodes <nodeID,nodeID,...>
```

Required.

List of one or more nodes to recommission, specified by node ID and separated by commas.

## tsm topology list-nodes

Display the nodes in the cluster and (optionally) the services on each node.

## Synopsis

```
tsm topology list-nodes [options] [global options]
```

## Options

```
-v, --verbose
```

Optional.

Shows each node ID, the node role (for more information, see `set-node-role` below), the node address and the processes on each node.

## tsm topology list-ports

Display the ports in the cluster.

## Synopsis

```
tsm topology list-ports [options] [global options]
```



### Options

`--node-name <nodeID>`

Optional.

Specify the node to list ports for.

`--service-name`

Optional.

Specify the service to list ports for.

## tsm topology node-nickname list

Display the node nicknames for nodes in the cluster.

### Synopsis

```
tsm topology node-nickname list [options] [global options]
```

### Options

`--nodes <nodeID,nodeID,...>`

Optional.

Specify the node IDs of the nodes to list with nicknames.

## tsm topology node-nickname remove

Remove the nickname from the specified node or nodes.

### Synopsis

```
tsm topology node-nickname remove [options] [global options]
```

## Options

`--all`

Required if `--nodes` is not specified.

Remove the nicknames from all nodes in the cluster.

`--nodes <nodeID,nodeID,...>`

Required if `--all` is not specified.

Specify the node ID of the node or nodes whose nicknames should be removed.

**tsm topology node-nickname set**

Set the nickname for the specified node.

## Synopsis

```
tsm topology node-nickname set [options] [global options]
```

## Options

`-id, --node <nodeID>`

Required.

Specify the node to set the nickname for.

`-nn, --nickname <name>`

Required.

The nickname for the specified node.

**tsm topology nodes get-bootstrap-file**

You can use the `tsm topology nodes get-bootstrap-file` command to get the bootstrap file that is required to add a new node to the cluster.

**Important:** The bootstrap file contains a copy of the master keystore file used for encrypting the configuration secrets. The file can also embedded credentials which are valid for a pre-determined amount of time (see `tabadmincontroller.auth.expiration.minutes`) and serve as a session cookie. We strongly recommend that you take additional measures to secure the bootstrap file.

## Synopsis

```
tsm topology nodes get-bootstrap-file --file <path\file>.json  
[global options]
```

## Options

`-f, --file <file>`

Required.

Full path and file name where the configuration file will be saved. If a duplicate file exists it will be overwritten.

`-nec, --no-embedded-credential`

Optional.

Added in version 2019.3.

By default embedded credentials are included in the bootstrap file. Use this option if credentials should not be included in the bootstrap file. Embedded credentials are temporary, and expire based on the value of the `tabadmincontroller.auth.expiration.minutes` configuration key, by default 120 minutes.

**Note:** You can disable the ability to include embedded credentials at the server level, using a configuration option. For more information, see `features.PasswordlessBootstrapInit`.

## tsm topology remove-nodes

Remove nodes from the cluster.

To complete removal of a node, you also must run the `tsm pending-changes apply` command. Some scenarios require that you move or redeploy processes before removing nodes. See [Remove a Node](#).

If you remove a node and want to re-add it to the cluster, you need to first run the `obliterate` script to clean Tableau off it, then reinstall the node using the normal process for adding a new node. For more information, see [Remove Tableau Server from Your Computer and Install and Configure Additional Nodes](#).

**Note:** To remove a node from a cluster it must have been configured with a process at some point in the past. If you are removing a node on which you've not configured any processes, then you must add a process on it, run `tsm pending-changes apply`, and then remove the node.

### Synopsis

```
tsm topology remove-nodes --nodes <nodeID,nodeID,...>
[global options]
```

### Options

`-n, --nodes <nodeID,nodeID,...>`

Required.

Specify the node or nodes to remove. If specifying multiple nodes, separate node IDs with a comma.

## tsm topology set-node-role

Set the Backgrounder and Extract Queries node roles. This determines the type of tasks that will be performed on the nodes. The following node roles can be useful if you have a multi-node cluster. Different node roles may require licences for Advanced Management or Data Management, or for both. For more information about licence requirements, see [Workload Management through Node Roles](#).

**Note:** Making configurations to node roles require a restart of the server and will require some downtime. For more information, see [tsm pending-changes](#).

### Synopsis

```
tsm topology set-node-role [options] [global options]
```

### Options

```
-n, --nodes <nodeID,nodeID,...>
```

Required.

List of one or more nodes to set node roles for, specified by node ID and separated by commas and without spaces between nodes.

```
-r --role <all-jobs,flows,no-flows,extract-refreshes,sub-
scriptions,extract-refreshes-and-subscriptions,no-extract-
refreshes,no-subscriptions,no-extract-refreshes-and-sub-
scriptions,extract-queries,extract-queries-interactive>
```

Required

Sets the role for the nodes specified. The valid values for this option are:

- all-jobs: Backgrounder will run all types of jobs.
- flows :Backgrounder will run only flow run jobs.

- **no-flows:** Backgrounder will not run flow run jobs.
- **extract-refreshes:** Backgrounder will run only extract refresh jobs. This includes, incremental refreshes, full refreshes, encryption and decryption of all extracts including extracts that flow outputs generate.
- **subscriptions:** Backgrounder will run only subscription jobs.
- **extract-refreshes-and-subscriptions:** Backgrounder will run extract-refreshes, encryption and decryption of all extracts including extracts that flow outputs create and subscription jobs.
- **no-extract-refreshes:** Backgrounder will run all jobs except extract-refreshes, extract encryption and decryption including extracts created from flow outputs.
- **no-subscriptions:** Backgrounder will run all jobs except subscriptions.
- **no-extract-refreshes-and-subscriptions:** Backgrounder will run all jobs except extract-refreshes, encryption and decryption of all extracts including extracts created from flow outputs and subscriptions.
- **extract-queries:** The nodes selected will run as all-jobs and will prioritise the processing of extract queries.
- **extract-queries-interactive:** The nodes selected will run as all-jobs and will prioritise the processing of interactive extract queries, such as those that run when a user is looking at their screen and waiting for an extract-based dashboard to load. This is an advanced setting and it should only be used if the cluster has a heavy subscription and alert job workload that causes users to experience degraded performance on viz load times that run around the same time as scheduled loads.
- **system:** Backgrounder will run only system maintenance jobs that interact with other Tableau Server processes, such as cleaning crashed jobs, reaping database events and syncing Active Directory.
- **no-system:** Backgrounder will run all jobs except system maintenance jobs.

## tsm topology set-ports

Set the ports for a service instance.

## Synopsis

```
tsm topology set-ports --node-name <nodeID> --port-name <port_name>  
--port-value <port_value> [options] [global options]
```

## Options

`-i, --instance <instance_id>`

Optional.

Specifies the instance id of the service. Defaults to 0 (zero) if not specified.

`-n, --node-name <nodeID>`

Required.

Specifies the node ID of the node.

`-pn, --port-name <port_name>`

Required.

The name of the port to be set, in this format: `service_name:port_type`. If no port type is specified, the primary port is assumed. For port name syntax, see [Dynamically mapped ports](#).

`-pv, --port-value <port_value>`

Required.

The port to set.

`-r, --restart`

Optional.

Suppress the prompt for restart and restart Tableau Server when necessary.

## tsm topology set-process

Set the number of instances of a process on a node. If a node already has the specified process, the number is updated to match the specified count.

- You can only set one process at a time. If you specify more than one process, any process after the first one will be silently ignored.
- You must set a process one node at a time. If you specify more than one node, the command will display an "invalid node name" error.

When you update the number of processes on nodes, you also need to apply pending changes. In most cases this also requires a server restart (you will be prompted), but there are special cases where you can make dynamic topology changes without needing to restart the server. For more information, see [Tableau Server Dynamic Topology Changes](#).

**Note:** For a complete list of process names, see [Tableau Server Processes](#).

### Synopsis

```
tsm topology set-process --count <process_count> --node <nodeID> --
process <process_name> [global options]
```

### Options

`-c, --count <process_count>`

Required.

The process count (number of instances) to set.

`-n, --node <nodeID>`

Required.

Specifies the node ID of the node on which to set the process.



```
-pr, --process <process_name>
```

Required.

The name of the process to be set.

## tsm topology toggle-coordination-service

**Note:** Beginning with version 2020.1.0, all coordination service ensemble commands require input for a "y/n" prompt confirming that a server restart will take place. To run these commands without input, include the `--ignore-prompt` option.

You can use the `tsm topology toggle-coordination-service` command to switch between coordination service ensembles. To learn more about Coordination Service ensembles, see [Deploy a Coordination Service Ensemble](#).

In version 2020.1.0 and later, the `tsm topology deploy-coordination-service` command also switches to the new ensemble. There is no need to run this command separately.

### Synopsis

```
tsm topology toggle-coordination-service [option] [global options]
```

### Option

```
--request-timeout <timeout in seconds>
```

Optional.

Wait the specified amount of time for the command to finish. Default value is 1800 (30 minutes).

## Global options

```
-h, --help
```

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

`--password "my password"`

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm user-identity-store

You can use the `tsm user-identity-store` commands to modify the settings of the identity store for Tableau Server after the initial configuration.

The initial configuration of the identity store is part of the installation process. See [Configure Initial Node Settings](#).

For introduction to identity store concepts, see [Identity Store](#).

For LDAP/Active Directory configuration reference table, see [External Identity Store Configuration Reference](#).

- [get-group-mappings](#)
- [get-user-mappings](#)
- [list](#)
- [set-connection](#)
- [set-group-mappings](#)
- [set-user-mappings](#)
- [verify-group-mappings](#)
- [verify-user-mappings](#)

### tsm user-identity-store get-group-mappings [options]

Displays identity store group mappings.

#### Synopsis

```
tsm user-identity-store get-group-mappings [global options]
```

### tsm user-identity-store get-user-mappings [options]

Displays identity store user mappings.

#### Synopsis

```
tsm user-identity-store get-user-mappings [global options]
```

## **tsm user-identity-store list [options]**

Lists user-identity configuration.

### **Synopsis**

```
tsm user-identity-store list [options] [global options]
```

### **Options**

**-v, --verbose**

Optional.

Lists all configuration parameters.

## **tsm user-identity-store set-connection [options]**

Sets identity store connection parameters.

### **Synopsis**

```
tsm user-identity-store set-connection --kerbkeytab <kerbkeytab>  
[options] [global options]
```

### **Options**

**-b, --bind <username and password | Kerberos>**

Optional.

Set LDAP bind type.

**-d, --domain <domain>**

Optional.

Domain name.

**-hn, --hostname <hostname>**

Optional.

The hostname of the LDAP server. You can enter a hostname or an IP address for this value. The host that you specify here will be used for user/group queries on the primary domain. In the case where user/group queries are in other domains, Tableau Server will query DNS to identify the appropriate domain controller.

`-kc,--kerbconfig <kerbconfig>`

Optional.

Kerberos configuration file path.

`-kp,--kerbprincipal <kerbprincipal>`

Optional.

Kerberos Principal.

`-kt,--kerbkeytab <kerbkeytab>`

Required.

Kerberos keytab file path.

`-l,--port <port>`

Optional.

Set LDAP Port value.

`-lp,--ldappassword <ldappassword>`

Optional.

LDAP Password.

```
-lu,--ldapusername <ldapusername>
```

Optional.

Set LDAP Username value.

```
-n,--nickname <nickname>
```

Optional.

NetBIOS name (nickname).

## **tsm user-identity-store set-group-mappings [options]**

Sets identity store group mappings and configures LDAP directories that implement an arbitrary or custom schema.

### **Synopsis**

```
tsm user-identity-store set-group-mappings [options]
[global options]
```

### **Options**

```
-b,--basefilter <groupbasefilter>
```

Optional.

Set group BaseFilter value.

```
-cn,--classnames <group_classnames>
```

Optional.

Override default user classname values (contains "group" string) with the values you set here. You can provide multiple classnames separated by commas.

```
-d,--description <description>
```

Optional.

Group description.

```
-e, --groupemail <groupemail>
```

Optional.

Group email value.

```
-m, --member <member>
```

Optional.

Set the group members.

```
-n, --groupname <groupname>
```

Optional.

Name of the group.

## **tsm user-identity-store set-user-mappings [options]**

Sets identity store user mappings and configures LDAP directories that implement an arbitrary or custom schema.

### **Synopsis**

```
tsm user-identity-store set-user-mappings --certificate <certificate> [options] [global options]
```

### **Options**

```
-c, --certificate <certificate>
```

Optional.

Users' certificate file location.

```
-cn, --classnames <user_classnames>
```

Optional.

Override default user classname values ("user" and "inetOrgPerson") with the values you set here. You can provide multiple classnames separated by commas.

`-dn,--displayname <displayname>`

Optional.

Display name of the user.

`-e,--email <email>`

Optional.

Users' email address.

`-jp,--jpegphoto <jpegfile>`

Optional.

Users' jpeg image location.

`-m,--memberof <groupname>`

Optional.

Group that the user is a member of.

`-t,--thumbnail <thumbnail>`

Optional.

Users' thumbnail location.

`-ub,--basefilter <userbasefilter>`

Optional.



Users' BaseFilter.

`-uu,--ldapusername <ldapusername>`

Optional.

Username.

## **tsm user-identity-store verify-group-mappings [options]**

Validates configuration for LDAP group mapping.

### **Synopsis**

```
tsm user-identity-store verify-group-mappings --verify <group_name>  
[global options]
```

### **Options**

`-v,--verify <group_name>`

Optional.

Name of group to search for.

## **tsm user-identity-store verify-user-mappings [options]**

Validates configuration for LDAP user mapping.

### **Synopsis**

```
tsm user-identity-store verify-user-mappings --verify <user_name>  
[global options]
```

### **Options**

`-v,--verify <user_name>`

Optional.

Name of user to search for.

## Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm version

You can use the `tsm version` command to get the versions of TSM and Tableau Server.

### Synopsis

```
tsm version [global options]
```

### Global options

`-h, --help`

Optional.

Show the command help.

`-p, --password <password>`

Required, along with `-u` or `--username` if no session is active.

Specify the password for the user specified in `-u` or `--username`.

If the password includes spaces or special characters, enclose it in quotes:

```
--password "my password"
```

`-s, --server https://<hostname>:8850`

Optional.

Use the specified address for Tableau Services Manager. The URL must start with `https`, include port `8850`, and use the server name not the IP address. For example `https://<tsm_hostname>:8850`. If no server is specified, `https://<localhost | dnsname>:8850` is assumed.

`--trust-admin-controller-cert`

Optional.

Use this flag to trust the self-signed certificate on the TSM controller. For more information about certificate trust and CLI connections, see [Connecting TSM clients](#).

`-u, --username <user>`

Required if no session is active, along with `-p` or `--password`.

Specify a user account. If you do not include this option, the command is run using credentials you signed in with.

## tsm File Paths

Certain tsm commands read files from or write files to default locations. These default locations are determined by `basefilepath` configuration keys defined for each command. You can use tsm to view the current value of the keys and to change the locations.

### NetworkService system account

In some organisations, security policies are implemented that restrict file access from system accounts, such as the NetworkService account. If you change tsm file paths, then you should verify that the NetworkService system account has full permission (with permissions inheritance enabled) to the resulting path. In addition, if you change a file path that was originally in the `*\data\tabsvc\*` path, you must maintain the NetworkService permissions to the original path. This permission must be maintained because the NetworkService system account handles operations by Tableau Server Administration Controller, Tableau Server Client File Service and Tableau Server Coordination Service.

### Permissions for the backup/restore file location

Required permissions for the backup/restore file location:

- NetworkService: read/write/execute permission
- Run As service account: read/write/execute permission

## Default locations for files

During the `tsm maintenance backup`, `restore`, `send-logs`, and `ziplogs` processes, and the `tsm sites export` and `sites import` processes, Tableau Server uses default locations for the files created or used by these commands.

For details on disk space requirements for backing up Tableau Server, see [Disk Space Usage for Backup](#).

By default:

- `tsm maintenance commands`:
  - Backup – The backup `.tsbak` file is created in a temporary location in the data directory on the initial node and then saved in:

```
<install drive>:<install\path>\data\tabsvc\files\backups
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to `D:\Tableau Server` the backup will be saved in:

```
D:\Tableau Server\data\tabsvc\files\backups
```

**Note:** The `tsm maintenance backup` command does not support Microsoft Windows UNC (Universal Naming Convention) file paths, also known as "network paths" (`\\<computer name>\<folder>\<file name>`) as the path to the

location where backup files are written. Instead, use local file system paths (<drive letter>:\<folder name>\<file name>).

- **Restore** – The restore process restores a backup file from:

```
<install drive>:<install\path>\data\tabsvc\files\backups
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to D:\Tableau Server the restore process will use a backup in:

```
D:\Tableau Server\data\tabsvc\files\backups
```

- **Send-logs** – The send-logs sends the logs file from:

```
<install drive>:<install\path>\data\tabsvc\files\backups
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\backups\
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to D:\Tableau Server the send-logs process will sent log files from:

```
D:\Tableau Server\data\tabsvc\files\backups
```

- **Ziplogs** – The ziplogs file is generated in:

## Tableau Server on Windows Help

```
<install drive>:<install\path>\data\tabsvc\files\log-archives
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\log-archives
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to D:\Tableau Server the ziplogs file is generated in:

```
D:\Tableau Server\data\tabsvc\files\log-archives
```

- tsm sites

- Export – The export .zip file is generated to the following directory:

```
<install drive>:<install\path>\data\tabsvc\files\siteexports
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteexports
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to D:\Tableau Server the export .zip file is generated in:

```
D:\Tableau Server\data\tabsvc\files\siteexports
```

- Import – During the import process, Tableau Server looks for files in:

```
<install drive>:<install\path>\data\tabsvc\files\siteimports
```

By default, this is:

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\files\siteimports
```

But if you installed Tableau to a non-default location this will be different. For example, if you installed to D:\Tableau Server the import process looks for files in:

```
D:\Tableau Server\data\tabsvc\files\siteimports
```

## Get the current file location

You can see the current file location for a specific command using `tsm configuration get`:

- For `tsm` maintenance commands:

- backup, restore, and send-logs:

```
tsm configuration get -k basefilepath.backuprestore
```

- ziplogs:

```
tsm configuration get -k basefilepath.log_archive
```

- For `tsm` sites commands:

- export

```
tsm configuration get -k basefilepath.site_export.exports
```

- import

```
tsm configuration get -k basefilepath.site_import.exports
```



## Change the current file location

You can change the expected file locations using the `tsm configuration set` command to update the `basefilepath` variables. For details about specific base file paths, see [tsm configuration set Options](#).

Changing a `basefilepath` variable does not move existing files from the original directory to the new directory. If you want existing backup, restore, log files or site export or import files to reside in the new directory you specify, you must move them manually. You are responsible for creating the new location and for setting the correct permissions to allow tsm access to any files that will be placed there, and to the directory structure containing those files. If you change the backup/restore base file path, you should run the `tsm maintenance validate-backup-basefilepath` command (available in version 2022.1 and later) to verify the permissions are properly set.

The `tsm maintenance backup` command assembles the backup in a temporary location in the data directory before saving the backup file to the location specified by the `basefilepath.backuprestore` variable. Changing the `basefilepath` does not impact where the `tsm maintenance backup` command assembles the backup file.

You cannot specify a `basefilepath.backuprestore` location at the root of a drive. It must be in a folder.

- For tsm maintenance commands:
  - To change the backup, restore, or send-logs directory, run the following command:

```
tsm configuration set -k basefilepath.backuprestore -v  
"<drive>:\new\directory\path"
```

- To change the ziplogs directory:

```
tsm configuration set -k basefilepath.log_archive -v
"<drive>:\new\directory\path"
```

- For tsm sites commands:

- To change the sites export directory:

```
tsm configuration set -k basefilepath.site_export.exports
-v "<drive>:\new\directory\path"
```

- To change the sites import directory:

```
tsm configuration set -k basefilepath.site_import.exports
-v "<drive>:\new\directory\path"
```

After you change a default file location you need to do the following:

1. Apply pending changes:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

2. Stop Tableau Server:

```
tsm stop
```

3. Restart the TSM Controller:

```
net stop tabadmincontroller_0

net start tabadmincontroller_0
```

4. Wait several minutes for the controller to restart. You can confirm the controller has restarted with this command:

```
tsm status -v
```

When you can run that command and the Tableau Server Administration Controller is listed as 'running' the controller has restarted.

5. Start Tableau Server:

```
tsm start
```

## Entity Definitions and Templates

You can use the entity definitions and templates with the `tsm settings import` command to configure various Tableau Server settings.

### Configuration File Example

This article provides an example of a complete JSON configuration file, with `gatewaySettings` and `identityStore` entities specified. In addition, a configuration key sets the gateway timeout to 900 seconds.

Your configuration file will look different depending on the options you need to set.

You might set multiple `.json` configuration files during installation. To set the values for each file in Tableau Server, you run the following command, once for each configuration file:

```
tsm settings import -f path-to-file.json
```

After you set the configuration files, run `tsm pending-changes apply` to apply the changes from all of the `.json` files you've set.

```
{
  "configEntities": {
    "gatewaySettings": {
      "_type": "gatewaySettingsType",
      "port": 80,
      "publicHost": "localhost",
      "publicPort": 80
    },
    "identityStore": {
      "_type": "identityStoreType",
      "type": "local",
      "domain": "example.lan",
      "nickname": "EXAMPLE"
    }
  },
  "configKeys": {
    "gateway.timeout": "900"
  }
}
```

## Entities vs keys

As shown in the example above, there are two classes of configuration parameters: `configEntities` and `configKeys`.

### **configEntities**

Certain types of configuration are done through entity sets that map to specific scenarios, such as the identity store and gateway configurations. When you pass a set of `configEntities` with the `tsm settings import -f path-to-file.json` command, TSM validates the configuration. If values passed are invalid, TSM will provide an error. This enables you to make changes during the configuration process, rather than experience a configuration failure at initialisation or run time.

Entities can be set only by including a `configEntities` block in a `.json` file.

**Important:** All files that are referenced in configEntities must be located on the local computer. Do not specify UNC paths.

## configKeys

Entities cover only a small portion of the configuration values that can be set. Hundreds of keys correspond to parameters stored in .yaml files. Tableau Server uses these parameters to store all of the configuration information for all services.

You can set individual keys with the tsm configuration command. But during deployment, setting them along with other configuration scenarios in JSON files, as shown above, is more convenient.

Unlike configEntities, configKeys are not validated.

**Note:** We do not recommend setting parameters that are not documented in tsm configuration set Options.

## gatewaySettings Entity

You must configure the gateway settings for the Tableau Server computer.

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f /path/to/file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--`

`ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Gateway settings

The gateway settings in the template below specify the HTTP settings for Tableau Server. We recommend using SSL/TLS. Tableau Server is hard-coded to use port 443 for SSL/TLS. Therefore, if you enable SSL, you do not need to update the `gatewaySettings` entity.

## Configuration template

Use this template to configure the gateway settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see [Configuration File Example](#).

```
{
  "configEntities": {
    "gatewaySettings": {
      "_type": "gatewaySettingsType",
      "port": 80,
      "sslRedirectEnabled": true,
      "publicHost": "localhost"
    }
  }
}
```

## Configuration file reference

This table includes all of the options that can be included with the `"gatewaySettings"` entity set.

`_type`

Required.

## Tableau Server on Windows Help

**Value:** "gatewaySettingsType"

Do not change.

port

Specifies HTTP port. Default is port 80.

sslRedirectEnabled

**Options:** true or false.

publicHost

Specifies host name for http/s service.

trustedIPs

Specifies trusted IP addresses that communicate with Tableau Server. Trusted IP addresses include upstream proxy servers and servers that are used for trusted authentication with Tableau Server. See [Configuring Proxies and Load Balancers for Tableau Server](#) and [Add Trusted IP Addresses or Host Names to Tableau Server](#).

If you are running Tableau Server in a cluster then all other nodes of the cluster will automatically be included in the corresponding configuration file that this entity updates. Therefore, if you specify a new value for `trustedIPs`, then you must include the IP addresses for the other nodes in the value.

This option takes a list of strings, which requires passing each IP or host in quotes, separated by a comma (no space) and within brackets. For example:

`["192.168.1.101", "192.168.1.102", "192.168.1.103"]` or `["web-serv1", "webserv2", "webserv3"]`.

trustedHosts

Specifies trusted IP addresses that communicate with Tableau Server. Typically, this value contains a list of upstream proxy servers. The values in `trustedHosts` are used to

determine client request targets.

If you are running Tableau Server in a cluster then all other nodes of the cluster will automatically be included in the corresponding configuration file that this entity updates. Therefore, if you specify a new value for `trustedIPs`, then you must include the IP addresses for the other nodes in the value.

This option takes a list of strings, which requires passing each IP or host in quotes, separated by a comma (no space) and within brackets. For example:

```
[ "192.168.1.101", "192.168.1.102", "192.168.1.103" ] or [ "web-serv1", "webserv2", "webserv3" ].
```

## identityStore Entity

Tableau Server requires an identity store to store user and group information. Review Authentication and Identity Store topics before configuring the identity store for the first time. After you have installed the identity store on Tableau Server, you cannot change it without reinstalling the server.

**Important:** All entity options are case sensitive.

### Before you begin

Review the following information:

- If you will not be using the local identity store, then you will be using some version of LDAP. In this case, work with your directory/LDAP administrator to configure Tableau Server for your LDAP schema and bind requirements.
- Tableau Server configuration is optimised for Active Directory. If you are installing into Active Directory, we recommend configuring the identity store with Configure Initial Node Settings.
- LDAP bind is independent of user authentication. For example, you can configure Tableau Server to use simple bind to authenticate to the LDAP directory and then configure Tableau Server to authenticate users with Kerberos after installation.



- Do not connect to LDAP with simple bind over an unsecured connection. By default, LDAP with simple bind sends data in cleartext. Use LDAPS to encrypt traffic with simple bind. See [Configure Encrypted Channel to LDAP External Identity Store](#).
- To use Kerberos authentication for the LDAP bind with Tableau Server service, then you'll need a keytab file for GSSAPI bind, as described in the sections below. See also, [Understanding Keytab Requirements](#). In the context of Kerberos, GSSAPI bind is all you need during the base installation of Tableau Server. After you install the server, you can then [configure Kerberos for user authentication](#) and [Kerberos delegation to data sources](#).
- In this topic, we make the distinction between *LDAP* (the protocol for connecting to directory services) and an *LDAP server* (an implementation of a directory service). For example, `slapd` is an LDAP server that is part of the OpenLDAP project.
- Validate the LDAP configuration before initialising the server, see [Configure Initial Node Settings](#).
- Import JSON configuration files only as part of the initial configuration. If you need to make LDAP changes after you have imported the JSON configuration file and initialised Tableau Server, do not attempt to re-import the JSON file. Rather, make individual key changes with native tsm commands or with `tsm configuration set`. See [External Identity Store Configuration Reference](#).

## Configuration templates

The JSON templates in this section are used to configure Tableau Server with different identity store scenarios. Unless you're configuring a local identity store, you will need to select and edit a configuration file template that is specific to your LDAP environment.

Consider using the [Tableau Identity Store Configuration Tool](#) to help generate your LDAP JSON configuration file. The tool itself is not supported by Tableau. However, using a JSON file created by the tool instead of creating a file manually does not change the supported status of your server.

Select an identity store configuration template to edit:

- Local
- LDAP - Active Directory
- OpenLDAP - GSSAPI Bind
- OpenLDAP - Simple Bind

For more explanation about configuration files, entities and keys see Configuration File Example.

### Local

Configure local as the identity store type if your organisation does not already have an Active Directory or LDAP server for user authentication. When you select local as the identity store type, you use Tableau Server to create and manage users.

An alternative way to configure Tableau Server for local identity store is to run Setup GUI and select "Local" during the installation process. See Configure Initial Node Settings.

```
{
  "configEntities": {
    "identityStore": {
      "_type": "identityStoreType",
      "type": "local"
    }
  }
}
```



#### Important

The LDAP configuration templates below are examples. The templates, as presented, will not configure LDAP connectivity in your organisation. You must work with your directory administrator to edit the LDAP template values for a successful deployment.

Additionally, all files that are referenced in configEntities must be located on the local computer. Do not specify UNC paths.

### LDAP - Active Directory

Tableau Server configuration is optimised for Active Directory. If you are installing into Active Directory, configure the identity store with Configure Initial Node Settings.

An encrypted connection to Active Directory is required. See Configure Encrypted Channel to LDAP External Identity Store.

If for some reason you are unable to configure the identity store to communicate with Active Directory with TSM web interface, use this JSON template to configure Tableau Server to connect to Active Directory. This template uses GSSAPI (Kerberos) bind to authenticate Tableau Server service to Active Directory. Tableau Server includes support for Active Directory schema. Therefore, if you set the "directoryServiceType" option to "activedirectory" then you do not need to provide schema info in the "identityStoreSchemaType" option.

```
{
  "configEntities": {
    "identityStore": {
      "_type": "identityStoreType",
      "type": "activedirectory",
      "domain": "your-domain.lan",
      "nickname": "YOUR-DOMAIN-NICKNAME",
      "directoryServiceType": "activedirectory",
      "bind": "gssapi",
      "kerberosKeytab": "<path to local key tab file>",
      "kerberosConfig": "/etc/krb5.conf",
      "kerberosPrincipal": "your-principal@YOUR.DOMAIN"
    }
  }
}
```

We recommend binding to Active Directory with GSSAPI. However, you can connect with simple bind and LDAPS. To connect with simple bind, change `bind` to `simple`, remove the three Kerberos entities, and add the `port/sslPort`, `username`, and `password` options. The following example shows Active Directory with simple bind json.

```
{
  "configEntities":{
    "identityStore": {
      "_type": "identityStoreType",
      "type": "activedirectory",
      "domain": "your-domain.lan",
      "nickname": "YOUR-DOMAIN-NICKNAME",
      "directoryServiceType": "activedirectory",
      "hostname": "optional-ldap-server",
      "sslPort": "636",
      "bind": "simple",
      "username": "username",
      "password": "password"
    }
  }
}
```

### OpenLDAP - GSSAPI bind

Use the template below to configure OpenLDAP with GSSAPI bind. Do not use this template if your organisation is running Active Directory. If you are installing into Active Directory, use the template above, LDAP - Active Directory.

In most cases, organisations that use OpenLDAP with GSSAPI (Kerberos) will use a keytab file to store credentials. In the following example, a keytab file is used for authentication credentials.

However, you can provide credentials through the `username` and `password` entities.

You can also specify both a keytab and a username and password pair. In this case, Tableau Server will attempt to use the keytab, but if authentication fails for any reason it will fallback and use the username and password credentials.

```
{
  "configEntities":{
    "identityStore": {
```

```

    "_type": "identityStoreType",
    "type": "activedirectory",
    "domain": "your-domain.lan",
    "nickname": "YOUR-DOMAIN-NICKNAME",
    "directoryServiceType": "openldap",
    "bind": "gssapi",
    "kerberosKeytab": "<path to local key tab file>",
    "kerberosConfig": "/etc/krb5.conf",
    "kerberosPrincipal": "your-principal@YOUR.DOMAIN",
    "identityStoreSchemaType": {
      "userBaseFilter": "(objectClass=inetOrgPerson)",
      "userUsername": "user",
      "userDisplayName": "displayname",
      "userEmail": "email",
      "userCertificate": "certificate",
      "userThumbnail": "thumbnail",
      "userJpegPhoto": "photo",
      "groupBaseFilter": "(objectClass=groupofNames)",
      "groupName": "groupname",
      "groupEmail": "groupemail",
      "groupDescription": "groupdescription",
      "member": "member",
      "distinguishedNameAttribute": "",
      "serverSideSorting": "",
      "rangeRetrieval": "",
      "userClassNames": ["inetOrgPerson", "someClass2"],
      "groupClassNames": ["groupOfU-
niqueNames1", "groupOfUniqueNames2"]
    }
  }
}

```

## OpenLDAP - Simple bind

```

{
  "configEntities":{
    "identityStore": {
      "_type": "identityStoreType",
      "type": "activedirectory",
      "domain": "my.root",
      "nickname": "",
      "hostname": "optional-ldap-server",
      "port": "389",
      "directoryServiceType": "openldap",
      "bind": "simple",
      "username": "cn=username,dc=your,dc=domain",
      "password": "password",
      "identityStoreSchemaType": {
        "userBaseFilter": "(objectClass=inetOrgPerson)",
        "userUsername": "user",
        "userDisplayName": "displayname",
        "userEmail": "email",
        "userCertificate": "certificate",
        "userThumbnail": "thumbnail",
        "userJpegPhoto": "photo",
        "groupBaseFilter": "(objectClass=groupofNames)",
        "groupName": "groupname",
        "groupEmail": "groupemail",
        "groupDescription": "groupdescription",
        "member": "member",
        "distinguishedNameAttribute": "",
        "serverSideSorting": "",
        "rangeRetrieval": "",
        "userClassNames": ["inetOrgPerson","someClass2"],
        "groupClassNames": ["groupOfU-
niqueNames1","groupOfUniqueNames2"]
      }
    }
  }
}

```

```
}
```

## Configuration template reference

### Shared identity store options

`type`

Where you want to store user identity information. Either `local` or `activedirectory`. (If you want to connect to any LDAP server, select `activedirectory`.)

`domain`

The domain of the computer where you installed Tableau Server.

`nickname`

The nickname of the domain. This is also referred to as the NetBIOS name in Windows environments.

The `nickname` option is required for all LDAP entities. If your organisation does not require a nickname/NetBIOS, then pass a blank key, for example: `"nickname": ""`.

### LDAP GSSAPI bind options

`directoryservicetype`

The type of directory service that you want to connect to. Either `activedirectory` or `openldap`.

`kerberosConfig`

The path to the Kerberos configuration file on the local computer. If you are installing into Active Directory, we don't recommend using the existing Kerberos configuration file or keytab file that may already be on the domain-joined computer. See Identity Store.

`kerberosKeytab`

The path to the Kerberos keytab file on the local computer. It is recommended that you create a keytab file with keys specifically for Tableau Server service and that you do not share the keytab file with other applications on the computer.

#### `kerberosPrincipal`

The service principal name for Tableau Server on the host machine. The keytab must have permission for this principal. Do not use an existing keytab for the system.

Rather, we recommend that you register a new service principal name. To see principals in a given keytab, run the `klist -k` command. See Understanding Keytab Requirements.

#### LDAP simple bind options

#### `directoryservicetype`

The type of directory service that you want to connect to. Either `activedirectory` or `openldap`.

#### `hostname`

The hostname of the LDAP server. You can enter a hostname or an IP address for this value. The host that you specify here will be used for user/group queries on the primary domain only. If user/group queries are in other domains (not in the primary domain), Tableau Server will not use this value, but instead will query DNS to identify the appropriate domain controller.

#### `port`

Use this option to specify the non-secure port of the LDAP server. Plaintext is usually 389.

#### `sslPort`

Use this option to enable LDAPS. Specify the secure port of the LDAP server. LDAPS is usually port 636. To use LDAPS you must also specify hostname option. See Configure Encrypted Channel to LDAP External Identity Store.



### username

The user name that you want to use to connect to the directory service. The account that you specify must have permission to query the directory service. For Active Directory, enter the username, for example, `j.smith`. For LDAP servers, enter the distinguished name (DN) of the user that you want to use to connect. For example, you might enter `cn=username,dc=your-local-domain,dc=lan`.

### password

The password of the user that you want to use to connect to the LDAP server.

### Shared LDAP options

The following options can be set for generic LDAP, OpenLDAP, or Active Directory implementations.

### bind

The way that you want to authentication communication from the Tableau Server service to the LDAP directory service. Enter `gssapi` for GSSAPI (Kerberos).

### domain

In Active Directory environments, specify the domain where Tableau Server is installed, for example, `"example.lan"`.

For non-AD LDAP: the string you enter for this value is displayed in the "Domain" column of user management tools. You can enter an arbitrary string, but the key cannot be blank.

### root

LDAP only. Do not specify for Active Directory.

If you do not use a dc component in the LDAP root or you want to specify a more complex root you need to set the LDAP root. Use the `"o=my,u=root"` format. For example, for the domain, `example.lan`, the root would be `"o=example,u=lan"`.

### membersRetrievalPageSize

This option determines the maximum number of results returned by an LDAP query.

For example, consider a scenario where Tableau Server is importing an LDAP group that contains 50,000 users. Attempting to import such a large number of users in a single operation is not a best practice. When this option is set to 1500, Tableau Server imports the first 1500 users in the first response. After those users are processed, Tableau Server requests the next 1500 users from the LDAP server, and so forth. We recommend that you modify this option only to accommodate the requirements of your LDAP server.

#### `identityStoreSchemaType` options

If you configure an LDAP connection to an LDAP server, you can enter schema information specific to your LDAP server in the `identityStoreSchemaType` object.

**Important** If you are connecting to Active Directory ("`directoryServiceType`": "`activedirectory`"), then do not configure these options.

#### `userBaseFilter`

The filter that you want to use for users of Tableau Server. For example, you might specify an object class attribute and an organisation unit attribute.

#### `userUsername`

The attribute that corresponds to user names on your LDAP server.

#### `userDisplayName`

The attribute that corresponds to user display names on your LDAP server.

#### `userEmail`

The attribute that corresponds to user email addresses on your LDAP server.

#### `userCertificate`

The attribute that corresponds to user certificates on your LDAP server.

## Tableau Server on Windows Help

`userThumbnail`

The attribute that corresponds to user thumbnail images on your LDAP server.

`userJpegPhoto`

The attribute that corresponds to user profile images on your LDAP server.

`groupBaseFilter`

The filter that you want to use for groups of users of Tableau Server. For example, you might specify an object class attribute and an organisation unit attribute.

`groupName`

The attribute that corresponds to group names on your LDAP server.

`groupEmail`

The attribute that corresponds to group email addresses on your LDAP server.

`groupDescription`

The attribute that corresponds to group descriptions on your LDAP server.

`member`

The attribute that describes the list of users in a group.

`distinguishedNameAttribute`

The attribute that stores the distinguished names of users. This attribute is optional, but it greatly improves the performance of LDAP queries.

`serverSideSorting`

Whether the LDAP server is configured for server-side sorting of query results. If your LDAP server supports server-side sorting, set this option to `true`. If you are unsure whether your LDAP server supports this, enter `false`, as misconfiguration may cause errors.

`rangeRetrieval`

Whether the LDAP server is configured to return a range of query results for a request. This means that groups with many users will be requested in small sets instead of all at once. LDAP servers that support range retrieval will perform better for large queries. If your LDAP server supports range retrieval, set this option to `true`. If you are unsure whether your LDAP server supports range retrieval, enter `false`, as misconfiguration may cause errors.

`groupClassNames`

By default Tableau Server looks for LDAP group object classes containing the string “group”. If your LDAP group objects do not fit the default class name, override the default by setting this value. You can provide multiple classnames separated by commas. This option takes a list of strings, which requires passing each class in quotes, separated by a comma (no space) and within brackets. For example:

```
[ "basegroup", "othergroup" ].
```

`userClassNames`

By default Tableau Server looks for LDAP user object classes containing the string “user” and “inetOrgPerson”. If your LDAP user objects do not use these default class names, override the default by setting this value. You can provide multiple classnames separated by commas. This option takes a list of strings, which requires passing each class in quotes, separated by a comma (no space) and within brackets. For example:

```
[ "userclass1", "userclass2" ].
```

## Importing the JSON file

After you have finished editing the JSON file, pass the file and apply settings with the following commands:

```
tsm settings import -f path-to-file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the

`--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## kerberosSettings Entity

Before you configure Kerberos authentication, review Kerberos Requirements.

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f /path/to/file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Configuration template

Use this template to configure Kerberos settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

After you have finished with the initial configuration of Kerberos authentication, use the `tsm authentication kerberos <commands>` sub-category to set additional values.

```
{  
  "configEntities": {
```

```

    "kerberosSettings": {
        "_type": "kerberosSettingsType",
        "enabled": "true",
        "keytabFile": "/path/to/keytab_file"
    }
}

```

## Configuration file reference

The following list includes all of the options that can be included with the "kerberosSettings" entity set.

Option

Value

enabled

Options: true or false.

Enables Kerberos authentication.

keytabFile

Required.

Path to valid Kerberos keytab file.

dbClasses

Comma-separated list of database classes for global credentials. May be required for connecting to Cloudera data sources.

## mutualSSLSettings Entity

Before you configure mutual SSL, review [Configure SSL for External HTTP Traffic to and from Tableau Server](#).

The `mutualSSLSettings` entity combines both SSL and mutual SSL configuration. Mutual SSL requires that external SSL has been enabled and properly configured.

The TSM entities use JSON and key-value pairs. Use the configuration file template below to create a `.json` file. Provide values for the appropriate keys for your environment, and then pass the `.json` file to Tableau Server with the following commands:

```
tsm settings import -f <path-to-file.json>
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### Configuration template

Use this template to configure mutual SSL settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

```
{
  "configEntities": {
    "mutualSSLSettings": {
      "_type": "mutualSSLSettingsType",
      "sslEnabled": true,
      "proxyLogin": false,
      "clientCertRequired": true,
```

```

    "caCertFile": "required",
    "keyFileName": "required",
    "keyPassphrase": "",
    "chainFile": "",
    "revocationFile": "",
    "redirect": false,
    "fallbackToPassword": true,
    "protocols": "",
    "cipherSuite": "",
    "forceHttpsForPublicEmbed": false
  }
}
}

```

## Configuration file reference

`sslEnabled`

Enable SSL. This is a prerequisite to enabling mutual SSL.

`clientCertRequired` (MutualSSL)

Set to true to enable mutual SSL authentication. Set to false to disable.

`caCertFile` (MutualSSL)

Required.

Specify the CA-issued certificate file for two-way SSL. The file path must be readable by Tableau Server.

`certFileName`

Specify the file that contains the concatenation of PEM encoded CA certificates that form the certificate chain for the server certificate.



Alternatively the referenced file can be the same as `caCertFile` when the CA certificates are directly appended to the server certificate for convenience.

`keyFileName`

If the key is not combined with the certificate, use this configuration key to point to the key file. If you have both an RSA and a DSA private key, you can configure both in parallel (for example, to also allow the use of DSA ciphers).

`keyPassphrase`

Optional. Passphrase for the certificate file. The passphrase you enter will be encrypted while at rest.

**Note:** If you create a certificate key file with a passphrase, you cannot reuse the SSL certificate key for SAML.

`revocationFile`

Specifies the file path for an SSL CA Certificate Revocation List (.crl) file.

`Redirect`

Default: `true`. Specifies whether Tableau Server should redirect http requests as https requests to the appropriate endpoint.

`clientCertMapping` (MutualSSL)

Specifies the method for retrieving the user name from the certificate.

Accepted values: `ldap`, `upn`, `cn`

- For a server using local authentication, the default setting is `upn`(User Principal Name).
- When Tableau Server authentication is configured for Active Directory (AD), the

default is `ldap` (Lightweight Directory Access Protocol). This tells the server to go to AD to validate the user, and it ignores the names inside the certificate.

You can set `cn` for either authentication type to use the CN in the Subject DN in the certificate.

For more information, see [Mapping a Client Certificate to a User During Mutual Authentication](#).

`fallbackToPassword (MutualSSL)`

Set to true to give users the option to sign in to Tableau Server through their username and password if mutual SSL authentication fails. Set to false to disallow this fallback option.

`protocols`

List the Transport Layer Security (TLS) protocol versions you want to allow or disallow.

Default value: `"all -SSLv2 -SSLv3"`

However, we recommend the using the following setting:

`"all -SSLv2 -SSLv3 -TLSv1 -TLSv1.1"`

For more information, see `tsm security external-ssl enable`. For general information, see the [Apache online documentation](#).

`cipherSuite`

List ciphers to allow or disallow for SSL.

Default value:

`"HIGH:MEDIUM:!aNULL:!MD5:!RC4:!3DES:!CAMELLIA:!IDEA:!SEED"`

See the [OpenSSL ciphers](#) page for cipher list format. Use caution when changing this option. The default values disallow ciphers that are no longer considered adequately secure.

`proxyLogin`

Default: false. Indicates that Tableau Server uses a proxy for SSL on sign-in only. It controls the protocol the server reports to Tableau Desktop for sign-in APIs.

`forceHTTPForPublicEmbed`

Default value: false. Forces the code for embedded views to use SSL.

## openIDSettings Entity

Before you configure OpenID authentication, review Requirements for Using OpenID Connect.

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f path-to-file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Configuration template

Use this template to configure OpenID settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

After you have finished with the initial configuration of OIDC, use the tsm authentication openid <commands> sub-category to set additional values.

```
{
  "configEntities": {
    "openIDSettings": {
      "_type": "openIDSettingsType",
      "enabled": true,
      "clientId": "required",
      "clientSecret": "required",
      "configURL": "required if staticFile value is not set",
      "staticFile": "required if configURL value is not set",
      "externalURL": "required"
    }
  }
}
```

## Configuration file reference

The following list includes all of the options that can be included with the "openIDSettings" entity set.

`_type`

Required.

Do not change.

`enabled`

Required.

Set to `true`.

`clientId`

Required.

## Tableau Server on Windows Help

Specifies the provider client ID that your IdP has assigned to your application. For example, "laakjwdlnaoiloadjkwha".

`clientSecret`

Required.

Specifies the provider client secret. This is a token that is used by Tableau to verify the authenticity of the response from the IdP. This value is a secret and should be kept securely.

For example, "fwahfkjaw72123=".

`configURL`

Required.

Specifies provider configuration URL. If you do not specify a configuration URL, then delete this option and specify a path and file name for `staticFile` instead.

`staticFile`

Required.

Specifies the local path to the static OIDC discovery JSON document. If you do not specify a static file, then delete this option and specify a url for `configURL` instead.

`externalURL`

Required.

The URL of your server. This is typically is the public name of your server, such as `http://example.tableau.com`.

`connectionTimeout`

Optional.

Specifies connection timeout span in seconds. Default is 10.

`readTimeout`

Optional.

Specifies read timeout span in seconds. Default is 30.

`ignoreDomain`

Set this to `true` if the following are true:

- You are using email addresses as usernames in Tableau Server
- You have provisioned users in the IdP with multiple domain names
- You want to ignore the domain name portion of the `email` claim from the IdP

Before you proceed, review the user names that will be used as a result of setting this option to `true`. User name conflicts may occur. In the case of a user name conflict, the risk of information disclosure is high. See Requirements for Using OpenID Connect.

`ignoreJWK`

Set this to `true` if your IdP does not support JWK validation. In this case, we recommend authenticating communication with your IdP using mutual TLS or another network layer security protocol. Default is `false`.

`customScope`

Specifies a custom scope user-related value that you can use to query the IdP. See Requirements for Using OpenID Connect.

`idClaim`

Change this value if your IdP does not use the `subclaim` to uniquely identify users in the ID token. The IdP claim that you specify should contain a single, unique string.

`usernameClaim`

Change this value to the IdP claim that your organisation will use to match user names as stored in Tableau Server.

`clientAuthentication`

Specifies custom client authentication method for OpenID Connect.

To configure Tableau Server to use the Salesforce IdP, set this value to `client_secret_post`.

`iFramedIDPEnabled`

Set to `true` to allow IdP displayed in an iFrame. The IdP must disable clickjack protection to allow iFrame presentation.

## samlSettings Entity

This article contains a template and reference for configuring server-wide SAML on Tableau Server, using a configuration file with keys and values for the `samlSettings` entity. This information supplements the SAML configuration steps in [Configure Server-Wide SAML](#).

To create a SAML configuration template and apply it to Tableau Server, complete the following steps:

1. Review the following two sections that describe the template and how it's structured (Template categories and definitions and `samlSettings` configuration template).
2. Paste the JSON code shown in the template into a new text file, and save it using a `.json` extension.
3. Use the SAML configuration entity reference to help you provide values where required.
4. Add optional key/value pairs specific to your environment. For example, if your SAML certificate key file requires a passphrase, you will need to specify the password in the

`wgserver.saml.key.passphrase` parameter using the `tsm configuration set command`.

5. Pass the configuration file to Tableau Server.

## Template categories and definitions

The template uses placeholders for each key value. These placeholders are categorised as follows:

- **Required:** Attributes with the `"required"` value must be replaced with valid data before you run the configuration command. Review the configuration file reference for valid values.
- **Hard-coded:** Attribute names that are prepended with an underscore (`_`), for example `"_type"` hold hard-coded values. Do not change these values.
- **Default values:** Attributes that are set to a value that is not `"required"` are default values. These are required attributes that you can change as appropriate for your environment.
- **Empty sets:** Values that are empty (`""`) can be passed as they are, or you can provide a value for your installation.

**Important:** All entity options are case sensitive.

## samlSettings configuration template

Paste this code into a text file and customise it for your environment, using the reference below.

```
{
  "configEntities": {
    "samlSettings": {
      "_type": "samlSettingsType",
```



```
    "enabled": true,  
    "returnUrl": "required",  
    "entityId": "required",  
    "certFile": "required",  
    "keyFile": "required",  
    "idpMetadataFile": "required",  
    "idpDomainAttribute": "",  
    "idpUsernameAttribute": "required"  
  }  
}  
}
```

## SAML configuration entity reference

The following list includes all of the options you can include with the "samlSettings" entity set.

### idpMetadataFile

Required. The path and file name for the XML file generated by the IdP. The XML metadata must include the user name attribute (assertion).

If you completed the steps described in [Configure Server-Wide SAML](#) the value you enter here would be:

```
"C:\ProgramData\Tableau\Tableau Server\data\saml\<metadata-  
file.xml>"
```

### enabled

true | false

Required. Indicates whether SAML authentication is enabled. Do not set this option to `true` before setting other required SAML configuration options.

`returnURL`

This is typically the external URL that Tableau Server users enter in their browser to access the server, such as `https://tableau_server.example.com`. This value is used to create the ACS URL attribute when configuring the IdP.

`entityId`

Required. Service provider (in this case, Tableau Server) entity ID value.

Identifies your Tableau Server configuration to the IdP. We recommend that you enter the same value as the `returnURL` option.

`idpUsernameAttribute`

Required. In the IdP metadata, find the attribute that is used to specify user name values, and enter the name of that attribute. Default is `username`.

`certFile`

Required. Enter the location and file name of the x509 certificate (.crt) file for SAML. For example:

`"C:\ProgramData\Tableau\Tableau Server\data\saml\<file.crt>"`

For more information, see [SAML Requirements and Configure Server-Wide SAML](#).

`keyFile`

Required. Specify the location of the private key (.key) file that accompanies the certificate file. For example:

`"C:\ProgramData\Tableau\Tableau Server\data\saml\<file.key>"`

**Note:** If you are using a RSA PKCS#8 key that requires a passphrase, you must set the passphrase using a `configKey` entity (see [Configuration File Example](#)) or

with `tsm` configuration set. The key for the passphrase using these methods is `wgserver.saml.key.passphrase`. The value must be a non-null string.

#### `idpDomainAttribute`

For organisations that use LDAP or Active Directory, this value specifies which SAML attribute Tableau Server will reference to determine the domain name. For example, if your IdP specifies the domain name in the `domain` attribute, then you would specify `domain` for this value. **Note:** For organisations that have users signing in from multiple domains, this value is required.

If you do not provide a value for this key, the value used depends on the Tableau Server identity store setting:

- For local identity store, the `idpDomainAttribute` value is ignored.
- For Active Directory or LDAP identity stores, Tableau uses the FQDN from the configuration setting `wgserver.domain.default`.

To get the value for `wgserver.domain.default`, you can run the following command:

```
tsm configuration get --key wgserver.domain.default
```

#### `desktopNoSAML`

true | false

Optional. Allow users to use SAML authentication when they sign in from Tableau Desktop.

By default this is not set, so the effective behaviour is equivalent to setting it to false. If single sign-on from Tableau client applications does not work with your IdP, you can set this to true to disable SAML authentication through Tableau Desktop.

`appNoSAML`

`true | false`

Optional. Allow using SAML to sign in from older versions of Tableau Mobile app. Devices running Tableau Mobile app version 19.225.1731 and higher ignore this option. To disable devices running Tableau Mobile app version 19.225.1731 and higher, disable SAML as a client login option on Tableau Server.

`logoutEnabled`

`true | false`

Optional. Enables single logout for users who have logged on with SAML. The default is `true`.

The IdP configuration metadata must include a single logout endpoint with POST binding.

This setting applies only for server-wide SAML

When set to `false`, Tableau Server will not attempt single logout.

`logoutUrl`

Optional. Enter the URL to redirect to after users sign out of the server. Setting this option requires that `logoutEnabled` is set to `true`.

By default this is the Tableau Server sign-in page. You can specify an absolute or a relative URL.

`maxAuthenticationAge`

Optional. Specifies the maximum number of seconds allowed between a user's authentication with the IdP and processing of the AuthNResponse message. The default value is -1, which means `maxAuthenticationAge` is unset or ignored by default. Prior to February 2022, the default value was 7200 (2 hours).

To optimise session length, use the same timeout value as is set on the IdP.

`maxAssertionTime`

Optional. Specifies the maximum number of seconds, from creation, that a SAML assertion is usable. Default value is 3000 (50 minutes).

`sha256Enabled`

`true | false`

Optional. The type of signature Tableau Server will use when sending messages to the IdP. When set to `true`, Tableau Server will sign messages with the SHA 256 signature algorithm. When set to `false`, Tableau Server will sign messages with SHA 1. Default is `true`.

This option sets the signature algorithm to the following messages that Tableau Server signs:

- AuthnRequest messages when `signRequests` is enabled.
- LogoutRequest messages if `logoutEnabled` is enabled.

`signRequests`

`true | false`

Optional. Specifies whether Tableau Server will sign the AuthnRequests that are sent to the IdP. Signed requests are not always necessary for all IdPs. We recommend signing requests to ensure the most secure option when configuring SAML. To verify whether your IdP accepts signed request, inspect the IdP metadata: if `wantAuthnRequestsSigned` is set to `true`, then your IdP will accept signed requests.

Default value is `true`. To disable signed requests, set this option to `false`.

`acceptableAuthnContexts`

Optional. Sets the `AuthNContextClassRef` SAML attribute. This optional attribute enforces validation of certain authentication 'contexts' in IdP initiated flows. Set a comma-separated set of values for this attribute. When this attribute is set, Tableau Server validates that the SAML response contains at least one of the values listed. If the

SAML response does not contain one of the configured values, authentication will be rejected, even if the user has successfully authenticated with the IdP.

Leaving this option blank will result in default behaviour: any successfully authenticated SAML response will result in a user being granted a session within Tableau Server.

`iFramedIdpEnabled`

`true | false`

Optional. Default value is `false`, meaning that when users select the sign-in button on an embedded view, the IdP's sign-in form opens in a pop-up window.

When you set it to `true`, and a server SAML user who is already signed in navigates to a web page with an embedded view, the user will not need to sign in to see the view.

You can set this to `true` only if the IdP supports signing in within an `iframe`. The `iframe` option is less secure than using a pop-up, so not all IdPs support it. If the IdP sign-in page implements clickjack protection, as most do, the sign-in page cannot display in an `iframe`, and the user cannot sign in.

If your IdP does support signing in via an `iframe`, you might need to enable it explicitly. However, even if you can use this option, it disables Tableau Server clickjack protection for SAML, so it still presents a security risk.

## Pass the configuration file to Tableau Server

After you have provided an appropriate value for each entity you include in the configuration template, use the following commands to pass the `.json` file and apply settings to Tableau Server.

```
tsm settings import -f path-to-file.json
```

```
tsm pending-changes apply
```

## See also

After you complete the initial SAML configuration, use `tsm authentication mutual-ssl <commands>` to set additional values.

For the command-line reference for configuring SAML, see `tsm authentication saml <commands>`.

## sapHanaSettings Entity

Use the `sapHanaSettings` entity to configure SAML delegation for SAP HANA.

Review [Configure SAP HANA SSO](#) before you continue.

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f path-to-file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

### SAP HANA SAML settings

The settings in the template below specify the settings for Tableau Server in a SAML delegation scenario with SAP HANA.

## Configuration template

Use this template to configure trusted authentication settings.

All that are referenced in configEntities must be located on the local computer. Do not specify UNC paths.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

```
{
  "configEntities": {
    "sapHanaSettings": {
      "_type": "sapHanaSettingsType",
      "enabled": "true",
      "usernameFormat": "username",
      "usernameCase": "preserve",
      "certFile": "path-to-cert_file",
      "keyFile": "path-to-key_file"
    }
  }
}
```

## Configuration file reference

This table includes all of the options that can be included with the "gatewaySettings" entity set.

enabled

Required.

**Values:** true or false

usernameFormat

**Values:** username, domain\_and\_username, or email



Specifies user name credential format.

`usernameCase`

**Values:** `lower`, `upper`, or `preserve`

Specifies user input name case.

`certFile`

Specifies file path and name for the certificate file on the local computer.

For example, "`c:\\Program Files\\Tableau\\Tableau Server-\\SAML\\saml_cert.crt`".

`keyFile`

Specifies file path and name for the certificate key on the local computer.

For example, "`c:\\Program Files\\Tableau\\Tableau Server-\\SAML\\saml_key.der`".

## shareProductUsageDataSettings Entity

Before you configure this entity, see Product usage data to better understand the behavioural and usage data that Tableau collects. (Your confidential database values are never included.)

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f /path/to/file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--`

`ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes` apply.

## Configuration template

Use this template to configure product usage data settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

```
{
  "configEntities": {
    "shareProductUsageDataSettings": {
      "_type": "shareProductUsageDataSettingsType",
      "enabled": "true"
    }
  }
}
```

## Configuration file reference

The following list includes all of the options that can be included with the `"shareProductUsageDataSettings"` entity set:

`_type`

**Required value:** `shareProductUsageDataSettingsType`

`enabled`

**Options:** `true` or `false`

The default, `true`, shares product usage data from your server with Tableau.

## trustedAuthenticationSettings Entity

Before you configure trusted authentication, review Trusted Authentication.

Use the configuration file template below to create a json file. After you have filled in the options with the appropriate values, pass the json file and apply settings with the following commands:

```
tsm settings import -f /path/to/file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Configuration template

Use this template to configure trusted authentication settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

After you have finished with the initial configuration of trusted authentication, use the `tsm authentication trusted <commands> sub-category` to set additional values.

```
{
  "configEntities": {
    "trustedAuthenticationSettings": {
      "_type": "trustedAuthenticationSettingsType",
      "trustedHosts": ["webserv1", "webserv2", "webserv3"]
    }
  }
}
```

```

    }
}

```

## Configuration file reference

The following list includes all of the options that can be included with the "trustedAuthenticationSettings" entity set.

### trustedHosts

Required.

IP address or host names of web servers that request trusted tickets from Tableau Server.

This option takes a list of strings, which requires passing each IP or host in quotes, separated by a comma (no space) and within brackets. For example:

```
[ "192.168.1.101", "192.168.1.102", "192.168.1.103" ] or [ "web-serv1", "webserv2", "webserv3" ].
```

The values you specify overwrite previous settings. Therefore, you must include the full list of hosts when you configure this value.

### tokenLength

Optional.

The value can be set to any integer between 9 and 255, inclusive.

Determines the number of characters in each trusted ticket. The default setting of 24 characters provides 144 bits of randomness. This option is ignored unless `useV2Tickets` is set to `true`, which is not a recommended best practice.

### logLevel

Optional.

```
all | debug | info | warn | error | fatal | off
```

Default: `info`

Specifies logging level for processes related to creating and redeeming trusted tickets.  
See [Change Logging Levels](#).

`timeoutInSeconds`

Optional.

Default: `180`

Specifies the length of time (in seconds) to invalidate trusted tickets after they are created.

`tryCount`

Optional.

Integer.

Default: `10`

Specifies the number of times to attempt to create a trusted ticket entry.

`use9DigitToken`

Optional.

`true | false`

Default: `false`

When set to `true`, tickets are 9 digits long (as in version 8.0 and earlier) and the option `tokenLength` is ignored. This option is intended for temporary support of legacy code.

**Warning:** Setting this option to `true` severely and negatively impacts the security strength of trusted ticket authentication.

useV2Tickets

Optional.

`true | false`

Default: `false`

Specifies whether Tableau Server should return a legacy URL format for trusted ticket requests. The legacy URL format includes a 24 character, Base64-encoded string. Beginning with Tableau Server 10.3, the URL that is returned has been updated and includes a Base64-encoded UUID and a 24 character secure random string. Only set option this to `true` if you have deployed trusted tickets with custom code that requires the legacy URL format. We recommend instead, updating your custom code to accept the new URL format.

□

## web-data-connector-settings Entity

This entity is used to manage web data connector (WDC) settings. To learn more about using WDCs in Tableau Server, see [Web Data Connectors in Tableau Server](#) and [tsm data-access](#).

Use the configuration file template below to create a `.json` file. After you have filled in the options with the appropriate values, pass the `.json` file and apply settings with the following commands:

```
tsm settings import -f /path/to/file.json
```

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Web data connector settings

The web data connector (WDC) settings in the template below specify whether WDCs are enabled, whether refresh of WDCs is enabled, and the primary and secondary safe lists. The safe lists indicate which WDC URLs are approved for use in your Tableau Server installation, and the domains or URLs that a connector can send requests to and receive requests from.

## Configuration template

Use this template to configure the WDC settings.

**Important:** All entity options are case sensitive.

For more explanation about configuration files, entities and keys see Configuration File Example.

## Single WDC

```
{
  "configEntities": {
    "web-data-connector-settings": {
      "_type": "webDataConnectorSettingsType",
      "refreshEnabled": true,
      "whitelist": {
        "https://www.example.com:443/wdc/": {
          "secondaryWhitelist": [
            "https://www.example.com/*.\"",
            "https://www.coolapi.com/*.\""
          ]
        }
      },
      "enabled": true
    }
  }
}
```

## Multiple WDCs

```
{
  "configEntities": {
    "web-data-connector-settings": {
      "_type": "webDataConnectorSettingsType",
      "refreshEnabled": true,
      "whitelist": {
        "https://www.example.com:443/wdc/": {
          "secondaryWhitelist": [
            "https://www.example.com/.*"
          ]
        },
        "https://www.mysite.com:443/coolwdc/": {
          "secondaryWhitelist": [
            "https://www.mysite.com/.*",
            "https://www.coolapi.com/.*"
          ]
        }
      },
      "enabled": true
    }
  }
}
```

### Configuration file reference

This table includes all of the options that can be included with the `web-data-connector-settings` entity set.

`_type`

Required.



## Tableau Server on Windows Help

**Value:** `webDataConnectorSettingsType`

Do not change.

`refreshEnabled`

Set to `false` to disable refresh of WDCs. Defaults to `true`.

`whitelist`

Required.

Can contain one or more matching sets of safe lists and secondary safe lists (one set per WDC). The first URL provided is the safe list, where you specify the WDC URL and port, formatted as follows:

`<scheme>://<host>:<port>/<path>`

For many WDCs, the `<port>` value is 443, which is the default port for HTTPS, but you can check the value for your connector by looking at the data source details on Tableau Server or Tableau Cloud.

`secondaryWhitelist`

Required.

Specifies the domains or URLs that a connector can send requests to and receive requests from, for example, external JavaScript libraries, REST APIs or local files. To add an entire domain to this secondary safe list, you can use a wildcard expression `. *` at the end of the URL, as shown in the following example:

`https://www.example.com/. *`

`enabled`

Set to `false` to disable use of WDCs. Defaults to `true`.

## tabcmd

**Note:** The tabcmd command-line utility version 2.0 is available at [Tableau tabcmd](#). This new version allows you to run tabcmd commands on MacOS and Linux, and to authenticate using personal access tokens (PATs). Version 2.0 is built on public endpoints available in the Python-based Tableau Server Client (TSC). This latest version has limited support for Tableau Server.

Tableau provides the tabcmd command-line utility that you can use to automate site administration tasks on your Tableau Server site. For example, creating or deleting users, projects and groups.

**Note:** The tabcmd utility is included with Tableau Server and is automatically installed on the server nodes. However, its installer is not included, so if you want to run tabcmd on computers that are not part of your Tableau Server installation, you need to download the installer from the Tableau website. For more information, see [Install tabcmd](#) below.

## Install tabcmd

**Note:** These instructions are for installing the tabcmd 1.0 command-line utility. To install the tabcmd 2.0 command-line utility, go to [Tableau tabcmd](#) (new window).

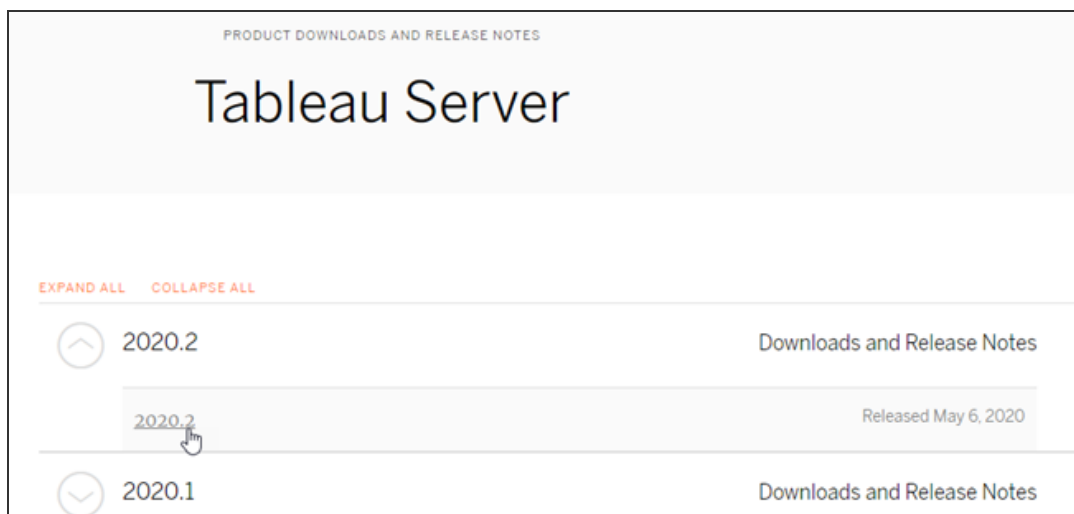
When Tableau Server or Tableau Cloud is upgraded to a new version, if an updated version of tabcmd is required, you can download it from the [Tableau Server Releases](#) page on the Tableau website.

For Tableau Server, we recommend you download the version that matches your server version. For Tableau Cloud, we recommend you always download the latest version to avoid issues caused by version incompatibilities. In either case, using an out of date version of tabcmd can cause errors and unpredictable results.

## Tableau Server on Windows Help

1. Open a web browser and go to the [Tableau Server Releases](#) page. Go to this page even if you use Tableau Online.
2. If you're using:
  - **Tableau Cloud**, use [Tableau tabcmd 2.0](#) (new window).
  - **Tableau Server (Windows or Linux)**: select the release that matches your server version.

In either case, if the expanded information shows maintenance releases, select the latest maintenance release or the one that matches your server version.



This takes you to the release notes page, called Resolved Issues, where you can read about security improvements and resolved issues.

3. Scroll to the **Download Files** section under the resolved issues, select the tabcmd download link that is compatible with the computer on which you'll run the tabcmd commands.

## Download Files

### Windows

- [TableauServerTabcmd-64bit-2020-1-3.exe \(93 MB\)](#)
- [TableauServer-64bit-2020-1-3.exe \(1540 MB\)](#)

### Linux

- [tableau-tabcmd-2020-1-3.noarch.rpm \(10 MB\)](#)
- [tableau-tabcmd-2020-1-3\\_all.deb \(10 MB\)](#)
- [tableau-server-2020-1-3.x86\\_64.rpm \(1647 MB\)](#)
- [tableau-server-2020-1-3\\_amd64.deb \(1649 MB\)](#)

The remaining steps refer to this computer as “the tabcmd computer.”

4. Save the installer to the tabcmd computer, or a location accessible from that computer .
5. Complete the installation steps as appropriate for the operating system of the tabcmd computer:

### • Windows

By default tabcmd is installed to `C:\Program Files\Tableau\Tableau Server\<version>\extras\Command Line Utility`. You can change this during installation and recommend that you install tabcmd to a folder named `tabcmd` at the root of the `C:\` drive (`C:\tabcmd`). This can make it easier to locate and run, and will accommodate some limitations with the Windows operating system if you add the tabcmd directory to the Windows PATH.

**Note** The tabcmd Setup program does not add the tabcmd directory to the Windows PATH variable. You can add it manually, or you can include the full path to tabcmd each time you call it.

You can install tabcmd in two ways on Windows:

- Double-click the installer to follow the steps in the UI:
  - a. Accept the licence agreement.
  - b. If you want to install to a non-default location, click **Customise** and type or browse to the location you want to install tabcmd to.
  - c. Click **Install**.

If you are prompted by Windows Defender Firewall or User Account Control, click **Allow access**.

- Run the installer from a command prompt:
  - a. Open a command prompt as administrator on the tabcmd computer.
  - b. Navigate to the directory where you copied the tabcmd installer.
  - c. Install tabcmd:

```
tableau-setup-tabcmd-tableau-<version_code>-  
x64.exe /quiet ACCEPTEULA=1
```

To install to a non-default location:

```
tableau-setup-tabcmd-tableau-<version_code>-  
x64.exe /quiet ACCEPTEULA=1 INSTALLDIR=  
R "<path\to\install\directory>"
```

For example:

```
tableau-setup-tabcmd-tableau-<version_code>-  
x64.exe /quiet ACCEPTEULA=1 INSTALLDIR=  
R "C:\tabcmd"
```

For a complete list of command line options you can use with the tabcmd installer, run the installer with a `/?`. For more information on

tabcmd installer command line options, see [Install Switches and Properties for tabcmd \(Windows\)](#).

The tabcmd Setup program creates logs in `C:\Users\<user>\AppData\Local\Temp` you can use if you have problems installing tabcmd. The logs use the naming convention `Tableau_Server_Command_Line_UTILITY_(<version_code>)_#####.log`.

## • Linux

**Note:** To run tabcmd on a Linux computer, you must have Java 11 installed. On RHEL-like systems, this will be installed as a dependency when you install tabcmd. On Ubuntu systems, you need to install Java 11 separately if it is not already installed.

As of July 2022, Debian distributions are no longer supported. For more information, see [this Tableau Community post](#).

- a. Log on as a user with sudo access to the tabcmd computer.
- b. Navigate to the directory where you copied the `.rpm` or `.deb` package that you downloaded.

- On RHEL-like distributions, including CentOS, run the following command:

```
sudo yum install tableau-tabcmd-<version>.noarch.rpm
```

- On Ubuntu, run the following command:

```
sudo apt-get install ./tableau-tabcmd-<version>_all.deb
```

To uninstall tabcmd from a Linux computer, see the documentation for the Linux variety you are running.

6. (Optional) Add the fully qualified location where tabcmd is installed to your system path to allow you to run tabcmd commands without changing to that location, or specifying the location with each command. Steps to do this depend on the type and version of your operating system. For more information, see [PATH\\_\(variable\)](#).

## How to use tabcmd

The basic steps for using tabcmd are as follows:

1. Open the Command Prompt as an administrator.

**Note:** Do not use PowerShell to run tabcmd commands on Windows. Using PowerShell can cause unexpected behaviour.

2. On a Windows computer, if you installed tabcmd on a computer other than the initial node, change to the directory where you installed tabcmd.

On a Linux computer, you do not need to change to the install directory.

3. Run the tabcmd command.

When you use tabcmd, you must establish an authenticated server session. The session identifies the server or Tableau Cloud site and the user running the session. You can start a session first, and then specify your command next, or you can start a session and execute a command all at once.

**Important:** If you are using `tabcmd` to perform more than one task, you must run tasks one after another (serially), rather than at the same time (in parallel).

Commands (such as `login`) and the options (such as `-s`, `-u`, etc.) are not case sensitive, but the values you provide (such as `User@Example.com`) are case sensitive.

## Examples

The following command demonstrates starting a session with the Tableau Server named *tab-server.mycompany.com*:

```
tabcmd login -s http://tabserver.mycompany.com -u admin -p mypassword
```

The next example shows a command that deletes a workbook named *Sales\_Workbook*:

```
tabcmd delete "Sales_Workbook"
```

Here's how to accomplish all of the above with one command – note that you do not need `login` here:

```
tabcmd delete "Sales_Workbook" -s http://tabserver.mycompany.com -u admin -p mypassword
```

A Tableau Server can run multiple sites. When a workbook is on the Default site of a multi-site server you don't need to specify Default, the above command is sufficient. However, if the command applies to something on a site other than Default, you need to specify the site ID for that site (see `login`). Here's the same command for a workbook that's on the West Coast Sales site (site ID `wsales`):

```
tabcmd delete "Sales_Workbook" -s http://tabserver.mycompany.com -t wsales -u admin -p mypassword
```

The options `-s`, `-t`, `-u`, and `-p` are among the `tabcmd` global variables, which can be used with any command.

For more information, see `tabcmd` Commands.



## Status messages and logs

When a command is successful, `tabcmd` returns a status code of zero. A full error message for non-zero status codes is printed to **stderr**. In addition, informative or progress messages may be printed to **stdout**.

A full log named **tabcmd.log** that includes debugging, progress and error messages is written to `C:\Users\<username>\AppData\Local\Tableau\.`

## tabcmd Commands

**Note:** The `tabcmd` command-line utility version 2.0 is available at [Tableau tabcmd](#). This new version allows you to run `tabcmd` commands on MacOS and Linux, and to authenticate using personal access tokens (PATs). Version 2.0 is built on public endpoints available in the Python-based Tableau Server Client (TSC). This latest version has limited support for Tableau Server.

Looking for Tableau Server on Linux? See [tabcmd Commands](#).

You can use the following commands with the `tabcmd` command line tool:

- `addusers` (to group)
- `createextracts`
- `creategroup`
- `createproject`
- `createsite`
- `createsiteusers`
- `createusers`
- `decryptextracts`
- `delete workbook-name or datasource-name`
- `deleteextracts`
- `deletegroup`
- `deleteproject`
- `deletesite`
- `deletesiteusers`

deleteusers  
editdomain  
editsite  
encryptextracts  
export  
get *url*  
initialuser  
listdomains  
listsites  
login  
logout  
publish  
publishsamples  
reencryptextracts  
refreshextracts  
removeusers  
reset\_openid\_sub  
runschedule  
set  
syncgroup  
upgradethumbnails  
validateidpmetadata  
version

## **addusers** *group-name*

Adds users to the specified group.

### **Example**

```
tabcmd addusers "Development" --users "users.csv"
```

## Options

`--users`

Add the users in the given `.csv` file to the specified group. The file should be a simple list with one user name per line. User names aren't case sensitive. The users should already be created on Tableau Server.

If you use this command with large `.csv` files on Tableau Server, a server administrator can enable settings that help improve performance.

For more information, see [CSV Import File Guidelines](#).

`--[no-]complete`

When set to `complete` this option requires that all rows be valid for any change to succeed. If not specified, `--complete` is used.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h`, `--help`

Displays the help for the command.

`-c`, `--use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## createextracts

Creates extracts for a published workbook or data source.

### Options

`-d, --datasource`

The name of the target data source for extract creation.

`--embedded-datasources`

A space-separated list of embedded data source names within the target workbook. Enclose data source names with double quotes if they contain spaces. Only available when creating extracts for a workbook.

`--encrypt`

Create encrypted extract.

`--include-all`

Include all embedded data sources within target workbook. Only available when creating extracts for workbook.

`--parent-project-path`

Path of the project that is the parent of the project that contains the target resource. Must specify the project name with `--project`.

`--project`

The name of the project that contains the target resource. Only necessary if `--workbook` or `--datasource` is specified. If unspecified, the default project 'Default' is used.

`-u, -url`

The canonical name for the resource as it appears in the URL.

`-w, -workbook`

The name of the target workbook for extract creation.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.



## Tableau Server on Windows Help

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### `creategroup` *group-name*

Creates a group. Use `addusers` (for local groups) to add users after the group has been created. Use `syncgroup` (for Active Directory groups) to create and synchronise a Tableau Server group with an Active Directory group.

#### Example

```
tabcmd creategroup "Development"
```

#### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

## Tableau Server on Windows Help

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

--

Specifies the end of options on the command line. You can use -- to indicate to `tabcmd` that anything that follows -- should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use -- in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## `createproject project-name`

Creates a project.

### Example

```
tabcmd createproject -n "Quarterly_Reports" -d "Workbooks showing  
quarterly sales reports."
```

### Options

`-n, --name`

Specifies the name of the project that you want to create.

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the `-n` option. For example, to specify a project called "Nested" that exists in a "Main" project, use the following syntax: `--parent-project-path "Main" -n "Nested"`.

## Tableau Server on Windows Help

`-d, --description`

Specifies a description for the project.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or "") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

## Tableau Server on Windows Help

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### `createsite` *site-name*

Creates a site.

#### Examples

Create a site named West Coast Sales. A site ID of `WestCoastSales` will be automatically created, the site will have no storage quota limit, and site administrators will be able to add and remove users:

```
tabcmd createsite "West Coast Sales"
```

Create a site named West Coast Sales with a site ID of `wsales`:

```
tabcmd createsite "West Coast Sales" -r "wsales"
```

Prevent site administrators from adding users to the site:

```
tabcmd createsite "West Coast Sales" --no-site-mode
```

Set a storage quota, in MB:

```
tabcmd createsite "West Coast Sales" --storage-quota 100
```

## Options

`-r, --url`

Used in URLs to specify the site. Different from the site name.

`--user-quota`

Maximum number of users that can be added to the site.

`--[no-]site-mode`

Allows or denies site administrators the ability to add users to or remove users from the site.

`--storage-quota`

In MB, the amount of workbooks, extracts and data sources that can be stored on the site.

`--extract-encryption-mode`

The extract encryption mode for the site can be **enforced**, **enabled** or **disabled**. For more information, see Extract Encryption at Rest.

`--run-now-enabled`

Allow or deny users from running extract refreshes, flows or schedules manually. **true** to allow users to run tasks manually or **false** to prevent users from running tasks manually. For more information, see Server Settings (General and Customisation).



### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is

saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### `createsiteusers` *filename.csv*

Adds users to a site, based on information supplied in a comma-separated values (CSV) file. If the user isn't already created on the server, the command creates the user before adding that user to the site.

The CSV file must contain one or more user names and can also include (for each user) a password, full name, licence type, administrator level, publisher (yes/no) and email address. For information about the format of the CSV file, see [CSV Import File Guidelines](#).

As an alternative to including administrator level and publisher permissions in the CSV file, you can pass access level information by including the `--role` option and specifying the site role you want to assign users listed in the CSV file.

By default, users are added to the site that you're logged in to. To add users to a different site, include the global `--site` option and specify that site. (You must have permissions to create users on the site you specify.)

If the server contains multiple sites, you can't add server (system) administrators through the `createsiteusers` command. Use `createusers` instead. If you specify the `Server-Administrator` site role for the `--role` option, the command returns an error. If the CSV file includes `System` as value for administrator, the value is ignored and the user is assigned the `Unlicensed licence` type.

If the server contains only one site (the default site), you can specify `system` for the administrator value for a user, or even assign the `ServerAdministrator` site role using the `--role` option, if you want all users in the CSV file to be server administrators.

By default, this command creates users using a synchronous operation (it waits for all operations to complete before proceeding). You can use the `--no-wait` option to specify an asynchronous operation.

#### Improving performance for large CSV files

A server administrator can use the `tabadmin set` command to enable settings that help to improve performance for large CSV files. For more information, see [Improve performance for large CSV files passed through tabcmd](#) in the [CSV Import File Guidelines](#) topic.

#### Local authentication

If the server is configured to use local authentication, the information in the CSV file is used to create users.

#### Active Directory authentication

If the server is configured to use Active Directory authentication, user information is imported from Active Directory, and password and friendly name information in the CSV file is ignored. Further, if a user is specified in the CSV file but no corresponding user exists in Active Directory, the user is not added to Tableau Server. For Active Directory users, because the user name is not guaranteed to be unique across domains, you must include the domain as part of the user name. You can specify this as either `domain\username` or `user-`

## Tableau Server on Windows Help

name@domain.com; however, we recommend using the domain\username format. For more information, see [User Management in Deployments with External Identity Stores](#).

### Example

```
tabcmd createsiteusers "users.csv" --role "Explorer"
```

### Options

--admin-type

Deprecated. Use the --role option instead.

--auth-type

Sets the authentication type (Local or SAML) for all users in the .csv file. If unspecified, the default is Local.

**Note:** To use SAML authentication, the site must be configured for site-specific SAML in Tableau Server settings. For information, see [Configure Site-Specific SAML](#).

--[no-]complete

Deprecated. Default error behaviour: if there are more than 3 errors within a ten-row span, then the command will fail.

--no-publisher

Deprecated. Use the --role option instead.

--nowait

Don't wait for asynchronous jobs to complete.

--publisher

Deprecated. Use the --role option instead.

`--role`

Specifies a site role for all users in the `.csv` file. When you want to assign site roles using the `--role` option, create a separate CSV file for each site role.

**Valid values are:** `ServerAdministrator`, `SiteAdministratorCreator`, `SiteAdministratorExplorer`, `SiteAdministrator`, `Creator`, `Explorer-CanPublish`, `Publisher`, `Explorer`, `Interactor`, `Viewer`, **and** `Unlicensed`.

The default is `Unlicensed` for new users and unchanged for existing users. Users are added as unlicensed also if you have a user-based server installation, and if the `createsiteusers` command creates a new user, but you have already reached the limit on the number of licences for your users.

**Note:** On a multi-site Tableau Server, if you want to assign the `Server-Administrator` site role using the `--role` option, use the `createusers` command instead of `createsiteusers`.

`--silent-progress`

Don't display progress messages for the command.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

## Tableau Server on Windows Help

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows



how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### `createusers filename.csv`

Create users in Tableau Server, based on information supplied in a comma-separated values (CSV) file.

The CSV file must contain one or more user names and can also include (for each user) a password, full name, licence type, administrator level, publisher (yes/no) and email address. For information about the format of the CSV file, see [CSV Import File Guidelines](#).

As an alternative to including administrator level and publisher permissions in the CSV file, you can pass access level information by including the `--role` option and specifying the site role you want to assign users listed in the CSV file.

If the server has only one site (the default site), the user is created and added to the site. If the server has multiple sites, the user is created but isn't added to any site. To add users to a site, use `createsiteusers`.

If you have a user-based server installation, and if the command creates a new user but you have already reached the limit on the number of licences for your users, the user is added as an unlicensed user.

#### Local authentication

If the server is configured to use local authentication, the information in the CSV file is used to create users.

#### Active Directory authentication

If the server is configured to use Active Directory authentication, user information is imported from Active Directory, and password and friendly name information in the CSV file is ignored. Further, if a user is specified in the CSV file but no corresponding user exists in Active

Directory, the user is not added to Tableau Server. For Active Directory users, because the user name is not guaranteed to be unique across domains, you must include the domain as part of the user name. You can specify this as either `domain\username` or `username@domain.com`; however, we recommend using the `domain\username` format. For more information, see [User Management in Deployments with External Identity Stores](#).

### Example

```
tabcmd createusers "users.csv" --role "ServerAdministrator"
```

```
tabcmd createusers "users.csv"
```

### Options

`--admin-type`

Deprecated. Use the `--role` option instead.

`--[no-]complete`

Deprecated. Default error behaviour: if there are more than 3 errors within a ten-row span, then the command will fail.

`--no-publisher`

Deprecated. Use the `--role` option instead.

`--nowait`

Don't wait for asynchronous jobs to complete.

`--publisher`

Deprecated. Use the `--role` option instead.

`-r, --role`

Specifies a site role for all users in the `.csv` file. When you want to assign site roles using the `--role` option, create a separate CSV file for each site role.

**Valid values are:** `ServerAdministrator`, `SiteAdministratorCreator`, `SiteAdministratorExplorer`, `SiteAdministrator`, `Creator`, `ExplorerCanPublish`, `Publisher`, `Explorer`, `Interactor`, `Viewer`, and `Unlicensed`.

On a multi-site server, the command doesn't assign the user to a site. Therefore, the only site roles the command can successfully assign are `ServerAdministrator` and `Unlicensed`. If you specify any other site role, the command assigns the `Unlicensed` role.

On a single-site server, the user is created and added to the default site using the role that you specify.

If you have a user-based server installation, and if the command creates a new user but you have already reached the limit on the number of licences for your users, the user is added as an unlicensed user.

`--silent-progress`

Don't display progress messages for the command.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h`, `--help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

## Tableau Server on Windows Help

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you

might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## decryptextracts

Decrypt all extracts on a site. If no site is specified, extracts on the default site will be decrypted. For more information, see [Extract Encryption at Rest](#).

Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

### Example

```
tabcmd decryptextracts "West Coast Sales"
```

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

## Tableau Server on Windows Help

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## ***delete workbook-name or datasource-name***

Deletes the specified workbook or data source from the server.



## Tableau Server on Windows Help

This command takes the name of the workbook or data source as it is on the server, not the file name when it was published.

### Example

```
tabcmd delete "Sales_Analysis"
```

### Options

`-r, --project`

The name of the project containing the workbook or data source you want to delete. If not specified, the “Default” project is assumed.

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the `-r` option. For example, to specify a project called "Nested" that exists in a "Main" project, use the following syntax: `--parent-project-path "Main" -r "Nested"`.

`--workbook`

The name of the workbook you want to delete.

`--datasource`

The name of the data source you want to delete.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either

## Tableau Server on Windows Help

an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## deleteextracts

Deletes extracts for a published workbook or data source.

### Options

`-d, --datasource`

The name of the target data source for extract deletion.

`--embedded-datasources`

A space-separated list of embedded data source names within the target workbook. Enclose data source names with double quotes if they contain spaces. Only available when deleting extracts for a workbook.

`--encrypt`

Create encrypted extract.

`--include-all`

Include all embedded data sources within target workbook.

`--parent-project-path`

## Tableau Server on Windows Help

Path of the project that is the parent of the project that contains the target resource.  
Must specify the project name with `--project`.

`--project`

The name of the project that contains the target resource. Only necessary if `--workbook` or `--datasource` is specified. If unspecified, the default project 'Default' is used.

`-u, -url`

The canonical name for the resource as it appears in the URL.

`-w, -workbook`

The name of the target workbook for extract deletion.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or "") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

**deletegroup *group-name***

Deletes the specified group from the server.

**Example**

```
tabcmd deletegroup "Development"
```

**Global options**

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`



## Tableau Server on Windows Help

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## `deleteproject` *project-name*

Deletes the specified project from the server.

Using `tabcmd`, you can specify only a top-level project in a project hierarchy. To automate tasks you want to perform on a project within a parent project, use the equivalent Tableau [REST API](#) call.

### Example

```
tabcmd deleteproject "Designs"
```

### Option

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the command. For example, to specify a project called "Designs" that exists in a "Main" project, use the following syntax: `--parent-project-path "Main" "Designs"`.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

## Tableau Server on Windows Help

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### **`deletesite`** *site-name*

Deletes the specified site from the server.

#### **Example**

```
tabcmd deletesite "Development"
```

#### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

--

Specifies the end of options on the command line. You can use -- to indicate to `tabcmd` that anything that follows -- should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use -- in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### `deletesiteusers filename.csv`

Removes users from the site that you're logged in to. The users to be removed are specified in a file that contains a simple list with one user name, per line. (No additional information is required beyond the user name.)

By default, if the server has only one site, or if the user belongs to only one site, the user is also removed from the server. On a Tableau Server Enterprise installation, if the server contains multiple sites, users who are assigned the site role of **Server Administrator** are removed from the site but aren't removed from the server.

If the user owns content, the user's role is change to **Unlicensed**, but the user isn't removed from the server or the site. The content is still owned by that user. To remove the user completely, you must change the owner of the content and then try removing the user again.

If the user was imported from Active Directory, the user is removed from the site and possibly from the server. However, the user isn't deleted from Active Directory.

### Example

```
tabcmd deletesiteusers "users.csv"
```



### Improving performance for large CSV files

A server administrator can use the `tabadmin set` command to enable settings that help to improve performance for large CSV files. For more information, see [Improve performance for large CSV files passed through tabcmd](#) in the [CSV Import File Guidelines](#) topic.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

## Tableau Server on Windows Help

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### **`deleteusers filename.csv`**

Deletes the users listed in the specified comma-separated values (`.csv`) file.

The `.csv` file should contain a simple list of one user name per line.

#### **Example**

```
tabcmd deleteusers "users.csv"
```

## Options

`--[no-]complete`

When set to `--complete` this option requires that all rows be valid for any change to succeed. If not specified, `--complete` is used.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

## Tableau Server on Windows Help

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## editdomain

**Note:** As a best practice, you should back up Tableau Server before you edit the domain. The domain is saved in the Tableau repository, and, if it's incorrectly changed, administrators may not be able to sign in.

Changes the nickname or full domain name of an Active Directory domain on the server. A domain “nickname” is the Windows NetBIOS domain name.

## Tableau Server on Windows Help

You can modify the nickname for any domain the server is using. In general, you can modify the full domain name for any domain except the one that you used to sign in. However, if the user name that you're currently signed in with exists in both the current domain and the new domain, you can modify the full name for the current domain.

To ensure that Tableau Server can connect to other Active Directory domains, you must also specify secondary domains that Tableau Server connects to by setting the `wgserver.domain.whitelist` option with TSM. For more information about secondary domains and configuring the connection, see `wgserver.domain.allowlist`.

Review [User Management in Deployments with External Identity Stores](#) to understand how multiple domains, domain name mapping, and user names interact with Tableau Server.

To see a list of domains, use [listdomains](#).

### Examples

```
tabcmd editdomain --id 2 --nickname "new-nickname"
```

```
tabcmd editdomain --id 3 --name "new-name"
```

### Options

`--id`

The ID of domain to change. To get a list of domain IDs, use [listdomains](#).

`--name`

The new name for the domain.

`--nickname`

The new nickname for the domain.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`



## Tableau Server on Windows Help

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is

saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## ***editsite site-name***

Changes the name of a site or its web folder name. You can also use this command to allow or deny site administrators the ability to add and remove users, or prevent users from running certain tasks manually. If site administrators have user management rights, you can specify how many users they can add to a site.

### **Examples**

```
tabcmd editsite wc_sales --site-name "West Coast Sales"
```

```
tabcmd editsite wc_sales --site-id "wsales"
```

```
tabcmd editsite wsales --status ACTIVE
```

```
tabcmd editsite wsales --user-quota 50
```

## Options

`--site-name`

The name of the site that is displayed.

`--site-id`

Used in the URL to uniquely identify the site.

`--user-quota`

Maximum number of users who can be members of the site.

`--[no-]site-mode`

Allow or prevent site administrators from adding users to the site.

`--status`

Set to `ACTIVE` to activate a site, or to `SUSPENDED` to suspend a site.

`--storage-quota`

In MB, the amount of workbooks, extracts and data sources that can be stored on the site.

`--extract-encryption-mode`

The extract encryption mode for the site can be **enforced**, **enabled** or **disabled**. For more information, see [Extract Encryption at Rest](#). Depending on the number and size of extracts, this operation may consume significant server resources.

`--run-now-enabled`

Allow or deny users from running extract refreshes, flows or schedules manually. **true** to allow users to run tasks manually or **false** to prevent users from running tasks manually. For more information, see [Server Settings \(General and Customisation\)](#).

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

## Tableau Server on Windows Help

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## encryptextracts

Encrypt all extracts on a site. If no site is specified, extracts on the default site will be encrypted. For more information, see [Extract Encryption at Rest](#).

Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

### Example

```
tabcmd encryptextracts "West Coast Sales"
```

### Global options

## Tableau Server on Windows Help

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or "") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`



Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

--

Specifies the end of options on the command line. You can use -- to indicate to `tabcmd` that anything that follows -- should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use -- in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## export

Exports a view or workbook from Tableau Server and saves it to a file. This command can also export just the data used for a view. View data is exported at the summary level. To export detail-level data, you must use the Tableau Server UI. For details, see [Download Views and Workbooks](#).

Note the following when you use this command:

- **Permissions:** To export, you must have the **Export Image** permission. By default, this permission is Allowed or Inherited for all roles, although permissions can be set per workbook or view.
- **Exporting data:** To export just the data for a view, use the `--csv` option. This exports the summary data used in a view to a .csv file.
- **Specifying the view, workbook, or data to export:**
  - Use part of the URL to identify what to export, specifically the `"workbook/view"` string as it appears in the URL for the workbook or view. Don't use the "friendly name", and exclude the `:iid=<n>` session ID at the end of the URL.

For example, the Tableau sample view *Order Details* in the *Superstore* workbook has a URL similar to this: `<server_name>/#/views/Superstore/OrderDetails?:iid=2`

To export the *Order Details* view, use the string `Superstore/OrderDetails`.

Do *not* use `Superstore/Order Details`, or `Superstore/OrderDetails?:iid=2`.

- If the server is running multiple sites and the view or workbook is on a site other than Default, Use `-t <site_id>`.
- To export a workbook, get the URL string by opening a view in the workbook, and include the view in the string you use.

In the above example, to export the *Superstore* workbook, use the string `Superstore/OrderDetails`.

- To export a workbook, it must have been published with **Show Sheets as Tabs** selected in the Tableau Desktop Publish dialog box.

**Note:** The Tableau workbook that contains the **administrative views** can't be exported.

- To filter the data you download, add a parameter filter using this format:

```
?<filter_name>=value
```

or, if filtering on a parameter and that parameter has a display name that matches the name of a measure or dimension:

```
?Parameters.<filter_name>=value
```

- **The saved file's format:** Your format options depend on what's being exported. A workbook can only be exported as a PDF using the `--fullpdf` argument. A view can be exported as a PDF (`--pdf`) or a PNG (`--png`).

- **The saved file's name and location** (optional): If you don't provide a name, it will be derived from the view or workbook name. If you don't provide a location, the file will be saved to your current working directory. Otherwise, you can specify a full path or one that's relative to your current working directory.

**Note:** You must include a file name extension such as `.csv` or `.pdf`. The command doesn't automatically add an extension to the file name that you provide.

- **Dashboard web page objects not included in PDF exports:** A dashboard can optionally include a web page object. If you're performing an export to PDF of a dashboard that includes a web page object, the web page object won't be included in the PDF.
- **Non-ASCII and non-standard ASCII characters and PDF exports:** If you're exporting a view or workbook with a name that includes a character outside the ASCII character set, or a non-standard ASCII character set, you need to URL encode (percent-encode) the character.

For example if your command includes the city Zürich, you will need to URL encode it as `Z%C3%BCrich`:

```
tabcmd export "/Cities/Sheet1?locationCity=Z%C3%BCrich" -full-pdf
```

## Clearing the Cache to Use Real-Time Data

You can choose to add the URL parameter `? :refresh=yes` to force a fresh data query instead of pulling the results from the cache. If you're using `tabcmd` with your own scripting and the `refresh` URL parameter is being used a great deal, this can have a negative impact on performance. It is recommended that you use `refresh` only when real-time data is required – for example, on a single dashboard instead of on an entire workbook.

## Examples

**Views**

```
tabcmd export "Q1Sales/Sales_Report" --csv -f "Weekly-Report.csv"
```

```
tabcmd export -t Sales "Sales/Sales_Analysis" --pdf -f "C:\Tableau_
Workbooks\Weekly-Reports.pdf"
```

```
tabcmd export "Finance/InvestmentGrowth" --png
```

```
tabcmd export "Finance/InvestmentGrowth?:refresh=yes" --png
```

**Workbooks**

```
tabcmd export "Q1Sales/Sales_Report" --fullpdf
```

```
tabcmd export "Sales/Sales_Analysis" --fullpdf --pagesize tabloid -
f "C:\Tableau_Workbooks\Weekly-Reports.pdf"
```

**Options**

**-f, --filename**

Saves the file with the given filename and extension.

**--csv**

View only. Export the view data (summary data) in .csv format.

**--pdf**

View only. Export as a PDF.

**--png**

View only. Export as an image in .png format.

**--fullpdf**

## Tableau Server on Windows Help

Workbook only. Export as a PDF. The workbook must have been published with **Show Sheets as Tabs** enabled.

`--pagelayout`

Sets the page orientation (`landscape` or `portrait`) of the exported PDF. If not specified, its Tableau Desktop setting will be used.

`--pagesize`

Sets the page size of the exported PDF as one of the following: `unspecified`, `letter`, `legal`, `note folio`, `tabloid`, `ledger`, `statement`, `executive`, `a3`, `a4`, `a5`, `b4`, `b5`, or `quarto`. Default is `letter`.

`--width`

Sets the width in pixels. Default is 800 px.

`--height`

Sets the height in pixels. Default is 600 px.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or "") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## get url

Gets the resource from Tableau Server that is represented by the specified (partial) URL. The result is returned as a file.

Note the following when you use this command:

- **Permissions:** To get a file, you must have the **Download/Web Save As** permission. By default, this permission is allowed or inherited for all roles, although permissions can be set per workbook or view.
- **Specifying a view or workbook to get:** You specify a view to get using the `"/views/<workbookname>/<viewname>.<extension>"` string, and specify a workbook to get using the `"/workbooks/<workbookname>.<extension>"` string. Replace `<workbookname>` and `<viewname>` with the names of the workbook and view as they appear in the URL when you open the view in a browser and replace `<extension>` with the type of file you want to save. Don't use the session ID at the end of the URL (`?iid=<n>`) or the "friendly" name of the workbook or view.

For example, when you open a view *Regional Totals* in a workbook named *Metrics Summary*, the URL will look similar to this:

```
/views/MetricsSummary_1/RegionalTotals?iid=1
```

Use the string `/views/MetricsSummary_1/RegionalTotals.<extension>` to get the view.

Use the string `/workbooks/MetricsSummary_1.<extension>` to get the workbook.

When downloading workbooks and views from Tableau Server, the content of the .twb or .twbx file is stored in plain text. All data, including filter values that may give semantic clues to the data, will be readable by anyone who opens the file.



- **File extension:** The URL must include a file extension. The extension determines what is returned. A view can be returned in PDF, PNG, or CSV (summary data only) format. A Tableau workbook is returned as a TWB if it connects to a published data source or uses a live connection, or a TWBX if it connects to a data extract.

**Note:** If you're downloading a view to a PDF or PNG file, and if you include a `--filename` parameter that includes the `.pdf` or `.png` extension, you don't have to include a `.pdf` or `.png` extension in the URL.

- **The saved file's name and location** (optional): The name you use for `--filename` should include the file extension. If you don't provide a name and file extension, both will be derived from the URL string. If you don't provide a location, the file is saved to your current working directory. Otherwise, you can specify a full path or one that's relative to your current working directory.
- **PNG size** (optional): If the saved file is a PNG, you can specify the size, in pixels, in the URL.

### Clearing the cache to use real-time data

You can choose to add the URL parameter `? : refresh=yes` to force a fresh data query instead of pulling the results from the cache. If you're using `tabcmd` with your own scripting, using the `refresh` parameter a great deal can have a negative impact on performance. It is recommended that you use `refresh` only when real-time data is required – for example, on a single dashboard instead of on an entire workbook.

### Examples

#### Views

```
tabcmd get "/views/Sales_Analysis/Sales_Report.png" --filename  
"Weekly-Report.png"
```

```
tabcmd get "/views/Finance/InvestmentGrowth.pdf" -f "Q1Growth.pdf"
```

```
tabcmd get "/views/Finance/InvestmentGrowth" -f "Q1Growth.pdf"
```

```
tabcmd get "/views/Finance/InvestmentGrowth.csv"
```

```
tabcmd get "/views/Finance/InvestmentGrowth.png?size=640,480" -f  
growth.png
```

```
tabcmd get "/views/Finance/InvestmentGrowth.png?refresh=yes" -f  
growth.png
```

### *Workbooks*

```
tabcmd get "/workbooks/Sales_Analysis.twb" -f "C:\Tableau_Work-  
books\Weekly-Reports.twb"
```

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

## Tableau Server on Windows Help

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## initialuser

Create the initial Server administrative user on a server that doesn't have an initial administrative user defined. This creates a Server administrator. This doesn't create a TSM administrator.

**Note:** The **tabcmd initialuser** command doesn't require authentication to Tableau Server, but you must run the command on the initial server node.

### Notes:

- The **tabcmd initialuser** command doesn't require authentication to Tableau Server, but you must run the command on the initial server node.
- The `username` value cannot include an at sign (@) unless the username suffix matches Tableau Server's primary domain. For example, if Tableau Server connects to domain "myco.com", a username of "user@example.com@myco.com" cannot be used.

### Examples

```
tabcmd initialuser --username "admin" --password "password" --server  
http://localhost
```

```
tabcmd initialuser --username "admin" --password "password" --  
friendly "Tableau Admin" --server http://localhost
```

To prompt for the password in the shell, don't include the `--password` parameter in the command. For example:

```
tabcmd initialuser --username "admin" --server http://localhost
```

### Options

`-f, --friendly`

Creates the initial Server administrative user with the display name.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

## Tableau Server on Windows Help

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is

saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## listdomains

Displays a list of the Active Directory domains that are in use on the server, along with their nicknames and IDs. If the server is configured to use local authentication, the command returns only the domain name `local`.

### Example

```
tabcmd listdomains
```

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.



## Tableau Server on Windows Help

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an

empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

## Tableau Server on Windows Help

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### listsites

Returns a list of sites to which the logged in user belongs.

#### Example

```
tabcmd listsites --username adam --password mypassword
```

#### Options

`--get-extract-encryption-mode`

The extract encryption mode for the site can be **enforced**, **enabled** or **disabled**. For more information, see [Extract Encryption at Rest](#).

#### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h`, `--help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

## Tableau Server on Windows Help

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you

might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## login

Logs in a Tableau Server user.

Use the `--server`, `--site`, `--username`, `--password` global options to create a session.

**Note:** When you use the **tabcmd login** command, you can't use SAML single sign-on (SSO), even if the server is configured to use SAML. To log in, you must pass the user name and password of a user who has been created on the server. You will have the permissions of the Tableau Server user that you're signed in as. For more information, see [Set Users' Site Roles and Permissions](#).

If you want to log in using the same information you've already used to create a session, just specify the `--password` option. The server and user name stored in the cookie will be used.

If the server is using a port other than 80 (the default), you will need to specify the port.

You need the `--site (-t)` option only if the server is running multiple sites and you're logging in to a site other than the Default site. If you don't provide a password you will be prompted for one. If the `--no-prompt` option is specified and no password is provided, the command will fail.

Once you have logged in, the session will continue until it expires on the server or the `logout` command is run.

### Example

Logs user jsmith in to the Tableau Server running on their local machine:

```
tabcmd login -s http://localhost -u jsmith -p password
```

## Tableau Server on Windows Help

Logs administrator in to the Sales site on sales-server:

```
tabcmd login -s http://sales-server -t Sales -u administrator -p  
password
```

```
tabcmd login -s http://sales-server:8000 -t Sales -u administrator -  
p password
```

Logs administrator in to the Sales site on sales-server using SSL, but doesn't validate the server's SSL certificate:

```
tabcmd login --no-certcheck -s https://sales-server -t Sales -u  
administrator -p password
```

Establishes a forward proxy and port for localhost:

```
tabcmd login --proxy myfwdproxyserver:8888 -s http://localhost -u  
jsmith -p password
```

Logs user jsmith in to the reverse proxy using SSL:

```
tabcmd login -s https://myreverseproxy -u jsmith -p password
```

### Options

**-s, --server**

If you're running the command from a Tableau Server computer that's on your network, you can use `http://localhost`. Otherwise, specify the computer's URL, such as `http://bigbox.myco.com` or `http://bigbox`.

If the server is using SSL, you will need to specify `https://` in the computer's URL.

For Tableau Cloud, specify the full URL including the pod that your site is deployed to.

For example: `https://prod-useast-b.online.tableau.com`.

**-t, --site**

Include this option if the server has multiple sites, and you're logging in to a site other than the default site.

The site ID is used in the URL to uniquely identify the site. For example, a site named West Coast Sales might have a site ID of west-coast-sales.

`-u, --username`

The username of the user logging in. For Tableau Cloud, the username is the user's email address.

`-p, --password`

Password for the user specified for `--username`. If you don't provide a password you will be prompted for one.

`--password-file`

Allows the password to be stored in the given `filename.txt` file rather than the command line, for increased security.

`-x, --proxy`

Use to specify the HTTP proxy server and port (Host:Port) for the `tabcmd` request.

`--no-prompt`

Don't prompt for a password. If no password is specified, the `login` command will fail.

`--no-proxy`

Don't use an HTTP proxy server.

`--cookie`



## Tableau Server on Windows Help

Saves the session ID on login. Subsequent commands won't require a login. This value is the default for the command.

`--no-cookie`

Don't save the session ID information after a successful login. Subsequent commands will require a login.

`--timeout SECONDS`

The number of seconds the server should wait before processing the `login` command. Default: 30 seconds.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## logout

Logs out of the server.

### Example

```
tabcmd logout
```

**publish *filename.twb(x)*, *filename.tds(x)*, or *filename.hyper***

Publishes the specified workbook (.twb(x)), data source (.tds(x)), or extract (.hyper) to Tableau Server.

If you're publishing a workbook, by default, all sheets in the workbook are published without database user names or passwords.

The permissions initially assigned to the workbook or data source are copied from the project that the file is published to. Permissions for the published resource can be changed after the file has been published.

If the workbook contains user filters, one of the thumbnail options must be specified.

**Example**

```
tabcmd publish "analysis.twbx" -n "Sales_Analysis" --db-username
"jsmith" --db-password "secret-password"
```

```
tabcmd publish "analysis_sfdc.hyper" -n "Sales Analysis"
--oauth-username "user-name" --save-oauth
```

If the file isn't in the same directory as tabcmd, include the full path to the file.

**Example**

```
tabcmd publish "\\computer\volume\Tableau Workbooks\analysis.twbx"
-n "Sales_Analysis" --db-username "jsmith" --db-password "secret-
password"
```

```
tabcmd publish "\\computer\volume\Tableau Workbooks\analysis_sfd-
c.hyper" -n "Sales Analysis" --oauth-username "username" --save-
oauth
```

## Options

`-n, --name`

Name of the workbook or data source on the server. If omitted, the workbook, data source, or data extract will be named after filename.

`-o, --overwrite`

Overwrites the workbook, data source, or data extract if it already exists on the server.

`-r, --project`

Publishes the workbook, data source, or data extract into the specified project. Publishes to the "Default" project if not specified.

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the `-r` option. For example, to specify a project called "Nested" that exists in a "Main" project, use the following syntax: `--parent-project-path "Main" -r "Nested"`.

`--db-username`

Use this option to publish a database user name with the workbook, data source, or data extract.

`--db-password`

Use this option to publish a database password with the workbook, data source, or extract.

`--save-db-password`

Stores the provided database password on the server.

`--oauth-username`

The email address of the user account. Connects the user through a preconfigured OAuth connection, if the user already has a saved access token for the cloud data source specified in `--name`. Access tokens are managed in user preferences.

For existing OAuth connections to the data source, use this option instead of `--db-username` and `--db-password`.

`--save-oauth`

Saves the credential specified by `--oauth-username` as an embedded credential with the published workbook or data source.

Subsequently, when the publisher or server administrator signs in to the server and edits the connection for that workbook or data source, the connection settings will show this OAuth credential as embedded in the content.

If you want to schedule extract refreshes after publishing, you must include this option with `--oauth-username`. This is analogous to using `--save-db-password` with a traditional database connection.

`--thumbnail-username`

If the workbook contains user filters, the thumbnails will be generated based on what the specified user can see. Can't be specified when `--thumbnail-group` option is set.

`--thumbnail-group`

If the workbook contains user filters, the thumbnails will be generated based on what the specified group can see. Can't be specified when `--thumbnail-username` option is set.

`--tabbed`

## Tableau Server on Windows Help

When a workbook with tabbed views is published, each sheet becomes a tab that viewers can use to navigate through the workbook. Note that this setting will override any sheet-level security.

`--append`

Append the extract file to the existing data source.

`--replace`

Use the extract file to replace the existing data source.

`--disable-uploader`

Disable the incremental file uploader.

`--restart`

Restart the file upload.

`--encrypt-extracts`

Encrypt extracts when you publish a workbook, data source or extract to the server. For more information, see [Extract Encryption at Rest](#).

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.



## Tableau Server on Windows Help

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you

might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## publishsamples

### Description

Publishes Tableau Sample workbooks to the specified project. Any existing samples will be overwritten.

### Syntax

```
tabcmd publishsamples -n [project name] [Global options]
```

### Example

Publish samples to the Inside Sales project on the Default site, as user jsmith.

```
tabcmd publishsamples -n "Inside Sales" -t "" -s localhost --user-  
name "jsmith" --password "secret-password"
```

### Options

`-n, --name`

Required. Publishes the Tableau samples into the specified project. If the project name includes spaces, enclose the entire name in quotes.

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the `-n` option. For example, to specify a project called "Nested" that exists in a "Main" project, use the following syntax: `--parent-project-path "Main" -n "Nested"`.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is

saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## reencryptextracts

Re-encrypt all extracts on a site with new encryption keys. This command will regenerate the key encryption key and data encryption key. You must specify a site. For more information, see [Extract Encryption at Rest](#).

Depending on the number and size of extracts, this operation may consume significant server resources. Consider running this command outside of normal business hours.

### Examples

```
tabcmd reencryptextracts "Default"
```

```
tabcmd reencryptextracts "West Coast Sales"
```

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, tabcmd (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

--

Specifies the end of options on the command line. You can use -- to indicate to `tabcmd` that anything that follows -- should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use -- in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## refreshextracts *workbook-name* or *datasource-name*

Performs a full or incremental refresh of extracts belonging to the specified workbook or data source.

This command takes the name of the workbook or data source as it appears on the server, not the file name when it was published. Only an administrator or the owner of the workbook or data source is allowed to perform this operation.

**Note:** This method will fail and result in an error if your Server Administrator has disabled the **RunNow** setting for the site. For more information, see [Tableau Server Settings](#).

## Examples

```
tabcmd refreshextracts --datasource sales_ds
```

```
tabcmd refreshextracts --project "Sales External" --datasource  
sales_ds
```

```
tabcmd refreshextracts --project "Sales External" --parent-project-  
path "Main" --project "Sales External" --datasource sales_ds
```



## Tableau Server on Windows Help

```
tabcmd refreshextracts --workbook "My Workbook"
```

```
tabcmd refreshextracts --url SalesAnalysis
```

```
tabcmd refreshextracts --workbook "My Workbook" --addcalculations
```

```
tabcmd refreshextracts --datasource sales_ds --removecalculations
```

### Options

`--incremental`

Runs the incremental refresh operation.

`--synchronous`

Adds the full refresh operation to the queue used by the Backgrounder process, to be run as soon as a Backgrounder process is available. If a Backgrounder process is available, the operation is run immediately. The refresh operation appears on the Background Tasks report.

During a synchronous refresh, `tabcmd` maintains a live connection to the server while the refresh operation is underway, polling every second until the background job is done.

**Note:** The `--synchronous` option isn't available for data sources refreshed with Tableau Bridge.

`--workbook`

The name of the workbook containing extracts to refresh. If the workbook has spaces in its name, enclose it in quotes.

`--datasource`

The name of the data source containing extracts to refresh.

`--project`

Use with `--workbook` or `--datasource` to identify a workbook or data source in a project other than *Default*. If not specified, the Default project is assumed.

`--parent-project-path`

Specifies the name of the parent project for the nested project as specified with the `--project` option.

For example:

- To specify a project called "Nested" that exists in a "Main" project, use the following syntax:
- `--parent-project-path "Main" --project "Nested"`
- To specify a project called "Nested2" that is nested within the "Nested" project:
- `--parent-project-path "Main/Nested" --project "Nested2"`

`--url`

The name of the workbook as it appears in the URL. A workbook published as "Sales Analysis" has a URL name of "SalesAnalysis".

`--addcalculations`

Use with `--workbook` to materialise calculations in the embedded extract of the workbook or `--datasource` to materialise calculations in the extract data source. Adds the operation to the queue used by the Backgrounder process. If a Backgrounder process is available, the operation runs immediately. This operation appears on the [Background Tasks for Extracts](#) administrative view.

`--removecalculations`

## Tableau Server on Windows Help

Use with `--workbook` or `--datasource` to remove calculations that were previously materialised. Adds the operation to the queue used by the Backgrounder process. If a Backgrounder process is available, the operation runs immediately. This operation appears on the [Background Tasks for Extracts](#) administrative view.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

## Tableau Server on Windows Help

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## reset\_openid\_sub

Clears OpenID Connect identifiers (sub values) that have already been associated with Tableau Server identities. See [Changing IdPs in Tableau Server for OpenID Connect](#).

### Example

```
tabcmd reset_openid_sub --target-username jsmith
```

### Options

`--target-username`

Clears sub value for the specified individual user.

`--all`

Clears sub values for all users.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

## Tableau Server on Windows Help

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## **removeusers** *group-name*

Removes users from the specified group.

### **Example**

```
tabcmd removeusers "Development" --users "users.csv"
```

### **Options**

`--users`

Remove the users in the given `.csv` file from the specified group. The file should be a simple list with one user name per line.



## Tableau Server on Windows Help

If you use this command with large `.csv` files on Tableau Server, a server administrator can enable settings that help to improve performance. For information, see [Improve performance for large CSV files passed through tabcmd](#)

`--[no-]complete`

Requires that all rows be valid for any change to succeed. If not specified `--complete` is used.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

## Tableau Server on Windows Help

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## `runsched` *schedule-name*

Runs the tasks in the specified schedule for the site that you're currently logged into. You can't run this for all sites using `tabcmd`. To run the tasks in the schedule for all sites, log in to the web interface, and from the **Schedules** page, select **All Sites** and then do a **Run Now** on the schedule.

This command takes the name of the schedule as specified on the server.

This command isn't available for Tableau Cloud.

**Note:** This method will fail and result in an error if your Server Administrator has disabled the **RunNow** setting for the site. For more information, see [Tableau Server Settings](#).

## Example

```
tabcmd runschedule "5AM Sales Refresh"
```

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

## Tableau Server on Windows Help

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## ***set setting***

Enables the specified setting on the server. Details about each setting can be seen on the Maintenance page on the server.

Use an exclamation mark in front of the setting name to disable the setting. You can enable or disable the following settings:

- `allow_scheduling`
- `embedded_credentials`

## Tableau Server on Windows Help

- `remember_passwords_forever`

### Example

```
tabcmd set embedded_credentials
```

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.



## Tableau Server on Windows Help

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

### ***syncgroup group-name***

Synchronises a Tableau Server group with an Active Directory group. If the Tableau Server group doesn't already exist, it's created and synchronised with the specified Active Directory group.

If the group name itself includes an "@" (other than as the domain separator) you need to refer to the symbol using the hex format "\0x40".

#### **Example**

```
tabcmd syncgroup "Development"
```

```
tabcmd syncgroup "Dev\0x40West"
```

**Note:** If you synchronise a group that you're a member of, changes that you make using this command don't apply to your user. For example, if you use this command to remove the administrator right from users in a group that you're a member of, you're still an administrator when the command finishes.

## Options

`--grant-license-mode <grant-license-mode>`

Specifies whether a role should be granted on sign-in. Default is `on-sync`. Valid values are `on-login`, `on-sync`. If no value is specified, `on-sync` is assumed and the default role will be granted when the group is synchronised. For more information, see [Modifying user roles with Grant role on sign-in](#).

`--no-publisher`

Deprecated. Use the `--role` option instead.

`--overwritesiterole`

Allows a user's site role to be overwritten with a less privileged one when using `--role`. By default, a user site role can be promoted when using `--role`, but can't be demoted. Because the `--overwritesiterole` option will demote user site roles, use it with caution.

`--publisher`

Deprecated. Use the `--role` option instead.

`-r, --role`

Specifies a site role for users in the group. The default is `Unlicensed`.

## Tableau Server on Windows Help

Valid values are: `SiteAdministratorCreator`, `SiteAdministratorExplorer`, `SiteAdministrator`, `Creator`, `ExplorerCanPublish`, `Publisher`, `Explorer`, `Interactor`, `Viewer`, `Unlicensed`.

`--silent-progress`

Don't display progress messages for the command.

### Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h`, `--help`

Displays the help for the command.

`-c`, `--use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s`, `--server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

## Tableau Server on Windows Help

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## upgradethumbnails

Starts and stops the Upgrade Thumbnails job. To learn more, see Upgrade Thumbnails Job.

### Examples

To start the Upgrade Thumbnail job:

```
tabcmd upgradethumbnails --server <serverURL>
```

To stop the in progress Upgrade Thumbnail job:

```
tabcmd upgradethumbnails --server <serverURL> --stop
```

## Options

`--stop`

When specified, stops the in progress Upgrade Thumbnails job. If this option isn't specified, the Upgrade Thumbnail job will be started.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

## Tableau Server on Windows Help

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or """) or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## validateidpmetadata

Identifies Tableau Server sites that are configured with IdPs using the insecure digest algorithm, SHA-1. This command also identifies IdPs that are using certificates with an insufficient RSA key size or elliptic curve size.

**Note:** This command is only available for site-specific SAML. For more information, see [Configure Site-Specific SAML](#).



## Options

`--digest-algorithms <ALGORITHMS>`

A space-separated list of digest algorithms. Legal values are `sha1` and `sha256`. If not specified, server uses values from server configuration setting, `wgserv-er.saml.blocklisted_digest_algorithms`.

`--min-allowed-elliptic-curve-size <SIZE>`

If not specified, server uses values from server configuration setting, `wgserv-er.saml.min_allowed.elliptic_curve_size`.

`--min-allowed-rsa-key-size <SIZE>`

If not specified, server uses values from server configuration setting, `wgserv-er.saml.min_allowed.rsa_key_size`.

`--site-names <SITENAMES>`

A space-separated list of site names on which to perform certificate validation. If not specified, then all sites are inspected.

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or "") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

## Tableau Server on Windows Help

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you

might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

## version

Displays the version information for the current installation of the `tabcmd` utility.

### Example

```
tabcmd version
```

## Global options

The following options are used by all `tabcmd` commands. The `--server`, `--user` and `--password` options are required at least once to begin a session. An authentication token is stored so subsequent commands can be run without including these options. This token remains valid for five minutes after the last command that used it.

`-h, --help`

Displays the help for the command.

`-c, --use-certificate`

Use client certificate to sign in. Required when mutual SSL is enabled.

For information about configuring the certificate, start with the following topic appropriate for your Tableau Server OS:

- **Windows:** [Configure Mutual SSL](#)
- **Linux:** [Configure Mutual SSL](#)

`-s, --server`

## Tableau Server on Windows Help

The Tableau Server URL, which is required at least once to begin session.

`-u, --user`

The Tableau Server username, which is required at least once to begin session.

`-p, --password`

The Tableau Server password, which is required at least once to begin session.

`--password-file`

Allows the password to be stored in the given `.txt` file rather than the command line for increased security.

`-t, --site`

Indicates that the command applies to the site specified by the Tableau Server site ID, surrounded by single quotes or double quotes. To specify the Default site, use either an empty string with single or double quotes (" or ") or use Default in double quotes ("Default"). Site ID is case-sensitive when using a cached authentication token. If you do not match the case, you may be prompted for a password, even if the token is still valid.

`-x, --proxy`

Host:Port

Uses the specified HTTP proxy.

`--no-prompt`

When specified, the command will not prompt for a password. If no valid password is provided the command will fail.

`--no-proxy`

When specified, an HTTP proxy will not be used.

`--no-certcheck`

When specified, `tabcmd` (the client) does not validate the server's SSL certificate.

`--[no-]cookie`

When specified, the session ID is saved on login so subsequent commands will not need to log in. Use the `no-` prefix to not save the session ID. By default, the session is saved.

`--timeout`

Waits the specified number of seconds for the server to complete processing the command. By default, the process will wait until the server responds.

`--`

Specifies the end of options on the command line. You can use `--` to indicate to `tabcmd` that anything that follows `--` should not be interpreted as an option setting and can instead be interpreted as a value for the command. This is useful if you need to specify a value in the command that includes a hyphen. The following example shows how you might use `--` in a `tabcmd` command, where `-430105/Sheet1` is a required value for the `export` command.

```
tabcmd export --csv -f "D:\export10.csv" -- -430105/Sheet1
```

**Tip:** For `Tabcmd` 1.0 commands available for Tableau Cloud, see [tabcmd commands](#).

## Install Switches and Properties for `tabcmd` (Windows)

**Note:** The `tabcmd` command-line utility version 2.0 is available at [Tableau tabcmd](#). This new version allows you to run `tabcmd` commands on MacOS and Linux, and to authenticate using

## Tableau Server on Windows Help

personal access tokens (PATs). Version 2.0 is built on public endpoints available in the Python-based Tableau Server Client (TSC). This latest version has limited support for Tableau Server.

You can use the following switches when installing the Tableau Server Command Line Utility (tabcmd) version 2019.4.0 or later from the command line on Windows.

**Note:** There are no equivalent switches for the Linux version of the tabcmd installer.

Switch	Description	Comments
<code>/install   /repair   /uninstall   /layout "&lt;directory&gt;"</code>	Run Setup to either install, repair or uninstall tabcmd, or with /layout, create a complete local copy of the installation bundle in the directory specified.	Default is to install, displaying UI and all prompts. If no directory is specified on a fresh install, <code>C:\Program Files\Tableau\Tableau Server-&lt;version&gt;\extras\Command Line Utility</code> is assumed.
<code>/passive</code>	Run Setup with minimal UI and no prompts.	
<code>/quiet   /silent</code>	Run Setup in unattended, fully silent	<b>Note:</b> Use either <code>/silent</code> or <code>/quiet</code> , not both.

	mode. No UI or prompts are displayed.	
/norestart	Run Setup without restarting Windows, even if a restart is necessary.	<p><b>Note:</b> In certain rare cases, a restart cannot be suppressed, even when this option is used. This is most likely when an earlier system restart was skipped, for example, during installation of other software.</p>
/log "<log-file>"	<p>Log information to the specified file and path.</p> <p>By default log files are created in the user's %TEMP% folder with a naming convention of Tableau_Server_Command_Line_utility_&lt;version_code&gt;.log.</p>	<p>If no file location is specified, the log file is written to the user's TEMP folder (C:\Users\&lt;username&gt;\AppData\Local\Temp). Check this log file for errors after installation.</p> <p>Example: &lt;Setup file&gt; /silent /log "C:\Tableau\Logs\tabcmd-Install" ACCEPTTEULA=1</p>



Properties	Description	Comments
ACCEPTTEULA=1   0	Accept the End User Licence Agreement (EULA). Required for quiet, silent and passive install. 1 = accept the EULA, 0 = do not accept the EULA.	<p>If not included when using /passive, /silent or /quiet, Setup fails silently.</p> <p>If included but set to 0, Setup fails.</p>
INSTALLDIR- R="<path\to\installation\directory>"	Install tabcmd to the specified non-default install location.	<p>Specifies the location to install tabcmd. If not used, tabcmd is installed to C:\Program Files\Tableau Server\&lt;version_code&gt;\extras\Command Line Utility</p> <p><b>Example:</b> &lt;Setup file&gt; /silent</p>

		INSTALLDIR= R="C:\tabcmd"
--	--	------------------------------

## Troubleshooting

You can use the following topics to troubleshoot and resolve issues with Tableau Server.

### Work with Log Files

Tableau Server creates log files as a normal part of its activities. You may need to use the server log files when you are troubleshooting issues with Tableau Server or if Tableau Support requests logs from you to help you resolve an issue.

You can create a zipped log file archive using the `tsm maintenance ziplogs` command. The zipped archive contains copies of the logs you can unzip and look at, or send to Tableau Support. Once you have a copy of the archive, you can delete the archive from your server. For more information on log file archives, see [Log File Snapshots \(Archive Logs\)](#).

This collection of topics provides information about how to create log file archives, the contents of specific log files, and details about when and how you might want to look at a log.

### Contents of Tableau Server Logs

Every Tableau Server process writes information about what it is doing to its own log file. Singly these give detailed information on the actions of each process. Taken together these log files contain detailed information about internal communication between components of Tableau Server while processing users' requests or performing automated tasks. Tableau Server logs only contain technical information useful for troubleshooting; the status of different components, actions taken by different processes, communication attempts, queries to the database (not including results) and timings of requests, for example.

Log files could contain some specific data such as names of database servers, as well as their IP addresses and ports, names or IP addresses of Tableau Server computers and URLs and names of the workbooks and views accessed by users.

Log files do not contain any sensitive customer data such as passwords, results of the queries or data shown on the views.

**Note:** When logging at the `DEBUG` level, full environment information is gathered when Tableau starts. This means that if you have any sensitive information in an environment variable, it may be included in a log. Logging at the default `INFO` level only gathers safe environment information.

The `tsm maintenance ziplogs` command allows users to not only generate a zipped archive of log files, but also to include Tableau Server repository data if the `-d` option is specified. The repository contains metadata from Tableau Server (for example, usernames, groups, projects, permissions on Tableau Server, extract refresh schedules). The repository also includes layout and connection information for the workbooks, but does not have any data such as passwords, actual data from the database or data shown on the view.

Data displayed in views comes from extract files or databases, and is cached in memory. It is not saved in logs or, in the case of live connections, in separate files on Tableau Server computers. Extract files are stored on Tableau Server computers as `.hyper` files in the `dataengine` folder, but are never included in the zipped log archive.

## Investigating Tableau Server Issues

The range and complexity of possible issues with Tableau Server means that there is no simple process you can use to investigate all problems, but a general approach would include these steps:

1. **Clean up** existing log files to reduce their size. For more information, see [Remove Unneeded Files](#).

**Important:** If there is a chance you will want to get help from Tableau Support troubleshooting an issue, be sure to create a zipped archive of your logs before cleaning them up. The clean up can delete important information Support may need. For details on creating log archives, see Log File Snapshots (Archive Logs).

2. **Set the appropriate logging level.** This is something that Tableau Support will instruct you on. For more information including impact of different log levels, see Change Logging Levels.
3. **Reproduce the issue** you are troubleshooting so the logs capture the events related to the problem.
4. **Create an archive** of the logs. For more information see Log File Snapshots (Archive Logs).

**Important:** Use this archive when looking at the log files. You should not edit, move or delete any files directly on the server.

5. **Review the TSM Administration Controller log** (`\tabadmincontroller\tabadmincontroller_node<n>-<n>.log`) to understand any configuration or deployment done by TSM from the command line, Web UI or API, including jobs started by TSM. Start with the controller log. This is where you'll get most useful information.

**Note:** The `tsm.log` is less wordy than the `tabadmincontroller_*.log` but can provide useful, complimentary troubleshooting information.

6. **Review the Apache logs** (`\httpd\access.####_##_##_##_##_#.log` and `\httpd\error.log`) for requests that may be related to the issue you are investigating.

The Apache logs will contain a fair amount of "noise" that does not apply to issues you are experiencing.

## Tableau Server on Windows Help

- If you find a request that seems to be related to your issue, search the `vizqlserver` directory for entries that include the unique request ID from the Apache logs.
- Look for the response code and message associated with the request ID.
- Search for the name of the workbook, view, dashboard or data source that is related to your issue. Make sure to look for a relevant timestamp.
- If you find a request that seems to be related to your issue, look at the response code associated with the request. (200s are good, 500s indicate problems.)
- Locate the unique request ID associated with the request you've identified (the unique request ID is a 24 character alphanumeric string at the very end of the request).

### 7. Review the log archive further to search for other messages and possible errors.

- Use the request ID from the Apache logs to search the `vizqlserver` folder of the log archive for files containing related log entries. Look for indications of a problem (for example, error messages or long-running queries).
- The free, open source tool, Logshark can be a useful option for reviewing log archives. For more information, see [Troubleshooting Tableau Server](#) in the Tableau Blueprint.

### 8. Review script logging.

Tableau Server includes logs for most of the scripts that are included in the scripts directory. By default: `C:\Program Files\Tableau\Tableau Server-packages\scripts.<version_code>` These logs are saved to:

- `<install_drive>\<install_path>\logs\`  
by default:
- `C:\ProgramData\Tableau\Tableau Server\logs\`

### 9. Contact support

If you are not able to solve the issue yourself, or if requested by Tableau Support, send the zipped archive to Tableau.

## Tableau Server Logs and Log File Locations

Tableau Server generates log files as a normal part of its functioning. Each service that runs as part of Tableau Server generates its own logs. These log files include information about what is happening on the server, what the service or process is doing and what, if any, errors or warnings are generated. The extent of information in the logs depends on which service is writing the logs, what the logging levels are set to, and what is happening on the server.

Looking for Tableau Server on Linux? See [Server Log File Locations](#).

Log files can be useful in helping to identify and fix issues that Tableau Server is having. In some cases, system administrators may be able to look at logs and find clues to what is happening, but in most situations, the Tableau Server logs are most useful for Tableau Support. When you open a case with Support, you may be asked to send log files from your server.

**Note:** The specific directories and logs generated by Tableau Server depend on the version of server you are running and which processes you have configured. New services and processes are added periodically to support new functionality. For details about processes or services you might find logs for, see [Tableau Server Processes](#).

### Tableau Server log files on an active cluster

As a best practice, you should not edit or delete log files in an active Tableau Server installation. Doing this can cause unexpected behaviour or server downtime. Most Tableau Server logs are written to a location in the data directory. Some logs are written to other locations.

The easiest and safest way to gather and view server log files is to create a log archive, which is a zipped collection of logs from all nodes in a cluster. If you think you may need old logs for any reason, for example, to compare with new logs after doing an upgrade, or to send to Tableau Support when troubleshooting a server issue, create a zip archive, and move the

archive to a safe location that is not part of your Tableau Server infrastructure. For more information about log files in a log archive, see [Server Log Files in a zipped archive](#).

Logs can take up a good deal of space, especially on a heavily used server. You can use the `tsm maintenance cleanup` command to remove logs you no longer want or need. but if you think you may need your existing logs, consider archiving them before cleanup.

### Primary log locations on a working Tableau Server installation

Most of the Tableau Server logs are written to the data directory, by default `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\`. Subfolders are created for each instance of a service, with a name that includes the service name and the version code. For example:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\backgrounder
```

### Configuration file locations on a working Tableau Server installation

In addition to logs for each service or process, a `config` subfolder contains configuration information about the service.

```
C:\ProgramData\Tableau\Tableau Server-  
\data\tabsvc\config\backgrounder
```

Tableau Support may ask you to gather some of these if you are working with them on a server issue. The contents can be analysed by Support.

### Logs that are not written in the primary location

A few logs are not part of the main set of logs and are written to locations other than the normal log folders:

- The TSM log. The `tsm.log` file is located in `C:\Users\<user>\.tableau\tsm.`
- The install log. By default the `app-install.log` file is located in `C:\ProgramData\Tableau\Tableau Server\logs.`
- The upgrade log. By default the `app-upgrade.log` file is located in `C:\ProgramData\Tableau\Tableau Server\logs.`

- Shell script logs. Tableau Server scripts are located in the \scripts directory (By default: `C:\Program Files\Tableau\Tableau Server-packages\scripts.<version_code>\`) and many of these generate logs each time a script is run. Script logs are saved to:

```
<install_drive>\<install\path>\logs\
```

by default:

```
C:\ProgramData\Tableau\Tableau Server\logs
```

### Server Log Files in a zipped archive

You may want to look at Tableau Server log files or need to send them to Tableau Support if you have a problem with your server. Use the `tsm maintenance ziplogs` command to create a zipped archive of log files from all nodes in your installation. By default, Tableau Server log file archives are gathered in a zip file called `logs.zip`, but you can specify a different file name when you create the archive. You can copy the archive from the server to a local computer and open it there, or send it to Tableau Support.

When you unzip the archive, a directory is created for each node in the cluster, and in that directory are sub-directories for each service or process using this naming convention:

```
<service_name>_<instance>.<version>.<build>
```

If there are multiple instances of a service on a node, there will be multiple directories for that service, one for each instance. For example, if you have two Backgrounders on a node, you will see directories like these:

```
backgrounder_0.<version>.<build>
backgrounder_1.<version>.<build>
```

The specific directories and logs in the zip file depend on what version of Tableau Server you have and which processes you have configured. For details about processes or services you might find logs for, see [Tableau Server Processes](#).

### Temporary Files

Any file that starts with `exe_` in the folder below is a Tableau Server file and can be deleted.



C:\ProgramData\Tableau\Tableau Server\temp

## Log File Snapshots (Archive Logs)

Tableau Server includes functionality to generate a snapshot of log files for archival purposes. If you plan to clean up and delete old log files as part of regular server maintenance, you may consider archiving log files to an off-server storage location before deleting them.

**Note:** For instructions about collecting logs on older versions of Tableau Server for Windows, see the archived online help on the [Tableau Help](#) page.

Or, if you are working with Tableau Support on a case, the support engineer may request a server log file snapshot.

This topic describes:

- How to generate a log file snapshot
- How to send the snapshot directly to Tableau Support from the Tableau Server administration tools
- How to download the snapshot
- How to delete archived logs

Use the TSM web interface

1. Open TSM in a browser:

https://<tsm-computer-name>:8850. For more information, see [Sign in to Tableau Services Manager Web UI](#).

2. Click the **Maintenance**.
3. Generate a log file snapshot.
  - a. On the Server Maintenance page, under Log Files, click **Generate Log File Snapshot**.

An options dialog displays:

- b. On the Options page, enter or select the options you want, including a **Description**, time **Range** of log files to be included and the optional types of logs to be included (**Include Netstat Info**, **Include MSInfo**, **Include Postgres Data**, **Include Recent Crash Dumps**), then click **Generate Log File Snapshot**.

The log file snapshot is saved to a fixed location on the computer where TSM and Tableau Server are installed. If you have a multi-node installation, the snapshot is saved to the initial node of the cluster. The location is specified by the `base-filenamepath_log_archives` variable.

By default the snapshot is saved to:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\log-archives
```

You can find the current location by querying the `basefilenamepath_log_archives` setting and change the location by specifying a new value for `basefilenamepath_log_archive`. For more information, see [tsm File Paths](#).

4. After you generate the snapshot, you can select it and upload it to Technical Support, download it to your local machine or delete it:

## Tableau Server on Windows Help

### Log Files

Generate a custom log file snapshot. After Tableau Server has generated the snapshot, you can download the snapshot or upload it to Tableau Technical Support. Generating

<input type="button" value="Generate Log File Snapshot"/>		<input type="button" value="Upload To Technical Support Case"/>		<input type="button" value="Download"/>	<input type="button" value="Delete"/>
Description	Created	Range	Size	Stored in	Status
<input type="radio"/>	Jun 7, 2018, 6:43:14 PM UTC	2 days	3.7 MB	node1	Succeeded
<input type="radio"/>	Jun 7, 2018, 10:05:34 PM UTC	2 days	230 B	node1	Succeeded
<input checked="" type="radio"/> Logs generated at 6/19/2018, 7:37:26 AM	Jun 19, 2018, 2:45:53 PM UTC	2 days	69 MB	node1	Succeeded

5. To download a local copy of the snapshot or to delete it, select the snapshot under Log Files and then select the appropriate **Action**.

### Uploading log snapshots for Tableau Support

1. Click the **Maintenance** tab.
2. Select the snapshot you want to send.

### Log Files

Generate a custom log file snapshot. After Tableau Server has generated the snapshot, you can download the snapshot or upload it to Tableau Technical Support. Generating

<input type="button" value="Generate Log File Snapshot"/>		<input type="button" value="Upload To Technical Support Case"/>		<input type="button" value="Download"/>	<input type="button" value="Delete"/>
Description	Created	Range	Size	Stored in	Status
<input type="radio"/>	Jun 7, 2018, 6:43:14 PM UTC	2 days	3.7 MB	node1	Succeeded
<input type="radio"/>	Jun 7, 2018, 10:05:34 PM UTC	2 days	230 B	node1	Succeeded
<input checked="" type="radio"/> Logs generated at 6/19/2018, 7:37:26 AM	Jun 19, 2018, 2:45:53 PM UTC	2 days	69 MB	node1	Succeeded

3. Click **Upload to Technical Support Case**.
4. In the dialog that displays, enter the **Support Case Number** and your **Contact Email**

**Address**, then click **Upload Snapshot**.

Upload To Technical Support Case

Upload your log file snapshot to Tableau Technical Support. Upload time is dependent upon the network connection and size of the log file snapshot. To file a new support case, select the Info icon in the header and then select Support.

Support Case Number

Contact Email Address

You are about to upload the following log file snapshot:

Description	<b>Logs generated at 6/19/2018, 7:37:26 AM</b>
Created	<b>Jun 19, 2018, 2:45:53 PM UTC</b>
Range	<b>3 days</b>
Size	<b>69 MB</b>

[Tableau Software Privacy Policy](#)

For additional methods to send log archives to Tableau Support, see [Sending Large Files to Tableau](#) in Salesforce Help.

Use the TSM CLI

You create a snapshot archive of Tableau Server log files using the `tsm maintenance ziplogs` command.

By default, this command creates a zip file containing all of the log files. If you are running a distributed installation of Tableau Server, perform this step from the initial node. Logs from all nodes will be included in the zip file.

To create a log file snapshot:

1. On the initial node, open a command prompt as administrator.
2. Type the following command:

## Tableau Server on Windows Help

```
tsm maintenance ziplogs -l -f <filename>
```

where `<filename>` is name of the zipped archive file you want to create. Choose a unique name with no spaces. If an existing ziplog with the same file name already exists the creation of the file will fail unless you include the `-o` option to force an overwrite, delete the existing file, or specify a different name in the command.

You can specify a time range for the snapshot and you can also specify which types of logs to include. For more information, see `tsm maintenance ziplogs`.

The log file snapshot is saved to a fixed location on the computer where TSM and Tableau Server are installed. If you have a multi-node installation, the snapshot is saved to the initial node of the cluster. The location is specified by the `basefilepath_log_archives` variable.

By default the log file snapshot is saved to:

```
C:\ProgramData\Tableau\Tableau Server\data\tabsvc\files\log-archives
```

You can find the current location by querying the `basefilepath.log_archives` setting:

```
tsm configuration get -k basefilepath.log_archive
```

and change the location by specifying a new value for `basefilepath.log_archive`:

```
tsm configuration set -k basefilepath.log_archive -v  
"<drive>:\new\directory\path"
```

For more information, see `tsm File Paths`.

### Sending log archives to Tableau Support

You can send log files to Tableau Support as a part of a customer support case (a customer support case number is required). Before sending a log file, use `tsm maintenance ziplogs` command to combine the log files into a single zip file archive.

- At a command prompt, type the following command:

```
tsm maintenance send-logs -f <zip file name> -c <case number> -
e <email address>
```

where `<case number>` is your support case number, `<email address>` is your contact email for this support case, and `<zip file name>` is the file name of your archive with .zip file extension.

For additional methods to send log archives to Tableau Support, see [Sending Large Files to Tableau](#) in Salesforce Help.

## Change Logging Levels

By default, Tableau Services Manager (TSM) and Tableau Server log events at the **Info** level. You can change this if you need to gather more information (if you are working with Tableau Support, for example).

As a best practice you should not increase logging levels except when troubleshooting an issue, as instructed by Support. You should only set a logging level to debug when investigating a specific issue. Changing log levels can have these impacts:

- Increasing the log level to `debug` or `trace` increases the amount of information being logged and can have a significant impact to performance. Reproduce the issue and then reset the logging level back to `info`.
- Setting the log level to `warn` or `error` can reduce the amount of information so much that it is not useful for Tableau Support.

**Note:** When logging at the `DEBUG` level, full environment information is gathered when Tableau starts. This means that if you have any sensitive information in an environment variable, it may be included in a log. Logging at the default `INFO` level only gathers safe environment information.

### Logging Levels

The following logging levels are listed in order of increasing amount of information logged:

## Tableau Server on Windows Help

- off
- fatal
- error
- warn
- info (the default)
- debug
- trace

### Change Logging Levels

Set logging levels for TSM and Tableau Server processes using **tsm configuration set** configuration keys. The key you use depends on which component of TSM or Tableau Server you want to change the logging level for.

### Dynamic log level configuration

In version 2020.2, we introduced dynamic configuration. The capability has been expanded in subsequent releases. If you are only changing logging levels for one or more of these components, and are running the appropriate version of Tableau, you can change the logging levels without restarting Tableau Server.

These logging levels are dynamically configurable, beginning with these versions:

- 2020.2 - **tsm services** (`tsm.log.level`) and **control application services** (`tsm.-controllerapp.log.level`).
- 2020.3 - **backgrounder** (`backgrounder.log.level`), **cluster controller** (`cluster-controller.log.level`), **data server** (`dataserver.log.level`), **file store** (`filestore.log.level`), **data source properties** (`tdsservice.log.level`), and **VizQL server** (`vizqlserver.log.level`).
- 2020.4 - adds **interactive microservice container** (`tomcatcontainer.log.level`) and **application server** (`vizportal.log.level`).

### Configuration Keys for Changing Logging Levels

This table includes both dynamically configurable keys and those that are not dynamically configurable.

Configuration key	Location of affected logs
<p><code>tsm.log.level</code></p> <p>Changes TSM logging levels for: clientfileservice, licenseservice, tabadminagent, tabadmincontroller, tabsvc</p>	<p>(path begins with C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\)</p> <p>\&lt;service&gt;\&lt;service&gt;_node&lt;n&gt;-&lt;instance&gt;.log</p> <p><b>example:</b> \clientfileservice\clientservice_node1-0.log</p>
<p><code>tsm.controlapp.log.level</code></p> <p>Changes TSM logging levels for: control applications</p>	<p>\&lt;service&gt;\control_&lt;service&gt;_node&lt;n&gt;-&lt;instance&gt;.log</p> <p><b>examples:</b> \clientfileservice\control_clientservice_node1-0.log</p> <p>\filestore\control_filestore_node1-0.log</p>
<p><code>&lt;process&gt;.native_api.log.level</code></p> <p>Valid process names are backgrounder, vizportal, vizqlserver, dataserver</p> <p><b>Note:</b> These are not dynamically configurable.</p>	<p>\vizqlserver\*.txt</p>
<p><code>backgrounder.log.level</code></p> <p>Changes logging levels for: Backgrounder</p>	<p>\backgrounder\*.log</p>



## Tableau Server on Windows Help

<p><code>clustercontroller.log.level</code></p> <p>Changes logging levels for: Cluster Controller</p>	<p><code>\clustercontroller\*.log</code></p>
<p><code>dataserver.log.level</code></p> <p>Changes logging levels for: Data Server</p>	<p><code>\dataserver\*.log</code></p>
<p><code>filestore.log.level</code></p> <p>Changes logging levels for: File Store</p>	<p><code>\filestore\*.log</code></p>
<p><code>gateway.log.level</code></p> <p>Changes logging levels for: Gateway control processes</p>	<p><code>\gateway\*.log</code></p>
<p><code>gateway.httpd.loglevel</code></p> <p><b>Note:</b> added in version 2021.3.0</p> <p>Changes logging levels for: Gateway</p>	<p><code>\gateway\*.log</code></p>
<p><code>hyper.log.level</code></p> <p>Changes logging levels for: Hyper</p>	<p><code>\hyper\*.log</code></p>
<p><code>tdsservice.log.level</code></p> <p>Changes logging levels for: Data Source Properties service</p>	<p><code>\tdsservice\*.log</code></p>
<p><code>tomcatcontainer.log.level</code></p> <p>Changes logging levels for microservices in: Interactive Microservice Container and Non-Inter-</p>	<p><code>\tomcatcontainer\*.log</code></p>

active Microservice Container	
vizportal.log.level	\vizportal\*.log
Changes logging levels for: Application Server	
vizqlserver.log.level	\vizqlserver\*.log
Changes logging levels for: VizQL Server	

For more information, see [tsm configuration set Options](#).

If you are only changing dynamically configurable logging levels, you do not need to stop or start the server (for more information, see [Dynamic log level configuration](#) above). If you are changing other logging levels, you may need to stop Tableau Server before changing the logging levels and restart it afterwards. If this is the case, you will be prompted.

On a multi-node installation of Tableau Server, set logging levels from the initial node.

To change the logging level:

1. (Optional for dynamically configurable logging levels in 2020.2.0 and later) Stop Tableau Server by opening a command prompt and typing:

```
tsm stop
```

2. Set the logging level to by typing `tsm configuration set -k <config.key> -v <config_value>`

where `<config.key>` is one of the keys in the above table and `<config_value>` is a valid logging level.

Examples:

## Tableau Server on Windows Help

- `tsm configuration set -k backgrounder.native_api.log.level -v debug`
- `tsm configuration set -k tsm.log.level -v debug`
- `tsm configuration set -k tsm.controlapp.log.level -v debug`

3. Apply pending changes by running the `tsm pending-changes apply` command.
4. (Optional, only if server is stopped) Start Tableau Server by running the following command:

```
tsm start
```

### Reset Logging Levels

After you reproduce the issue and gather the information related to the issue, reset the logging levels so there is no lingering performance impact and no additional disk space used up.

Reset the logging level back to its default (info) using the appropriate command with a `-d` option. You need to apply pending changes after resetting the level, and if you are resetting logging levels for Tableau Server processes, you may need to stop the server before making the change and start it after applying the pending changes.

#### Examples:

- `tsm configuration set -k backgrounder.native_api.log.level -d`
- `tsm configuration set -k tsm.log.level -d`

## Troubleshoot Tableau Server Install and Upgrade

Follow the suggestions in this topic to resolve common issues with Tableau Server. For additional troubleshooting steps based on process status viewed on the Status page, see [Troubleshoot Server Processes](#).

## General Troubleshooting Steps

Many Tableau Server issues can be addressed with some basic steps:

1. Make sure there is enough disk space on each computer running Tableau Server. Limited disk space can cause a failure to install, a failure to upgrade or problems running Tableau Server.
2. Restart Tableau Server. Issues related to processes not fully started can be resolved by restarting Tableau Server in a controlled way. To restart Tableau Server, use the `tsm restart` command. This will stop all the processes associated with Tableau Server and then restart them.
3. Reindex Tableau Server. Issues related to indexing can be resolved by reindexing Tableau Server. To reindex Tableau Server, use the `tsm maintenance reindex-search` command. For more information, see [Reindexing Tableau Server Search & Browse](#) below.
4. Restart the computer on which Tableau Server is running. Some issues, such as those related to data source connectivity, can be resolved by restarting the server computer.

## Common Tableau Server Install Issues

### Installation logs location

The installation logs are written to the `\Temp` directory of the user account that is running Setup. In most cases, this is located at `C:\Users\<user>\AppData\Local\Temp`.

To determine where the `\Temp` directory is for the logged on user, run the following command in Windows Command Prompt: `ECHO %Temp%`.

### Install program does not prompt for location to install to

When you install Tableau Server for the first time, you will be prompted for the location you want to install to. *If you do not see this prompt, you may have leftover files or directories from*

*a previous installation, even if you uninstalled Tableau.* To completely remove all traces of Tableau version 2018.2 or later, run the `tableau-server-obliterate.cmd` script, then restart the computer and try the install again. If the previous installation was a version earlier than 2018.2, manually delete all Tableau related folders before rerunning the install program.

**Important:** If you created a backup of Tableau (`<file>.tsbak`) you want to keep (for example, to restore to your new installation), copy that file to a safe location on another computer to guarantee it is not removed when you clean up your Tableau computer.

### Install program does not restart Windows

When you install Tableau Server the Setup program may prompt you to restart Windows at the end of the installation. In certain cases, clicking **Restart** does not restart the computer. This can happen when a 3rd Party component installer is requesting a restart of Windows.

If clicking **Restart** does not restart Windows, complete the installation by manually restarting Windows.

### TSM Install fails with 'initialisation failed' error

If you attempt to install Tableau Server and the installation fails with this error:

```
Tableau server initialization failed  
See install log at C:\ProgramData\Tableau\Tableau Server\logs
```

This may be related to a permissions issue on your computer. The user is signed into Windows and installing Tableau must have administrator permissions to the C drive, to C:\Windows, and C:\Windows\System32 folders, and to the cmd.exe file. This is true even if you are not installing Tableau on the C drive.

For more information, see the [Tableau Knowledge Base](#).

## TSM Initialise screen does not display

When installing or upgrading Tableau Server, if the browser opens but nothing displays, you may need to add the hostname to the trusted sites list. Alternatively, clear the browser cache or use a different browser. For more information, see the [Tableau Knowledge Base](#).

## Multiple install attempts fail

If you attempt to install Tableau Server and the installation fails, any subsequent installation attempts are likely to fail unless you run the `tableau-server-obliterate.cmd` script to clean Tableau off the computer.

**Important:** You must run the `tableau-server-obliterate.cmd` script from a 64-bit command prompt. For example, run `cmd.exe` in the `C:\Windows\System32` folder. If you run the script from a 32-bit command prompt, the script will not completely remove Tableau, and subsequent installations may fail. To determine if you are running a 64-bit command prompt, type `echo %processor_architecture%` in your command window. If the result includes "64" (AMD64 for example), the command prompt is a 64-bit prompt. If the result includes "x86" you are running a 32-bit prompt. For more information, see the appropriate Microsoft documentation for your versions of Windows.

A failed install attempt can leave the computer in a state that causes subsequent attempts to also fail with errors that don't seem directly related to a previous install attempt.

To fix this problem, run the `tableau-server-obliterate.cmd` script to clean up any leftover remnants of the previous installation attempt and then restart the computer. For more information, see [Running the tableau-server-obliterate script](#).

**Important:** If you created a backup of Tableau (`<file>.tsbak`) you want to keep (for example, to restore to your new installation), copy that file to a safe location on another computer to guarantee it is not removed when you clean up your Tableau computer.

## Tableau Server on Windows Help

Obliterate script generates error: 'refresh-environment-variables.cmd' is not recognised as an internal or external command

If you use Control Panel to uninstall Tableau Server and then run the `tableau-server-obliterate.cmd` script to completely remove Tableau from your computer, the script may generate an error about the refresh-environment-variables. This occurs because a second script called by the obliterate script was not moved to the temp directory. You can ignore this error.

### Install fails due to hardware requirements

Tableau Server cannot install if the computer you are installing on does not meet the minimum hardware requirements. The requirements apply to all computers on which you are installing Tableau Server. For details on minimum hardware requirements, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#).

### Install or upgrade fails due to CPU requirements

Beginning in version 2020.4.0 Tableau Server requires CPUs that support SSE4.2 and POPCNT instruction sets. You cannot install or upgrade Tableau Server 2020.4.0 or later on computers that have CPUs which do not support these instruction sets.

You may see this error message when installing a new installation, or in preparation for upgrading an existing installation:

```
Your computer's processor doesn't meet the minimum requirements that
Tableau requires to install the software. If you are using a VM,
make sure Processor compatibility mode is off.
```

The SSE4.2 and POPCNT instruction sets have been common for more than 10 years and most newer CPUs support them, but if you get an error related to processor minimum requirements when attempting to install or upgrade Tableau Server on a Virtual Machine (VM), Processor compatibility mode may be enabled on the VM. To successfully install or upgrade Tableau on a VM, make sure the Processor compatibility mode is turned off.

## Common Tableau Server Upgrade Issues

### Upgrade logs location

By default the upgrade log, `app-upgrade.log`, is written to `C:\ProgramData\Tableau\Tableau Server\logs`.

### Error: Failed to establish a connection with Active Directory

Beginning with Tableau version 2021.2, Tableau Server no longer allows insecure connections with Active Directory. If your current instance of Tableau Server is communicating with Active Directory over a non-encrypted channel, upgrade will fail.

To resolve this issue follow one of the steps below:

- Investigate and resolve the failed secure connection. See the Microsoft topic, [LDAP Over SSL Connection Issues](#).
- Run the following commands to allow an insecure connection on your current version of Tableau Server before you upgrade:

```
tsm configuration set -k wgserver.domain.allow_insecure_connection -v true --force-keys
```

```
tsm pending-changes apply
```

After upgrade completes, we recommend securing the channel and then setting this option to `false`.

**Note:** By default (when `wgserver.domain.allow_insecure_connection` is set to `false`), Active Directory group synchronisation will fail if the communication channel with Active Directory is not encrypted.



## Tableau Server on Windows Help

Maps do not display or display incompletely after upgrading

Beginning with Tableau version 2019.2, the internet access requirements changed for maps. If you are upgrading from version 2019.1.x or earlier to version 2019.2.x or later, and maps are not displaying as expected, confirm that your environment is configured to allow access on port 443 to `mapsconfig.tableau.com` and `api.mapbox.com`.

In version 2019.1.x or earlier, access was necessary to `maps.tableausoftware.com`.

For more details on internet access requirements, see [Communicating with the Internet](#).

Upgrade script error: "Tableau Server Version change validation failed."

When upgrading, if you run the `upgrade-tsm` script from the `scripts.<version_code>` directory for the earlier version, the upgrade will fail with an error:

```
Tableau Server Version change validation failed.  
Tableau Server <version> is already installed.
```

If you get this error, change to the `scripts.<version_code>` directory for the version you just installed and run the script from there.

Upgrade multi-node, initialising additional node fails with 'Enter your credentials again' error

If you attempt to initialise an additional node when upgrading Tableau Server and see this error:

```
Enter your credentials again. The credentials you enter must provide  
administrative access to the computer where you generated the con-  
figuration file.
```

this is an indication that the node is unable to connect to or communicate with the initial node.

This can happen for multiple reasons:

- The credentials you entered are not valid or you mistyped them. The credentials must be for a user who has administrative permissions on the computer where Tableau Server was first installed. You do not need to use the credentials of the user who

created the bootstrap file but doing so will ensure you are using valid credentials.

- The local firewall of the computer you are trying to add is not allowing communication to the initial node. For more information, see [Local firewall configuration](#).

### Upgrading fails due to lack of disk space

If there is not enough disk space for the Tableau Server Setup program to run and do the upgrade, the installation will fail. The amount of disk space required will depend on the size of your repository database and the number and size of your extracts.

**Note:** When upgrading from a pre-TSM version of Tableau Server (a version earlier than 2018.2.0), the uninstallation of Tableau creates a server backup file in the data directory. This backup file has a `.tsbak` extension and is required for the upgrade. *After* you upgrade successfully, you can safely delete this file to free up space (make a copy on a computer that is not part of your Tableau Server installation in case you need the file for any reason). Do not delete this file until you have completed the upgrade and know it is working.

To free up disk space:

1. Create a log archive snapshot using the `tsm maintenance ziplogs` command.

After you create the ziplogs file, save it to a safe location that is not part of your Tableau Server installation.

2. Clean up unnecessary files using the `tsm maintenance cleanup` command. For more information, see [Remove Unneeded Files](#).

### Upgrade fails on RebuildSearchIndex job

Beginning with version 2020.1.x, the final step in an upgrade is to rebuild the search index. At this point, all services have been upgraded, so if this job fails, you can manually reset the

search server by running the `tsm maintenance reset-searchserver` command. You do not need to obliterate and start over.

The error will be:

An error occurred while rebuilding search index.

To reset the search server :

1. On the initial node, open a command prompt as administrator.

This must be a new command prompt because the upgrade script updates the system environment for the new version.

2. Rebuild the search index using the `tsm maintenance reset-searchserver` command.

Upgrade fails on 2022.1 and later

After upgrading Tableau Server 2022.1 (or later), restoring a Tableau Server backup as part of your upgrade process can cause the following error:

*“The backup cannot be restored because Tableau Server uses the new identity service tables by default.”*

This issue occurs because Tableau Server 2022.1 (and later) uses an identity schema that is different from the identity schema used by the backup. To resolve this issue, see [Troubleshoot Issues with the Identity Migration](#).

Upgrade fails on 2020.4.0 or later

Beginning with version 2020.4.0, the Checkpoint Upgrade feature allows you to retry a failed upgrade. In general, this is most useful for experienced server administrators and IT professionals who are comfortable with Tableau Server log files and are willing to search through them. But the feature can help in all failed upgrades because it allows you to rerun the `upgrade-tsm` script, and the script is run from the last successful step, saving time. For those with experience, it may be possible to identify problems like disk space problems or permissions issues, correct them, and rerun the upgrade.

If you are upgrading to version 2020.4.0 or later and the upgrade fails, the following steps may help you to complete the upgrade:

- Rerun the `upgrade-tsm` script. Upgrade failures are sometimes a result of timeouts during the upgrade process, and rerunning the script can allow the upgrade to get beyond intermittent or occasional timing issues. This is also a step that is safe and easy to do. Rerunning the script will do no harm, and at worst, the upgrade will fail again at the same point, but without needing to go through any previous steps.

The script is located in the `\scripts` directory:

By default,

```
C:\Program Files\Tableau\Tableau Server-
\packages\scripts.<version_code>\upgrade-tsm.cmd
```

If your Tableau Server upgrade isn't successful when you rerun the `upgrade-tsm` script, and you are comfortable with Tableau Server logs, you can take these additional troubleshooting steps:

- Look at the output of the script in the command window (rerun the script if you no longer have the command window open). You need to run the script in a command window with administrator access. Useful error messages may help you identify the cause of the upgrade failure and give you some ideas for how to correct the issue.
- Look in the `app-upgrade.log` file. Any errors that are displayed at the command line will also appear in the `app-upgrade.log` file, often with more details.
- Look in the `tabadmincontroller.log` file. Upgrade problems that aren't easily identifiable in the above two instances are likely the result of an issue in a job. The `tabadmincontroller.log` file may have more information that helps you diagnose the issue.

**Note:** For information about log file locations, see [Tableau Server Logs and Log File Locations](#).

### Upgrade fails due to permission problems with the backup/restore file location

With versions of Tableau Server before 2022.1.0, if the file location for the backup/restore file does not have the correct permissions, the upgrade script will fail with an error about not being able to read the backup file or not being able to restore the repository.

Beginning with version 2022.1, the upgrade script confirms the permissions of file location for the backup/restore file before starting the upgrade so the file can be written to and read from the location during the upgrade to the new version of Tableau Server.

Required permissions for the backup/restore file location:

- NetworkService: read/write/execute permission
- Run As service account: read/write/execute permission

The errors will be similar to these:

```
The runas user does not have permission to read the backup file:
<backup/restore basefilepath>.
```

```
Repository restore failed.
```

```
An error occurred during installation.
```

```
An error occurred while restoring repository.
```

The location used by TSM for backup and restore is defined by the `base-filepath.backuprestore` configuration key and has a default that the installation program sets up with correct permissions, but these may be impacted by organisation IT rules or if you change the location to one you have created yourself. A new command available starting in 2022.1 allows you to check the permissions on the backup/restore file location immediately after creating it to avoid any permission-related problems. For details about that command, see `tsm maintenance validate-backup-basefilepath`.

For details about the backup/restore file path, see `tsm File Paths`.

## Common Settings Import Issues

Import of settings file causes "not present on any node" validation error due to missing services

If you are upgrading by installing a new version of Tableau Server and importing a settings file from an earlier version, you may encounter topology validation errors when running the `tsm settings import` command.

This can happen when you export a settings file from an older version of Tableau Server and import it into a new version, and new services have been added to Tableau between the two versions.

Errors will be similar to this (the specific service may be different):

```
c:\Users\mytableau\Desktop>tsm settings import -f 20183-export.json
```

```
Pending topology set.
```

```
There are 1 topology validation errors/warnings.
```

```
Service 'elasticserver' is not present on any node in the cluster.
```

```
Service: Elastic Server
```

To resolve this issue, add any missing services to Tableau Server:

1. For any service that generated a validation error, add the service with an instance count of 1.

For example, if the Elastic Server is not present in the cluster, set the process instance count to 1 using the service name that appears in the first line of the validation error message:

```
tsm topology set-process -n node1 -pr elasticserver -c 1
```

Repeat this step for each service that results in an error.

2. When you have no more warnings or errors, apply the pending changes:

```
tsm pending-changes apply
```

Your settings should be imported successfully.

Import of settings file causes "configuration value you specified does not match" error

If you are installing a new version of Tableau Server and import a settings file from an earlier version, you may encounter configuration validation errors when running the `tsm settings import` command. These can occur when a settings file includes a configuration value that has since been removed from Tableau.

The error will look similar to this (the configuration key may be different):

```
c:\Users\mytableau\Desktop>tsm settings import -f 20183-export.json
Configuration error: At least one configuration value you specified
does not match a known configuration key. This applies to the fol-
lowing keys: '[features.TsmConfigFileService]'
Use this parameter to override unknown key error: --force-keys
```

To resolve this issue, edit the settings file you are importing to remove the reference to the configuration key or keys in the error:

1. Copy the JSON settings file and save the copy for backup.
2. Open the JSON settings file in a plain text editor.
3. Locate and delete the entire line that includes the key. In this example, `features.TsmConfigFileService`:

```
"configKeys" : {
  "config.version" : 19,
  "tabadmincontroller.port" : "8850",
  "endpoints.enabled" : false,
  "endpoints.health.enabled" : true,
  "features.TsmConfigFileService" : true,
  "tableau_projects.language" : "en",
```

The above is an example of a small section of an exported settings file and is not intended to represent the entire contents of the file.

4. Save the settings file and import it again.

You may encounter additional errors related to topology validation. For information about solving those errors, see [Import of settings file causes "not present on any node" validation error due to missing services above](#).

"You cannot directly modify instances of the Coordination Service" error

This error can occur in two situations:

- When you import a Tableau Server settings file into an installation that has a different Coordination Service topology than the settings file does
- When you attempt to configure the Coordination Service using the `tsm topology set-process` command

If you see this error after importing a settings file:

The Tableau Server settings file has a different Coordination Service topology than the target server does. This can happen if you are upgrading Tableau Server by installing a new version and importing a settings file from an earlier version. If you have not explicitly deployed a Coordination Service ensemble on the target server, it has a single instance of Coordination Service, on the initial node.

To correct this error you can take either correct the mismatch from the command line, or by editing the settings import file. You can also discard all pending changes, deploy the Coordination Service on the target computer to match the settings in the import file, and reimport the settings file.

To correct the mismatch from the command line, for each node that generates an error, use the `tsm topology set-process` command to revert the instance count of Coordination Service.

1. Run the `tsm pending-changes list` command. The output shows you which nodes have changes.



2. Find the node or nodes where the Coordination Service count is changed.

For example, if the settings file had a Coordination Service instance on node2, but the target system did not have any Coordination Service instance on that node, the count for node 2 would show as changed from 0 to 1 by the import of the settings file:

```
C:\Windows\system32>tsm pending-changes list
Configuration
There are no pending configuration changes.
Topology
node2:
    Coordination Service
        New Instance Count:1
        Old Instance Count:0
```

3. Use the `tsm topology set-process` command to set the count back to the "Old Instance" value.

For the example above:

```
tsm topology set-process -n node2 -c 0 -pr "Coordination Service"
```

4. Once you have reset any Coordination Service instance count that was changed, apply pending changes:

```
tsm pending-changes apply
```

If you see the error when setting the process count for Coordination Service manually:

This error can also occur if you attempt to update the Coordination Service directly, using the `tsm topology set-process` command instead of the `tsm topology` commands for managing the Coordination Service. If you tried this:

1. Use the `tsm pending-changes discard` command to discard the pending changes.
2. Use the correct commands for configuring the Coordination Service. For more information, see [Deploy a Coordination Service Ensemble](#).

## Troubleshooting connections to TSM

### Unable to connect to TSM

If you are able to connect to TSM from the computer where you installed Tableau (using `https://localhost:8850` for example), but cannot connect from another computer (using `https://<server-name>:8850`), you may need to configure the local firewall on the Tableau Server computer.

Beginning with version 2018.2 you need to configure the firewall manually. For more information, see [Local firewall configuration](#).

## Starting Tableau Server

### Tableau Server cannot determine if it fully started

In some instances Tableau Server may report that it could not determine if all components started properly on startup. A message displays: 'Unable to determine if all components of the service started properly'.

If you see this message after starting, verify that Tableau Server is running as expected by using a `tsm status -v` command.

If the status shows as running ("Status: RUNNING"), then the server successfully started and you can ignore the message. If the status is DEGRADED or STOPPED, see 'Tableau Server doesn't start' in the next section.

### Tableau Server doesn't start

If Tableau Server does not start or is running in a degraded state, run the `tsm restart` command from a command prompt. This will shut down any processes that are running, and restart Tableau Server.

## Reindexing Tableau Server Search & Browse

Problems that can be solved by rebuilding Search & Browse index

Symptoms of an index that needs to be rebuilt include:

- A blank list of sites when a user attempts to log in
- A blank list of projects when a user tries to select a project
- Missing content (workbooks, views, dashboards)
- Unexpected or inaccurate alerts (for example, an "refresh failed" alert on a workbook that does not include an extract)

If you see any of these behaviours, reset and rebuild the Search & Browse index using the `tsm maintenance reset-searchserver` command.

## Activating Tableau Server

Tableau Server licence activation fails

In some instances Tableau Server licence activation may fail. Error messages can range from a very generic one:

- `An error has occurred`

To more specific messages:

- `Function flxActCommonLicSpcPopulateFromTS returned error 50030, 71521,`
- `No license found for 'Tableau Server'`

To resolve this issue, try these solutions in the order listed:

Confirm you can access the licensing server

The Tableau licensing service was moved to a new data centre on 6 October 2018. This means any environments that required special configuration (static IP safe listing for example) to access `licensing.tableau.com` or `licensing.tableau.com` will need to be updated before you can activate, refresh or deactivate a Tableau product key.

To test access, type the URL and the port of the licensing server in a browser:

```
https://licensing.tableau.com:443
```

and:

```
https://atr.licensing.tableau.com/_status/healthz
```

If you are able to access the server, a "Test success" message displays for the first server, and an "OK" message displays for the second.

Tableau Server needs to make a connection to the following internet locations for licensing purposes:

- atr.licensing.tableau.com:443
- licensing.tableau.com:443
- register.tableau.com:443
- o.ss2.us
- s.ss2.us
- crt.rootca1.amazontrust.com
- crt.sca1b.amazontrust.com
- crt.sca0a.amazontrust.com
- crt.sca1a.amazontrust.com
- crt.sca2a.amazontrust.com
- crt.sca3a.amazontrust.com
- crt.sca4a.amazontrust.com
- \*.digicert.com

## Tableau Server on Windows Help

- `ocsp.*.amazontrust.com`
- `crl.*.amazontrust.com`

Requests to the above domains may be on port 80 or 443. Port 80 is used for certificate validation (revocation, certificate chain, etc). Port 443 is used for SSL connections.

Requests to the `ocsp.*.amazontrust.com` and `crl.*.amazontrust.com` domains are managed by Amazon for certificate revocation information. See [ACM certificate characteristics](#) for more information.

### Verify the date and time

Verify the date and time on the initial Tableau Server computer is correct. If the clock is set to a time and date earlier than the current date, Tableau Server cannot be activated.

### Verify FlexNet Licensing Service has started

If the date and time on the Tableau Server computer are correct, verify that the FlexNet Licensing Service is running on the initial Tableau Server computer.

1. On the initial computer, from the Windows Start menu, open **services.msc**.
2. In the Services dialog box, verify that the status of *FlexNet Licensing Service 64* (64-bit) or *FlexNet Licensing Service* (32-bit) is **Started**.

If FlexNet is not listed as **Started**, right-click FlexNet Licensing Service and select **Start**.

If the **Start** option is greyed out, the service may be set to Disabled. To enable the service:

- a. Right-click FlexNet Licensing Service and select **Properties**.
- b. From the **Startup type** drop-down list, select **Automatic**.
- c. Click the **Start** button, and then click **OK**.

Force the product key to be read again

1. On the initial Tableau Server computer, sign in as administrator and open a command prompt.

Change to the Tableau Server bin directory. By default, this is:

```
C:\Program Files\Tableau\Tableau Server\packages\bin.<version_
code>
```

- 2.
3. Type the following commands:

```
tsm stop
lmreread
```

```
tsm start
```

Send the contents of trusted storage to Tableau Support

If FlexNet Licensing Services is installed and running but you're still seeing an error, there might be a problem with the Tableau product key information. To resolve this issue, complete the following steps to create a file of the key information located in trusted storage.

1. On the initial Tableau Server computer, sign in as administrator and open a command prompt.
2. Type the following command:

```
serveractutil -view > <machine_name>-LicResults.txt
```

This creates the `<machine_name>-LicResults.txt` file in your current directory.

If you don't have write permissions for that location and see an error, change to a location where you do have permission to create a file and run the command again.

3. Contact Tableau Support (<http://www.tableau.com/en-gb/support/request>) and include the `<machine_name>-LicResults.txt` file that you created.

## tabcmd Installation Problems

### Installing tabcmd separately

tabcmd is automatically installed on the initial Tableau Server node when you install Tableau Server, but if you want to run it on another computer, you need to download and install tabcmd separately. For details, see [Install tabcmd](#).

### Problems installing tabcmd on Linux

tabcmd requires Java 11 to run properly. On RHEL-like systems, this will be installed as a dependency when installing tabcmd. On Debian-like systems, you need to install Java 11 separately if it is not already installed.

As of July 2022, Debian distributions are no longer supported. For more information, see [this Tableau Community post](#).

### Java is not installed

If you see errors similar to this when installing tabcmd, confirm that Java 11 is installed on your Linux computer:

```
Cannot find 'java' in your PATH. Install 'java' and make sure it is  
in your PATH to continue.
```

### Incorrect version of Java is installed

If you see errors similar to these, confirm that Java 11 is installed:

```
Exception in thread "main" java.lang.UnsupportedClassVersionError:  
com/tableausoftware/tabcmd/Tabcmd : Unsupported major.minor version  
52.0
```

or.

```
*** Uncaught exception NoClassDefFoundError: javax/xml-  
l/bind/JAXBException  
*** See the logs for the stacktrace.
```

## Troubleshoot Job Failures Due to Service Failures

Beginning in Tableau Server version 2021.1, a new set of error messages help you understand when jobs fail due to an issue with a service. This topic explains the messages and what they can mean.

An error message will be displayed in this format:

```
<nodeId>
<service>_<instanceId>.<version>: <error>
```

There are four categories of errors:

- **Missing status** - If a service is unable to report its status, for example, if a node is down, if tabadminagent is unable to report status or if a service has failed in a way that results in its dependent services not being able to be installed, this will show up as a "missing status" error.
- **Failed to update configuration** - If a service is unable to update its configuration file, this shows up as a "failure to update configuration" error. This may occur during upgrades, when attempting to apply pending changes to new services. See the service's control app log, <dataDir>/tabsvc/logs/<service>/control-<service>\_<nodeId>-<instanceId>, for more details about the error.
- **Failed to reach the requested state. Current state: <currentState>** - If a service cannot be installed/removed/started/stopped, this results in a "failed to reach requested state" error. This can happen during upgrades when new services are being installed and old ones removed. Possible options for <currentState> are: DEPLOY\_FAILED, INSTALL\_FAILED, DISABLE\_FAILED, ENABLE\_FAILED, CONFIGURE\_FAILED, UNINSTALL\_FAILED, REMOVE\_FAILED. Most common are: INSTALL\_FAILED, UNINSTALL\_FAILED and REMOVE\_FAILED. See the service's control app log, <dataDir>/tabsvc/logs/<service>/control-<service>\_<nodeId>-<instanceId>, for more details about the error.
- **Failed to start/stop. Current status: <currentStatus>** - This occurs if a service that should be running is stopped or if a service that should be stopped continues to run. Possible values in <currentStatus> are: ACTIVE, BUSY, PASSIVE, UNLICENSED, DOWN, STATUS\_UNAVAILABLE and DEGRADED. The first three (ACTIVE, BUSY, PASSIVE) are considered "running" statuses. The last four are a "stopped" status. See



the main service log, <dataDir>/tabsvc/logs/<service>/<service>\_<nodeId>-<instanceId>.log, for more details about the error.

An example of an error message is:

```
This job failed due to unexpected error: 'ServiceOperationTimeoutException'
One or more services failed to reach their expected state.
node1:
    vizportal_0.2021.4.0.0: Failed to reach requested state. Current state: INSTALL_FAILED
```

Beginning in version 2021.3, an additional error message has been added for the second and third error types that will match the errors found in the control app logs.

## Troubleshoot Server Sign in Problems

There are several different sign in options between Tableau Services Manager (TSM) and Tableau Server.

- **TSM** – If you are not able to sign into TSM, make sure you are using credentials for a user who has administrative rights to the computer where TSM is installed. This user may or may not also be a Tableau Server administrator. This is true whether you are signing in to the Web UI or the CLI. For more information, see [Sign in to Tableau Services Manager Web UI](#).
- **Tableau Server** –
  - **Administrators:** if you are signing into Tableau Server as an administrator, you must use credentials for a user who has an administrator role in Tableau Server. You create the initial administrator when you first install Tableau, but can add other users as administrators once Tableau is installed and running. For more information, see [Sign in to the Tableau Server Admin Area](#).

- Non-administrative users: If you are signing into Tableau Server as a user, you need to use credentials for a user who has been added to Tableau Server. For more information, see [Sign in to Tableau Server or Tableau Cloud](#).

**Note:** If users with valid credentials are unable to sign into Tableau Server, make sure you have not added a node without applying pending changes. If you have a pending new node, signing into Tableau Server may not be possible.

## Troubleshooting scenarios

### TSM Initialise screen does not display

When installing or upgrading Tableau Server, if the browser opens but nothing displays, you may need to add the hostname to the trusted sites list. Alternatively, clear the browser cache or use a different browser. For more information, see the [Tableau Knowledge Base](#).

## Troubleshoot Licensing

This topic includes instructions for troubleshooting issues related to Tableau Server licensing.

### Product key failure with forward proxy servers

If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before attempting to activate, refresh or deactivate product keys.

### Handle an unlicensed server

Tableau offers two licensing models: role-based and core-based. To learn more about role-based and core-based licensing, see [Licensing Overview](#).

role-based licensing requires each active user account to be covered by a licence. role-based licences have a defined capacity, or number of users that they allow. Each user is assigned a unique user name on the server and is required to identify themselves when connecting to the server.

Core-based licensing has no constraints on the number of user accounts in the system, but it does restrict the maximum number of processor cores that Tableau Server can use. You can install Tableau Server on one or more machines to create a cluster, with the restriction that the total number of cores in all the machines does not exceed the number of cores you have licensed and that all of the cores on a particular machine are covered by the licence.

### Unlicensed role-based server

The most common reason for a server that has role-based licensing to be unlicensed is an expired product key or an expired maintenance contract.

### Unlicensed core-based server

A core-based server can become unlicensed for a variety of reasons, such as an expired product key or when Tableau Server nodes running licensed processes cannot contact the Tableau Server node running the Licence Manager service. To learn more about licensed processes, see [Tableau Server Processes](#).

When the server is unlicensed you may not be able to start or administer the server. You can, however, manage your licences using the `tsm licences` command.

### Unlicensed server administrator

All Tableau Server administrators require a user licence. Tableau Server administrators will always consume the highest role available. If a Creator product key is activated, the Tableau Server Administrator(s) will take this role. If the highest role available on Tableau Server is an Explorer, the Server Administrator will take the Explorer role. If Creator licences are added to the server, any existing Server Administrator accounts using Explorer licences will automatically convert to use Creator licences.

TSM administrator accounts do not require licences.

If the licence that the server administrator is using expires, then the account will become unlicensed and will be unable to sign in.

Verify the expiration date of your licence(s) for the administrators on the server:

- Run `tsm licences list`.
- Compare the date with the date displayed in the [Tableau Customer Portal](#).
- If the portal does not display the date that you expect, contact [Customer Success](#).
- To renew your licence, visit the [Tableau renewal](#) web page.
- Run the `tsm licences activate` command to activate a new licence for the administrator account(s).

If the TSM date matches the portal date and the following refresh operation fails, contact [Tableau Support](#).

If the licence for your administrator account has expired or will expire soon, you will need to activate a new licence for the account. Alternatively, you can unlicense a non-administrator user to free a licence for the server administrator account.

If a Tableau Server administrator is using a Creator, Explorer or Viewer licence and their licence expires, they will use another licence of the same type, if available. If no licence seats are available the user will become “unlicensed”.

**Important:** Do not restart Tableau Server until you have activated a new licence or transferred a site role for the server administrator account.

## Troubleshoot role-based licensing

This section provides information about resolving issues that can occur when adding the role-based Viewer, Explorer and Creator licences to Tableau Server or Tableau Cloud, or when these licences expire. The highest available licence type is Creator, followed by Explorer, and finally Viewer. To learn more about role-based licensing, see [Licensing Overview](#).

A user or administrator is unlicensed due to licence expiry

To avoid having users unexpectedly become unlicensed or move to another site role, you should always do one of the following before the licence that they are currently using expires:

- Renew and activate a replacement licence. If a user occupies a Creator, Explorer or viewer licence and their licence expires, they will use another licence of the same type, if available.
- Change the site role of those users to allow the use of a licence that is not due to expire.

To learn how site roles can be changed to require a different licence, see [Set Users' Site Roles](#).

The reassignment of users to new licences is governed by the following logic:

- When a Server Administrator user occupies a Creator licence and their licence expires (with no replacement licences available), they are reassigned to an Explorer licence if any Explorer licences are available. This licence reassignment occurs in order of most recent login. Server Administrators displace other users who might be currently using an Explorer licence. If no Creator or Explorer licences are available a Server Administrator becomes unlicensed.
- When a non-Server Administrator user occupies a Creator licence and their licence expires (with no replacement licences available), they become unlicensed. To avoid having these users become unlicensed, change their site role before the licence expires. This is especially important for users in the Site Administrator Creator site role, who must move to the Site Administrator Explorer site role before their Creator licence expires to avoid losing Site Administrator capabilities.
- When a non-Server Administrator user occupies an Explorer or Viewer licence and their licence expires (with no replacement licences available), they are upgraded to a higher licence type, if licences of that type are available. Specifically, the following occurs when a licence expires:
  - Users who occupy an Explorer licence will move to a Creator licence, if available (with no change to site role).
  - Users who occupy a Viewer licence will move to an Explorer licence, if available. If no Explorer licences are available, these users will move to a Creator licence, if available (with no change to site role).

- If no licences are available at the higher licence types, those users are moved to Unlicensed.

Users are reassigned to a new licence as described above in order of most recent login, with lower licence types reassigned first (first Viewer, then Explorer, and then Creator).

For example: Two users with a Viewer licence, a user with the Creator licence, and two Server Administrators with a Creator licence all have their licences expire. Four unexpired Explorer licences are available for these users. In this situation, the following occurs in the order shown below:

1. The user with a Viewer licence who logged in most recently is reassigned to an Explorer licence.
2. The second user with a Viewer licence is reassigned to an Explorer licence.
3. The Server Administrator user with a Creator licence who logged in most recently is reassigned to an Explorer licence, and then the second Server Administrator with a Creator licence is reassigned to the remaining Explorer licence.
4. The user with the Creator licence becomes unlicensed.

Server Administrator site role is unchanged when using a Creator licence

Server Administrators gain Creator capabilities if Creator licences are available in Tableau Server, with no change to their site role name. All other Tableau Server and Tableau Cloud users gain Creator licences only if assigned to a site role that includes Creator in its name.

Licences are not immediately available

When you add a role-based licence to Tableau Server, those licences become available to all users when you restart Tableau Server.

A user with a Viewer licence cannot open Tableau Server or Tableau Cloud workbooks from Tableau Desktop

A user with a Viewer licence who also has a separate Tableau Desktop licence will be unable to open workbooks on Tableau Server or Tableau Cloud using Tableau Desktop. To open workbooks using Tableau Desktop, that user will need an Explorer or Creator licence on Tableau Server or Tableau Cloud.

## Handle an Unlicensed Server Process

There are several status indicators on the Tableau Server Status page that help you understand the state of Tableau Server processes. An orange-colour status box, "Unlicensed", indicates that one of the server processes is unable to retrieve the Tableau Server licence information.

In the image below, one of the VizQL processes is unlicensed:

**Process Status**  
The real-time status of processes running in Tableau Server.

Process	Primary 10.32.139.21	Worker 10.32.139.22
Gateway	✓	✓
Application Server	✓	✓
API Server	✓	✓
VizQL Server	✓ ✓	⚠
Cache Server	✓ ✓	✓ ✓
Search & Browse	✓	✓
Backgrounder	✓	✓
Data Server	✓ ✓	✓ ✓
Data Engine	✓	✓
File Store	✓	✓
Repository	✓	✓

✓ Active
🔄 Busy
✓ Passive
⚠ Unlicensed
✗ Down
□ Status unavailable

There may be several reasons why a process is unable to access licensing information. For example, there may be network issues preventing a process running on an additional node from communicating with the licensing service on the initial node. Or, the unlicensed process may be getting sent more requests than it can accept at a particular moment and can't handle the licensing request. The impact to users depends on which process is unable to confirm its licence, and whether there are other instances of the process on one of the server nodes. In the case of the unlicensed VizQL process above, some users may be able to access views while others cannot.

To resolve the problem, **stop**, then **start** Tableau Server.

## Tableau Services Manager (TSM) Command Timeout

When Tableau Server is configured with two instances of the repository and failover to the backup repository occurs, TSM attempts to restart the original repository so that it is available as a backup. If this cannot be done for any reason, subsequent TSM commands can fail due to timeouts while waiting for the original repository to recover.

Commands that can be impacted include:

- tsm maintenance restore
- tsm maintenance reindex-search
- tsm reset
- tsm security regenerate-internal-tokens
- tsm sites export
- tsm sites import

If any of these commands is failing, and you have a repository that is not recovering, remove the repository from the server topology, apply pending changes and re-add it.

## Troubleshooting Tableau Services Manager (TSM) Backup

### Backup fails to start because services do not start

When you back up Tableau Server, one of the first steps taken is to confirm that key services are running, and, if they are not, to start them. If these services cannot be started:

- Active Repository
- File Store
- Cluster Controller

any attempt to back up Tableau Server will fail with one of the following errors:

An error occurred starting one or more of the following services:  
Active Repository, File Store, Cluster Controller.



## Tableau Server on Windows Help

One or more of the following services did not start in a timely fashion: Active Repository, File Store, Cluster Controller.

To successfully back Tableau Server up, make sure these processes can start.

### Backup fails with a sharing violation error.

TSM backup can fail with a misleading error when there is a lack of disk space.

If your backup fails with a "sharing violation", check these logs for errors similar to these:

#### tabadmincontroller\*.log

```
2019-02-27 13:42:16.011 -0600 pool-37-thread-2 : INFO
com.t-
ableau-
software.tabadmin.webapp.backup.AbstractBackupSingleInstanceAction -
Starting 'backup' call on node1:8315 for service pgsql_
0.20183.18.1214.0808 with params
{"node":"node1","skipVeri-
fication":false,"singleNode":true,"origin":"COMMAND_
LINE","writePath":"test-
backup.ts-
bak","-
post-
gresOnly":-
false,"overrideDiskSpaceCheck":false,"skipCompression":false}
```

#### tabadminagent\*.log

```
2019-02-27 13:44:01.796 -0600 pool-14-thread-5 : ERROR org.a-
pache.thrift.server.TThreadPoolServer - Error occurred during pro-
cessing of message.
```

```
java.lang.RuntimeException: org.apache.thrift.TExcep
java.nio.file.FileSystemException: C:\ProgramData\Tableau\Tableau
Server\data\tabsvc\tabadminagent\0\filetransfer\df699acb-731a-41dd-
af6b-baa39e2d6cc3: The process cannot access the file because it is
being used by another process.
```

```

        at com.google.common.base.Throwables.propagate(Throw
ables.java:241)
        at
com.t-
ableau-
soft-
ware.tabad-
min.agent.services.TRestoreFileTransferHandler.processFile
(TRestoreFileTransferHandler.java:110)
        at com.t-
ableau-
soft-
ware.-
file.trans-
fer.endpoint.FileTransferHandler$Processor$processFile.getResult
(FileTransferHandler.java:262)
        at com.t-
ableau-
soft-
ware.-
file.trans-
fer.endpoint.FileTransferHandler$Processor$processFile.getResult
(FileTransferHandler.java:246)
        at org.apache.thrift.ProcessFunction.process(Pro-
cessFunction.java:39)
        at org.apache.thrift.TBaseProcessor.process
(TBaseProcessor.java:39)
        at org.apache.thrift.TMultiplexedProcessor.process(T
multiplexedProcessor.java:123)
        at org.apache.thrift.server.TThreadPoolServer$Worker
(TThreadPoolServer.java:286)
        at java.util.concurrent.ThreadPoolExecutor.runWorker
(ThreadPoolExecutor.java:1149)
        at java.util.concurrent.ThreadPoolExecutor$Worker.ru
(ThreadPoolExecutor.java:624)

```

## Tableau Server on Windows Help

```
at java.lang.Thread.run(Thread.java:748)
Caused by: org.apache.thrift.TException: java.nio.-
file.FileSystemException: C:\ProgramData\Tableau\Tableau Server-
\data\tabsvc\tabadminagent\0\filetransfer\df699acb-731a-41dd-af6b-
baa39e2d6cc3: The process cannot access the file because it is being
used by another process.

at com.t-
ableau-
soft-
ware.-
file.trans-
fer-
.file-
transferservice.server.FileTransferServiceHandler.deleteTransfer
(FileTransferServiceHandler.java:217)
at com.t-
ableau-
soft-
ware.tabadmin.agent.services.TRestoreFileTransferHandler.processFile
(TRestoreFileTransferHandler.java:106)
... 9 more
Caused by: java.nio.file.FileSystemException: C:\Pro
gramData\Tableau\Tableau Server-
\data\tabsvc\tabadminagent\0\filetransfer\df699acb-731a-41dd-af6b-
baa39e2d6cc3: The process cannot access the file because it is being
used by another process.

at sun.nio.fs.WindowsException.translateToIOException
dowsException.java:86)
at sun.nio.fs.WindowsException.rethrowAsIOException
(WindowsException.java:97)
at sun.nio.fs.WindowsException.rethrowAsIOException(
dowsException.java:102)
at sun.nio.fs.WindowsFileSystemProvider.implDelete
(WindowsFileSystemProvider.java:269)
```

```

        at sun.nio.fs.AbstractFileSystemProvider.deleteIfExists
(AbstractFileSystemProvider.java:108)
        at java.nio.file.Files.deleteIfExists(Files.java:116)
        at com.t-
ableau-
soft-
ware.-
file.trans-
fer-
.file-
transferservice.server.FileTransferServiceHandler.deleteTransfer
(FileTransferServiceHandler.java:215)
        ... 10 more

```

This can be an indication that the backup failed because there was not enough disk space.

## Cookie Restriction Error

When a user signs in to Tableau Server, a session cookie is stored in their local browser. The stored cookie is how Tableau Server maintains that the signed in user has been authenticated and can access the server. Because the cookie is set with the same domain or sub-domain as the browser's address bar, it is considered a first-party cookie. If a user's browser is configured to block first-party cookies, they will be unable to sign in to Tableau Server.

When a user signs in to Tableau Server via an embedded view, or in an environment where trusted authentication has been configured, the same thing happens: a cookie is stored. In this case, however, the browser treats the cookie as a third-party cookie. This is because the cookie is set with a domain that's different from the one shown in the browser's address bar. If a user's web browser is set to block third-party cookies, authentication to Tableau Server will fail. To prevent this from occurring, web browsers must be configured to allow third-party cookies.

## Troubleshoot Data Sources

For users to work with Tableau Server data sources, up to three things need to be in place:

- **Permissions for the data source:** Anyone connecting to a data source must have the **Connect** and **View** permission capabilities for it. This also applies to users accessing views that connect to data sources. Anyone publishing and modifying data sources must have the appropriate user site role and also have the **Save** and **Download/Save As** permissions. See Permissions for more information.

Multidimensional (cube) data sources have to be downloaded and used in Tableau Desktop, so they require **Download/Web Save As** permission. For more information about cubes in Tableau, see Cube Data Sources.

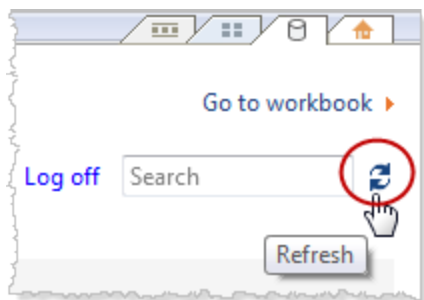
- **Ability to authenticate to the database:** There are several ways you can connect to data in Tableau and control who has access to what. Basically, whichever entity is connecting to the database must be able to authenticate. The entity could be Tableau Server performing an extract refresh. It could be a Tableau Desktop user connecting to a data source that then connects to a live database. It could also be a Tableau Server user who's accessing a view that connects to a live database. Refer to Data Security to learn more about your options.
- **Database drivers:** If the person who created and published the data source in Tableau Desktop needed to install additional database drivers, you may need to install them on Tableau Server as well. If you are running a distributed installation of Tableau Server where, for example, the data server process is running on an additional node, any required database drivers must be installed there as well as on the initial server node. Other processes require drivers as well. See Database Drivers for more information.

## Data Source Error Messages

Here are some errors that workbook authors and other users may encounter as they work with data sources and views:

**Permission to access this Tableau Server data source denied:** Connecting to a data source requires the Connect permission. See Data access for published Tableau data sources for more information.

**Data source not found:** Someone working with a view may see this error if a data source is removed from Tableau Server or if their Connect to Data page needs to be updated. To update the Connect to Data page in Tableau Desktop, click the Refresh icon:



**Unable to connect to this Tableau Server data source:** This error may appear if the connection information for the data source has changed – for example, as a result of the database server name changing. Look at the Data Connection information for the data source and confirm that it has the correct settings.

**Unable to list Tableau Server data sources:** This error may occur if a user is trying to access Tableau Server data sources and there are connectivity issues between Tableau Server and Tableau Desktop.

**Can't connect with a cube data source:** To use a published multidimensional (cube) data source, you must download the data source and use it in Tableau Desktop. Verify that you have the **Download/Web Save As** permission for the data source. If you try to add a published Cube data source to a workbook in Web Edit mode on Tableau Server, you will receive the error **Unable to connect to the data source. / DataServiceFailure Unable to connect to the server "<Tableau\_Server\_name>"**. For more information about cubes in Tableau, see Cube Data Sources.

## Troubleshoot WDC Problems

Web Data Connectors (WDCs) are web pages that provide a data connection accessible over HTTP, for data sources that don't already have a connector in Tableau. This topic covers potential issues that you might run into with WDCs.

## WDC Extract refresh failed with error 'Render process terminated - render process crashed (exit code=-2147483645)'

We recommend that you use a Run As service account that is not in any administrator group for the computer Tableau Server is running on. This is a best practice for security reasons, but it can also impact connection issues with data sources and WDCs. The particular issue with WDC extract refresh failures is one type of connection problem that can occur if your Run As service account is a member of an Administrators group on the Tableau Server computer. To resolve this issue, update the Run As service account so it does not have any administrator privileges on the computer.

For details about this issue, see the [Tableau Knowledge Base](#).

For information about best practices when creating or updating the Run As service account, see [Creating the Run As service account](#).

## Troubleshoot Subscriptions

"The view snapshot in this email could not be properly rendered."

If you receive a subscription with this error message, there could be several reasons:

- **Missing credentials:** Some views are published with embedded credentials. You may receive the above error if the embedded credentials are now out-of-date, or if the view was republished without the embedded credentials.
- **Database temporarily down:** If the view has a live database connection and the database was temporarily down when the subscription was being generated, you might receive the above error.
- **Background process timeout:** By default, the background process that handles subscriptions has a timeout value of 30 minutes per view for the rendering of a view. If rendering a view goes beyond this time limit, the next view in the workbook results in a failed job due to the timeout. In the majority of cases, this default is plenty of time.

However, if the background process is handling an extraordinarily large and complex dashboard, that may not be enough time. You can check the Background Tasks for Non Extracts admin view to see if that's the case. To increase the timeout threshold, use the `tsm configuration set subscriptions.timeout` command.

## Can't see images in email

For images of content to display in a subscription email, users subscribed to views, in addition to **View** permissions, must also have **Download Image/PDF** permissions. For more information, see Permissions.

## Can't subscribe

If you can see a view on Tableau Server and it has a subscription icon (✉) in the upper right corner, you can subscribe to it.

To subscribe to a view, Tableau Server needs to be correctly configured (described in [Manage Subscriptions](#)) and the view you're subscribing to must either have embedded credentials for its data source or not rely on credentials at all. Examples of the latter include a workbook that connects to an extract that isn't being refreshed, or a workbook whose data is in a file that was included with the workbook at the time of publishing. Embedding credentials is a step that happens in Tableau Desktop (see the [Tableau Help](#) for details).

## No subscription icon

It's possible to see a view but be unable to subscribe to it. This can happen for several reasons:

- **No subscriptions have been scheduled:** If no subscriptions have been scheduled or all subscription schedules are disabled, the subscription icon will not appear. To set a schedule for subscriptions, see [Create or Modify a Schedule](#).
- **The view uses a live database connection:** Views with live database connections, where you're prompted for your database credentials when you first click the view, aren't available for subscription. A subscription includes a view (or workbook), data, and a schedule. To deliver the data required for the view, Tableau Server either needs embedded database credentials or data that doesn't require credentials. Where live



database connections are concerned, Tableau Server doesn't have the credentials, only the individual users do. This is why you can only subscribe to views that either don't require credentials or have them embedded.

- **Tableau Server is configured for trusted authentication:** You may also be able to see a view but be unable to subscribe to it (no subscription icon) if Tableau Server is configured for trusted authentication. See [Ensure Access to Subscriptions](#) for more information.

## Receiving invalid or "broken" subscriptions

If you configured subscriptions on test or development instances of Tableau Server in addition to your in-production instance, disable subscriptions on your non-production instances. Keeping subscriptions enabled on all instances can result in your users receiving subscriptions that appear to be valid, but that don't work, or receiving subscriptions even though they've unsubscribed from the view or workbook.

## Missing attachments

You can add a PDF attachment to your subscription if your administrator has it enabled. If the PDF attachment is missing from your subscription, it might be because the size of the PDF exceeds either the email server size limit or the maximum size limit set by server administrators. In Tableau Server, the maximum size limit for PDF attachments to subscriptions can be adjusted through the tsm configuration option `subscriptions.max_attachment_size_megabytes`. For more information, see [Configure Server Event Notification and Set Up a Site for Subscriptions](#).

Starting in Tableau 2024.1, you can send emails with your own sending server, which will allow you to send attachments with a maximum email size of 10 MB.

To enable this feature, navigate to site settings, find the **Customise Email Notifications** section and tick the box next to **Use your SMTP server**.

Note: If you're using your own sending server, Tableau will attempt to send a subscription email with a subset of the attachment that is under the 10 MB limit, but this is not

guaranteed. If Tableau can't send the attachment, you'll see a message letting you know that the attachment is too large to send.

## Suspended Subscriptions

By default, a subscription is suspended after 5 consecutive subscription failures. To change the threshold number of subscription failures that can occur before they are suspended, use the tsm configuration set option, `backgrounder.subscription_failure_threshold_for_run_prevention`. This sets the threshold for the number of consecutive failed subscriptions necessary before suspending the subscription. This is a server-wide setting.

Only Server administrators can configure the threshold number of subscription failures before a subscription is suspended. For information on setting this threshold, see [Set up a Server for Subscriptions](#).

By default, administrators are not emailed when a subscription is suspended, but can opt-in to suspension emails per site through **My Account Settings**.

### Resume suspended subscriptions

Administrators and subscription owners can resume subscriptions in several ways:

- from My Subscription tab in Content Settings
- from the Subscriptions tab per workbook
- from the Subscriptions tab under Tasks (Server Admins only)

When a subscription is resumed, the alert failing count goes back to zero. The next evaluation of the subscription will occur at the next scheduled evaluation time.

### Can't set subscription frequency to "When Data Refreshes"

You can set subscriptions to run when an extract refreshes if the workbook uses a connection to a published extract. When creating or modifying a subscription, you might not see a **Frequency** option if the workbook uses:

- More than one extract refresh
- A live data connection

## Subscriptions not arriving ("Error sending email. Can't send command to SMTP host.")

You may see the above error in Windows Event Viewer if subscriptions aren't arriving and your SMTP server is using encrypted (TLS) sessions. To send subscriptions to an SMTP server that is configured with TLS, you must configure secure SMTP on Tableau Server. See [Configure SMTP Setup](#). (If you're experiencing this error, note that Tableau Server will still indicate that subscriptions are being sent in the [Background Tasks for Non Extracts](#) admin view.)

## Missing data quality warnings or sensitivity labels

Data quality warnings and sensitivity labels are included in subscription emails when:

- Tableau Server or Tableau Cloud is licensed with Data Management. For more information, see [About Data Management](#).
- Tableau Catalog is enabled. For more information, see [Enable Tableau Catalog](#).
- In site settings, the tick box under **High-Visibility Data Labels in View and Workbook Subscriptions** is selected. (In earlier versions, the tick box is under **Data Quality Warnings in Subscriptions**.)

## Troubleshoot SAML

This topic provides information about resolving issues that can occur when you configure SAML authentication.

### SAML and Enable Automatic Logon

If you are using SAML and if Tableau Server is also configured to use Active Directory, do not also select **Enable automatic logon**. **Enable automatic logon** and SAML cannot both be used on the same server installation.

## HTTP status 500 error when configuring SAML

Under some circumstances you might get an HTTP status 500 error and see the following error after enabling SAML and navigating to the Tableau Server URL in a browser:

```
org.opensaml.saml2.metadata.provider.MetadataProviderException:  
User specified binding is not supported by the Identity Provider  
using profile urn:oasis:names:tc:SAML:2.0:profiles:SSO:browser
```

To help resolve this error, make sure of the following:

- The IdP URL for the SSO profile specified in the SAML tab is correct.
- The IdP URL for the SSO profile provided while creating the service provider in the IdP is correct.
- The IdP is configured to use HTTP-POST requests. (Redirect and SOAP are not supported.)

If any of these settings were not correct, make appropriate updates and then perform the SAML configuration steps again, starting with generating and exporting the XML metadata document from Tableau Server.

If these settings are correct, but you still see the error, examine the metadata XML that is produced by Tableau Server and by the IdP, as described in SAML Requirements.

## Signing in from the command line

SAML is not used for authentication when you sign in to Tableau Server using `tabcmd` or the **Tableau Data Extract command line utility** (provided with Tableau Desktop), even if Tableau Server is configured to use SAML. These tools require the authentication configured when Tableau Server was originally installed (either local authentication or AD).

## Login fails: Failed to find the user

Login fails with the following message:

## Tableau Server on Windows Help

```
>Login failure: Identity Provider authentication successful for user  
<username from IdP>. Failed to find the user in Tableau Server.
```

This error typically means that there is a mismatch between the usernames stored in Tableau Server and provided by the IdP. To fix this, make sure that they match. For example, if Jane Smith's username is stored in the IdP as `jsmith` it must be stored in Tableau Server as `jsmith.`

### Login fails: SSL offloading

Login fails with the following message:

```
Unable to Sign In - Invalid username or password.
```

Additionally, the vizportal logs (set to debug mode) contain the following message:

```
DEBUG com.tableau.core.util.RemoteIP - Found header null in X-  
FORWARDED-PROTO
```

**Note:** To log SAML-related events, `vizportal.log.level` must be set to `debug`. For more information, see [Change Logging Levels](#).

This combination of messages indicates a misconfiguration of an external proxy server that is offloading SSL for the connection to Tableau Server. To resolve this issue, see the KB article, ["Unable to Sign In" and "Invalid username or password" Error With SAML After Upgrading](#).

### SAML error log

SAML authentication takes place outside Tableau Server, so troubleshooting authentication issues can be difficult. However, login attempts are logged by Tableau Server. You can create a snapshot of log files and use them to troubleshoot problems. For more information, see [Log File Snapshots \(Archive Logs\)](#).

**Note:** To log SAML-related events, `vizportal.log.level` must be set to `debug`. For more information, see [Change Logging Levels](#).

Check for SAML errors in the following files in the unzipped log file snapshot:

`\vizportal\vizportal-<n>.log`

The application process (`vizportal.exe`) handles authentication, so SAML responses are logged by that process.

## Trailing slash

On the SAML tab, confirm that the **Tableau Server return URL** does not end with a trailing slash

Correct: **`http://tableau_server`**

Incorrect: `http://tableau_server/`

## Confirm connectivity

Confirm that the Tableau Server you are configuring has either a route-able IP address or a NAT at the firewall that allows two-way traffic directly to the server.

You can test your connectivity by running telnet on Tableau Server and attempting to connect with the SAML IdP. For example: `C:\telnet 12.360.325.10 80`

The above test should connect you to the HTTP port (80) on the IdP and you should receive an HTTP header.

## Multiple domains

On the SAML tab, confirm that the Tableau Server **Domain** attribute will detect the domain in the `the domain\username` format in the SAML assertion by leaving it blank.

Correct: `<empty>`

Incorrect: yourdomain.com

## Troubleshooting Mutual SSL Authentication

This topic describes possible mutual (two-way) SSL authentication issues and their causes, the messages that users might see, and possible ways to mitigate the issues.

For more information about mutual SSL authentication and LDAP, UPN, and CN user mapping, see the following topics:

- [Configure Mutual SSL Authentication](#)
- [Mapping a Client Certificate to a User During Mutual Authentication](#)

**We couldn't find a valid client certificate. Contact your Tableau Server administrator.**

The client is missing a certificate.

If the client has no client certificate, the user sees this message during authentication:

```
We couldn't find a valid client certificate. Contact your Tableau  
Server administrator.
```

To resolve the issue, the user should contact the system administrator to generate a certificate for the client computer.

### Invalid user name or password

The client doesn't support mutual SSL authentication.

Versions of Tableau Desktop older than version 9.1 do not support mutual SSL authentication. If an older version of Tableau Desktop is used to connect to Tableau Server that is configured for mutual SSL authentication, the following can occur:

- If Tableau Server is configured to use fallback authentication, the client displays a sign-in dialog box and the user can enter a user name and password.
- If the server is not configured to use fallback authentication, the user sees the following message and cannot connect to the server:

```
Invalid user name or password
```

For more information about fallback authentication, see [Configure Mutual SSL Authentication](#).

**We couldn't find your user name in the client certificate. Contact your Tableau Server administrator or sign in using your Tableau Server account.**

Client certificates are not published to Active Directory.

If Tableau Server is configured to use Active Directory for authentication, and if user mapping is set to LDAP, Tableau Server sends the client certificate to Active Directory for authentication. However, if client certificates have not been published to Active Directory, authentication fails and the user sees the following message:

```
We couldn't find your user name in the client certificate. Contact  
your Tableau Server administrator or sign in using your Tableau  
Server account.
```

To resolve this issue, the system administrator should make sure that client certificates are published to Active Directory. Alternatively, the server should be configured to use a different user mapping (UPN or CN), and the system administrator should be sure that client certificates contain user names in the UPN or CN fields.

**Users unexpectedly see a sign-in dialog box that displays an error message**

If Tableau Server is configured to use mutual SSL authentication and certificates are available for use with users' computers, a user should not see a sign-in dialog box, because



Tableau Server uses the certificate to authenticate the user. However, if the server does not recognise the user name in the certificate, the user sees a sign-in dialog box with an error message that indicates why the certificate was not used. This can occur when all of the following conditions are true:

- Fallback authentication is enabled.
- If the server is using UPN or CN mapping, the user name in the certificate UPN or CN field is not recognised. If the server is using LDAP mapping, the certificate is not mapped to the user in Active Directory.

To resolve this issue, the system administrator should do the following, depending on how user mapping is configured on Tableau Server:

- LDAP mapping: Make sure that the certificate is linked to the user, that the certificate is available for use with the user's computer, and that the user is configured as a Tableau Server user.
- UPN or CN mapping: Make sure that the certificate is available for the user's computer, that the user name is in the certificate UPN or CN field, and that the user name matches the user name on Tableau Server (including domain).

**We couldn't find your user name in the client certificate. Contact your Tableau Server administrator**  
**Certificate does not contain a valid Tableau Server user name.**

The user name in the UPN or CN fields is missing or invalid

When Tableau Server is configured to use UPN or CN mapping, the server reads the user's name from the UPN or CN field of the certificate and then looks up the user name in Active Directory or in the local repository on Tableau Server. (The specific field that the server reads depends on which mapping – UPN or CN – the server is configured to use.) If the field that is supposed to contain the user name has nothing in it, the user sees the following message:

We couldn't find your user name in the client certificate. Contact your Tableau Server administrator.

If a client certificate contains a user name but Active Directory and Tableau Server don't recognise the user name, the user sees the following message:

Certificate does not contain a valid Tableau Server user name.

This can occur when all of the following conditions are true:

- Tableau Server is configured to use UPN or CN mapping.
- Fallback authentication is not enabled.
- The client certificate has no user name in the UPN or CN field, or the user name in the UPN or CN field does not match a user name in Active Directory or on Tableau Server.

To resolve this issue, the system administrator should make sure that the user's certificate has the correct user name in the UPN or CN fields of the certificate.

## The user is signed in using an unexpected user name (LDAP mapping)

When the server is configured to use Active Directory authentication and LDAP mapping, the certificate is linked to a user in Active Directory. If the certificate contains a user name in the UPN or CN field, that user name is ignored.

If the intention is that the user should be signed in with the user name in the UPN or CN fields, the server should be configured to use UPN or CN mapping.

## The user is signed in as the incorrect user (UPN or CN mapping)

Under some circumstances, the user name in a UPN or CN field in the client certificate can be ambiguous. The result is that a user is signed in to the incorrect identity.

For more information about the conditions under which this issue can occur, see the section “Address user-name ambiguity in multi-domain organisations” in Mapping a Client Certificate to a User During Mutual Authentication.

## Troubleshoot Trusted Authentication

This section includes some common issues and errors you might encounter when you're configuring trusted authentication.

A common source for trusted authentication errors are misconfiguration with a proxy server or load balancer. If your Tableau Server operates behind a reverse proxy server or a load balancer, see [Configure Tableau Server to work with a reverse proxy server and/or load balancer](#) and [Add a Load Balancer](#).

Trusted authentication information is written to `ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver\vizql-*.log`.

To increase the logging level from `info` to `debug`, run the following commands:

```
tsm configuration set -k vizqlserver.trustedticket.log_level -v debug
tsm pending-changes apply
```

To test your trusted authentication deployment, see [Test Trusted Authentication](#).

See also

For more troubleshooting information for specific errors, see the following topics accessible from the **Other articles in this section** below:

### Request for ticket by web server

- Ticket Value of -1 Returned from Tableau Server
- HTTP 401 - Not Authorised
- HTTP 404 - File Not Found
- Invalid User (SharePoint or C#)

### Viewer redeeming ticket

- Attempting to Redeem the Ticket from the Wrong IP Address
- Cookie Restriction Error

### Navigating between several embedded views

- An error occurred communicating with the server (403)

## Ticket Value of -1 Returned from Tableau Server

Tableau Server returns -1 for the ticket value if it cannot issue the ticket as part of the trusted authentication process. Before troubleshooting this scenario, be sure to set the log level for trusted authentication to `debug` as specified in [Troubleshoot Trusted Authentication](#).

The exact reason for this message is written to the `vizqlserver_node*-* .log .*` files in the following folder:

```
ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver
```

Here are some things to confirm:

- **All web server host names or IP addresses are added to trusted hosts**

The log error, 'Invalid request host: <ip\_address>' may indicate that the IP address or host name for the computer sending the POST request is not in the list of trusted hosts on Tableau Server. See [Add Trusted IP Addresses or Host Names to Tableau Server](#) to learn how to add IP addresses or host names to this list.

- **IP addresses are IPv4**

If you are using IP addresses to specify trusted hosts, they must be in Internet Protocol version 4 (IPv4) format. An IPv4 address looks like this: 123.456.7.890. IPv6 addresses (for example, fe12::3c4a:5eab:6789:01c%34) are not supported as a way of inputting trusted hosts.

- **Username in POST request is a valid Tableau Server user**

The username you send in the POST request must be a licensed Tableau Server user. You can see a list of users by signing in to Tableau Server as an administrator.

The following log errors indicate a user POST issue:

## Tableau Server on Windows Help

- "Missing username and/or client\_ip"
- "Invalid user: <username>"
- "Unlicensed user is not allowed: <username>"

### Username in POST request includes domain

If Tableau Server is configured to use Local Authentication, the username that you send in the POST can be a simple string. However, if the server is configured for Active Directory you must include the domain name with the user name (domain\username). For example, the username parameter might be: `username=dev\jsmith`. A common error log for this scenario is 'Invalid user: <username>'.

- **Content-Type is specified**

If you are designing an ASP.NET or C# application, you need to declare the content type in your HTTP request. For example:

```
http.setRequestHeader("Content-Type", "application/x-www-form-urlencoded; charset=UTF-8")
```

If you do not specify content type and Tableau Server returns a -1, the log files contain the error: 'missing username and/or client\_ip'.

## HTTP 401 - Not Authorised

If you receive a **401 - Not Authorized error**, it could be for one of the following reasons:

- You may have configured Tableau Server to use Active Directory with SSPI. If your web server uses SSPI, you do not need to set up trusted authentication. You can embed views and your users will have access to them as long as they are licensed Tableau server users and members of your Active Directory. For more information, see `tsm authentication sspi <commands>`.

**Note:** SSPI can only be configured on Tableau Server for Windows.

- Or a **302- Redirect error** after you have deployed Tableau Server, then it's likely the trusted ticket code you have written to construct the URL for the client has not been updated to account for the two-part ticket URL format. For more information, see [Get a Ticket from Tableau Server](#).

## HTTP 404 - File Not Found

You may receive this error if your program code references a Tableau Server URL that does not exist. For example, your web server may construct an invalid URL that cannot be found when the webpage tries to retrieve it.

Another cause for this error is if you did not enter the trusted web servers as specified in [Add Trusted IP Addresses or Host Names to Tableau Server](#). If you have already entered the trusted web servers, verify that the IP addresses or host names are correct.

## Invalid User (SharePoint or C#)

You may encounter this error if you've configured Tableau Server for trusted authentication.

The example code for the `SharePoint.dll` references the following GET request:

```
SPContext.Current.Web.CurrentUser.Name
```

The above request will return the display name of the current Windows Active Directory user. If you want to use the login ID, then you will need to change the code to:

```
SPContext.Current.Web.CurrentUser.LoginName
```

After you make the change, recompile the `SharePoint.dll`.

## Attempting to Redeem the Ticket from the Wrong IP Address

When you've configured Tableau Server for trusted authentication, you may encounter issues with redeeming the ticket.

This issue can occur when Tableau Server is configured to enforce client IP address matching. Because the client web browser IP address is not considered by default when redeeming

the ticket, make sure that the client's web browser IP address that is sent in the POST request to Tableau Server is the same as when the browser tries to retrieve the embedded view.

For example, in the Trusted Authentication diagram, if the **POST request in step 3** sends the parameter `client_ip=74.125.19.147`, then the **GET request in step 5** must come from that same IP address.

For more information, see [Optional: Configure Client IP Matching](#) to learn how to configure Tableau Server to enforce client IP address matching.

## Cookie Restriction Error

When a user signs in to Tableau Server, a session cookie is stored in their local browser. The stored cookie is how Tableau Server maintains that the signed in user has been authenticated and can access the server. Because the cookie is set with the same domain or sub-domain as the browser's address bar, it is considered a first-party cookie. If a user's browser is configured to block first-party cookies, they will be unable to sign in to Tableau Server.

When a user signs in to Tableau Server via an embedded view, or in an environment where trusted authentication has been configured, the same thing happens: a cookie is stored. In this case, however, the browser treats the cookie as a third-party cookie. This is because the cookie is set with a domain that's different from the one shown in the browser's address bar. If a user's web browser is set to block third-party cookies, authentication to Tableau Server will fail. To prevent this from occurring, web browsers must be configured to allow third-party cookies.

## An error occurred communicating with the server (403)

If Tableau Server is configured for trusted authentication, you may receive this error after opening a new view in a browser and attempting to navigate back to views you'd opened earlier.

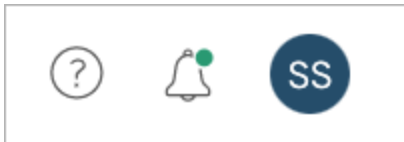
Tableau Server provides protection against unauthorised reuse of VizQL sessions through the tsm configuration set `Options vizqlserver.protect_sessions`, which are set to `true` by default. Because Tableau Server is configured for trusted authentication, you might not need

this level of protection. To disable this option, you can use tsm configuration set Options to change `vizqlserver.protect_sessions` to `false`.

## Handle Extract Refresh Alerts

When Tableau Server cannot complete a scheduled refresh, an alert appears to indicate that the refresh has failed. If a scheduled refresh fails five consecutive times, Tableau Server suspends the refresh. When a refresh is suspended, Tableau Server does not try to run it again until someone takes an action that attempts to correct the cause of the failure.

**Note:** The number of consecutive failures for a refresh is set to five by default, but can be changed by a Tableau Server administrator, using the `backgrounder.failure_threshold_for_run_prevention` option. For more information, see tsm configuration set Options.

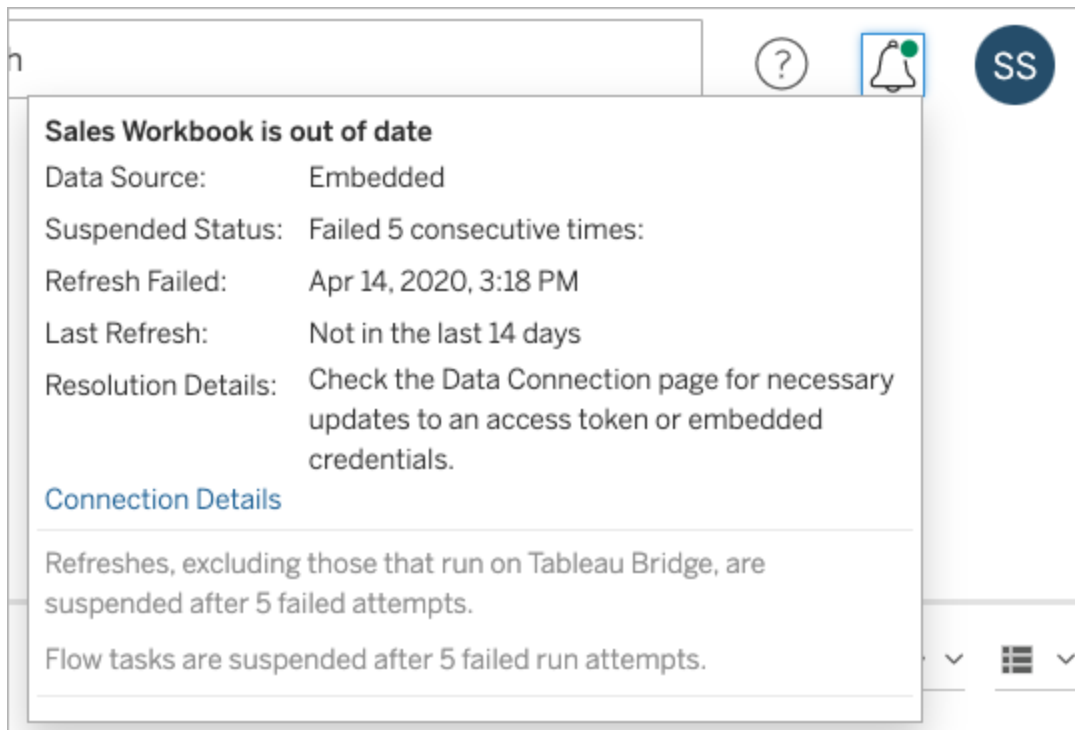


You will see the Alerts menu only if an extract refresh failed and you are:

- A system or site administrator
- The author of the workbook or data source that couldn't be refreshed
- The author of a workbook that connects to a data source that couldn't be refreshed

When you open the Alerts menu you can see more information about the refresh failure(s):

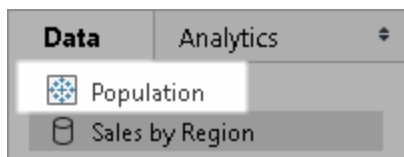




When a **Data source** is listed as **Embedded** it means that the data source definition (which includes things like the data source credentials or the database name) is embedded, or resides, within the workbook itself, originally created in Tableau Desktop.

When a data source name or workbook name is listed as the **Data source** (for example, **Data source: sales\_data**), it means that the data source is a Tableau Server data source. The data source definition resides on Tableau Server.

In the Data pane on Tableau Desktop, you can determine whether the data source is on Tableau Server or is local. If the data source is on the server, a Tableau icon is displayed next to the data source name instead of a database icon :



## Resolving Extract Refresh Problems

To resolve refresh issues, you can take any of these actions, based on the cause indicated in the alert:

- **Errors related to access token validation or user credentials**

You can resolve some extract refresh problems by clicking the **Connection Details** in the alert. Tick the box next to the problematic data source, click **Actions > Edit Connection**, and then enter the missing information. Click **Save** when you're done. After you update the connection information, Tableau Server restarts the refresh schedule.

If you originally embedded the credentials or other data connection information when you published the workbook or data source from Tableau Desktop, you can also republish the workbook or data source. As part of the publishing process, you can choose to set a new refresh schedule. If you don't choose a new schedule, Tableau Server restarts the existing schedule.

- **Errors that indicate the database was unreachable**

Confirm that the database is online and that you can sign in to access the data. You can use the **Try again** link in the alert to restart the refresh schedule.

- **Errors when using user filters or impersonation**

See the [Tableau Knowledge Base](#).

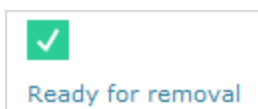
If the problem cannot be corrected by editing the data connection, you will need to resolve it in Tableau Desktop and republish the workbook.

**Tip:** Administrators can edit data connections at any time on the **Data Connections** page, accessible from each site by clicking the **Content** tab and Data Connections

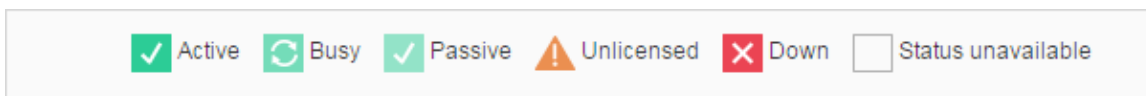
## Troubleshoot Server Processes


**Note:** The information in this article refers to the Tableau Server status page. For information about the Tableau Server status page and the TSM status page, see [View Server Process Status](#).

When Tableau Server is functioning properly, processes will show as Active, Busy or Passive (Repository). If there is additional information, a message appears below the status icon:



Possible status indicators are:



If you are seeing multiple  **Status: Down** messages, verify that the Run As service account password has not expired. If the password has expired, you must update it in Tableau Server, see [Updating the Run As service account password](#). Permission changes related to the Run As service account may also cause multiple service failures, see [Verify Folder Permissions](#).

**Note:** Tableau Server is designed to be self-correcting. If a service or process stops responding or goes down, Tableau Server attempts to restart it. This can take 15 to 30 minutes to complete. Because of this, reacting immediately to service or process alerts can be counter-productive, especially in an installation with redundant services that can handle requests while one restarts.

The following sections provide troubleshooting recommendations for status messages that you may see.

## Cluster Controller

This message will only display if you have more than two nodes.

 **Status: Down; Message: "Node degraded"**

One or more of the following are true:

- Repository on the node is stopped.
- Node cannot respond to failover elsewhere on the cluster.
- If Tableau Server is configured for high availability and this is the active repository, fail-over to the second repository occurs.
- No status available for repository or file store on this node.


No action is necessary unless the cluster controller is regularly down or is down for an extended period of time.

If that occurs, take the following actions, in order, until the problem is resolved:

1. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
2. Restart Tableau Server.
3. If Cluster Controller continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.

## File Store

File Store status only reflects the state of the File Store when the page was loaded.

An active status () with no message indicates that no extracts were being synchronised when the page was loaded. It is possible that the recurring "catch-all" job is running and synchronising extracts.

 **Status: Busy; Message: "Synchronising"**

"Synchronising" usually indicates that extracts were being synchronised across File Store nodes when the page was loaded.

However, the "synchronising" message is also returned following installation (both single-node and multi-node). After Tableau has initialised, the status should disappear within 15 or 20 minutes.

### **Status: Down; "Data Extracts unavailable"**

On a single-node installation: "Data Extracts unavailable" indicates that existing extracts may be available but publish/refresh will fail. On multi-node installations, this message indicates that extract synchronisation will fail for this node.

No action is necessary unless the File Store is regularly down or is down for an extended period of time.

If that occurs, take the following actions, in order, until the problem is resolved:

1. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
2. Restart Tableau Server.
3. If File Store continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.

### **Status: Busy; "Decommissioning"**

This message indicates that this File Store is in read-only mode and that any unique files on this node are being replicated to other File Store nodes.

To remove this node, wait until the status message changes to "Ready for removal".

### **Status: Active; "Ready for removal"**

This message indicates that the File Store is in read-only mode.

You can safely stop (`tsm stop`) the cluster and remove File Store processes, or remove entire node.

### **Status: Active; "Decommission failed"**

This message indicates that the File Store is in read-only mode and that at least one unique file failed to replicate to another File Store node.

To resolve a failed decommissioning:

1. Run the `tsm topology filestore decommission` command again.
2. Check disk space on other File Store nodes. Decommissioning will fail if another File Store node does not have enough space to store all the extracts.
3. Check the `tsm.log` file on the initial node and additional nodes for errors.
4. Stop Tableau Server (`tsm stop`) and then try running the `tsm topology filestore decommission` command again.
5. Put the File Store node back into read/write mode (`tsm topology filestore recommission`), collect logs and then contact Support.
6. With Support: copy and merge the `extracts` directory from this File Store node to the same directory on another File Store node.

## Index and Search Server



**Status: Passive; Message: n/a**

In multi-node environments, a passive status indicates that the node is working as intended but cannot join the cluster and receive traffic.

To get the Index and Search Server process to active status:

1. Use the `tsm topology set-process` command to remove passive Index and Search Server processes from the nodes.  
  

```
tsm topology set-process -n <Node> -pr indexandsearchserver -c 0
```
2. Apply the changes (`tsm pending-changes apply`).
3. Restart Tableau Server (`tsm restart`).
4. Use the `tsm topology set-process` command to add the Index and Search Server process to nodes one at a time.

## Tableau Server on Windows Help

```
tsm topology set-process -n <Node> -pr indexandsearchserver -c  
1
```

5. Apply the changes (tsm pending-changes apply --ignore-warnings).
6. Restart Tableau Server (tsm restart).
7. Use the tsm status command to check the status of `indexandsearchserver` on affected nodes.

## Repository



**Status: Busy; Message: "Setting up"**

The "Setting up" message indicates one or more of the following states:

- Passive repository is being synchronised with active repository.
- Repository is not ready to handle failover.
- Repository may have gotten more than two minutes behind active repository and is being setup again (this is faster than waiting for a sync).
- Failover occurred and this former active repository is rejoining the cluster.

Wait until the repository status message changes to "Passive".

If this message does not appear, or if it is taking a long time:

1. Check disk space and free space if possible.
2. Check cluster controller logs for errors.
3. Restart node.



**Status: Busy; Message: "Synchronising"**

Repository is synchronising, for example after a failover.



**Status: Down; Message: n/a**

When the Repository shows a status of down and there is no message, then the Repository is in one of the following states:

- If the installation is configured for high availability, failover of the repository occurred.
- Processes are restarting with updated database connection configurations after failover.
- If another active repository is not available, Tableau Server is down.

Take these actions in order until a step resolves the problem:

1. Wait several minutes for cluster controller to attempt to restart.
2. Restart Tableau Server (`tsm restart`).
3. Check disk space. If disk space is limited, save the log files (use `tsm maintenance ziplogs`) in case you need them for Support, then remove unnecessary files.
4. Restart Tableau Server.
5. If repository continues to show as down, save the log files (`tsm maintenance ziplogs`) and contact Support.



**Status: Passive; Message: n/a**

A passive status with no message indicates that the node is working as intended and that it is ready for failover if needed.

## VizQL Server



**Status: Unlicensed; Message: n/a**

For information about unlicensed status for a VizQL Server process, see [Handle an Unlicensed Server Process](#).

## Troubleshoot Inconsistent Process Status

**Disclaimer:** This topic includes information about a third-party product. Inclusion of this information is not an endorsement of the product, but is provided as a convenience for our customers. Please note that while we make every effort to keep references to third-party content accurate and up to date, the information we provide here might change without notice as the third-party product changes.



Follow the suggestions to resolve issues with Tableau Server process status. For additional troubleshooting steps based on process status viewed on the Status page, see [Troubleshoot Server Processes](#).

### Issue

When Tableau Server is configured with multiple network cards, the Status page may report inconsistent or inaccurate process status. These potential inconsistencies and inaccuracies can result in other functionality such as alerting or notifications unreliability.

### Environment

- Tableau Server 2021.2 and higher
- Tableau Server computers with multiple network cards (NICs)

### Resolution

To address this problem, you can disable the second NIC, or use the following procedure to assign metrics to each NIC on the computer.

**Note:** Updating DNS or using local routing in the etc\hosts file to refer to the preferred IP address will not resolve this issue without also taking the following steps. For more related information, see [Error "No Tableau Server user found" and "DataServiceFailure" occur intermittently in the Multiple Network Interfaces \(NICs\) Environment](#).

#### Assign metrics for each network interface

A metric is a way to indicate the “cost” of using a network interface. The higher the metric, the more expensive it is to use. By default in Windows, Automatic Metric is enabled, but you can manually assign metrics to each network interface to indicate which network interface is preferred. The lower a metric value the more preferred the interface is.

To manually configure metrics for a network interface:

1. In Control Panel, click **Network and Internet**.
2. Click **Network and Sharing Center**.
3. Click **Change adapter settings**.
4. Right-click on a network interface and click **Properties**.
5. Select **Internet Protocol Version 4(TCP/IPv4)** and click **Properties**.
6. On the General tab, click **Advanced**.
7. On the IP Settings tab, clear **Automatic metric** and enter the metric that you want in the **Interface metric** box.

The metric indicates the cost of using the interface, so give your preferred interface a lower value than the other interface(s) on the computer.

Repeat the process for any other interfaces, giving them metrics based on their preference. The interface that Tableau Server uses should be the preferred interface and have the lowest value metric. For example, give the preferred network interface a metric of 5 and the secondary interface a value of 10.

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For more information about Windows and using the metric feature for IP routes, see the following Microsoft documentation:

- <https://support.microsoft.com/en-us/kb/299540>
- <https://technet.microsoft.com/en-gb/library/cc771274.aspx>

## Troubleshoot Desktop Licence Reporting

When Tableau Server and Tableau Desktop instances are properly configured, Tableau Desktop licence usage information is available in two administrative views, Desktop Licence Usage and Desktop Licence Expiration. If you can't see these views, check the requirements below. If you can see the views but there is no data in them, you can troubleshoot by using the Troubleshooting topic in the Desktop Deployment Guide: [Troubleshooting licence reporting](#). For details on how to configure Tableau Desktop, see [Configure Desktop Licence Reporting](#) in the Tableau Desktop Deployment Guide.

### Administrative views aren't available

The Desktop Licence Reporting administrative views are available only to Tableau Server administrators. If you do not see links to the Desktop Licence Usage and Desktop Licence Expiration views on the Server Status page (select **Manage All Sites** from the sites menu), verify the following:

- You are signed in as a Tableau Server administrator.
- You are running a version of Tableau Server 10.0 or later, and users are running Tableau Desktop version 10.0 or later. Desktop Licence Reporting is available beginning with version 10.0 of Tableau Server and Tableau Desktop.
- Tableau Server has Desktop Licence Reporting enabled. (The feature is disabled by default.) For more information, see [Enable and configure Desktop licence reporting](#).

## Troubleshoot Disk Space Usage on Tableau Server Nodes

When available disk space on a Tableau Server node is low, performance can be degraded. If free space falls too low, Tableau Server may begin to perform erratically.

To monitor free disk space, configure Tableau Server to save disk usage information (this is on by default) and, if desired, enable email notifications about low disk space. For more information, see [Configure Server Event Notification](#).

**Note:** Disk space monitoring measures free disk space on each server node. Available space may be impacted by programs or processes that are not a part of Tableau Server.

If you find that your Tableau Server installation is running into free disk space limitations, you should take steps to make more space available. This topic suggests some ways you can do that. You can also find useful information in the Tableau Knowledge Base: [After Running Out of Hard Disk Space, a Few Processes Are Not Able to Start](#).

## Viewing Disk Usage on Tableau Server Nodes

When disk space usage monitoring is enabled (this is the default), server administrators can use the Server Disk Space administrative view to see current disk space usage, and one month of usage data on your Tableau Server nodes. Use this view to help you determine whether one of your server nodes is experiencing a jump in space usage, or if space usage has increased over time.

## Cleaning Up Tableau Server-Related Files

To minimise server space used by Tableau Server, you can clean up unnecessary files.

Use the `tsm maintenance cleanup` command to remove log files, temporary files, and unneeded entries in the PostgreSQL database. If you want to save the logs before you clean them up, you can make an archive. For more information, see [Remove Unneeded Files](#).

Once you have cleaned up log files and temporary files, you may want to use the administrative views to determine which workbooks and data sources are taking up the most space on your server, and whether any of these is not being used. For more information, see [Administrative Views](#).

## Reducing Coordination Service logs

The Coordination Service can generate large numbers of transaction logs during normal functioning. By default the Coordination Service will gather these up, creating a snapshot for every 100,000 transaction logs, and deleting snapshots older than five days. If fewer than 100,000

## Tableau Server on Windows Help

transaction logs exist, no snapshot is created, and the logs are left in place until the transaction log threshold is reached. As a result, disk space can run low as logs accumulate. By default the logs and snapshots are saved in the Tableau Server data directory: C:\ProgramData\Tableau\Tableau Server-

gramData\Tableau\Tableau Server-  
\data\tabsvc\appzookeeper\<n>\version-2.

If you experience a shortage of disk space due to old transaction logs, your Tableau Server installation may be generating fewer than 100,000 logs daily. You can adjust the number of logs required to trigger the creation of a snapshot using the `zoo-`

`keeper.config.snapCount` option:

```
tsm configuration set -k zookeeper.config.snapCount -v <transaction_
log_count>
```

```
tsm pending-changes apply
```

For more information, see `zookeeper.config.snapCount`.

### Unable to access Tableau Server or TSM Web UI after running out of disk space

To avoid running out of disk space, consider configuring low disk space notifications to let you know when space reaches a pre-determined size. For more information, see [Configure Server Event Notification](#).

If you do run out of disk space, you may have problems accessing Tableau Server or TSM using the web UI. To fix this problem, delete extraneous files to free up disk space then force a server reconfigure by setting a non-existent key.

1. On the initial node, open a command prompt as administrator.
2. Set a non-existent configuration key:

```
tsm configuration set -k foo -v bar --force-keys
```

3. Apply the changes to force the reconfiguration:

```
tsm pending-changes apply
```

Setting a key that does not exist will have no impact on Tableau.

## Troubleshoot Run As User

As discussed in the topic, [Run As Service Account](#), Tableau Server requires administrative-like access to the machine on which it is installed. Therefore, when you update the Run As service account, a background process will configure permissions on the Tableau computer for that account. However, in some complex deployment scenarios you may need to verify or manually configure the Run As service account permissions on the local Tableau Server computer. Use this section to verify how permissions are configured on the machines running Tableau Server in your deployment. This section also includes procedures that describe how to set permissions and configure security policies for the Run As service account.

### Required Run As Service Account Settings

The Run As service account needs permissions that allows it to modify files and registry settings. In addition, because the Run As service account is used as the security context for the Tableau Server Application Manager service (tabsvc), the account must also be given rights to log on as a service.

These permissions are set automatically when you update the Run As service account in Tableau Server Configuration as described in the topic, [Change the Run As Service Account](#).

If you have changed the Run As service account, then we recommend revoking the permissions for the previous account. See [Revoke Run As Service Account Permissions](#).

The account you use for the Run As service account should not be a member of the Local Administrators or Domain Administrators account. Instead, we recommend using a domain user account that is not an administrator for the Run As service account. Using a domain account that is not a member of these administrator groups is a good security practice and can help avoid access to certain data sources and folders. For information on best practices when creating a Run As service account, see [Creating the Run As service account](#).

If you have recently changed Run As service account or are getting permission errors, use this section to confirm that Tableau Server meets the permission requirements that are detailed here. If you're running a distributed installation, all Run As service account permission configurations must be the same across all nodes.

**Note:** Do not hide the files created by the Tableau Server installer.

Verify Folder Permissions

The account the Tableau Server service runs under is referred to as the Run As service account. The Run As service account needs permission to specific folder resources on the Windows computer.

This topic provides:

- An accounting of the permissions that are required by the Run As service account.
- Information about installing Tableau Server in non-default locations.
- How to reapply permissions on an existing Run As service account using TSM.

This topic refers to the drive where Windows is installed as the *system drive*. The system drive is equivalent to the Windows environmental variable, %WINDIR%. The drive where Tableau Server is installed is referred to as the *install drive*.

Resource	System or install drive	File Path	Permissions required
folder	system	SYSTEMROOT:\windows\system32	Read, List folder contents
executable	system	SYSTEMROOT:\windows\system32\cmd.exe	Read & execute
Drive root	install	root, for example, Local Disk (C:)	Read, List folder con-

			tents
folder	install	PROGRAMFILES\Tableau\Tableau Server	Modify
folder	install (on system drive)	\ProgramData\Tableau\Tableau Server\	Modify
folder	install (on non-system drive)	\Tableau\Tableau Server\data\	Modify

When you update the Run As service account in TSM, a background process will configure the folder permissions on the Tableau computer for the Run As service account that you specify.

In this case, where you are installing on the system drive into the default folder (C:\Program Files\Tableau), the configuration of folder permissions will be handled by TSM. You do not need to verify or change any folder permissions for this scenario. If you install Tableau Server onto a different drive, you will need to manually configure some permissions.

#### Installing in a non-default location

If you are installing Tableau Server in a non-default location on a different drive, then you will need to configure permissions on the installation folder for Run As service account as well as the predefined local accounts: Network Service, Local Service and System.

The following table describes the permissions that are applied if you install Tableau Server in a non-default location. All of these permissions are set on the installation folder and are inherited by the subfolders and files in the installation folder. These permissions are configured by the Tableau Setup program and are also reconfigured whenever you upgrade Tableau Server to a new version. Changing permissions on these folders may impair functionality.



For more information about different accounts used by Tableau Server, see [Windows Accounts and Permissions](#).

Set permissions for this account:	Permissions required
The user account that is used to install and upgrade Tableau Server	Full control
The user account that is used to run TSM commands	Full control
System account	Full control
Run As service account, Network Service and Local Service	Read & execute

### Reapplying folder permissions

In some organisations, Group Policy or other system management solutions are used to standardise permissions and accounts on application servers. If your organisation runs a such a solution, be sure to configure the system to accommodate the folder permissions required by the Run As service account. If the folder permissions for the Run As service account have been changed, you can use TSM to reapply the permissions. See [Changing an existing domain Run As service account to a different account](#).

### Verify Registry Permissions

The account the Tableau Server service runs under needs permission to modify the registry on the local machine.

In a multi-node cluster, the registry permissions are only granted on the tsm node in the cluster.

When you update the Run As service account, TSM will configure the registry permissions on the Tableau computer for the account you specify. It's unlikely that you will need to apply these permissions manually.

Verify that the Run As service account has been granted permissions to the `HKEY_LOCAL_MACHINE\Software\Tableau` registry branch. If the account that you have specified as the Run As service account is a member of the local administrative group or a member of the Domain Admins security group, then the account will not be displayed on the Permissions page.

## Permissions

TSM will grant Read permission and the following Special permissions to these branches:

- Query Value
- Set Value
- Create Subkey
- Enumerate Subkeys
- Notify
- Write DAC
- Write Owner
- Read Control

To view or edit permissions on registry directories:

1. Open the Registry Editor by entering `regedit` in Windows Run, and then clicking **OK**.
2. In Registry Editor, navigate to the directory where you want to view or edit permissions. Right-click the directory, and then click **Permissions....**
3. In Permissions, on the Security tab, select the Run As service account, and then click **Advanced**.  
If you are adding your Run As service account, then click **Add** and follow the Windows process for adding a user account to the Security tab. After you have added the account, then select the Run As service account, and then click **Advanced**
4. In Advanced Security Settings, on the Permissions tab, select the Run As service account, and then click **Edit**.
5. On the Permission Entry, under Basic permissions, verify that **Read** and **Special permissions** are selected. Verify that **Only apply these permissions to objects and/or containers within this container** is not selected.
6. To view or edit Special permissions, click **Show advanced permissions**.
7. Under Advanced permissions, verify that the permissions enumerated at the beginning of this topic are selected. Verify that **Only apply these permissions to objects and/or containers within this container** is not selected.

8. If you have set new permissions, then click **OK** through the multiple windows to finish. If you have viewed permissions and not edited anything, then click **Cancel** to close all windows.

#### Verify the Local Security Policy

After you specify a Run As service account in Tableau Services Manager (as described in the topic, [Change the Run As Service Account](#)), TSM will update the local security policy on the computer running Tableau Server. TSM will update the local security policy to give "log on as a service" and "log on locally" permissions to the Run As service account. This elevated policy is required because the Run As service account is used as the security context for the Tableau Server Application Manager service (tabsvc).

**Note:** If the Run As service account that you specify in TSM is a member of the local administrators or a domain administrator, then TSM may not update the local security policy. Updating the Run As service account with an account that is a member of local administrators or domain administrators is not a good security practice. We recommend using a domain User account for the Run As service account.

In some cases, you may need to manually set security policy for your Run As service account. For example, some organisations run Windows Group Policy that remove "Log on as a service" or "Allow log on locally" rights that have been set on user accounts. Or an organisation may run a policy that creates a permission conflict by specifying "Deny log on as a service." If your organisation does this, then you will need to disable or edit such Group Policies so that your Run As service account is not affected. For details on best practices when creating a Run As service account, see [Creating the Run As service account](#).

The following procedure describes how to configure security policies, **Log on as a service** and **Allow log on locally**, manually. You can also use the procedure below to verify that your Run As service account is appropriately configured with local security policy rights. For example, you should verify that the Run As service account is not specified on the **Deny log on as a service** policy.

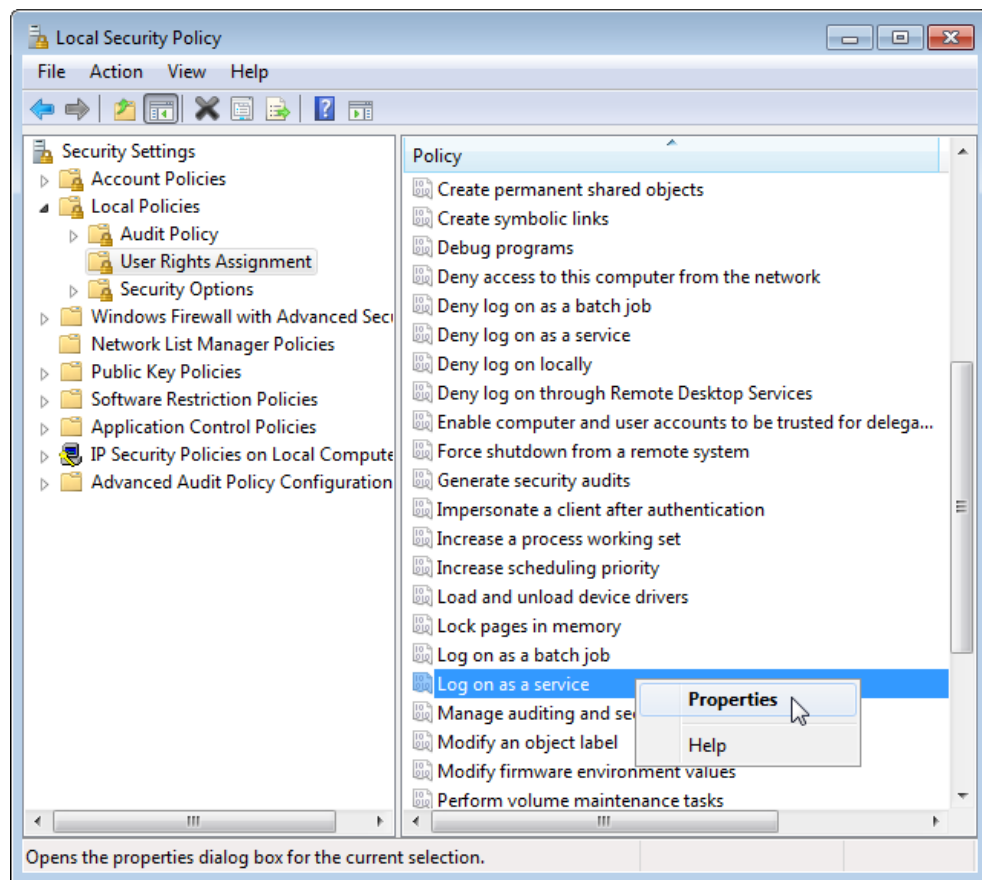
If you are running a distributed installation, then configuration must be the same across the initial and all additional nodes.

To verify or update the local security policy:

1. Select **Start > Control Panel > Administrative Tools > Local Security Policy**.
2. In Local Security Policy, open **Local Policies**, select **User Rights Assignments**.

To verify or set **Log on as a service** policy:

- a. Right-click **Log on as a service** policy and then click **Properties**.



- b. In **Log on as a service Properties**, click **Add User or Group**.
- c. Type the <domain>\<username> for the Tableau Server Run As service account (for example: MYCO\tableau\_server), and click **Check Names**.
- d. When the account resolves correctly, it is underlined. Click **OK**.

**To verify or set Allow log on locally policy:**

- a. Right-click **Allow log on locally** policy and then click **Properties**.
- b. Verify that the Run As service account is specified. If it is not, follow the procedure above to add the Run As service account.

**To verify Run As service account is not specified in the Deny log on as a service policy:**

- a. Right-click **Deny log on as a service** policy, and then click **Properties**.
- b. In **Deny log on as a service Properties**, verify that the Run As service account is not listed. If it is, remove it. When you are finished, click **OK**.

3. Click **OK** to close the Local Security Settings windows.

## Verify Tableau Service Settings

Confirm that Tableau services are assigned the correct Log On and Startup values. If you are running a **distributed installation** of Tableau Server, perform these steps on all nodes in the cluster.

**Note:** The Startup Values for TSM services changed in these maintenance releases: 2020.215, 2020.3.10, 2020.4.6 and 2021.1.3. Values changed from "Automatic" to "Automatic (Delayed Start)" for the following TSM services: Tableau Server Administration Agent, Tableau Server Administration Controller, Tableau Server Client File Service, Tableau Server Coordination Service, Tableau Server Licence Manager and Tableau Server Service Manager. If you are running older versions of Tableau Server, you do not have to change these values from "Automatic" but can do so without negative impact.

1. Log on as administrator to the computer running Tableau Server.
2. On the Tableau Server computer, select **Start > Control Panel > Administrative Tools > Computer Management > Services and Applications > Services**.

3. Open Services and Applications, then click **Services**. Confirm that the following services have the correct settings:

Service Name	Logon Value	Startup Value
FLEXnet Licensing Service 64	Local System	Automatic
Secondary Logon	Local System	Manual
Tableau Server Administration Agent	Local System	Automatic (Delayed Start)
Tableau Server Administration Controller	Network Service	Automatic (Delayed Start)
Tableau Server Client File Service	Network Service	Automatic (Delayed Start)
Tableau Server Coordination Service	Network Service	Automatic (Delayed Start)
Tableau Server Licence Manager  (Runs on initial node only)	Local Service  The Licence Manager relies on default Windows folder permissions that are applied to the Local Service. In more secure environments, you must modify the permissions on the Tableau installation directory. Otherwise, you may encounter licensing errors.  See Verify Folder Permissions for more information.	Automatic (Delayed Start)

Service Name	Logon Value	Startup Value
Tableau Server Service Manager	<domain>\<username> This is the Run As service account. See below. If you have not specified a Run As service account, then the Network Service system account is used.	Automatic (Delayed Start)

**Note:** Do not change the default settings on the **Recovery** tab of the **Tableau Server Service Manager Properties** dialog box; leave the settings for failure recovery as **Restart the Service**.

### Changing the Log On Value

To change the **Log On** value for Tableau Server (tabsvc) to the Run As service account, see [Change the Run As Service Account](#).

## Revoke Run As Service Account Permissions

Changing the Run As service account in Tableau Server Configuration Utility does not remove the permissions from the previous account. Therefore, after you change the Run As service account, we recommend manually revoking permissions from the previous account as a secure best practice. Follow the procedure below to revoke permissions from the previous Run As service account.

If you have changed your Run As service account and your organisation uses a forward proxy solution, then you may need to reconfigure the local LAN settings with the new Run As service account. See [Configure a forward proxy server](#) for more information.

You must be logged onto the Tableau Server computer with an administrator account to perform the following procedures.

## Remove folder permissions

Tableau Server configures permissions on Windows folders according to the location where you install Tableau Server. Before you remove folder permissions, review [Verify Folder Permissions](#) to identify the resources for which you will need to remove permissions. Run the following procedure for each of the resources you have identified:

1. For each resource (drive, folder, executable), right-click the resource, and then click **Properties**.
2. On the resource property page, click the **Security** tab, and then click **Edit** to change permissions.
3. On the Permissions page, select the previous Run As service account and then click **Remove**.
4. Click **OK**.

## Remove registry permissions

Remove the previous Run As service account from the following registry locations:

- HKEY\_CURRENT\_USER\Software\Tableau
- HKEY\_LOCAL\_MACHINE\Software\Tableau

**Warning:** Editing the Windows registry incorrectly can have harmful effects on your computer.

1. Open the Registry Editor by entering `regedit` in Windows Run, and then clicking **OK**.
2. For each registry directory, right-click the **Tableau** folder, and then click **Permissions**.
3. In the **Permissions for Tableau** page, select the previous Run As service account, and then click **Remove**.
4. Click **OK**.

## Remove security policies

Remove the previous Run As service account from the following security policies:

- “Log on as a service” policy
- “Allow log on locally” policy



1. Select **Start > Control Panel > Administrative Tools > Local Security Policy**.
2. In **Local Security Policy**, open **Local Policies**, select **User Rights Assignments**.
3. For each policy:
  - a. Right-click the policy and then select **Properties**.
  - b. On the policy property page, select the previous Run As service account, and then click **Remove**.
  - c. Click **OK**.

## Server Administrator Reference

You can learn more about Tableau Server processes, ports and accounts and permissions.

### Tableau Server Processes

This topic describes the options for setting the process configuration. To configure Tableau Server processes, you need to specify which processes and how many instances should run on each node. You do this using the `tsm topology set-process` command. For more information, see [Changing the number of processes on a node](#).

Looking for Tableau Server on Linux? See [Process Reference](#).

Except where explicitly noted in the table below, applying changes in processes will stop Tableau Server if it is running when you apply those changes. After changes are applied, Tableau Server is returned to the state it was in before process configuration, so if the server was running, it will be restarted.

**Important:** Your process topology will depend on your organisational needs.

### Licensed processes

Some of the processes that are installed as a part of Tableau Server are 'licensed' processes. Licensed processes need a valid Tableau Server licence in order to run. Other processes that

are installed as a part of Tableau Server are not tied to a valid licence. This has the following impact:

- Every licensed process needs to regularly contact the Tableau Server Licence Manager service that runs on the initial Tableau Server computer to verify they are licensed. If they cannot confirm there is a valid licence, for example, if the initial node is not available, the process will not run and Tableau Server may not function properly or reliably.
- If you have a core-based Tableau Server licence, the cores on any node with a licensed process will count against the total count of licensed cores.

**Note:** If you have Data Management and a core-based licence, you will need to understand how the licensed processes will count against the total count of licensed cores that come with each licence. For more information, see [Licence Data Management](#).

The 'Licensed' column in the table below identifies those processes that require a valid licence, and which impact the count of cores in core-based licences.

<b>Tableau Server Processes</b> These processes have a status of <code>running</code> when Tableau Server is running, and <code>stopped</code> when Tableau Server is stopped.				
Name shown in <code>tsm status -v</code>	Name used with <code>tsm topology set-process</code>	Purpose	Notes	Licensed
Analytics Extensions Microservice	<code>analyt-extension</code>	The Analytics Extensions Microservice supports a set of functions to	Automatically installed on any node where Application Server (VizPortal) is installed.	No

		pass expressions to analytics extensions for integration with R, Python and Einstein Discovery.		
Application Server	vizportal	The Application Server (VizPortal) handles the web application, REST API calls, and supports browsing and searching.	When Application Server is installed, Data Engine is also installed, unless the node already has an instance of Data Engine.  When the first instance of Application Server is installed on a node, the Interactive Container Service is also installed.	Yes
Ask Data	Cannot be configured manually.	The Ask Data service is used by the Ask Data feature.	Runs automatically on all nodes where Data Server is running.	No
Authentication  Added: 2022.1	Cannot be configured manually.	The Authentication service handles the identity migration process and identity pools.	Status for this process is only available through tsm CLI.  Identity migration must be complete and the Identity Service turned on to set up and user	No

		<p>After the identity migration process is complete and as part of identity pools management, the Authentication service is responsible for the following:</p> <ul style="list-style-type: none"><li>• Searching for a user identity in the appropriate Identity Service table, using the returned universal unique identifier (UUID) to</li></ul>	<p>identity pools. For more information, see <a href="#">About the Identity Migration and Provision and Authenticate Users Using Identity Pools</a>.</p>	
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		<p>query the legacy system_ user table and find the appropriate system user, and then granting them a user session, which completes the authentication workflow.</p> <ul style="list-style-type: none"><li>• Importing immutable user iden-</li></ul>		
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		<p>tifiers and additional user attributes when the configured identity store is external (AD or LDAP).</p>		
<p><b>Back-grounder</b></p>	backgrounder	<p>The Backgrounder runs server tasks, including extract refreshes, subscriptions, 'Run Now' tasks and tasks initiated from tabcmd.</p>	<p>When Backgrounder is installed, Data Engine is also installed, unless the node already has an instance of Data Engine.</p> <p>Backgrounder is a single-threaded process. You can add more instances of backgrounder to a node to expand the capacity of the node to run jobs in parallel.</p> <p>In most situations, you can increase or decrease</p>	Yes

			the number of backgrounder instances on an existing node of a running server without causing a stop and restart the server. The exception is when you have Data Management licensed and you add the first instance of backgrounder to a node or remove the last instance of backgrounder from the node. For more information, see Tableau Server Dynamic Topology Changes.	
Cache Server	cacheserver	The Cache Server is a query cache distributed and shared across the server cluster. This in-memory cache speeds user experience across many scenarios. VizQL	The cache is single-threaded, so if you need better performance you should run additional instances of cache server.  We recommend you install no more than a maximum of six cache server instances, limiting each node to no more than two. Our testing indicates that installing	No

		server, backgrounder and data server (and application server to a lesser extent) make cache requests to the cache server on behalf of users or jobs.	more than a total of six cache server instances in a Tableau Server installation provides no improvement and could have a negative impact on performance.	
Cluster Controller	cluster-controller	The Cluster Controller is responsible for monitoring various components, detecting failures and running failover when needed.	Automatically installed on every node.	No
<b>Collections</b>  Added: 2021.2.0	collections	The Collections service provides meta data for the collections and favourites features.	The Collections service is installed on the first node where the Application (vizportal) is installed.  For high availability, we recommend you install an instance of the Collections service on every	No



			node that has an instance of the Application Server installed. For more information, see Tableau Server Collections Service.	
<p>Connection Pooling</p> <p>Added: 2023.1.0</p>		The Connection Pooling service is intended to offer an option for pooling database connections to the repository.	<p>The Connection Pooling service is installed on the every node in a disabled state. It cannot be enabled except in TSM.</p> <p>It should <b>not</b> be enabled except by instructions from Tableau Support.</p>	No
<p><b>Content Exploration</b></p> <p>Added: 2021.1.0</p>	con-ten-texploration	The Content Exploration service extends search and browse capabilities for Tableau Server. It also depends on Index and Search Server to do its operations.	<p>The Content Exploration service is installed on the initial node.</p> <p>For high availability, we recommend you install an instance of the Content Exploration service on every node that has Application Server installed. For more information, see Tableau Server Content Exploration Service.</p>	No
<b>Data Engine</b>	Cannot be configured manually.	The Data Engine cre-	Automatically installed when you install File	Yes

		ates data extracts and processes queries.	<p>Store, VizQL Server, Application Server (VizPortal), Data Server, Prep Flow Authoring or Backgrounder.</p> <p><b>Note:</b> When File Store is configured externally, Data Engine is no longer installed with File Store. For more information see Tableau Server External File Store.</p>	
<p><b>Data Pro-filing</b></p> <p>Added: 202-1.4.0</p>	dataprofiling	The Data Pro-filing service handles column pro-filing requests for the Virtual Connection editor.	Only installed when you have a Data Man-agement licence. Then, automatically installed on any node where Back-grounder is installed.	Yes - Requires a Data Man-agement licence
<b>Data Server</b>	dataserver	The Data Server man-ages con-nections to Tableau Server data sources.	When Data Server is installed, Data Engine is also installed, unless the node already has an instance of Data Engine.	Yes
<p><b>Data Source Properties</b></p> <p>Added:</p>	tdsservice	The Data Source Prop-erties service provides pub-	Data Source Properties is added by default on the initial node. A Tableau Server install-	No

2020.1.0		lished data source metadata to client services like Ask Data.	ation must include at least one instance. For performance reasons, we recommend installing the Data Source Properties service on any node that has Application Server (VizPortal) installed.	
Data Stories  Added: 2023.1.0		The Data Stories service handles the analytical engine that powers the Data Stories dashboard extension.	Data Stories is automatically added to every node of the Tableau Server installation. It cannot be configured manually.	No
Elastic Server  Added: 2019.1  Removed: 2022.1  Starting in version 2022.1, Index and Search Server is	<code>elasticserver</code>	Elastic Server is used by Ask Data to index data and by Content Exploration service to index searchable content.	Elastic Server processes can be running on more than one node in a cluster. Optionally, they can be moved to any node. It is recommended to have an odd number of Elastic Server processes running.  The Elastic Server heap size can be configured by using the <code>elasticserver.vmopts</code> TSM configuration	No

used instead.			option. For more information, see <a href="#">tsm configuration set Options</a> .	
Extract Service  Added: 202-1.4.0	extract-service	The Extract service manages extracts of Virtual Connections.	Only installed when you have a Data Management licence. Then, automatically installed on any node where Backgrounder is installed.	Yes - Requires a Data Management licence
File Store	filestore	File Store can be configured to run locally on Tableau Server or externally using SAN or NAS storage.  When configured locally: The File Store automatically replicates extracts across Data Engine nodes.	When File Store is installed, Data Engine is also installed, unless the node already has an instance of Data Engine or if File Store is configured externally.	Local File Store: No  External File Store: Requires Advanced Management licence.
Gateway	gateway	The Gateway is a web server that handles all	Required on any node with an instance of VizQL Server, Vizportal or Tableau Prep Flow Authoring.	No

		requests to Tableau Server from browsers, Tableau Desktop and other clients.		
<p>Index and Search Server</p> <p>Added: 2022.1</p>	<code>index-andsearch-server</code>	<p>Index and Search Server is based on AWS OpenSearch. Tableau uses the search capability of Open Search to index data for Ask Data and the Content Exploration service.</p> <p>This server process is the replacement for Elastic Server, which is no longer used in version 2022.1 and later.</p> <p>As of version</p>	<p>Index and Search Server can be configured on more than one node in a cluster.</p> <p>We recommended an odd number of Index and Search Server processes running in total. On Tableau Server Clusters that have 3 or more nodes, we recommend that you configure Index and Search Server on at least three different nodes.</p> <p>The Index and Search Server heap size can be configured by using the <code>tsm set configuration</code> command with the <code>index-andsearch-server.vmopts</code> option. For more information,</p>	No

		2023.3.0, this process replaces Search and Browse.	see tsm configuration set Options.	
<b>Internal Data Source Properties</b>  Added: 2020.1.0	tdsnat- iveservice  Cannot be configured manually.	The Internal Data Source Properties service is an internal service that only communicates with the Data Source Properties service.	One instance of Internal Data Source Properties is automatically configured on each node that has an instance of Data Source Properties on it.	No
<b>Messaging Service</b>  Added: 2019.4.0	act- ivemqserver	The Messaging Service is used to support communication between microservices in Tableau Server.	Automatically installed on initial node when you install Tableau Server. One instance of the service is required.  On multi-node installations of Tableau Server, you can move the Messaging Service to a different node. In version 2020.1 you can add a second instance of the Messaging Service on an additional node to provide some redund-	No

			<p>ancy (in 2019.4, you cannot configure more than one instance in a cluster). For more information, see Tableau Server Messaging Service.</p>	
<p><b>Metrics Service</b></p> <p>Added: 2020.2.0</p> <p>Retired: 2024.2</p>	metrics	<p>The Metrics Service is responsible for reading and writing Metric data in Tableau Server.</p>	<p>Automatically installed on initial node with a single instance when you install Tableau Server. One instance of the service is required.</p> <p>You can add additional instances as necessary .</p> <p>We recommend at least one instance of the Metrics service on each node in a multi-node installation of Tableau Server. For more information, see Tableau Server Metrics Service.</p> <p>(The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information,</p>	No

			see <a href="#">Create and Troubleshoot Metrics (Retired).</a> )	
Minerva Service  Added: 202-1.4.0	minerva	The Minerva service executes queries to Virtual Connections.	Only installed when you have a Data Management licence. Then, automatically installed on any node where Backgroundrunner is installed.	Yes - Requires a Data Management licence
NonRelational Storage Service  Added: 202-3.1.0  The NRS service is non-functional and deprecated.	nrs	The NonRelational Storage service is a microservice managed and used internally by other Tableau services.  <b>Note:</b> The service appears in the CLI but is deprecated. It will be retired (entirely removed) in a future release.	Automatically installed on the initial node of Tableau Server. This service cannot be managed by system administrators.	No
Virtual Connections Service	published-connections	The Virtual Connections service handles quer-	Only installed when you have a Data Management licence. Then, automatically installed on	Yes - Requires a Data Man-



Added: 202-1.4.0		ies to Virtual Connections.	any node where Back-grounder is installed.	agement licence
Query Gateway Microservice  Added: 202-1.4.0	querygateway	The Query Gateway Microservice routes queries to the appropriate microservice, depending on the query type and source.	Only installed when you have a Data Management licence. Then, automatically installed on any node where Back-grounder is installed.	Yes - Requires a Data Management licence
Query Policy Service  Added: 202-1.4.0	querypolicy	The Query Policy service provides information about Data Policies when processing queries.	Only installed when you have a Data Management licence. Then, automatically installed on any node where Back-grounder is installed.	Yes - Requires a Data Management licence
Repository	pgsql	The PostgreSQL repository is the main database for Tableau Server. It stores work-book and user metadata. When Tableau Cata-	You are limited to a maximum of two instances of the repository in a cluster, and must have at least three nodes in the cluster to add a second repository instance.	No

		logue (or Tableau Metadata API) is enabled, the repository stores Tableau content and external assets metadata.		
<b>Resource Limits Manager</b>  Added in: 2022.1	"Resource Limits Manager"	The Tableau Server Resource Limits Manager tracks background resource usage in relation to the set resource limits to make sure the resource limits are applied correctly.	The Resource Limits Manager is automatically and by default installed on the Initial node of Tableau Server. We do not recommend adding more processes or configuring this on additional nodes of the Tableau Server.	No  Requires Advanced Management
<b>SAML Service</b>	Cannot be configured manually.	The SAML Service acts as a proxy between Tableau Server and SAML Identity Providers	Automatically installed on each node where you install Tableau Server.  Shows a status of <code>stopped</code> in output of <code>tsm status -v</code> unless	No

		(IdPs).	<p>site SAML is enabled.</p> <p>You cannot configure the SAML Service manually.</p>	
<p><b>Search And Browse</b></p> <p>Retired: 2023.3.0</p>	searchserver	The Search and Browse service handles fast search, filter, retrieval and display of content metadata on the server.	<p>Beginning in version 2022.3.0, Search and Browse is no longer used. The Index and Search Server completely replaces this. Beginning in version 2023.3.0, it is no longer installed.</p> <p><b>Note:</b> If you are running Tableau Server version 2022.3 or 2023.1, you <i>should not configure more than one instance of Search and Browse</i> for any installation. Configuring more than one instance can, in rare cases, result in stability issues.</p>	No
<b>Tableau Prep Conductor</b>	flowprocessor	The Tableau Prep Conductor runs flows and processes flows for ingestion by Data Cata-	By default, it is automatically enabled on a node where background is enabled. If the node role is set to exclude flows, then Tableau Prep Conductor	Yes

		logue. It leverages the scheduling and tracking functionality of Tableau Server so you can automate running flows to update the flow output.	is not installed on that node. For more information, see Workload Management through Node Roles. Starting in 2020.4, Data Management is not needed to enable this process on Tableau Server.	
<b>Tableau Prep Flow Authoring</b>  Added in version 2020.4.	floweditor	Provides the interactive Prep Flow experience in the browser.	When Tableau Prep Flow Authoring (floweditor) is installed, Data Engine, Tableau Prep Flow Service (flowqueryservice) and Gateway are also installed, unless the node already has an instance of each of those.	Yes
Tableau Prep Minerva Service  Added as Tableau Prep Flow Service in version 2020.4 and	flowminerva  Note: previously flowqueryservice	Used by Tableau Prep Flow Authoring (floweditor) for querying data-sources.	By default, it is automatically enabled on a node where Tableau Prep Flow Authoring (floweditor) is enabled.	Yes

renamed in version 2021.2.				
<b>Tableau Statistical Service</b>  Added: 2022.1  Retired: 20-23.3	statsservice	The Tableau Statistical Service manages the statistical engine for Explain Data and predictive modelling functions.	Automatically installed on any node where VizQL is installed.  For more information, see Tableau Statistical Service.	No
<b>VizQL Server</b>	vizqlserver	The VizQL Server loads and renders views, computes and executes queries.	When VizQL Server is installed, Gateway and Data Engine are also installed, unless the node already has an instance of Gateway and Data Engine.  In most situations you can change the number of VizQL instances on an existing node of a running server without causing a stop and restart the server. An exception is if you are adding VizQL to an existing node that did not previously have VizQL or any other process that also installs	Yes

			Gateway and Data Engine. For more information, see Tableau Server Dynamic Topology Changes.	
VizData Service  Added: 2024.2	vizdata-service	The VizData Service manages connections to published data sources on Tableau Server.	An instance of VizData Service is installed for every instance of Data Server.	Yes
VizData Native Service  Added: 2024.2	vizdata-native-service	The VizData Native Service communicates with the VizData Service on Tableau Server.	An instance of VizData Native Service is added for each instance of VizData Service.	Yes
<p><b>Tableau Microservice Container Processes</b> These processes are automatically added when the first instance of Backgrounder or Application Server is added to a node. If all instances of Backgrounder or Application Server are removed from a node, the microservice container process is also removed.</p> <p>Container status depends on the status of the microservices within the container. If all microservices are running, the container process has a status of <code>running</code>. If all microservices are stopped, the container process status is <code>error</code>. If one or more microservices is running while others are not, the container service has a status of</p>				

degraded. For more information, see Tableau Server Microservice Containers.				
Interactive Microservice Container		Container process for internal Tableau Server microservices that are bundled together for ease of deployment and scalability purposes.	These containers and the microservices they contain cannot be manually configured. The microservices may change over time.	No
Non-Interactive Microservice Container	non-interactive	Container process for internal Tableau Server microservices that are bundled together for ease of deployment and scalability purposes.	These containers and the microservices they contain cannot be manually configured. The microservices may change over time.	No
<b>Tableau Services Manager (TSM) Processes</b> These processes have a status of <i>running</i> once TSM has been initialised, and remain running even when Tableau Server is stopped.				
Activation Service	Cannot be configured manually.	The Activation	Automatically installed on the initial node begin-	No

Added in version 2021.1		Service, also known as the authorisation-to-run service (ATR), enables you to activate Tableau Server without running out of licences. It provides short-term leases of configurable duration until the product key expires.	ning in versions 2023.1.3, 2022.3.7, 2022.1.15 and later.  In earlier versions, this is automatically installed on the initial node when ATR is enabled.	
Administration Agent	Cannot be configured manually.	The TSM Agent monitors the Coordination Service for changes to configuration or topology and delivers new configurations to each service (configuration-) or deploys new services and removes	Automatically installed on each node where you install Tableau Server.  You cannot configure the Administration Agent manually.  For more details, see Tableau Server Administration Agent.	No



		old ones (topology)		
<b>Administration Controller</b>	Cannot be configured manually, except to move it to another node. For more information, see Recover from an Initial Node Failure.	The TSM Controller handles requests to TSM and orchestrates configuration and topology changes and workflow across service processes. The Controller also serves as the REST API endpoint (HTTPS).	<p>Automatically installed when you install TSM on the initial node.</p> <p>You cannot configure the Administration Controller manually except to move it to another node. For more information, see Recover from an Initial Node Failure.</p> <p>For more details, see Tableau Server Administration Controller</p>	No
<b>Client File Service</b>	client-file-service	The Client File Service (CFS) manages most shared files in a multi-node cluster. For example, authentication related certificates, keys and files (OpenID, mutual SSL, SAML and Kerberos), and cus-	<p>Automatically installed on the initial node. No other instances are installed unless you explicitly configure them. See Configure Client File Service.</p> <p>In multi-node deployments, we recommend you configure an instance of CFS on each of the nodes where you deploy the Coordination Service. Redeploying the</p>	No

		tomisation files are managed by CFS.	<p>Coordination Service does not have any impact on CFS.</p> <p>CFS does not display in the Status page or the Configuration page but is visible in the output of the <code>tsm status -v</code> command.</p> <p>To view or set instances of CFS, use the <code>tsm topology</code> command.</p>	
Coordination Service	Cannot be set with <code>tsm topology set-process</code> .	The Coordination Service serves as the single source of truth.	Automatically installed on the initial node. No other instances are installed unless you explicitly deploy a new Coordination Service ensemble. For details, see <a href="#">Deploy a Coordination Service Ensemble</a> .	No
Service Manager	Cannot be configured manually.	The Service Manager	<p>Automatically installed on all nodes.</p> <p>You cannot configure the Service Manager manually.</p>	No
Licence Manager	Cannot be configured manually.	The Licence Manager handles licens-	Automatically installed on the initial node when you install TSM.	No

		ing.	A single instance of this is installed on a Tableau Server cluster. The Licence Manager process should only be manually configured if the initial node fails. For more information, see <a href="#">Recover from an Initial Node Failure</a>	
<b>Tableau Server Maintenance Processes</b> These processes have a status of <code>stopped</code> unless they are actively running to complete a job.				
Database Main-tenance	Cannot be configured manually.	The Database Maintenance service is responsible for performing maintenance operations on the Tableau Server repository.	<p>Automatically installed on each node where you install Tableau Server.</p> <p>Shows a status of <code>stopped</code> in output of <code>tsm status -v</code> unless it is actively performing database maintenance. Maintenance can include updates related to enabling remote access to the repository and changing passwords used to access the repository.</p> <p>You cannot configure the Database Maintenance</p>	No

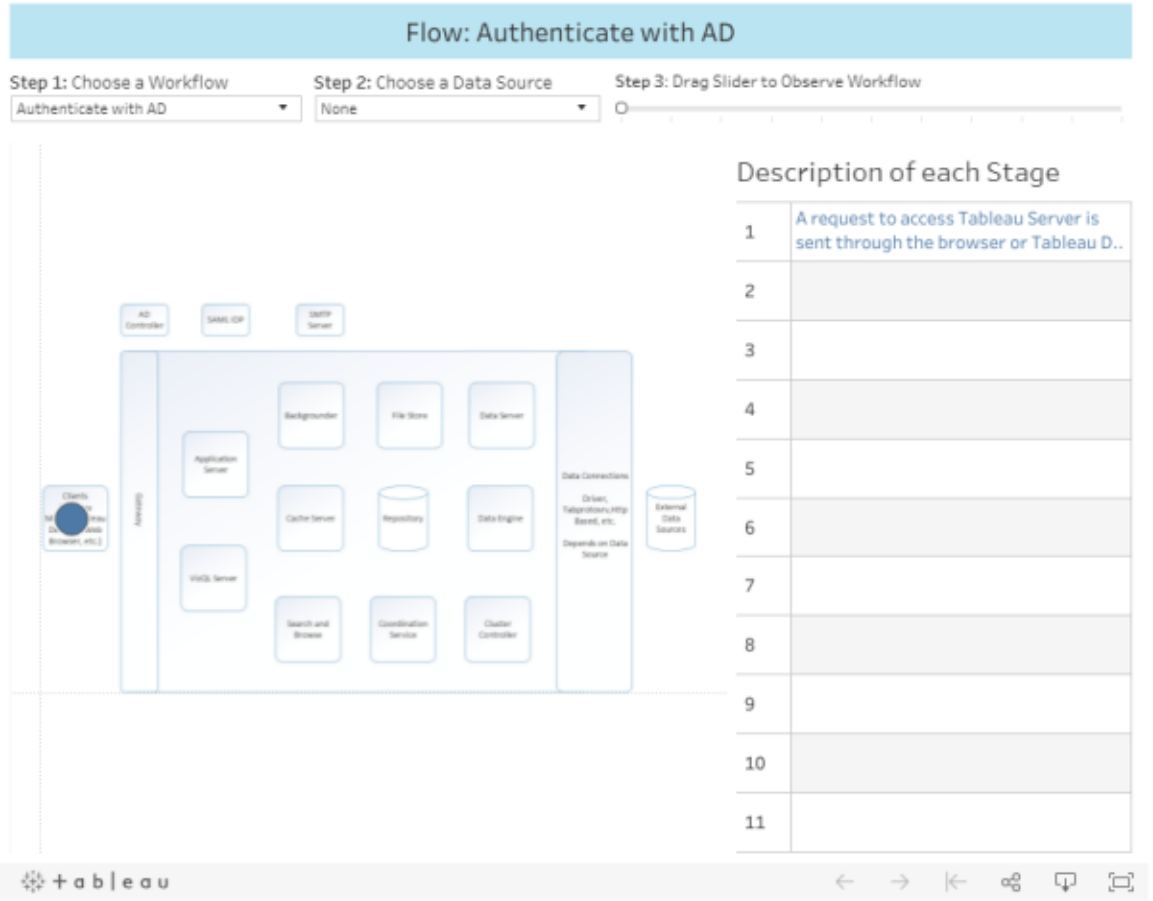
			service manually.	
<b>Backup/Restore</b>	Cannot be configured manually.	The Backup and Restore service is responsible for performing backup and restore operations on the data stored in the Tableau Server repository and file store.	<p>Automatically installed on each node where you install Tableau Server.</p> <p>Shows a status of <code>stopped</code> in output of <code>tsm status -v</code> unless it is performing a backup or restore operation.</p> <p>You cannot configure the Backup and Restore service manually.</p>	No
<b>Site Import/Export</b>	Cannot be configured manually.	The Site Import and Export service is responsible for migrating Tableau Server sites between server clusters.	<p>Automatically installed on each node where you install Tableau Server.</p> <p>Shows a status of <code>stopped</code> in output of <code>tsm status -v</code> unless it is performing an import or export.</p> <p>You cannot configure the Site Import and Export service manually.</p>	No

## Process workflow

The Tableau Server processes and how they interact depend on what action or activity is taking place. For example, the processes that are used, and how they interact, differ when you publish a workbook from those used when you sign in using SAML. For some interactive

views on process workflow, see the below workbook. This allows you to select a particular workflow and follow it step by step from start to finish.

**Disclaimer:** This workbook is published on Tableau Public and is not maintained by Tableau documentation. We cannot guarantee that it is up-to-date with the latest version of Tableau Server.



## Tableau Server Administration Agent

The Administration Agent monitors the Coordination Service for changes to configuration or topology and delivers new configurations to each service (configuration) or deploys new services and removes old ones (topology). The Administration Agent also checks each of the services for status and reports this back to the Coordination Service. This process will be automatically configured on each node of the cluster during installation – no explicit configuration is required or possible.

The Administration Agent may also be referred to as the *TSM Administration Agent*.

<b>Process</b>	Administration Agent
<b>Status</b>	Status of the Administration Agent process is not visible on the Status Page. Use the TSM CLI to view status. For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the Administration Agent process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\tabadminagent</code> . For more information, see Tableau Server Logs and Log File Locations

What happens when an Administration Agent process fails? All other Tableau Server processes running on the same node will display as “unavailable” on the TSM status page. Tableau Server will continue to work as expected, however you will not be able to make configuration/topology changes to the cluster. Failed Administration Agent processes automatically restart as long as the computer itself is otherwise healthy. If the Administration Agent doesn’t start up on the node, you can try to start the service manually by running the following command:

```
sc start tabadminagent_0
```

## Tableau Server Administration Controller

The Administration Controller process hosts the TSM REST API for configuring and managing your Tableau Server deployment. There can only be a single instance of the

Administration Controller in the entire cluster.

This process will be automatically configured on the initial node of the cluster during installation – no explicit configuration is required.

The Administration Controller is also referred to as the *TSM Controller* and the *TSM Administration Controller*.

<b>Process</b>	Administration Controller
<b>Status</b>	Status of the Administration Controller process is visible on the Status Page, displayed as <b>TSM Controller</b> . For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the Administration Controller process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\tabadmincontroller. For more information, see Tableau Server Logs and Log File Locations

What happens when the Administration Controller process fails?

If the Administration Controller fails, the Tableau Server cluster should continue to function; however, TSM commands and the TSM web UI will be unavailable. You will not be able to make any changes or updates to the configuration or topology until the Administration Controller is back up and running. Like other TSM services, Administration Controller is automatically restarted if it is stopped or has failed.

If the Administration Controller doesn't start up on the node, you can try to start the service manually by running the following command:

```
sc start tabadmincontroller_0
```

### Moving the Administration Controller

If the initial node fails, you need to move the Administration Controller and the Licensing Service to a different node so that Tableau Server can continue to function. For details on how to do this, see Recover from an Initial Node Failure.

Restarting the Administration Controller

Restart the TSM Administration Controller:

```
net stop tabadmincontroller_0  
  
net start tabadmincontroller_0
```

**Note:** You must run these commands as an administrator from a command prompt. Depending on how your computer is configured, you may need to run them in the C:\Windows\System32 folder.

**Note:** It may take a few minutes for tabadmincontroller to restart. If you attempt to apply pending changes in the next step before the controller has fully restarted, TSM will not be able to connect to the controller. You can verify that the controller is running by using the `tsm status -v` command. Tableau Server Administration Controller should be listed as "is running".

Tableau Server Application Server

The Application Server (VizPortal) handles the web application and REST API calls. Application Server also supports browsing and searching. To ensure high availability of Application Server, configure instances on each node in the Tableau Server cluster.

Process	Application Server
Status	Status of the Application Server process is visible on the Status Page. For more information, see View Server Process Status
Logging	Logs generated by the Application Server process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\viz-portal. For more information, see Tableau Server Logs and Log File Locations



What happens when an Application Server process fails? Requests being handled by that instance will fail, but subsequent requests will be routed to other running Application Server processes. Assuming the node containing the failed Application Server is still running, the failed process should automatically restart within seconds.

### Troubleshooting problems with Application Server

Beginning with version 2024.2.0, admins can enable Activity and Resource Tracing (ART) data to trouble issues with Application Server. The ART data captured provides detailed insights of memory and CPU usage. This can be useful if your server is experiencing Server Resource Manager (SRM) restarts due to native memory saturation with Application Server (VizPortal).

**Important:** When you enable ART, additional entries are written to VizPortal Java and CPP logs. You should not leave ART enabled after you are finished investigating. Be sure to disable ART to avoid extra disk space usage.

### Enable ART data on Tableau Server

To enable ART data:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following tsm commands:
  - a. `tsm configuration set -k vizportal.enable_art -v true`
  - b. `tsm configuration set -k vizportal.log_art_java -v true`
  - c. `tsm configuration set -k vizportal.art_skip_list -v "/v1/reportEventU-  
nau-  
thentic-`

```

ated,/v1/-
getSes-
sionIn-
fo,/v1/hasUn-
seenNo-
tific-
ation-
s,/v1/re-
freshSes-
sion,/v1/-
getViews,/v1/-
getUser-
s,/v1/-
getWork-
book-
s,/v1/-
getView,/v1/-
getServer-
Set-
ting-
sUnauthenticated,/v1/getProjectAncestors,/v1/getWorkbook"

```

d. `tsm restart`

Application Server logs are found here by default:

`C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizportal`

### Disable ATR

Disable ATR data after completing your investigation. To disable ATR, run the following commands at a command prompt:

1. `tsm configuration set -k vizportal.enable_art -v false`
2. `tsm configuration set -k vizportal.log_art_java -v false`
3. `tsm configuration set -k vizportal.art_skip_list -v ""`
4. `tsm restart`

## Tableau Server Backgrounder Process

The Backgrounder process runs server jobs, including extract refreshes, subscriptions, flow runs and data driven alerts. Jobs are initiated both from scheduled tasks and when started manually using 'Run Now', REST API or tabcmd commands.

<b>Process</b>	Backgrounder
<b>Status</b>	Status of the Backgrounder process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Backgrounder process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\backgrounder</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens if a Backgrounder process goes down? Jobs on the failed Backgrounder process are retried once the Backgrounder process recovers from failure. Most background jobs are scheduled to run periodically, and the same background task will be picked up and performed normally at the next scheduled time by a functioning Backgrounder process.

Failed Backgrounder processes automatically restart as long as the computer itself is otherwise healthy, and the failed jobs will be retried.

To make the Backgrounder process highly available, you should configure one or more instances to run on multiple nodes in the cluster.

### Managing Backgrounder Resources

Backgrounders as mentioned earlier in this topic, run server tasks and can be resource intensive. There are several ways in which you can manage the resources that Backgrounder needs to run the server tasks:

- Increase the number of instances on a specific node: Backgrounder is single-threaded. It can only launch a single job at a time. Adding more Backgrounder instances to a node can increase the number of jobs that can be run in parallel on that node, but keep in mind that each job launched can itself use multiple threads. You can add Backgrounder instances up to one half the number of cores. When deciding where and how many Backgrounders to run, consider that each Backgrounder process launched for a job can use multiple threads, so adding Backgrounder instances may limit the effectiveness of each process. Also keep in mind how other server processes will affect each machine's available capacity.
- Isolate Backgrounder process: If you are running Tableau Server on a multi-node cluster, you can dedicate one or more nodes for running Backgrounder. For more information, see Recommended Baseline Configurations.
- Node Roles: You can also separate the type of jobs or workload that the Backgrounder on a node does. For example, you can have one node dedicated to running extract refreshes only. For more information, see Workload Management through Node Roles.
- Restricting users from manually running jobs: Currently users can run extract refreshes, flow run and subscriptions using the web interface, REST API and tabcmd commands, and can run them at any time of the day. This can take up server resources during times that your server is busy doing other activities. Starting in Tableau Server 2020.1, a new Run Now settings allows the server administrator to choose whether or not to allow users to run jobs manually. By disabling the Run Now option, you have better control over how backgrounders are utilised as well as being able to better predict the load. This does not apply or affect jobs that are generated for scheduled tasks. For more information on configuring this setting, see Server Settings (General and Customisation).

#### Related content

- Improving group synchronisation performance

## Tableau Server Cache Server

The Cache Server provides a shared external query cache. It's a cache of key/value pairs which hold information from previous queries to speed up future requests. To make Cache Server highly available, configure one or more Cache Server processes on multiple nodes of the cluster.

<b>Process</b>	Cache Server
<b>Status</b>	Status of the Cache Server process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Cache Server process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\cacheserver</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens when Cache Server process goes down? The consequences are relatively mild. Tableau Server will still work but actions may take longer as they do not have cached results available. As the queries rerun, the restarted Cache Server gets repopulated, eventually speeding things up for end users. In effect, Cache Server does not have an availability impact; however, it does have an impact on various end user performance scenarios.

To reduce impact on user performance, run multiple processes of this type across the cluster. We recommend you install no more than a maximum of six cache server instances, limiting each node to no more than two. Our testing indicates that installing more than a total of six cache server instances in a Tableau Server installation provides no improvement and could have a negative impact on performance.

A failed Cache Server process is automatically restarted; as long as the computer itself is otherwise healthy, the Cache Server process will relaunch.

## Tableau Server Client File Service

The Client File Service (CFS) stores and distributes files needed by TSM (e.g. certificates, customisation files, etc.). Files that are managed by the Client File Service are renamed and

obfuscated before they are distributed across the deployment. This process also parametrises the file attributes that are required by Tableau services. As a result, files are not mapped to a single file location on the file system. Be sure you have an off-box backup of all files managed by CFS.

The following files are managed by CFS:

- SAML certificate file
- SAML key file
- SAML IdP metadata file
- OpenID.static.file
- Kerberos.keytab file
- LDAP Kerberos keytab file
- LDAP Kerberos conf file
- Mutual SSL certificate file
- Mutual SSL revocation file
- Customisation header logo file
- Customisation sign-in logo file
- Customisation compact logo file

The following files are not managed or distributed by CFS:

- External SSL files. The certificate and key files for external SSL are stored and managed by the Coordination Service. You do not need to manually distribute these files.
- SSL files for LDAP external identity store. You must distribute the SSL certificate file manually to each node in the cluster. See [Configure Encrypted Channel to LDAP External Identity Store](#).

The Client File Service functions much like the File Store does for files needed by business services. By default, CFS is only installed on the initial node of your Tableau Server installation. To configure CFS for high availability, we recommend that you configure an instance of CFS on each of the nodes where you deploy the Coordination Service.

In a cluster, if a node that is running your only instance of CFS fails, any files being managed by CFS will be lost, and you will need to repopulate CFS those files by reimporting certs and custom images, and making any related configuration changes.

<b>Process</b>	Client File Service
<b>Status</b>	Status of the Client File Service process is not visible on the Status Page. Use the TSM CLI to view status. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Client File Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\clientfileservice</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens when a CFS process fails? Nothing, as long as there is still at least one functioning CFS process in the cluster. The controller will redirect file transfer requests to the other working CFS process.

Failed Client File Service processes automatically restart as long as the computer itself is otherwise healthy.

## Tableau Server Collections Service

The Tableau Server Collections service was added in Tableau Server version 2021.2. The Collections service powers the Collections feature. It provides information about collections and connects with the Content Exploration service to get meta data about collections and items within collections. The Collections service also supports the Favourites feature.

### Server Configuration

The Collections Service is automatically installed on the first node where Application Server (vizportal) is installed.

### Multi-Node Configuration

For high availability and better performance, we recommend you install one instance of the Collections Service on every node that is running the Application Server (vizportal).

<b>Process</b>	Collections Service
<b>Status</b>	Status of the Collections Service is visible on the Status Page and from the

	command line using the <code>tsm status -v</code> command. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Collections Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\collections</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### Impact if the Collections Service is not running properly

If the Collections Service stops, it should automatically restart as long as the computer itself is otherwise healthy.

### One instance of Collections service

If you have a single instance of the Collections service configured and that instance fails, collections and favourites will not be available.

### Multiple instances of Collections service

If you have a multi-node installation of Tableau Server and have configured instances of the Collections service on multiple nodes, when one instance fails, collections and favourites may not be available to some users.

### Log Files

The Collections Service creates two sets of log files:

- `control_collections*.log`: These logs will contain information about the service starting and being enabled.
- `collections_*.log`: Any errors or problems are logged here.

For more information, see [Tableau Server Logs and Log File Locations](#).



## Tableau Server Content Exploration Service

The Tableau Server Content Exploration Service extends the capabilities of the Search and Browse process and is responsible for indexing all content in Tableau Server. This service is available in Tableau Server 2021.1 and later and required to search and browse external assets such as databases and tables. Databases and tables are only available if you have [Tableau Catalogue](#) enabled.

The Content Exploration Service is applicable to both quick and filtered searches. This service is not based on SOLR but depends on the Elastic Search to perform its functions.

### Server Configuration

The Content Exploration Service is automatically installed on the initial node.

### Multi-Node Configuration

For high availability and better performance, we recommend you install at least one instance of the Content Exploration Service on every node that is running the Application Server.

<b>Process</b>	Content Exploration Service
<b>Status</b>	Status of the Content Exploration Service is visible on the Status Page and can be accessed using the TSM CLI to view. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Content Exploration Service are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\contentexploration. For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### What happens when the Content Exploration Service fails?

If the Content Exploration Service stops working, any search requests for the content type it provides would fail to appear on the search results. If multiple instances of the service are installed, subsequent requests are routed to a healthy instance.

A failed Content Exploration service is automatically restarted; as long as the computer itself is otherwise healthy, the service will relaunch.

## Performance Tuning

The Content Exploration Service has the ability to scale up as needed but based on the available memory on the node. However, there is a memory allocation set by default that determines the maximum amount of memory that can be used by the service. While it is not typically recommended that you change this setting if you are seeing performance issues due to insufficient memory allocation, you can run the following commands to change the maximum memory allocation setting.

First, retrieve the current maximum memory allocation by running the following command:

```
tsm configuration get -k contentexploration.vmopts
```

Run the following set command to change the maximum memory allocation by updating the -Xmx value, followed by applying the pending changes. Do not change any other options:

```
tsm configuration set -k contentexploration.vmopts -v "-Xmx<new  
value>m -XX:+ExitOnOutOfMemoryError -Dspring.profiles.active=monolith"
```

For example:

```
tsm configuration set -k contentexploration.vmopts -v "-Xmx1024m -  
XX:+ExitOnOutOfMemoryError -Dspring.profiles.active=monolith"  
  
tsm pending-changes apply
```

## Log Files

The Content Exploration Service creates two sets of log files:

- `control_contentexploration*.log`: These logs will contain information about the service starting and being enabled.
- `contentexploration_*.log`: Any errors or problems are logged here.

For more information, see [Tableau Server Logs and Log File Locations](#).

### Search Accuracy

There are couple of ways the Content Exploration Service is used to make sure that searchable content is kept up to date:

- Whenever content managed by Tableau Server or Tableau Cloud is modified, including permissions, the Content Exploration Service re-indexes the relevant documents to keep its search indexes up to date.
- A system generated Backgrounder task that periodically validates that all content is properly synchronised and re-indexes any discrepancies that are found.

### Re-indexing

During restore, the restore process will initiate a full re-indexing of the content and external assets managed by Tableau Server. The re-indexing process consumes CPU resources which may be noticeable during backup and restore.

## Tableau Server Coordination Service

The Coordination Service is built on [Apache ZooKeeper](#), an open-source project, and coordinates activities on the server, guaranteeing a quorum in the event of a failure, and serving as the source of "truth" regarding the server topology, configuration and state. The service is installed automatically on the initial Tableau Server node, but no additional instances are installed as you add additional nodes. Because the successful functioning of Tableau Server depends on a properly functioning Coordination Service, we recommend that for server installations of three or more nodes, you add additional instances of the Coordination Service by deploying a new Coordination Service ensemble. This provides redundancy and improved availability in the event that one instance of the Coordination Service has problems.

The hardware for your cluster can have some effect on how well the Coordination Service runs. In particular:

- **Memory.** The Coordination Service maintains state information in memory. By design, the memory footprint is small, and is typically not a factor in overall server performance.

- Disk speed. Because the service stores state information on disk, it benefits from fast disk speed on the individual node computers.
- Connection speed between nodes. The service communicates continuously between cluster nodes; a fast connection speeds between nodes helps with efficient synchronisation.

<b>Process</b>	Coordination Service
<b>Status</b>	Status of the Coordination Service process is not visible on the Status Page. Use the TSM CLI to view status. For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the Coordination Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\app-zookeeper</code> . For more information, see Tableau Server Logs and Log File Locations

### Configuration for the Coordination Service

The Coordination Service is installed automatically on the initial node of Tableau Server. If you are running a single-node installation, you do not need to do anything to deploy or configure the Coordination Service. If your installation includes three or more nodes, you'll be prompted to configure a Coordination Service ensemble when you add your third node. This is not required, but is highly recommended as the Coordination Service serves a key function for high availability, acting as the source of "truth" about server topology, configuration, and state.

To configure a Coordination Service ensemble, use the TSM CLI and add the Coordination Service to the nodes you want running it. For details on how to deploy a Coordination Service ensemble, see Deploy a Coordination Service Ensemble.

### The Coordination Service Quorum

To ensure that the Coordination Service can work properly, the service requires a *quorum* – a minimum number of instances of the service. This means that the number of nodes in your

installation impacts how many instances of the Coordination Service you want to configure in your ensemble.

## Number of Coordination Service instances to use

The maximum number of Coordination Service instances you can have in an ensemble on Tableau Server depends on how many Tableau Server nodes you have in your deployment. Configure a Coordination Service ensemble based on these guidelines:

<b>Total number of server nodes</b>	<b>Recommended number of Coordination Service nodes in ensemble (must be 1, 3, or 5)</b>	<b>Notes</b>
1-2 nodes	1 node	This is the default and requires no changes unless you want to move the Coordination Service off your initial node and onto your additional node.
3-4 nodes	3 nodes	
5 or more nodes	3 nodes or 5 nodes	<p>Five is the maximum number of Coordination Service instances you can install. A 3-node Coordination Service ensemble allows for one of the ensemble nodes to fail without causing Tableau Server to fail. A 5-node ensemble allows for two of the ensemble nodes to fail without causing Tableau Server to fail.</p> <p>For most installations, three Coordination Service nodes are adequate, and because of the I/O-intensive nature of the Coordination Service, this is the most performant configuration.</p> <p>If high availability is your absolute priority, you may want to consider deploying a 5-node Coordination</p>

Total number of server nodes	Recommended number of Coordination Service nodes in ensemble (must be 1, 3, or 5)	Notes
		<p>Service ensemble. This provides the most redundancy in the event that one or more nodes fail but will require more system resources. A maximum of two of the ensemble nodes can fail without impacting Tableau Server (as long as any other services on the node also exist on still-functioning nodes).</p> <p>To reduce performance impact, locate the Coordination Service on nodes that are running fewer other services or consider using Coordination Service-only nodes. For details, see <a href="#">Configure Tableau Server for High Availability with Coordination Service-Only Nodes</a>.</p>

If you reduce the number of nodes

If you reduce the nodes in your cluster from three (or more) to two nodes, a warning tells you Tableau Server can no longer support high availability:

A minimum of three Tableau Server nodes are required for high availability. You can add a third node now, or continue with only two nodes. Continuing with only two nodes means Tableau Server will not be highly available. You can always add a third node later. Click OK to continue with 2 nodes, or Cancel to go back and add a node.

If you continue, Tableau Server will run, but you will not have any automatic failover of the repository.

## Tableau Server on Windows Help

### Viewing Coordination Service Status

The Coordination Service is not included in the listing when you View Server Process Status.

To see the state of the service, you can use the `tsm status` command:

```
tsm status -v
```

The output from the command shows you whether the service is running:

```
node1: TABLEAUSVR01
Status: RUNNING
'Tableau Server Gateway 0' is running.
'Tableau Server Application Server 0' is running.
'Tableau Server VizQL Server 0' is running.
'Tableau Server VizQL Server 1' is running.
'Tableau Server VizQL Server 2' is running.
'Tableau Server VizQL Server 3' is running.
'Tableau Server Cache Server 0' is running.
'Tableau Server Cache Server 1' is running.
'Tableau Server Coordination Service 0' is running.
'Tableau Server Cluster Controller 0' is running.
'Tableau Server Search And Browse 0' is running.
'Tableau Server Backgrounder 0' is running.
'Tableau Server Backgrounder 1' is running.
'Tableau Server Data Server 0' is running.
'Tableau Server Data Server 1' is running.
'Tableau Server Data Engine 0' is running.
'Tableau Server File Store 0' is running.
'Tableau Server Repository 0' is running (Active Repository).
'Tableau Server Administration Agent 0' is running.
'Tableau Server Administration Controller 0' is running.
'Tableau Server Service Manager 0' is running.
'Tableau Server License Manager 0' is running.
'Tableau Server Client File Service 0' is running.
'Tableau Server Database Maintenance 0' is stopped.
'Tableau Server Backup/Restore 0' is stopped.
```

'Tableau Server Site Import/Export 0' is stopped.

'Tableau Server SAML Service 0' is stopped.

## Tableau Server Data Engine

Hyper is Tableau's in-memory Data Engine technology optimised for fast data ingests and analytical query processing on large or complex data sets. Hyper powers the Data Engine in Tableau Server, Tableau Desktop, Tableau Cloud and Tableau Public. The Data Engine is used when creating, refreshing or querying extracts. It is also used for cross-database joins to support federated data sources with multiple connections.

<b>Process</b>	Data Engine
<b>Status</b>	Status of the Data Engine process is visible on the Status Page. For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the Data Engine process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\hyper</code> . For more information, see Tableau Server Logs and Log File Locations

### Memory and CPU usage

The Data Engine is designed to leverage all available CPU and memory on the machine to provide the fastest response times.

### CPU usage

Hyper technology leverages the new instruction sets in CPU and is capable of parallelising and scaling to all the available cores. Hyper technology is designed to scale to many cores efficiently, and also to maximise the use of each single core as much as possible. This means that you can expect to see up to an average of 75% use of total CPU per hour during query processing. Adding more CPU should result in performance improvement.

**Note:** The 75% hourly average usage is the default, and should be left unchanged unless you are running Data Engine on a dedicated server node. For more information about



running Data Engine on a dedicated node, see [Optimise for Extract Query-Heavy Environments](#).

Modern operating systems such as Microsoft Windows, Apple macOS and Linux have mechanisms to make sure that even if a CPU is fully used, incoming and other active processes can run simultaneously. In addition, to manage overall resource consumption and to prevent overloading and completely starving other processes running on the machine, the Data Engine monitors itself to stay within the limits set in the Tableau Server Resource Manager (SRM). Tableau Server Resource Manager monitors the resource consumption and notifies Data Engine to reduce the usage when it exceeds the predefined limit.

Since the Data Engine is designed to utilise the available CPU, it is normal to see spikes in CPU usage at times. If however, you see high CPU usage (ex: 95%) for extended periods of time (an hour or more), this can mean a couple of things:

- There is a high load of queries. This can happen if a server is under stress due to overload of multiple client requests and the queries are queuing up. If this happens often, it is an indication that more hardware is required to serve the clients. Adding more CPU in this case should help to improve performance.
- There is one long running query. In this case, the Tableau Server resource Manager will stop long running queries based on the timeout settings. This was also true for the Tableau Server versions earlier than version 10.5

For more information on Tableau Server Resource Manager, see [General Performance Guidelines](#).

## Memory usage

Memory usage of the Data Engine depends on the amount of data required to answer the query. The Data Engine will try to run this in-memory first. A working set memory is allocated to store an intermediate data structure during query processing. In most cases, systems have enough memory to do these types of processing, but if there isn't enough available memory, or

if more than 80% of RAM is utilised, the Data Engine shifts to spooling by temporarily writing to disk. The temporary file get deleted after the query has been answered. Therefore, spooling is an indication that more memory may be needed. Memory usage should be monitored and upgraded appropriately to avoid performance issues caused by spooling.

To manage memory resources on the machine, the maximum memory limit for Data Engine is set by Tableau Server Resource Manager (SRM).

#### Server configuration, Scalability, and Performance

- A single instance of Data Engine is automatically installed per node where an instance of File Store, Application Server (VizPortal), VizQLServer, Data Server or Backgrounder is installed on Tableau Server. The Data Engine can scale by itself and uses as much CPU and memory as needed, thus removing the need for multiple instances of the Data Engine. For more information on the server processes, see Tableau Server Processes.
- The instance of Data Engine installed on the node where File Store is installed is used for querying data for view requests. The instance of Data Engine installed on the node where backgrounder is installed is used for extract creation and refreshes. This is an important consideration when you are doing performance tuning. For more information, see Performance Tuning.
- Data Server, VizQL Server, and the Application Server (VizPortal) all use the local instance of Data Engine to do cross-database joins and create shadow extracts. Shadow extract files are only created when you work with workbooks that are based on non-legacy Excel or text, or statistical files. Tableau creates a shadow extract file in order to load the data more quickly.
- In Tableau Server 10.5 one instance of Data Engine is installed automatically when you install backgrounder. The backgrounder process uses the single instance of Data Engine (hyperd.exe) installed on the same node.

**Important!** There are exceptions to when the Data Engine is installed on the same node as File Store. When File Store is configured external to Tableau Server, Data Engine is no longer installed with File Store. In this configuration where Tableau Server is configured with an External File Store, Data Engine, will continue to be installed with the other process as noted above. In addition, you can also configure Data Engine on a node without other processes – but only when File Store is configured externally. For more information on External File Store, see [Tableau Server External File Store](#).

#### Scalability:

You can scale up with the new Data Engine: Since cores are fully utilised, adding more cores makes individual queries execute faster which in turn allows for more queries to execute in less time.

Memory usage should be monitored and upgraded appropriately to avoid the performance issues caused by spooling.

For more information on Scalability, see [Tableau Server Scalability](#).

#### Performance:

### Performance benefits

Starting in 10.5, Hyper technology has been integrated with Tableau Data Engine to give you the following key benefits:

- **Faster extract creation:** With Hyper technology, extracts are generated almost as fast as the source system can deliver data, no sorting needed.
- **Support for larger extracts:** Prior to this release, you might have not been able to get all your data into a single extract. With Hyper technology, much larger amounts of data can be included in a single extract.
- **Faster analysis of extracts:** In many cases you will see faster querying of data for larger extracts, or workbooks with complex calculations.

Here are some reasons why the Data Engine powered by Hyper performs better on larger or complex extracts and is optimised for faster querying:

- **Hyper technology is designed to consume data faster.** Unlike in previous versions, the Data Engine does not do any post processing like sorting. With Hyper, post processing steps like sorting are not needed giving the Data Engine the ability to perform better with larger extracts.
- **Hyper technology is memory-optimised.** This means that when needed, all data lives in memory. This results in fast data access times.
- **Hyper technology is CPU optimised.** This means that Data Engine now fully parallelises the query execution and utilises available CPU in such a way that query execution time scales almost linearly with the number of cores in the machine.
- **Hyper is a compiling query engine.** Queries are either interpreted or compiled to the machine code for maximum performance and allowing the Data Engine to get most performance out of modern hardware (CPU, large main-memory capacities).
- **Hyper technology uses advanced query optimisations to make queries faster.** Along with many additional advanced techniques such as, materialising min and max values for each column, mini-indices to optimise search ranges, more granular data block-level dictionaries, advanced logic for join and sub-query performance optimisations, the new Data Engine offers many improvements over the previous Tableau Data Engine in terms of performance and scalability.

For more information on performance, start with General Performance Guidelines, and Performance Tuning

## Tableau Server Data Server

The Data Server manages connections to published data sources on Tableau Server. To make Data Server highly available, configure one or more Data Server processes to run on multiple nodes of the cluster.

<b>Process</b>	Data Server
<b>Status</b>	Status of the Data Server process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Data Server process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\data-server</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens if a Data Server process fails? Queries running through the Data Server process will fail, resulting in a failed view rendering, extract refresh or alert. Subsequent requests, including a retry of the failed operation, should succeed as long as a working Data Server is available to accept rerouted requests.

Tableau Server is not dependent on Data Server to function; however, without a running Data Server, workbooks on the server lose the ability to query or to connect to published data sources. Any view that does not use Data Server for any of its data sources will still function correctly.

## Tableau Server Data Source Properties Service

Introduced in version 2020.1.0, the Tableau Server Data Source Properties service provides metadata for published data source from the Application Server (VizPortal) to client services like Ask Data.

**Note:** Tableau's Ask Data feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2.

One instance of the Data Source Properties service is configured on the initial node of Tableau Server. You can add additional instances on the initial node or on other nodes in a multi-node installation. You are required to configure at least one instance of the Data Source Properties service on any node that has an instance of Application Server.

<b>Process</b>	Data Source Properties Service
----------------	--------------------------------

<b>Status</b>	Status of the Data Source Properties Service is visible on the Status Page and from the command line using the <code>tsm status -v</code> command. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Data Source Properties Service are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\tdsservice</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### Log files for the Data Source Properties service

The Data Source Properties service creates two sets of log files:

- `control-tdsservice*.log`. These logs will contain information about the service starting and being enabled.
- `tdsservice_*.log`. Any errors or problems are logged here.

For more information, see [Log File Snapshots \(Archive Logs\)](#).

### Data Source Properties service in a multi-node cluster

How you configure the Data Source Properties service in a multi-node cluster depends on how you configure your nodes. In any installation of Tableau Server, you must have at least one instance of the service. In addition, you are required to configure at least one instance of Data Source Properties on any node that is configured with the Application Server (VizPortal).

## Tableau Server File Store

This topic describes File Store process when configured to run locally on Tableau Server. However, File Store can be run locally as well as external to Tableau Server. For more information on Tableau Server External File Store, see [Tableau Server External File Store](#).

The Tableau Server File Store process controls the storage of extracts. When File Store is installed, an instance of the Data Engine is also installed unless the node already has an instance of the data engine. In highly available (HA) environments, the File Store ensures that extracts are synchronised to other file store nodes so they are available if one file store node stops running.

<b>Process</b>	File Store
<b>Status</b>	Status of the File Store process is visible on the Status Page. For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the File Store process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\filestore. For more information, see Tableau Server Logs and Log File Locations

### The decommission Command

If you want or need to remove a File Store instance you need to decommission File Store first using the `tsm topology filestore decommission` command. If you don't decommission File Store before you attempt to remove it, you will be prompted to do so. Decommissioning puts the File Store instance into read-only mode and copies any unique data contained in the instance to the other File Store(s) in the cluster. While a File Store instance is being decommissioned, this shows on the Status page, and once all unique content has been copied to other File Store nodes, the decommissioned node shows as ready to be removed.

### Decommissioning File Store when co-located with the Administrative Controller

Tableau backup is fastest when an instance of File Store is located on the same node as the TSM Administrative Controller. If you are removing an instance of File Store that is co-located with the Controller, you will be warned about the performance impact for backups.

## Tableau Server Gateway Process

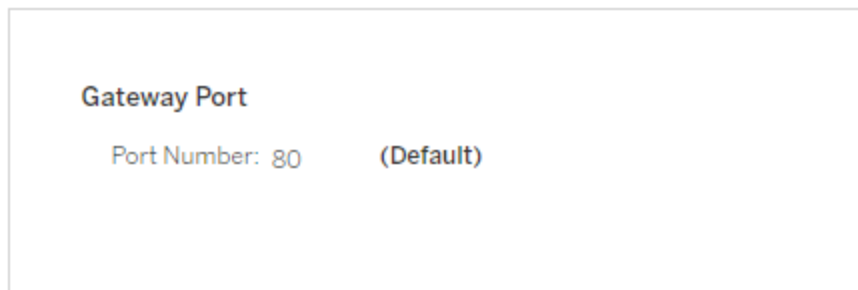
The Tableau Server gateway process is an Apache web server component (`httpd.exe`). Its role is to handle requests to the server from all clients – Tableau Desktop, mobile devices, a proxy, a load balancer, etc.

The server runs a single instance of the gateway process; you can't run more than one per machine. The gateway process is required on any node with an instance of VizQL Server or Vizportal.

<b>Process</b>	Gateway
<b>Status</b>	Status of the Gateway is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the gateway process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\httpd</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### Port assignment

By default, the gateway process listens for requests on port 80 (for HTTP requests) and 443 (for SSL requests). When you install Tableau Server on a computer, part of the server configuration makes sure that this port is open in the computer's firewall. If the computer is running a different process that requires port 80 for HTTP, you can change the port assignment for the gateway process during installation. (You cannot change the SSL/HTTPS port.)



If you need to set the HTTP port after installation, then run the following TSM command, where *node* is the node number (for example, `node1`) and *nn* is the new port number:

```
tsm topology set-ports --node-name node --port-name gateway:primary
--port-value nn
```

If you are running Tableau Server with a reverse proxy server, you will need to configure other port and host-related settings on Tableau Server. See [Configuring Proxies and Load Balancers for Tableau Server](#).



### Log files for the gateway process

The gateway process creates two sets of log files:

- Activity logs. The name for these log files has the format `access.yy_mm_dd_hh_mm_ss.log`.
- Error logs. All errors are logged in a single file named `error.log`.

For more information, see [Log File Snapshots \(Archive Logs\)](#).

### Gateway processes in a cluster

If your server environment is distributed across multiple machines, you can run a single gateway process on each node of the cluster. The most common scenario for running a gateway process on multiple computers in the cluster is that you have a load balancer in front of the cluster. In this scenario, the load balancer distributes requests to any gateway in the cluster. If you need to take a node off line (for example, to perform maintenance on that node), you can disable the load balancer's routing to that machine. When the maintenance is complete, you can re-enable the node on the load balancer.

You must have a gateway process running on at least one computer in the cluster. If you remove the gateway process from the primary server, you must make sure that another computer in the cluster is running the gateway process. You must also make sure that that computer is reachable by clients.

An instance of the gateway process is required on any node that is configured for one of these processes or services: VizQL Server, Vizportal or Tableau Prep Flow Authoring.

If the Tableau Server is configured to use SSL, you must make sure that the certificate for SSL support is in the same location on each computer in the cluster that has the gateway process running. For more information about using SSL, see [Configure SSL for External HTTP Traffic to and from Tableau Server](#).

Similarly, if the server installation uses a custom logo, the logo must be in the same location on every computer that is running the gateway process.

If you need to change the port number that the gateway process listens on, as explained earlier, you can use the configuration dialog box or run the following command for each worker computer that is running the gateway process:

```
tsm topology set-ports --node-name node --port-name gateway:primary
--port-value nn
```

Additional information

Configuring Proxies and Load Balancers for Tableau Server

Add a Load Balancer

Index and Search Server

The Tableau Server Index and Search Server process, based on OpenSearch, handles fast search, filter, retrieval and display of content metadata on your Tableau Server site. Beginning with Tableau Server version 2023.3, Index and Search Server completely replaces the Search and Browse process.

Server Configuration

The Index and Search Server is automatically installed on the initial node.

Multi-Node Configuration

To configure Index and Search Server for high availability, configure the process on multiple nodes. We recommend you configure an odd number of Index and Search Server instances. On Tableau Server Clusters that have 3 or more nodes, you should configure Index and Search Server on at least three different nodes.

<b>Process</b>	Index and Search Server
<b>Status</b>	Status of the Index and Search Server is visible on the Status Page and can be accessed using the TSM CLI to view. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Index and Search Server are located in C:\Pro-

	gramData\Tableau\Tableau Server\data\tabsvc\logs\index-andsearchserver. For more information, see Tableau Server Logs and Log File Locations
--	----------------------------------------------------------------------------------------------------------------------------------------------

### What happens when the Index and Search Server fails?

If Index and Search Server fails, users can still sign in to Tableau Server. However, the different content types (workbooks, projects, data sources and views, for example) will not appear on the Home page, the search bar or the Explore page. Existing workbooks and Views should still be accessible and fully functional if accessed from a bookmarked URL. The content is not actually missing. Rather, the content is not being returned in the search results; it will be displayed again after the Index and Search Server restarts. A failed Index and Search Server is automatically restarted; as long as the computer itself is otherwise healthy, the service will relaunch.

If more than one Index and Search Server is configured and running on multiple nodes when the failure occurs, requests made to a failed Index and Search Server will also fail, but subsequent requests will be routed to working Index and Search Server instances. Each Index and Search Server instance indexes across all nodes in the cluster, therefore as long as one Index and Search Server instance is running, results will still be returned across all nodes.

### Performance Tuning

The Index and Search Server heap size can be configured by using the `tsm set configuration` command with the `indexandsearchserver.vmopts` option. For more information, see `indexandsearchserver.vmopts`

### Re-indexing

During restore, the restore process will initiate a full re-indexing of the content and external assets managed by Tableau Server. The re-indexing process consumes CPU resources which may be noticeable during backup and restore.

## Tableau Server Internal Data Source Properties Service

The Tableau Server Internal Data Source Properties service was introduced in version 2020.1.0 and communicates with the Data Source Properties service. It is managed internally by Tableau Server and cannot be configured by an administrator.

An instance of the Internal Data Source Properties service is automatically configured on any node that has an instance of the Data Source Properties service.

<b>Process</b>	Internal Data Source Properties Service
<b>Status</b>	Status of the Internal Data Source Properties Service is visible on the Status Page and from the command line using the <code>tsm status -v</code> command. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Internal Data Source Properties Service are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\tdsnativeservice</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

Log files for the Internal Data Source Properties service

The Internal Data Source Properties service creates two sets of log files:

- `control-tdsnativeservice_*.log`. These logs will contain information about the service starting and being enabled.
- `nativeapi-tdsnativeservice_*.log`. Any errors or problems are logged here.

For more information, see [Log File Snapshots \(Archive Logs\)](#).

Internal Data Source Properties service in a multi-node cluster

One instance of the Internal Data Source Properties services is added to any node that has an instance of Data Source Properties configured. Because the Internal Data Source Properties service is managed internally by Tableau, there is nothing an administrator can configure related to the service.

## Tableau Server Messaging Service

The Tableau Server messaging service uses Apache ActiveMQ beginning with version 2019.4. This is a publish/subscribe platform that enables secure, scalable, performant and highly available message-oriented communication for microservices. The Messaging Service is used to support communication between microservices in Tableau Server.

The server runs a single instance of the Messaging Service by default. In version 2020.1 and later, if you have a multi-node instance of Tableau Server, you can configure a second instance of the Messaging Service.

<b>Process</b>	Messaging Service
<b>Status</b>	Status of the Messaging Service is visible on the Status Page and from the command line using the <code>tsm status -v</code> command. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the gateway process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\activemqserver</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### Impact if Messaging Service is not running properly

If the Messaging Service stops or fails to start the consequences depend on whether you have one or two instances of the Messaging Service configured.

### Multiple instances of Messaging Service (multi-node, version 2020.1 and later)

You can configure two instances of the Messaging Service configured if you have version 2020.1 or later *and* you have a multi-node installation of Tableau Server. In this case, if one instance fails, the other instance handles all traffic and you can remove and reinstall the failed instance.

### One instance of Messaging Service

If you have a single-node installation of Tableau Server, you are limited to a single instance of the Messaging Service. In this case, if the configured instance fails, Tableau Server will

continue to function, but the status will appear as "Degraded", and any event message that was sent to the Messaging Service while it was down may be lost, even if the service restarts. Event messages include permission changes to projects.

If the Messaging Service stops, it is automatically restarted as long as the computer itself is otherwise healthy.

### Messaging Service in a multi-node cluster

How you configure the Messaging Service in a multi-node cluster depends on what version of Tableau Server you are running. In all cases, you must run one instance of the Messaging Service.

Starting with version 2020.1, you can run two instances of the service in a multi-node environment. We recommend you run two instances as this provides redundancy. You can add a second instance to any node that does not already have the Messaging Service configured. You cannot add more than a combined total of two instances in your multi-node cluster.

## Tableau Server Metrics Service

### Retirement of the legacy metrics feature

Tableau's legacy metrics feature was retired in Tableau Cloud in February 2024 and in Tableau Server version 2024.2. In October 2023, Tableau retired the ability to embed legacy metrics in Tableau Cloud and in Tableau Server version 2023.3. With Tableau Pulse, we've developed an improved experience to track metrics and ask questions of your data. For more information, see [Create Metrics with Tableau Pulse](#) to learn about the new experience and [Create and Troubleshoot Metrics \(Retired\)](#) for the retired feature.

The Metrics service is responsible for reading and writing Metric data in Tableau Server. The service is required in order for Metrics to work properly. To make the Metrics service highly available, configure one or more instances of the service to multiple nodes of the cluster. We recommend you configure at least one instance on every node that is running the Application Server (VizPortal).

<b>Process</b>	Metrics Service
<b>Status</b>	Status of the Metrics Service is visible on the TSM Status Page and from the command line using the <code>tsm status -v</code> command. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Metrics Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\metrics</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

### Impact if the Metrics Service fails

The Metrics Service is required for Metrics to function properly on Tableau Server. In order to minimise issues, install multiple instances of the service in your server installation. If you have a single-node instance of Tableau Server, configure at least two instances of the service on your node. If the Metrics Service stops working, any Metrics requests that are in-process will fail. Subsequent requests are routed to a healthy instance of the service.

### Metrics Service in a multi-node cluster

The Metrics Service is required for Metrics to function properly on Tableau Server. In order to minimise issues, install multiple instances of the service in your server installation. In multi-node installations, we recommend you configure at least one instance of the Metrics Service on every node that is running the Application Server (VizPortal). This provides redundancy and maximum performance.

### Log files for the Metrics service

The Metrics Service creates two sets of log files:

- `control-metrics*.log`. These logs will contain information about the service starting and being enabled.
- `metrics_*.log`. Any errors or problems are logged here.

For more information, see [Log File Snapshots \(Archive Logs\)](#).

## Tableau Server Microservice Containers

By default, one instance of the Interactive Microservice Container is added to every node that has Application Server (Vizportal) installed, and one instance of the Non-Interactive Microservice Container is added to every node that has Backgrounder installed. Although you cannot add a Microservice container directly, you can use the TSM CLI to change the number of instances for both Microservice Containers, when necessary. If all instances of Backgrounder or Application Server are removed from a node, the container process is also removed.

Microservice Containers and the microservices:

- Interactive Microservice Container:
  - MessageBus Microservice
  - Relationship Query Microservice
  - Credentials Service
- Non-Interactive Microservice Container:
  - Relationship Ingestor Microservice
  - External Content Provider Microservice
  - Flow Provider Microservice
  - Content Provider Microservice

### Viewing Microservice Container Status

You can see the status of the Microservice Container processes from the TSM Status page, or from the command line, using the `tsm status -v` command. When you use the TSM Status page to View Server Process Status, the status of each container process is visible, but you cannot see the status of any of the microservices in the containers. When you use the command line, more detail is shown, including the status of each individual microservice.

### Microservice Container Status

The status of a container process depends on the status of the microservices within the container. When all microservices within a container process are running as expected, the



container status is **Active** (on the TSM Status page) or `running` (when viewed from the TSM command line). If all microservices within a container process are stopped, the status for the container is **Error** (on the TSM Status page) or `stopped` (from the TSM command line). If a microservice is stopped but at least one other microservice is running, the container status is **Degraded** (on the TSM Status page) or `degraded` (from the TSM command line).

When all microservices within a container process have a status of running, the container status is **Active**. If any microservice in a container is in an error state (has a status of `stopped` ) the container process status is **degraded**. If all microservices in a container are in an error state, the container status is **error**.

Use the TSM web interface

To view the Microservice Container status from the TSM Status page:

1. Open TSM in a browser:

`http://<tsm-computer-name>:8850`

2. Click **Status**:

The page displays the status for the Interactive Microservice Container and Non-Interactive Microservice Container processes, as well as status for other processes running as part of TSM or Tableau Server.

You cannot see the status of any individual microservice within a container process, but if the container process has a status of **Active** (a green tick), the microservices it contains are all running as expected. To see the status of individual microservices, use the TSM command line.

**Note:** The status of the container processes does not display on the older Tableau Server status page. For details about the two status pages and how they differ, see [View Server Process Status](#).

## Use the TSM CLI

To view the Microservice Container status from the TSM command line:

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm status -v
```

The output from the command shows you the status of the container services and the microservices in them:

```
node1: TABLEAUSVR01
Status: RUNNING
'Tableau Server Gateway 0' is running.
'Tableau Server Application Server 0' is running.
'Tableau Server Interactive Microservice Container 0' is running.
'MessageBus Microservice 0' is running.
'Relationship Query Microservice 0' is running.
'Tableau Server VizQL Server 0' is running.
'Tableau Server VizQL Server 1' is running.
'Tableau Server VizQL Server 2' is running.
'Tableau Server VizQL Server 3' is running.
'Tableau Server Cache Server 0' is running.
'Tableau Server Cache Server 1' is running.
'Tableau Server Coordination Service 0' is running.
'Tableau Server Cluster Controller 0' is running.
'Tableau Server Search And Browse 0' is running.
'Tableau Server Backgrounder 0' is running.
'Tableau Server Backgrounder 1' is running.
'Tableau Server Non-Interactive Microservice Container 0' is running.
'Relationship Ingestor Microservice 0' is running.
'External Content Provider Microservice 0' is running.
```

## Tableau Server on Windows Help

```
'Flow Provider Microservice 0' is running.
'Content Provider Microservice 0' is running.
'Tableau Server Data Server 0' is running.
'Tableau Server Data Server 1' is running.
'Tableau Server Data Engine 0' is running.
'Tableau Server File Store 0' is running.
'Tableau Server Repository 0' is running (Active Repository).
'Tableau Server Tableau Prep Conductor 0' is running.
'Tableau Server Elastic Server 0' is running.
'Tableau Server Ask Data 0' is running.
'Tableau Server Administration Agent 0' is running.
'Tableau Server Administration Controller 0' is running.
'Tableau Server Service Manager 0' is running.
'Tableau Server License Manager 0' is running.
'Tableau Server Client File Service 0' is running.
'Tableau Server Database Maintenance 0' is stopped.
'Tableau Server Backup/Restore 0' is stopped.
'Tableau Server Site Import/Export 0' is stopped.
'Tableau Server SAML Service 0' is stopped.
c:\Program Files\Tableau\Tableau Server-
\packages\scripts.near.18.1216.1859>
```

## Tableau Server Repository

Tableau Server Repository is a database that stores server data. This data includes information about Tableau Server users, groups and group assignments, permissions, projects, data sources, workbooks, and extract metadata and refresh information.

The Repository is also referred to as the *PostgreSQL* repository or database.

Process	Repository
Status	Status of the Repository is visible on the Status Page. For more information, see View Server Process Status
Logging	Logs generated by the repository are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\pgsql.

For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>
--------------------------------------------------------------------------------------

### Preferred active repository

When you configure Tableau Server you have the option to specify a node as the preferred active repository. When Tableau Server is configured for repository failover, the preferred active repository node is the one used for the active repository. This is an optional step, and if you do not specify a preferred active repository node, Tableau Server will select the active repository node on startup.

To configure the preferred active repository, use the `tsm configuration set` command to configure the `pgsql.preferred_host` option:

```
tsm configuration set -k pgsql.preferred_host -v "<host_name>"
```

**Note:** The `host_name` is case-sensitive and must match the node name shown in the output of `tsm status -v`.

Configure a preferred active repository node if you want Tableau Server to select a specific node on startup. You might want to do this if you have a particular server you want to use for your active repository (a computer with more disk space or memory for example), or if you are using custom administrative views. Custom administrative views have embedded connection information that refers to the repository for which you created the views. For more information on connecting to the Tableau Server repository, see [Collect Data with the Tableau Server Repository](#)

### The failoverrepository Command

If failover occurs and your passive repository becomes the active repository, it remains the active repository until either Tableau Server restarts or you use the `tsm topology failover-repository` command to switch back. Specify the repository you want to be the active one, or specify that the preferred active repository (if configured) should be made active again. For more information, see `tsm topology failover-repository`.

## Tableau Server Resource Limits Manager

This process was introduced in Tableau Server 2022.1.

The Tableau Server Resource Limits Manager tracks backgrounder resource usage in relation to the set resource limits to make sure the resource limits are applied correctly.

<b>Process</b>	Resource Limits Manager
<b>Status</b>	Status of the Resource Limits Manager is visible only in TSM CLI.
<b>Logging</b>	<p>Logs generated by the Resource Limits Manager are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\allegro.</p> <ul style="list-style-type: none"> <li>• The configuration logs are included in the Backgrounder logs.</li> <li>• The resource consumptions logs are included in the vizportal logs.</li> </ul> <p>For more information, see Tableau Server Logs and Log File Locations</p>

The Resource Limits Manager is automatically and by default installed on the initial node of Tableau Server. We do not recommend adding more processes or configuring this on additional nodes of the Tableau Server.

The maximum memory usage is set to 512 MB.

### What happens when the Resource Limits Manager fails?

The resource limits will no longer be applied but the jobs will continue to run using the available Backgrounder resources. The behaviour will be similar to the scenario where there are no set resource limits.

You can see the status using the tsm command - tsm status -v

## Tableau Server SAML Service

For Tableau Server installations that have site-specific SAML enabled, there will also be a SAML Service instance running on each node that is configured with Application Server. This service is automatically configured when site-specific SAML has been enabled on the server.

- In version 2023.1.x and later, SAML Service on Tableau Server isn't displayed until site SAML is enabled.
- In version 2022.3.x and earlier, SAML Service on Tableau Server is shown as stopped unless site SAML is enabled.

<b>Process</b>	SAML Service
<b>Status</b>	Status of the SAML Service process is not visible on the Status Page. Use the TSM CLI to view status. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the SAML Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\samlservice</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

If this process goes into a failed state, then users will not be able to sign in to Tableau Server if the user request is routed to an Application Server on this node. Like other processes, when a node containing the SAML Service fails, the failed process should automatically restart within seconds.

## Tableau Server Search and Browse

**Note:** Starting in version 2023.3, Search and Browse is retired (no longer installed). It is replaced by the Index and Search Server.

Starting in version 2022.3, Search and Browse is deprecated (installed but no longer used by Tableau Server). If you are running Tableau Server version 2022.3 or 2023.1,

*you should not configure more than one instance of Search and Browse* for any installation. Configuring more than one instance can, in rare cases, result in stability issues.

The Search & Browse process, based on Apache SOLR (in Tableau Server versions 2020.4 and earlier) and also known as searchserver, handles fast search, filter, retrieval and display of content metadata on your Tableau Server site. To configure high availability for the Search & Browse process, configure the process on multiple nodes. Starting in Tableau Server version 2021.1, the functionality of the Search and Browse process is enhanced by the Content Exploration Service. For more information, see [Tableau Server Content Exploration Service](#)

<b>Process</b>	Search & Browse
<b>Status</b>	Status of the Search & Browse process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Search & Browse process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\searchserver. For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens if a Search & Browse process fails? Users can still sign in to Tableau Server, but workbook content will appear to be missing. The content is not actually missing. Rather, the content is not being returned in the search results; it will be displayed again after the Search and Browse process restarts.

If more than one Search & Browse process is configured and running on multiple nodes when the failure occurs, requests made to a failed Search & Browse process will also fail, but subsequent requests will be routed to working Search & Browse processes. Each Search & Browse process indexes across all nodes in the cluster, therefore if all but one Search & Browse process fails, results will still be returned across all nodes.

## Tuning the Search & Browse Process

There are several ways you can change how the Search & Browse process works in Tableau Server. In most cases you should not need to change anything, but here are some configuration changes you can make.

### Search & Browse Max Heap Memory

You can configure Search & Browse options using the `searchserver.javamemopts` configuration key. The most important setting you can configure is the one controlling how large the maximum heap memory should be and specified by the `-Xmx` option. By default this is set by Tableau, based on the available physical memory for the server node running the Search & Browse service. The value should be set as high as possible, based on available physical memory and memory usage, but no higher than 24 GB.

When changing the amount of max heap memory, you need to take into account any other services on the system. If you're running low on memory on the computer running Tableau Server, you should consider adding more memory, or scaling down the topology on the machine. If you are running Search & Browse on a node with few other processes, or with a large amount of physical memory, you can consider increasing the amount used by the search service. If you are running Search & Browse on a node with more than the default number of processes, you should consider decreasing the maximum heap memory allocation to avoid having the service attempt to use more memory than is available.

## Default maximum heap memory allocations

The table below shows the *default* amount of heap memory Tableau allocates to Search & Browse on a server node, based on available memory:

System memory	SOLR heap memory
<= 16 GB	1 GB
<= 32 GB	2 GB



System memory	SOLR heap memory
<= 64 GB	4 GB
<= 128 GB	8 GB
> 128 GB	16 GB

To change the value of max heap memory, set the `-Xmx` value of `search-server.javamemopts` using the `tsm configuration set` command.

First get the current values:

```
C:\WINDOWS\system32>tsm configuration get -k search-
server.javamemopts
-Xmx512m -Xms512m -XX:+ExitOnOutOfMemoryError -XX:-UsePerfData
```

Next, change the value of the `-Xmx` option. Include but do not change all other options:

```
tsm configuration set -k searchserver.javamemopts -v "-Xmx8g -
Xms512m -XX:+ExitOnOutOfMemoryError -XX:-UsePerfData"
```

For more details about the `searchserver.javamemopts` configuration key, see `search-server.javamemopts`.

#### Client session timeouts

You can configure how long Search & Browse clients will wait to establish a connection to the Search & Browse server, and to Coordination Service (Zookeeper). Both timeout values are set to a relatively high value, but if you experience issues browsing to server content, and viz-portal and background logs show timeouts connecting to SOLR, try increasing these settings. If this has no impact, you may be running into limited resources on the Tableau Server computer.

```
searchserver.connection_timeout_milliseconds
searchserver.zookeeper_session_timeout_milliseconds
```

To change the values use the `tsm configuration set` command:

```
tsm configuration set -k searchserver.connection_timeout_milliseconds -v
```

For more details about the `searchserver.connection_timeout_milliseconds` configuration key, see `searchserver.connection_timeout_milliseconds`.

### Zookeeper connection health check timeout at startup

When Tableau Server is starting, resource usage is high, especially related to CPU usage. If Search & Browse does not make a connection to Coordination Service (zookeeper), it will fail to start. To account for this, Tableau Server performs a health check on the Coordination Service before starting Search & Browse.

If your Tableau Server computer is especially busy, or if Search & Browse fails to start, increase this timeout value.

An error is written to the `control-searchserver.log` files when this health check fails: `Failed zookeeper health check. Refusing to start SOLR.`

To increase the amount of time Tableau Server waits for a successful health check, set the value of `searchserver.startup.zookeeper_healthcheck_timeout_ms` using the `tsm configuration set` command.

```
tsm configuration set -k searchserver.startup.zookeeper_healthcheck_timeout_ms -v <nnnnnn>
```

For more details about the `searchserver.startup.zookeeper_healthcheck_timeout_ms` configuration key, see `searchserver.startup.zookeeper_healthcheck_timeout_ms`.

## Tableau Server Service Manager

The Service Manager manages the lifecycle of the Tableau Server business processes:

- Gateway
- Repository & Cluster Controller

# Tableau Server on Windows Help

- File Store
- Application Service
- SAML Service
- Backgrounder
- Data Server
- VizQL Server
- Data Engine
- Cache Server
- Search & Browse

This process will be automatically configured on each node of the cluster during installation.

<b>Process</b>	Service Manager
<b>Status</b>	Status of the Service Manager process is not visible on the Status Page. Use the TSM CLI to view status. For more information, see View Server Process Status
<b>Logging</b>	Logs generated by the Service Manager process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\tabsvc. For more information, see Tableau Server Logs and Log File Locations

What happens when a Service Manager process fails? All the business services on that node will fail as well. Depending on the services running on the node Tableau Server may run in a degraded state.

The Service Manager will automatically restart itself if the machine itself is healthy. If the Service Manager doesn't start up on the node you can try to start the services manually by running the following command:

```
sc start tabsvc_0
```

## Tableau Statistical Service

The Tableau Statistical Service manages the statistical engine behind Explain Data and predictive modelling functions on Tableau Server. This service is available in Tableau Server 2022.1 through to 2023.1.x.

**Note:** The Statistical Service was retired in version 2023.3.0 and no longer shows up on the status page or in the output of the tsm status command.

## Server configuration

The Tableau Statistical Service is automatically installed on any node where VizQL is installed.

<b>Process</b>	Tableau Statistical Service
<b>Status</b>	Status of the Tableau Statistical Service process is visible on the Status Page and can be accessed using the TSM CLI to view. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Tableau Statistical Service process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\statsservice</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

## Impact if the Tableau Statistical Service fails

If the Tableau Statistical Service stops working, Explain Data will be unavailable, and views that contain calculations with predictive functions `MODEL_PERCENTILE` and `MODEL_QUANTILE` won't render.

## Performance

If there is increased usage of Explain Data or predictive modelling functions on Tableau Server, you may benefit from installing additional instances of the Tableau Statistical Service on nodes running VizQL. For more information on configuring the topology of a Tableau Server node, see [Configure Nodes](#).

## Log files

The Statistical Service creates two sets of log files:

## Tableau Server on Windows Help

- `control_statsservice*.log`: These logs will contain information about the service starting and being enabled.
- `stdout_statsservice_*.log`: These logs will contain information about status and errors.

For more information, see [Tableau Server Logs and Log File Locations](#).

## Tableau Server TSM Maintenance Services

There are three TSM Maintenance Services that are installed on every node of the cluster: Database Maintenance, Backup/Restore and Site Import/Export.

<b>Processes</b>	Database Maintenance, Backup/Restore and Site Import/Export.
<b>Status</b>	Status of the TSM Maintenance services are not visible on the Status Page. Use the TSM CLI to view status. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by these processes are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\</code> , in the <code>databasemaintenance</code> , <code>backuprestore</code> and <code>siteimportexport</code> directories. For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

These services remain stopped unless a specific maintenance task that requires them is initiated by the administrator. Additional high-availability configuration is not required for these services. These services are used only for maintenance tasks such as backup and restore and should not impact the functioning of Tableau Server for the end users.

## Tableau Server VizQL Server

The VizQL Server loads and renders views, and computes and executes queries. To achieve high availability for the VizQL Server process, configure one or more instances to run on multiple nodes.

<b>Process</b>	VizQL Server
<b>Status</b>	Status of the VizQL Server process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the VizQL Server process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\vizqlserver. For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

What happens if a VizQL Server process fails? If there is only one VizQL Server process and it fails, then Tableau Server will no longer be able to render any views. High availability requires configuring redundant VizQL processes. A fairly typical configuration consists of two to four VizQL Server processes on each node.

This simultaneously serves the need for high availability and scalability. If multiple VizQL Server processes are running then the failure of a single process will result in the failure of any requests and the loss of session data at the time of its failure. Any future requests will be routed to the other working VizQL Server processes on the Tableau Server cluster.

## Tableau Prep Conductor

The Tableau Prep Conductor process runs flows and processes flows for ingestion by Data Catalogue. It leverages the scheduling and tracking functionality of Tableau Server so you can automate running flows to update the flow output. Starting in 2020.4 Data Management is only needed to schedule flows to run on Tableau Server. For more information, see [Tableau Prep Conductor](#).

<b>Process</b>	Tableau Prep Conductor
<b>Status</b>	Status of the Tableau Prep Conductor process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Tableau Prep Conductor process are located in C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\flowprocessor. For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

Tableau Prep Conductor uses the following components to run flows:

- **Backgrounder:** Tableau Prep Conductor uses the Backgrounder process to run flows. Backgrounder is single threaded, so each instance of the Backgrounder process on a node can run one flow at a time. By adding more Backgrounders to a node, you can increase the number of flows that can be run in parallel on that node. The Backgrounder processes can be up to half the number of the physical cores of that node.
- **Connectors:** Prep Conductor uses the supported Tableau Data connectors to connect to data. For a list of supported Connectors, see [Supported Connectors](#).
- **Data Engine:** Any changes to data or transformation steps in your flow that cannot be pushed to the underlying data source are processed using the Data Engine process. For example, SQL Server does not natively support regular expressions. When connecting to SQL Server, Tableau Prep lets you write regular expression calculations. Tableau Prep Conductor uses Data Engine to temporarily load the data and then perform the regular expression.

#### Performance and Scale Recommendations

- **Isolate flows to a separate node:** Running Tableau Prep Conductor on a separate node will isolate flow workflows from other Tableau workloads. This is highly recommended since Prep flows are CPU and RAM intensive.
- **Manage flow schedules:** You can control flow execution by creating flow schedules. These schedules let you determine when flows run, how frequently they run, the priority of that schedule, and whether to run items in that schedule serially or in parallel.
- **Add resources:** When scaling your Tableau Prep Conductor environment, we recommend scaling up to an 8 physical cores box per node running as many as 4 backgrounders on each. As you need more resources, we recommend adding more nodes to your server environment.

You can monitor user activity and performance of flows using Administrative views. For more information, see [Monitor Flow Health and Performance](#).

## Topology and Configuration

By default, Tableau Prep Conductor is automatically enabled on a node where backgrounder is enabled. If the node role is set to exclude flows, then Tableau Prep Conductor is not installed on that node. For more information, see [Workload Management through Node Roles](#).

It is recommended that you enable Tableau Prep Conductor on a dedicated node to run flows. For more information, see the following topics:

- For new Tableau Server installations, see [Step 1 \(New Install\): Install Tableau Server with Tableau Prep Conductor](#).
- To enable Tableau Prep Conductor on an existing installation of Tableau Server, see [Step 1 \(Existing Install\): Enable Tableau Prep Conductor](#).

## Tableau Prep Flow Authoring

The Tableau Prep Flow Authoring process provides the interactive Prep Flow experience in the browser, which lets users create and interact with flows on Tableau Server to clean and prepare data. For more information, see [Create and Interact with Flows on the Web](#). It was added in version 2020.4.

<b>Process</b>	Tableau Prep Flow Authoring
<b>Status</b>	Status of the Tableau Prep Flow Authoring process is visible on the Status Page. For more information, see <a href="#">View Server Process Status</a>
<b>Logging</b>	Logs generated by the Tableau Prep Flow Authoring process are located in <code>C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs\floweditor</code> . For more information, see <a href="#">Tableau Server Logs and Log File Locations</a>

Tableau Prep Flow Authoring is enabled by default. It uses these components:

- **Tableau Prep Minerva Service:** Used by Tableau Prep Flow Authoring for querying data sources. By default, it is automatically enabled on a node where Tableau Prep



Flow Authoring is enabled.

- **Data Engine:** The Data Engine creates data extracts and processes queries. By default, it is automatically enabled on a node where Tableau Prep Flow Authoring is enabled.
- **Gateway:** The Gateway process handles all requests to Tableau Server from browsers, Tableau Desktop and other clients. By default, it is automatically enabled on a node where Tableau Prep Flow Authoring is enabled.

### Performance and Scale Recommendations

Tableau Prep Flow Authoring can be CPU and RAM intensive. It is recommended to monitor the server and adjust your deployment as necessary by isolating flow authoring to a separate node or adding server resources.

#### Isolate flow authoring to a separate node

Running Tableau Prep Flow Authoring on a separate node will isolate flow authoring workflows from other Tableau workloads. If you have a busy server with many extract refreshes and a lot of viz editing and viewing, and you don't want to cause disruption to this workload, then it is recommended to isolate Prep Flow Authoring to its own server node. This means that all flow editing is directed to a dedicated node. For more information see [Configure Nodes](#).

**Note:** Prep Web Authoring uses shared services such as the Application Server (VizPortal), the PostgreSQL repository, the Cache Server and Hyper. If those services are already at capacity, they might also need additional resources because of the additional Prep Web Authoring load.

If you are running Tableau Server on a multi-node cluster, you can dedicate one or more nodes for running Backgrounder. Using the Backgrounder process, you can isolate background workloads such as Tableau Prep Conductor from all your interactive workloads such as Prep Flow Authoring and VizQL Server. For more information, see [Tableau Server Backgrounder Process and Workload Management through Node Roles](#).

For core and user-based deployments, it's strongly recommended that at least one node be dedicated to flows for best performance. While you can run flows on any licensed Server core, the additional resource cores purchases should only run Tableau Prep Conductor, and not extract refreshes or VizQL processes.

### Add resources

As you need more resources, you can add more nodes to your server environment. When planning your nodes, several factors can influence your decision on how much additional hardware you need to allocate.

The main things to consider when planning your nodes are:

- The number of concurrent users or concurrent sessions you expect during peak hours. The number of concurrent sessions per user can be set using the TSM option `maestro.sessionmanagement.maxConcurrentSessionPerUser`. For more information, see [tsm configuration set Options](#).
- The number of data input nodes that your flows have on average and the amount of data they have. The maximum row sampling limit can be set using the TSM option `maestro.app_settings.sampling_max_row_limit`. For more information, see [tsm configuration set Options](#).
- The complexity of the flows being authored and the number of nodes. Node types like joins, unions, aggregates and pivots will, in general, require more resources.

### Licence additional offerings

Additional licences for Data Management and Advanced Management are required for configuring nodes.

OFFERING	Allows you to:
Data Management	Configure a node to run only flows, or configure a node to run all jobs except flows. Tableau Prep Conductor must be running on the node.
	The Data Management licence includes Tableau Prep

**OFFERING**

**Allows you to:**

Conductor, which enables you to schedule and track flows. The licence is for a single Tableau Server deployment, which can be role-based or core-based.

As a Creator, Data Management is not required to create and edit flows directly on your server.

**Advanced Management**

Configure where the different types of workloads are processed through node rules. For example, you can run flows on one node and subscriptions and alerts on another node.

**Topology and Configuration**

To make Tableau Prep Flow Authoring highly available, configure two instances of Tableau Prep Flow Authoring on nodes when enabling it.

Here is an example of a two node configuration:

Topology

Security

User Identity & Access

Notifications

Licensing

Topology
















































Configure and improve Tableau Server performance by adding or removing nodes and changing process configurations and other settings. [Learn more](#)

node1 ip-10-176-60-76	node2 ip-10-176-61-177
Gateway <input checked="" type="checkbox"/>	Gateway <input checked="" type="checkbox"/>
Application Server 1 ▼	Application Server 1 ▼
Interactive Microservic... 1 ▼	Interactive Microservic... 1 ▼
VizQL Server 2 ▼	VizQL Server 2 ▼
Cache Server 2 ▼	Cache Server 2 ▼
Cluster Controller <input checked="" type="checkbox"/>	Cluster Controller <input checked="" type="checkbox"/>
Search & Browse <input checked="" type="checkbox"/>	Search & Browse <input checked="" type="checkbox"/>
Backgrounder 2 ▼	Backgrounder 2 ▼
Non-Interactive Micros... 1 ▼	Non-Interactive Micros... 1 ▼
Data Server 2 ▼	Data Server 2 ▼
Data Engine <input checked="" type="checkbox"/>	Data Engine <input checked="" type="checkbox"/>
File Store <input checked="" type="checkbox"/>	File Store <input checked="" type="checkbox"/>
Repository <input checked="" type="checkbox"/>	Repository <input type="checkbox"/>
Tableau Prep Conductor <input checked="" type="checkbox"/>	Tableau Prep Conductor <input checked="" type="checkbox"/>
Tableau Prep Flow Auth... 0 ▼	Tableau Prep Flow Auth... 2 ▼
Tableau Prep Flow Serv... <input type="checkbox"/>	Tableau Prep Flow Serv... <input checked="" type="checkbox"/>
Ask Data <input checked="" type="checkbox"/>	Ask Data <input checked="" type="checkbox"/>
Elastic Server <input checked="" type="checkbox"/>	Elastic Server <input type="checkbox"/>
Metrics Service 1 ▼	Metrics Service 0 ▼
Messaging Service <input checked="" type="checkbox"/>	Messaging Service <input type="checkbox"/>
Data Source Properties... 1 ▼	Data Source Properties... 0 ▼
Internal Data Source Pr... <input checked="" type="checkbox"/>	Internal Data Source Pr... <input type="checkbox"/>
TSM Controller <input checked="" type="checkbox"/>	TSM Controller <input type="checkbox"/>
License Server <input checked="" type="checkbox"/>	License Server <input type="checkbox"/>
Activation Service <input type="checkbox"/>	Activation Service <input type="checkbox"/>
Content Exploration Se... 1 ▼	Content Exploration Se... 0 ▼
Collections Service 1 ▼	Collections Service 0 ▼
Remove Node	Remove Node

## Tableau Server on Windows Help

Here is an example of a status page for a two node configuration:

 + a b   e a u	STATUS	MAINTENANCE	CONFIGURATION
-------------------------------------------------------------------------------------------------	--------	-------------	---------------

Process	node1 ip-10-176-60-76	node2 ip-10-176-61-177
Gateway		
Application Server		
Interactive Microservice Container		
VizQL Server	 	 
Cache Server	 	 
Cluster Controller		
Search & Browse		
Backgrounder	 	 
Non-Interactive Microservice Container		
Data Server	 	 
Data Engine		
File Store		
Repository		
Tableau Prep Conductor		
Tableau Prep Flow Authoring		 
Tableau Prep Flow Service		
Ask Data		
Elastic Server		
Metrics Service		
Messaging Service		
Data Source Properties Service		
Internal Data Source Properties Service		
2714 TSM Controller		
License Server		

# Tableau Server on Windows Help

Here is an example of a four node configuration:

+ a b l e a u

STATUS
MAINTENANCE
CONFIGURATION
Tableau Server is running

Topology

Security
User Identity & Access
Notifications
Licensing

Topology

Configure and improve Tableau Server performance by adding or removing nodes and changing process configurations and other settings. [Learn more](#)

node1

Gateway ☒
Application Server 1
Interactive Microserv... 1
VizQL Server 2
Cache Server 2
Cluster Controller ☒
Search & Browse ☒
Backgrounder 2
Non-Interactive Micros... 1
Data Server 2
Data Engine ☒
File Store ☒
Repository ☒
Tableau Prep Conductor ☒
Tableau Prep Flow Auth... 0
Tableau Prep Flow Serv... ☐
Ask Data ☒
Elastic Server ☒
Metrics Service 1
Messaging Service ☒
Data Source Properties... 1
Internal Data Source Pr... ☒
TSM Controller ☒
License Server ☒
Activation Service ☐
Content Exploration Se... 1
Collections Service 1

Remove Node

node2

Gateway ☒
Application Server 1
Interactive Microserv... 1
VizQL Server 2
Cache Server 2
Cluster Controller ☒
Search & Browse ☒
Backgrounder 2
Non-Interactive Micros... 1
Data Server 2
Data Engine ☒
File Store ☒
Repository ☒
Tableau Prep Conductor ☐
Tableau Prep Flow Auth... 1
Tableau Prep Flow Serv... ☒
Ask Data ☒
Elastic Server ☐
Metrics Service 0
Messaging Service ☐
Data Source Properties... 0
Internal Data Source Pr... ☐
TSM Controller ☐
License Server ☐
Activation Service ☐
Content Exploration Se... 0
Collections Service 0

Remove Node

node3

Gateway ☒
Application Server 1
Interactive Microserv... 1
VizQL Server 2
Cache Server 2
Cluster Controller ☒
Search & Browse ☒
Backgrounder 2
Non-Interactive Micros... 1
Data Server 2
Data Engine ☒
File Store ☒
Repository ☐
Tableau Prep Conductor ☒
Tableau Prep Flow Auth... 0
Tableau Prep Flow Serv... ☐
Ask Data ☒
Elastic Server ☐
Metrics Service 0
Messaging Service ☐
Data Source Properties... 0
Internal Data Source Pr... ☐
TSM Controller ☐
License Server ☐
Activation Service ☐
Content Exploration Se... 0
Collections Service 0


Remove Node

node4

Gateway ☒
Application Server 0
Interactive Microserv... 0
VizQL Server 0
Cache Server 0
Cluster Controller ☒
Search & Browse ☐
Backgrounder 0
Non-Interactive Micros... 0
Data Server 0
Data Engine ☒
File Store ☐
Repository ☐
Tableau Prep Conductor ☐
Tableau Prep Flow Auth... 2
Tableau Prep Flow Serv... ☒
Ask Data ☐
Elastic Server ☐
Metrics Service 0
Messaging Service ☐
Data Source Properties... 0
Internal Data Source Pr... ☐
TSM Controller ☐
License Server ☐
Activation Service ☐
Content Exploration Se... 0
Collections Service 0

Remove Node

Here is an example of a status page for a four node configuration:

<div>  <div> STATUS MAINTENANCE CONFIGURATION </div> <div> Tableau Server is running sign out </div> </div>				
Process	node1	node2	node3	node4
Gateway	✓	✓	✓	✓
Application Server	✓	✓	✓	
Interactive Microservice Container	✓	✓	✓	
VizQL Server	✓ ✓	✓ ✓	✓ ✓	
Cache Server	✓ ✓	✓ ✓	✓ ✓	
Cluster Controller	✓	✓	✓	✓
Search & Browse	✓	✓	✓	
Backgrounder	✓ ✓	✓ ✓	✓ ✓	
Non-Interactive Microservice Container	✓	✓	✓	
Data Server	✓ ✓	✓ ✓	✓ ✓	
Data Engine	✓	✓	✓	✓
File Store	✓	✓	✓	
Repository	✓	✓		
Tableau Prep Conductor	✓		✓	
Tableau Prep Flow Authoring		✓		✓ ✓
Tableau Prep Flow Service		✓		✓
Ask Data	✓	✓	✓	
Elastic Server	✓			
Metrics Service	✓			
Messaging Service	✓			
Data Source Properties Service	✓			
Internal Data Source Properties Service	✓			
TSM Controller	✓			
License Server	✓			
Activation Service				
Content Exploration Service	✓			
Collections Service	✓			
<div> Refresh Status <div> ✓ Active Busy Passive Unlicensed Degraded Error External Stopped Status Unavailable </div> </div>				

## Tableau Server Dynamic Topology Changes

With the introduction of TSM, Tableau Server also introduced the ability to make certain topology changes or updates without restarting the server. These are known as dynamic topology changes, and are possible with the Backgrounder and VizQL Server processes.

You can increase or decrease the number of backgrounder or VizQL Server instances on a node without requiring a Tableau Server restart if the node already has at least one instance of the process running. You must be only changing the number of instances of Backgrounder



or VizQL Server. If you also add or remove another process, or if you are adding the first instance of Backgrounder or VizQL Server to a node or removing the last instance of either from the node, Tableau Server will require a restart.

### Dynamic configuration changes

Beginning with version 2020.2.0 of Tableau Server, certain configuration changes can also be made dynamically using configuration keys. You can make dynamic topology changes at the same time you make dynamic configuration changes, without needing to restart Tableau server. For more information about dynamic configuration changes, see Tableau Server Release Notes in What's New and Changed for 2020.2 in Tableau Server.

### Example Scenarios

To better understand why this might be useful, consider these examples:

- **Backgrounder** – At the end of a sales quarter your sales team is using Tableau Server to keep track of their numbers. Dashboards that depend on extracts are showing sales people how they are doing. Any delay in extract refreshes means your team is not seeing the most up-to-date numbers. You can add additional backgrounders to any node that already has at least one backgrounder or VizQL Server, and increase the throughput of extract refreshes, helping to guarantee the numbers are up-to-date as your team finished up their quarter. Later, after the quarterly push, you can reduce the backgrounder instances again to return Tableau Server to its original configuration.
- **VizQL Server** – Similarly, if Tableau Server is unable to keep up with view refreshes, you can quickly add additional VizQL Server instances to any node that already has at least one instance of either VizQL Server or backgrounder configured. In the above backgrounder example, you might want to remove VizQL Servers temporarily, to accommodate additional backgrounders, and then re-add them back before your users arrive in the morning.

### Making dynamic topology changes

You can make dynamic topology changes using the TSM Web UI, or on the command line. To use the Web UI, sign in to TSM using a browser, and on the Configuration tab, update the number of backgrounder or VizQL Server instances for the node you are updating. For details, see [Configure Nodes](#). To make your changes using the TSM CLI, at a command prompt, run the

`tsm topology set-process` command. For details, see [Changing the number of processes on a node](#).

### Impact of dynamic topology changes

When making dynamic topology changes that remove existing instances of VizQL Server or backgrounder, the instances are removed immediately. Be aware of the following potential impacts to users and currently running jobs:

- Backgrounder – Any currently running jobs are terminated. The normal Tableau Server retry logic will restart these jobs, using another backgrounder instance.
- VizQL Server – Any currently active sessions are terminated. Users may see an error message. Refreshing the browser should clear the error.

### Best practices

Tableau recommends you test any dynamic topology changes you plan on using, before implementing them in your production environment. This will help you fully understand potential impacts to your users and scheduled refreshes and subscriptions, and allow you to most efficiently take advantage of the flexibility offered by dynamic topology.

### Automating dynamic topology changes

You can automate dynamic topology changes. For example, if you have most of your extract refreshes scheduled overnight, and know your server has extra capacity because users are not signed in, you can use a script or other automated deployment tool to add backgrounder instances when they can be most efficiently used, and then remove them before the start of the work day.

To automatically get the status of processes, use the `tsm status -v` command and parse the output in your script. Alternately, you can use the TSM REST API get server status. The API is currently in alpha. For more details, see [Get server status](#).

A sample script to set four instances of backgrounder on node2 might look like this:

## Tableau Server on Windows Help

```
echo Adding/Removing Processes
tsm topology set-process -pr backgrounder -n node2 -c 4
tsm pending-changes apply
echo Done!
```

### Additional information

#### Tableau Server Processes

### Server Process Limits

When you reconfigure processes for Tableau Server, there is a limit to the amount that you can increase the number of process instances. By default, the limit is set to eight. If your machine has enough RAM and CPU cores, and you want to go above this limit, you can change the limit using the `service.max_procs` configuration option. For each process instance, Tableau recommends that the machine running the process have at least 1 GB of RAM and 1 logical CPU core.

To change the maximum number of processes allowed:

1. Type the following command, where `number` is the maximum number of process instances you want to allow:

```
tsm configuration set -k service.max_procs -v <number>
```

For example:

```
tsm configuration set -k service.max_procs -v 10
```

2. Next type:

```
tsm pending-changes apply
```

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart

behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

## Tableau Services Manager Ports

The processes and services that make up the components of Tableau Services Manager (TSM) and Tableau Server on Windows use various ports to communicate. By default, most these ports are assigned (mapped) dynamically from a predefined range of ports. The port assignments are made for each service or process when it is installed. You can control what ports are used in a variety of ways.

A small subset of processes do not use dynamic port mapping and behave uniquely. For more information, see [Ports that are not dynamically mapped](#), below.

**Note:** This operation includes steps that you may need to perform using the TSM command line. To use the TSM CLI, you need administrator access to the command line on one of the nodes in your installation and TSM administrator credentials to run TSM commands.

### Ephemeral port use

If your operating system is configured to use ephemeral ports, your Tableau traffic may be routed through these, even when configured as described below. This happens at the OS level and is not something you can configure in Tableau. If you want to control port usage, consult your operating system documentation on how to limit ephemeral port usage.

### Firewall requirements

If you are running a firewall on the computer where you will be installing Tableau Server, then you will need to open the following default ports for Tableau Server traffic. All port numbers, except 443, can be changed.

Port	TCP/UDP	Used by...	TYPE OF INSTALLATION	
			All	Distributed / High Availability
80	TCP	Gateway	X	
443	TCP	SSL. When Tableau Server is configured for SSL, the application server redirects requests to this port. Do not change this port.	X	
8850	TCP	Tableau Services Manager.	X	
8060	TCP	PostgreSQL database.	X	
8061	TCP	PostgreSQL backup verification port	X	
8000-9000	TCP	Range of ports reserved by default for dynamic mapping of Tableau processes		X
27000-27009	TCP	Range of ports used by Tableau Server for Licence service. This range must be open on the node running the Licence service and accessible from other nodes. By default, the initial node runs the Licence service.	X	

## Port assignment

There are two approaches you can use for port assignment or mapping in TSM:

- **Dynamic port assignment.** This is the default and requires the least intervention by the administrator.
- **Manual port assignment.** This option requires an administrator to individually assign each port.

If you change port assignments and you are running a local firewall, see [Local firewall configuration](#).

## Dynamic port assignment

You can control which ports are used by changing the range of ports available to the dynamic assignment process. Doing this leaves dynamic port assignment in place but restricts the ports that can be chosen. With dynamic port assignment in place, you can still choose to assign ports for certain processes manually. This approach enables you to assign specific ports to specific processes, while leaving the others to be mapped dynamically. Using dynamic mapping, with or without some individually assigned ports is the easiest approach, and should satisfy the requirements of most customers. Dynamically assigned ports are preserved if you export your Tableau Server configuration.

By default, ports are assigned for each service or process from available ports between 8000 to 9000. This assignment takes place when services are installed for the first time on a node. After Tableau Server is initialised, you can see which ports are being used by which services or processes by running this command:

```
tsm topology list-ports
```

If you have a multi-node cluster, ports on all nodes are listed.

### Changing the port range

For organisations that have specific requirements for ports being used, the easiest way to control this is to change the range from which ports are dynamically selected. You need to do this at installation, by specifying a minimum and maximum port for the range in your configuration file.

**Note:** The minimum allowable size of your port range will depend on your server installation and how many services or processes you are running. As a general best practice you should not restrict the range too tightly because port assignment is done by selecting

random ports within the range, and if you do not allow a large enough range, selection may fail to find an available port.

To limit the range from which available ports are chosen to those between 8300 and 8600, your configuration file would include an entry similar to this:

```
"configKeys": {  
    "ports.range.min": "8300",  
    "ports.range.max": "8600"  
}
```

#### Blocking specific ports within the range

Beginning with version 2021.1.0, you can specify certain ports that are within the dynamically assigned range but should not be used by Tableau. This is useful if you have other software on your Tableau Server computers that rely on ports within the range Tableau is using.

To specify ports within the range that should not be used by TSM and Tableau Server, use the `ports.blocklist` configuration key:

```
tsm configuration set -k ports.blocklist -v <port>[,<port>,<port>]
```

For example:

```
tsm configuration set -k ports.blocklist -v 8000,8088, 8090
```

#### Disabling dynamic port assignment

If you need more control of port assignment than you can get through a combination of restricting port range and individually assigning ports, you can disable dynamic port mapping at initial server configuration. Disabling dynamic port mapping requires you to manually assign every port for every process, so we don't recommend this unless you need to control every single port assignment.

If you disable dynamic port mapping, you must configure the port for each process on each node of your installation.

To disable dynamic mapping, your configuration file would include an entry similar to this:

```
"configKeys": {  
    "service.port_remapping.enabled": false  
}
```

**Important:** When you disable dynamic port assignments, the Licence service port range is not included. This range (27000-27009) must be open on the node running the Licence service and accessible from other nodes. By default, the initial node runs the Licence service.

## Manual port assignment

You can disable automatic port assignment entirely and assign a port for each process individually. If you do this, you must assign a port for every process on every node. You can assign ports either in a configuration file, when the processes are first installed, or after installation, using a TSM command. Only ports assigned at process installation are preserved if you export your Tableau Server configuration.

You can specify individual ports for specific processes, whether or not dynamic mapping is enabled. You might do this if you want a process to use a particular port, or if you've disabled dynamic mapping. There are two ways to specify ports for processes: during installation or after installation.

### Configuring ports during installation

We recommend configuring port assignment during the installation process as described here. Changing ports after installation is a much more labor-intensive process.

To configure ports during installation, create a json file that specifies your port configuration. This process is similar to defining a non-default port range, but instead you specify a particular port for a specific service or process. If you are going to assign specific ports, this approach is the most robust way to do so because the port mapping is preserved if you export the server configuration and topology settings using the `tsm settings export` command.



To define ports at installation, add information to your configuration file to specify the node (`workerN`), process (`servicename`) and instance ID (`instanceid`), port type (`porttype`), and the port to be used. The format looks like this:

```
workerN.{servicename}_{instanceid}.{porttype}.port:X
```

Where:

- `workerN` is an optional parameter and identifies the node for which the remapping applies. Node numbers start with zero (0).  
We recommend you do not include this parameter unless you need to map different ports for the same service on different nodes. If you leave this parameter off, you can map a service port on the initial node, or map the same service port on multiple nodes.
- `servicename` is the name of the process or service that will use the port.
- `instanceid` is the instance of the process. If you are going to be configuring multiple instances of a process on one node, you would need to increment this value for each instance. Start the `instanceid` at zero (0) and increment it by one (1) for each instance of the process. For services that only install a single instance on any given node, this must be left off.
- `porttype` If setting the primary port, do not include this option.
- `port` is the port the process or service should use.

For example, to set the port for the first instance of the file store process on the initial node to 8500, you would include a configuration file entry similar to this:

```
"configKeys": {  
  "filestore_0.port": "8500"  
}
```

The example above does not include the optional `workerN` parameter, so sets the port on all nodes in the cluster. It also leaves off the `porttype` option because it is setting the primary filestore port.

**Important:** When specifying port changes with a configuration file, you must include the `-force-keys` parameter with the `tsm settings import` command.

## Configuring ports after installation

If you need to change ports after you have installed Tableau Server, use the `tsm topology set-ports` command. This approach allows you to specify a port for a specific process after that process has been installed. You are restricted by these limits:

- You must set ports individually, on each node.
- After you set an individual port, you must run `tsm restart`.
- The port assignments are not preserved if you need to import a Tableau Server configuration using `tsm settings import`.
- Port names use a different syntax for `tsm` commands than the syntax that is required for `configKeys`. The table at the end of this topic provides a syntax reference.

For example, to set second instance of the file store on the initial node to use port 8500:

```
tsm topology set-ports --node-name node1 --port-name filestore --
port-value 8500 --instance 2
```

The following example shows how to use shorthand commands to set the JMX ports:

```
tsm topology set-ports -n node1 --port-name vizqlserver:jmx.rmi -pv
9403 -i 1
```

```
tsm topology set-ports -n node1 --port-name vizqlserver:jmx -pv
9404 -i 2
```

**Note:** Port entries are not validated when you enter them. Therefore, if you use a port that is already assigned, or if you mistype the syntax for a command, Tableau will not give an error until you restart. After restarting, you may see a generic error, *The reconfigure async job failed*.

If you add an incorrect `portname:type` with a valid port, you cannot delete the incorrect entry. To update the port, you must reassign an unused port to that value to free up the port again.

## Ports that are not dynamically mapped

The Tableau Server repository uses two ports that are not dynamically mapped. These each have a default port that you can override using the `tsm configuration set` command and a process-specific parameter.

Port names	Port (default)	Description
pgsql.port	8060	<p>Port for the Tableau Repository (PostgreSQL database).</p> <p>To override this port:</p> <pre>tsm configuration set -k pgsql.-port -v &lt;port&gt;</pre>
pgsql.verify_restore.port	8061	<p>Port for verifying the integrity of a repository backup.</p> <p>to override this port:</p> <pre>tsm configuration set -k pgsql.verify_restore.port -v &lt;port&gt;</pre>

Because these ports do not use the dynamic port mapping system, they do not show up in the output of the `tsm topology list-ports` command. To see the value of these you need to use the `tsm configuration get -k <config.value>` command. For example:

```
tsm configuration get -k pgsql.port
```

## Dynamically mapped ports

This table lists the processes or services that use dynamically mapped ports.

Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
activemqserver.port	activemqserver:primary	ActiveMQ Service service port.
activemqserver.openwire.port	activemqserver:openwire	ActiveMQ Service openwire port.
appzookeeper_0.client.port	appzookeeper:client	Coordination Service client port.
appzookeeper_0.peer.port	appzookeeper:peer	Coordination Service peer port.
appzookeeper_0.leader.port	appzookeeper:leader	Coordination Service leader port.
backgrounder_0.port	backgrounder	Backgrounder primary port.
backgrounder_0.debug.port	backgrounder:debug	Backgrounder debug port.
backgrounder_0.jmx.port	backgrounder:jmx	Backgrounder jmx port.
backgrounder_0.jmx.rmi.port	backgrounder:jmx.rmi	Backgrounder jmx rmi port.
backgrounder_0.recommendations.trainer.port	backgrounder:recommendations.trainer	Backgrounder recommendations port.
backuprestore.port	backuprestore	Backup/Restore

Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
		service port.
cacheserver_0.port	cacheserver	Cache server port.
clustercontroller.status.port	clustercontroller:status	Cluster Controller status port.
clustercontroller.storage.port	clustercontroller:storage	Cluster Controller storage port.
databasemaintenance.port	databasemaintenance	Database Maintenance port.
dataserver_0.port	dataserver	Data server primary port.
dataserver_0.debug.port	dataserver:debug	Data server debug port.
dataserver_0.jmx.port	dataserver:jmx	Data server jmx port.
dataserver_0.jmx.rmi.port	dataserver:jmx.rmi	Data server jmx rmi port.
filestore.port	filestore	File store primary port.
filestore.status.port	filestore:status	File Store status port.
gateway.port	gateway	Gateway port.

Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
		<p>This defaults to 80, and if that is not available, to 8080. If that is not available, it tries 8000. That sequence is followed whether or not dynamic port assignment is enabled or not. If none of those ports are available and dynamic mapping is enabled, it takes an available port within the defined range. The gateway port must be the same on all nodes in a multi-node cluster, so if port 80 is selected on the initial node this is the port that will be used on all nodes and if it is unavailable on one of the other</p>

Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
		port selection will fail.
hyper.port	hyper	Data engine primary port.
hyper.connection.port	hyper:connection	Data engine connection port.
indexandsearchserver.port	indexandsearchserver	Index and Search server primary port.
index-andsearchserver.transport.port	indexandsearchserver:transport	Index and Search server transport port.
licenseservice.vendor_daemon.port	licenseservice:vendor_daemon	Licence service vendor daemon port. Used for licensing-related communications between nodes in a multi-node installation.
samlservice.port	samlservice	SAML service port.
siteimportexport.port	siteimportexport	Site Import/Export port.
tabadmincontroller.port	tabadmincontroller	TSM Controller port.
tabadminagent.columbo.port	tabadminagent:columbo	Administration

Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
		Agent service discovery port
tabadminagent.filetransfer.port	tabadminagent:filetransfer	TSM Agent file transfer port.
vizportal_0.authentication.port	vizportal:authentication	Application server authentication port.
vizportal_0.authorization.port	vizportal:authorization	Application server authorization port.
vizportal_0.maintenance.port	vizportal:.maintenance	Application server maintenance port.
vizportal_0.microservice.extensions.port	vizportal:.microservice:extensions	Application server extensions port.
vizportal_0.monolith_grpc.port	vizportal:monolith_grpc	Application server GRPC port.
vizportal_0.publishing.port	vizportal:publishing	Application server publishing port.
vizportal_0.recommendations.port	vizportal:recommendations	Application server recommendations port.
vizportal_0.port	vizportal	Application server primary



Port names: syntax for json file (configKeys)	Port names: syntax for tsm CLI	Description
		port.
vizportal_0.debug.port	vizportal:debug	Application server debug port.
vizportal_0.jmx.port	vizportal:jmx	Application server jmx port.
vizportal_0.jmx.rmi.port	vizportal:jmx.rmi	Application server jmx rmi port.
vizqlserver_0.port	vizqlserver	VizQL server primary port.
vizqlserver_0.debug.port	vizqlserver:debug	VizQL server debug port.
vizqlserver_0.jmx.port	vizqlserver:jmx	VizQL server jmx port.
vizqlserver_0.jmx.rmi.port	vizqlserver:jmx.rmi	VizQL server jmx rmi port.

## Enable the JMX Ports

To help you work through a problem with Tableau Server, Tableau Support may ask you to enable the server's JMX ports. These ports can be useful for monitoring and troubleshooting, usually with a tool like JConsole. In versions 2022.1 and later, the JMX ports can be enabled securely and this is the recommended method. In versions earlier than 2022.1, you can only enable the ports unsecured.

## Enable secure JMX ports

Beginning with version 2022.1 of Tableau Server, you can enable JMX ports securely. This procedure explains how to enable secure JMX. To enable JMX in earlier versions, see [Enable unsecured JMX ports](#) below.

To enable secure JMX ports on Tableau Server:

1. Open a command prompt as a user with administrator access to the computer where TSM is installed.
2. Run this command:

```
tsm maintenance jmx enable
```

The command has several options you can provide when running it. If you do not provide any options when you run the command, you will be prompted for options based on the answers you give.

For example:

```
C:\Windows\system32>tsm maintenance jmx enable
We do not recommend you enable JMX unsecured on a production
environment. Would you like to enable security features for
JMX?
(y/n): y
JMX access is readonly by default. Would you like to add read-
write access?
(y/n): n
Would you like to enable SSL?
(y/n): y
Would you like to require client authentication (mTLS)?
(y/n): n
Enabling JMX with the specified settings. This will perform a
server restart. Do you want to continue?
(y/n): y
Starting enable JMX asynchronous job.
```

For more information on the command and its options, see `tsm maintenance jmx enable`.

## Enable unsecured JMX ports

For versions of Tableau Server earlier than 2022.1.0, if you are enabling JMX ports, they can only be enabled unsecured.

**Important** Enabling unsecured JMX ports can introduce some security risk. We strongly recommend using secure JMX. If you do not have a version of Tableau Server that supports this, be aware of the risk and mitigate it by limiting access to the JMX ports to the fewest number of clients that's practical for your scenario. You typically limit access using the host's firewall rules, an external security device or routing rules.

To enable unsecured JMX ports on Tableau Server:

1. **Stop the server.**
2. Enter the following command:

```
tsm configuration set -k service.jmx_enabled -v true
```

Apply pending changes:

```
tsm pending-changes apply
```

- 3.

If the pending changes require a server restart, the `pending-changes apply` command will display a prompt to let you know a restart will occur. This prompt displays even if the server is stopped, but in that case, there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour. If the changes do not require a restart, the changes are applied without a prompt. For more information, see `tsm pending-changes apply`.

#### 4. Restart the Coordination Service and TSM Administration Controller:

```
net stop appzookeeper_0  
  
net start appzookeeper_0  
  
net stop tabadmincontroller_0  
  
net start tabadmincontroller_0
```

**Note:** You must run these commands as an administrator from a command prompt. Depending on how your computer is configured, you may need to run them in the C:\Windows\System32 folder.

It may take a few minutes for tabadmincontroller to restart. If you attempt to apply pending changes in the next step before the controller has fully restarted, TSM will not be able to connect to the controller. You can verify that the controller is running by using the `tsm status -v` command. Tableau Server Administration Controller should be listed as "is running".

#### 5. **Start the server.**

##### How the JMX Ports Are Determined

By default, the JMX ports assigned dynamically, from within a range of available ports. For details on how port assignment is done, and how to override dynamic mapping, see Tableau Services Manager Ports.

## ATRDdiag.exe Command Line Reference

You can use the ATRDiag command line utility to manage licensing issues related to the login-based licence management and authorisation-to-run (ATR) features.

## Synopsis

```
ATRDdiag -dumpATR -showAll -showVerbose -product ["Tableau Desktop"]  
["Tableau Prep"] ["Tableau Server"]  
  
-subProduct {subProduct} -version {version} -setVersion {version}  
  
-log [Trace][Debug][Info][Warn][Error][Fatal][Off] -status -  
deleteAllATRs  
  
-deleteInvalidATRs -deleteATR {atrIdToDelete}  
  
-enableATRFeature -disableATRFeature -enableLBLMFeature -dis-  
ableLBLMFeature  
  
-requireLBLMFeature -setDuration {seconds}
```

**Note:** All ATRDiag options are case-insensitive.

## Options

-dumpATR

Display a valid authorisation-to-run (ATR) on the command prompt (if present). Use -version/-product/-subProduct/-version to control which ATR is dumped if more than one is valid.

-showAll

Enumerate the contents of the registry to see available ATRs.(some of which might not be valid).

-showVerbose

Enumerate the contents of the registry and use `-version/-product/-sub-Product/-version` to provide per-product.

```
-product ["Tableau Desktop"]["Tableau Prep"]["Tableau Server"]
```

Defaults to "Tableau Desktop". Must specify "Tableau Server" to display Server ATR.

For example: `atrdiag -product "Tableau Server"`

```
***** App *****
AUID: {2f65351a-53b7-11ec-ab97-02b575f6b771}
TTL Start: Fri Dec 3 18:01:47 2021
TTL End: Wed Dec 8 18:01:47 2021
Renew Validity Start: Sat Dec 4 06:01:47 2021
Renew Validity End: Wed Dec 8 18:01:47 2021
Refresh Period (Refresh frequency on error): 43200000
Supported Config Count: 4
Supported Config: 0
  TTL Start: Fri Dec 3 18:01:47 2021
  TTL End: Wed Dec 8 18:01:47 2021
  Product: Tableau Server
  Sub Product: Standard
Version Pieces:
  Capabilities: LASTALLOEDBUILD=2022-01-01;CAPABILITY.MAP_STD=default;CAPABILITY.OFFLINE=true;CAPABILITY.TRIALVER=;CAPABILITY.CAP-REG=SHORT;CAPABILITY.DC_STD=default;CAPABILITY.DC_CAP=;CAPABILITY.FulfillmentID=2f79324d-53b7-11ec-ab97-02b575f6b771;CAPABILITY.HM_CAP=;EXPIRATION=2022-01-01;PRODUCT=Tableau Server;ISSUED=2021-11-19;CAPABILITY.ActivationID=;CAPABILITY.INTERACTOR=;START=2021-11-15;CAPABILITY.EDITION=Standard;CAPABILITY.INTERNE
T=0.0.0.VENDOR;CAPABILITY.EntitlementID=f5d-7f67-077c-67bd-5688-0a6d;CAPABILITY.GEMNAME=;CAPABILITY.MAX_USERS=;
Supported Config: 1
  TTL Start: Fri Dec 3 18:01:47 2021
  TTL End: Wed Dec 8 18:01:47 2021
  Product: Tableau Server Capacity
  Sub Product: Standard
Version Pieces:
  Capabilities: CAPABILITY.TIER_VIEWER=5;CAPABILITY.VIEWER=;CAPABILITY.FEAT_CAP=BLM:true;CAPABILITY.GUEST=;CAPABILITY.GBRAND=;LASTALLOEDBUILD=2021-12-16;CAPABILITY.FEAT_STD=default;CAPABILITY.FulfillmentID=6e42f98a-53b7-11ec-ab97-02b575f6b771;EXPIRATION=2021-12-16;ISSUED=2021-11-23;PRODUCT=Tableau Server Capacity;CAPABILITY.SINGLE_MACHINE=;CAPABILITY.ActivationID=;CAPABILITY.INTERACTOR=;START=2021-10-29;CAPABILITY.CORES=;CAPABILITY.TIER_EXPLORER=5;CAPABILITY.INTERNE=0.0.0.VENDOR;CAPABILITY.EntitlementID=48d7-bf3b-fd1d-1a0a-f199-5c51;CAPABILITY.TIER_CREATOR=5;CAPABILITY.GEMNAME=;
Supported Config: 2
  TTL Start: Fri Dec 3 18:01:47 2021
```

```
-subProduct {subProduct}
```

Defaults to "Professional".

```
-version {version}
```

No default; a valid value for this field is "Tableau 2021.1".

```
-setVersion {version}
```

Persist a default value for `-version`.

```
-log [Trace] [Debug] [Info] [Warn] [Error] [Fatal] [Off]
```

Display ATR log information.

```
-status
```

## Tableau Server on Windows Help

Provide ATR feature status (enabled or disabled), the licence server and dump the ATR.

`-deleteAllATRs`

Remove all ATRs present on the machine.

`-deleteInvalidATRs`

Remove all invalid ATRs.

`-deleteATR {atrIdToDelete}`

Remove an ATR by ID.

`-enableATRFeature`

Turn on the ATR feature. Must run as an administrator. For use on Tableau Desktop only.

`-disableATRFeature`

Turn off the ATR feature. Must run as an administrator. For use on Tableau Desktop only.

`-enableLBLMFeature`

Turn on login-based licence management (LBLM). Must run as an administrator.

`-disableLBLMFeature`

Turn off login-based licence management (LBLM). Must run as an administrator.

`-requireLBLMFeature`

Set the login-based licence management (LBLM) feature to required. Must run as an administrator.

```
-setDuration {seconds}
```

Set `ATRRequestedDurationSeconds` to seconds. Must run as an administrator.

## Global Options

```
-h, --help
```

Optional.

Show the command help.

## tabadmin

Beginning with version 2018.2, Tableau Server on Windows uses Tableau Services Manager (TSM). TSM replaces the legacy `tabadmin` command utility and the Tableau Server Configuration tool. If you have installed or upgraded to Tableau Server on Windows 2018.2 or later, you need to use TSM to configure and manage Tableau Server. For more information about TSM, see [Migrate from Tabadmin to the TSM CLI](#).

## Windows Accounts and Permissions

This topic describes the accounts used by Tableau Server and the folder permissions set by Tableau Server Setup.

### Accounts

The following accounts are used by Tableau Server:

**Local administrator account:** The account that you use to install Tableau Server must be a member of the local administrators group. To run TSM commands or to access the TSM Web UI, the account must be a member of the local administrator's group. See [Sign in to Tableau Services Manager Web UI](#).



**The Run As service account:** Many services run under the account that is configured as the Run As service account. By default, the Network Service account is configured as the Run As service account. However, if Tableau Server must access resources in Active Directory, then you will need to configure the Run As service account to use an Active Directory user account. When you specify a domain user account for the Run As service account, Tableau Server will set appropriate permissions on the local computer for the user account that you have specified. The account should not be a member of the local administrators group. For more information, see [Run As Service Account](#).

**Network Service:** The following services always run as Network Service:

- Tableau Server Coordination Service
- Tableau Server Client File Service
- Tableau Server Administration Controller

**Local Service:** The licensing service runs under the Local Service account.

**System:** The Tableau Server Administration Agent service runs under the System account. The Administration Agent service is responsible for service installation, configuration and monitoring.

## Permissions

Windows assigns default permissions to the root of each hard drive. Those permissions are set to be inherited by subfolders and files. Tableau Server functionality relies on these permission models for default installations:

- Local administrators group: this group is given full permission to all directories on the computer. The System account implicitly belongs to the local administrators group. As noted in the previous section, the account that you use to install and run TSM must have full access to the computer as granted by membership in the local Administrators group. However, after you have installed Tableau Server, you can specify a Windows group for TSM administration. See [Configure a Custom TSM Administration Group](#).
- The local users group is given read-execute permissions. The account that you specify as the Run As service account must be a member of the local users group. Network Service and Local Service implicitly belong to the local users group.

For more information about how directory structure is implemented in a custom installation, see [Before you install....](#)

## Help Output for upgrade-tsm Script

The following help content is the output when you run the following command:

```
upgrade-tsm.cmd -h
```

The upgrade-tsm script is installed to Tableau\Tableau Server-  
 \Packages\scripts.<version\_code>.

### Output

```
Usage: upgrade-tsm --accepteula [optional arguments]
```

```
Upgrade Tableau Server cluster to version <version number>.
This script should be run from any Tableau Server cluster node
after Tableau Server <version number> package
has been installed on all nodes.
```

#### REQUIRED

```
--accepteula                                Indicate that you have
accepted the End User License Agreement (EULA).
   You can find the EULA in docs directory

-u <value>, --username=<value>              TSM administrator user
name. Required if it is run using a non-TSM administrator
   account on the initial node, or if upgrading
prior to 2019.2.

-p <value>, --password=<value>             TSM administrator password.
Required if the --username option is specified.
   If a password is required but not provided,
ted for the password.
```

#### OPTIONAL

```
--debug                                    Print each command as it is
run for debugging purposes. Produces extensive
```

## Tableau Server on Windows Help

output.

--trust-admin-controller-cert  
certificate.

Do not validate the server

--no-prompt

Suppress script prompts. You

will only be prompted for missing required

parameters, for example, if you specify a us

password. If the

script needs to stop or restart Tableau Serv

without warning or

prompting. Use this if you automate the upgr

with a script.

--external-repository-config-file=filename

Required if upgrading from a Tableau Server

Tableau Server

that uses a later major version of PostgreSQ

to use an

external repository. The filename is a confi

describing a new

instance of the external repository. The new

use the same

type of external service as the current exte

but with the

supported version of PostgreSQL.

--external-repository-cert-file=filename

Required if upgrading from a Tableau Server

Tableau Server

that uses a later major version of PostgreSQ

to use an

external repository. The filename is an SSL

file for the new

external repository. The new repository shou

type

of external service as the current external

with the

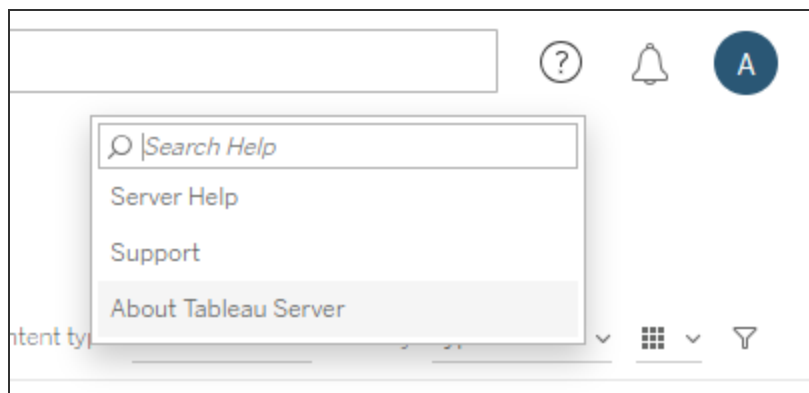
## View Server Version

The version of Tableau Server you are running is important. It determines the functionality and capabilities you have access to. Version is also important when you are upgrading, because in some cases how you upgrade depends on which version you are upgrading from, and which version you are upgrading to. Knowing your version is easy, once you understand how to find it.

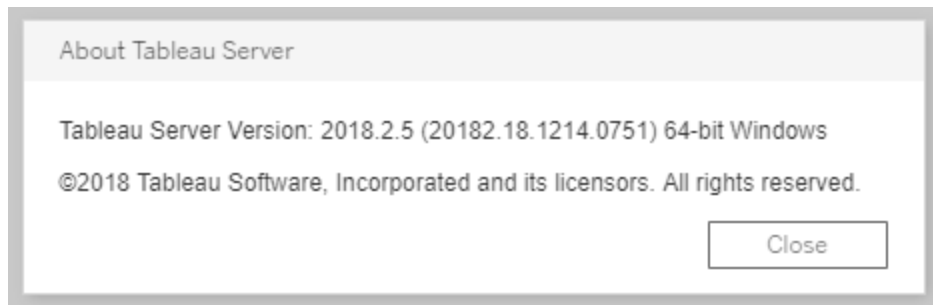
- Viewing version in Tableau Server – All server users can view the version of Tableau Server from the Help menu in the server web UI.
- Viewing version in Tableau Services Manager (TSM) – TSM administrators can view the versions of TSM and Tableau Server from the TSM command line (CLI).

### Viewing the server version from the Tableau Server web UI

- While logged into Tableau Server, click the information icon ( ? ) and **About Tableau Server**.



The version of Tableau Server is listed in the About Tableau Server dialog box:



### Viewing the server version and TSM version from the TSM command line

1. Open a command prompt as administrator on the initial node (the node where TSM is installed).
2. Run the following command:

```
tsm version
```

The output displays the versions of Tableau Services Manager (TSM) and Tableau Server.

For example:

```
C:\>tsm version
Tableau Services Manager command line version 20182.18.1214.0751.
Tableau Server version 20182.18.1214.0751.
```

### Short version, long version, and version\_code

In most cases, when you need to know your version number, you need to know the "short" version. This version number displays in the About Tableau Server dialog box and is made up of three parts: major, minor and maintenance versions. The short version number has this format: `nnnn.n.n`. For example: `2018.2.5`.

A longer version includes the major and minor version numbers, as well as other build-specific information, and has this format: `nnnnn.nn.nnnn.nnnn`, for example: `20182.18.1214.0751`.

When you see a reference to `<version_code>` in this documentation, it means this longer

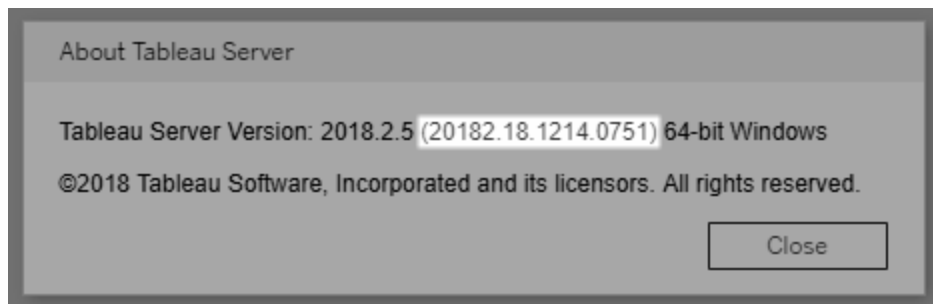
version. The most common reference to this `version_code` or long version in the documentation is when we are discussing install locations or paths to the scripts or bin directories.

Tableau Server is installed under a `\packages` folder, in locations that include the long version in the path name. This means that when you are navigating to a location within the `\packages` directory, you need to include the long version. For example, the `\scripts` folder: By default: `C:\Program Files\Tableau\Tableau Server-\packages\scripts.<version_code>\`.

For example: `C:\Program Files\Tableau\Tableau Server-\packages\scripts.20182.18.1214.0751`

### Finding the long version number

This longer version also displays in the About Tableau Server dialog box, in parentheses:



## Configure Einstein Discovery Integration

Beginning with version 2021.1.0, Tableau Server supports integration with Einstein Discovery, making Einstein Discovery predictions available to authors and viewers of workbooks and dashboards. Starting in version 2021.2.0, Einstein Discovery predictions is also now available when authoring flows on the web.

Einstein Discovery in Tableau is powered by [salesforce.com](https://www.salesforce.com). Consult your agreement with [salesforce.com](https://www.salesforce.com) for applicable terms.

To integrate Einstein Discovery with Tableau Server, there are several necessary configuration steps, including some in Tableau Server, and some in the Salesforce org running Einstein Discovery. This overview outlines these steps for Dashboard extensions, Analytics extensions and Tableau Prep extensions, and provides links to specific topics with steps for completing the server configuration.

For details on how to use Einstein Discovery predictions in Tableau, including licensing and permission requirements, see [Integrate Einstein Discovery Predictions in Tableau](#) in the Tableau Desktop and Web Authoring Help. For information about adding predictions in flows, see [Add Einstein Discovery Predictions to your flow](#).

### Einstein Discovery dashboard extensions

The Einstein Discovery dashboard extension allows workbook authors to surface real-time predictions in Tableau. The dashboard extension delivers predictions interactively, on-demand, using source data in a Tableau workbook and an Einstein Discovery-powered model deployed in Salesforce.

To configure Tableau Server for the Einstein Discovery dashboard extension you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. [Allow Saved Access Tokens](#)
  - b. Enable Dashboard extensions for the server. See: [Manage Dashboard and Viz Extensions in Tableau Server](#)
2. In Salesforce, in the organisation running Einstein Discovery:
  - a. Configure CORS in Salesforce.com for Einstein Discover Integration in Tableau Server.
  - b. In Salesforce, in the organisation running Tableau CRM, create a connected app. See [Step 1: Create a Salesforce connected app](#).
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. [Step 2: Configure Tableau Server for Salesforce.com OAuth](#)

## Einstein Discovery analytics extensions

The Einstein Discovery analytics extension gives your users the ability to embed predictions directly in Tableau calculated fields. A table calc script requests predictions from a model deployed in Salesforce by passing its associated prediction ID and input data that the model requires. Use Model Manager in Salesforce to auto-generate a Tableau table calculation script, and then paste that script into a calculated field for use in a Tableau workbook.

To configure Tableau Server for either the Einstein Discovery analytics extension you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. Allow Saved Access Tokens
  - b. Enable analytics extensions for the server and configure a connection type.  
See: [Configure Connections with Analytics Extensions](#)
2. In Salesforce, in the organisation running Einstein Discovery, create a connected app.  
See [Step 1: Create a Salesforce connected app](#).
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. [Step 2: Configure Tableau Server for Salesforce.com OAuth](#)

## Einstein Discovery Tableau Prep extensions

*Supported in Tableau Server and Tableau Cloud, starting in version 2021.2.0*

The Einstein Discovery Tableau Prep extension enables users to embed Einstein predictions directly in their flows when authoring flows on the web.

To configure Tableau Server or Tableau Cloud for the Einstein Discovery Tableau Prep extension, you need to do the following:

1. In Tableau Server:
  - a. Enable saved OAuth tokens for data connections and extensions in Tableau Server. See [Allow Saved Access Tokens](#)
  - b. Enable Tableau Prep Extensions for the server. See [Enable Tableau Prep Extensions](#).



2. In Salesforce, in the organisation running Einstein Discovery, create a connected app. See Step 1: Create a Salesforce connected app.
3. In Tableau Server, configure server for saved SF OAuth credentials using information from the connected app. Step 2: Configure Tableau Server for Salesforce.com OAuth

## Configure CORS in Salesforce.com for Einstein Discover Integration in Tableau Server

In version 2021.1.0 the ability to integrate Einstein Discovery predictions into Tableau Dashboards was added. You can do this using the Einstein Discovery dashboard extension. A prerequisite for this is configuring Cross-Origin Resource Sharing (CORS) in the Salesforce org that hosts Tableau CRM and includes the model and predictions that are going to be used.

This procedure explains how an administrator in a Salesforce.com organisation would do this configuration. You can find more information about CORS in the Salesforce documentation, [Configure Salesforce CORS Allowlist](#).

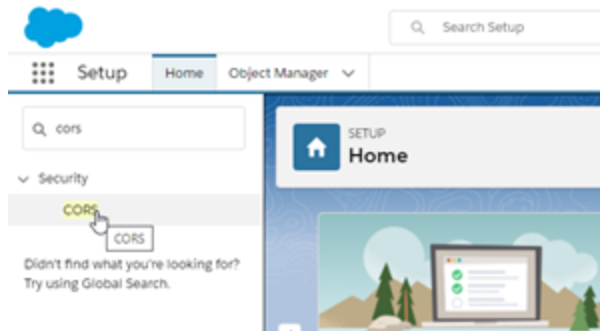
Configure CORS for Einstein Discovery.

**Note:** This procedure documents the process in Salesforce Lightning. If you are using the traditional interface, the navigation may be different but the configuration is the same.

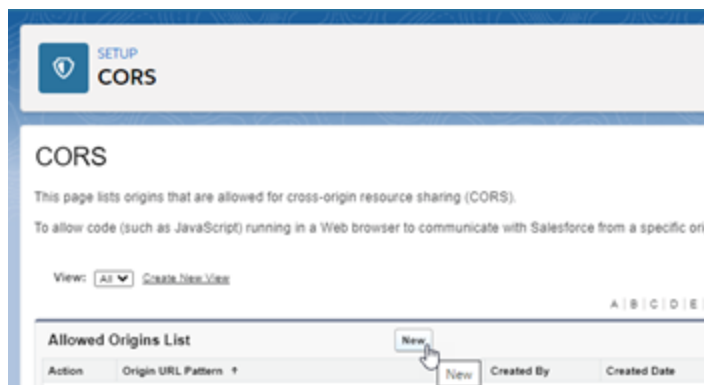
1. Sign in to your Salesforce.com developer account, click your username in the upper-right, and then select **Setup**.



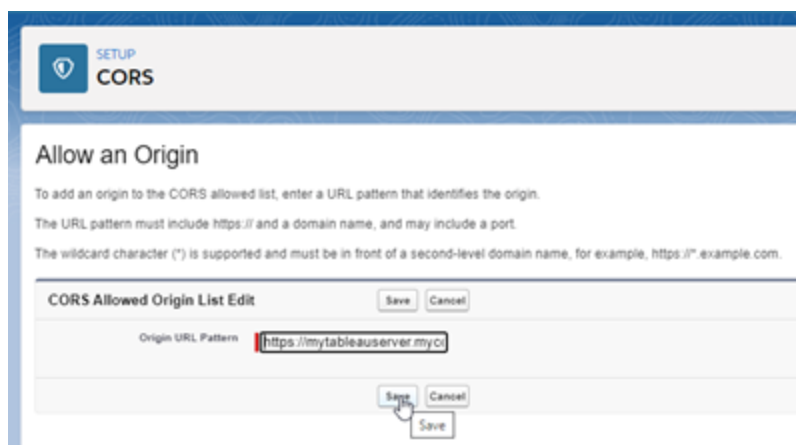
2. In the left navigation column, search for "cors" and select **CORS**.



3. In **CORS**, in the **Allowed Origins List** section, click **New**.



4. In **CORS Allowed Origin List Edit**, enter the URL of your Tableau server, beginning with "https://".



For more information about the URL pattern, see the Salesforce developer documentation: [https://developer.salesforce.com/docs/atlas.en-gb.chat-terapi.meta/chatterapi/extend\\_code\\_cors.htm](https://developer.salesforce.com/docs/atlas.en-gb.chat-terapi.meta/chatterapi/extend_code_cors.htm)

5. Click **Save**.

## Configure Connections with Analytics Extensions

Tableau supports a set of functions that your users can use to pass expressions to analytics extensions for integration with R, Python and Einstein Discovery.

**Note:** You can use R and Python scripts to perform complex cleaning operations in your Tableau Prep flows, but configuration and functionality supported can be different. For information see [Use R and Python Scripts in your Flow](#) in the Tableau Prep help.

This topic describes how to configure sites on Tableau Server with analytics extensions.

Because Tableau Server provides an authentication mechanism, it can be more secure to expose analytics extensions functionality to users through Tableau Server than in Tableau Desktop.

For more information about user scenarios and configuring Tableau Desktop, see [Pass Expressions Analytics Extensions](#), in the *Tableau Desktop and Web Authoring Help*.

The configuration steps in this article are specific to Workbooks. For information about how you can use R and Python scripts to incorporate predictive modelling data into your flow, see [Use R and Python scripts in your flow](#) in the *Tableau Prep Help*.

### Feature change history:

- 2021.2 – You can configure multiple analytics extension connections for each site. (You are limited to a single Einstein Discovery connection per site.)

For information about how to determine analytics extension usage in workbooks, see [Determining analytics extensions usage](#).

- 2021.1 – Einstein Discover is included as an analytics extension option. Einstein Discovery in Tableau is powered by [salesforce.com](#). Consult your agreement with [salesforce.com](#) for applicable terms.
- 2020.2 – You can configure a different analytics extension connection for each site on your server. Prior to this change a single analytics extension configuration applied globally to all sites on the server.
- 2020.1 – This functionality is now called *analytics extensions*. Previously the feature was called "external services".

## Server SSL

To configure SSL for analytics extensions, you must install a valid certificate on the computer running Tableau Server. The certificate must be trusted by the computer running Tableau Server. The certificate Subject field or one of the SAN entries on must exactly match the URI of the analytics extensions service configuration.

## Enable analytics extensions

Before you configure extensions, you must enable analytics extensions server-wide.

1. Sign in to the Tableau Server Admin Area.
  - If you only have a single site (default) on your server, click **Settings**, and then go to Step 2.
  - If you have multiple sites on your server:
    - a. Under **All Sites**, click **Manage all sites**.
    - b. Click the **Extensions** tab.
2. Scroll to **Analytics Extensions**, select **Enable analytics extensions** and then click

**Save.**

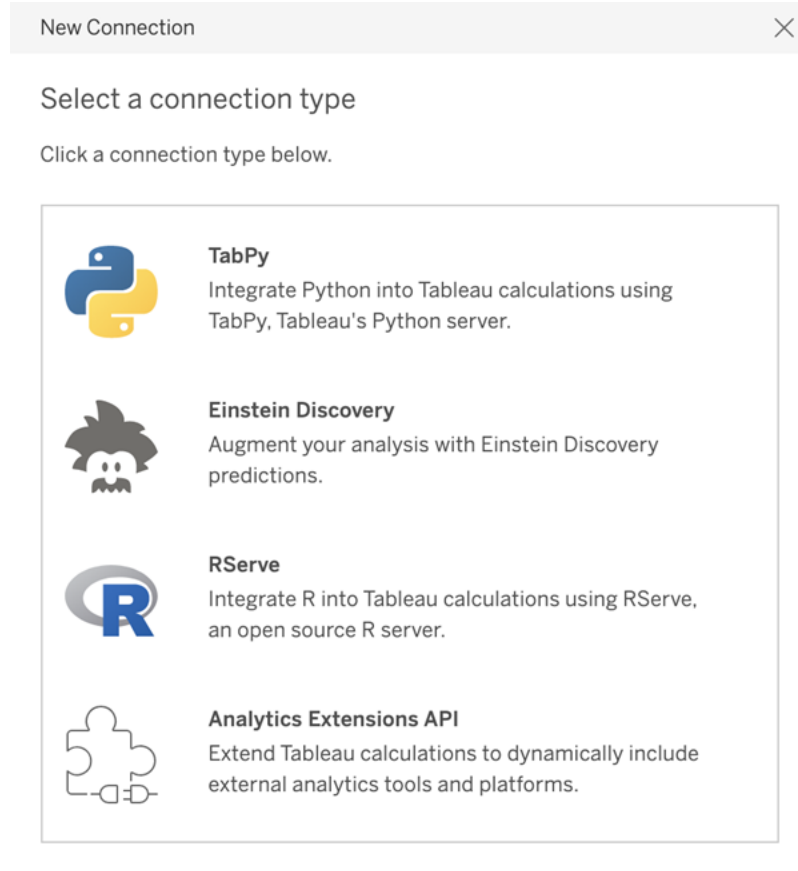
**Analytics Extensions**

Enable and configure analytics extensions on this server. Analytics extensions allow you to extend Tableau dynamic calculations with programming languages like R and Python, and with other external tools and platforms. [Learn more](#)

☒ Enable analytics extensions

## Configure analytics extensions settings

1. Sign in to the Tableau Server Admin Area.
2. On the Settings page, click the **Extensions** tab and then scroll to **Analytics Extensions**. (On multi-site deployments of Tableau Server, navigate to the site where you want to configure analytics extensions, and then click **Settings>Extensions**.)
3. **Multi-site deployments only:** you must enable Analytics Extensions on each site. Under Analytics Extensions, select **Enable analytics extensions for site**.
4. Under Analytics Extensions, click **Create new connection**.
5. In the **New Connection** dialog, click the connection type you want to add, then enter the configuration settings for your analytics service:



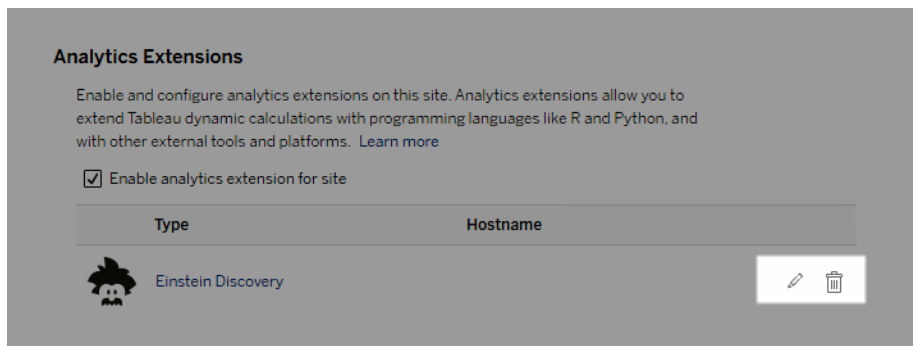
6. The options you need to configure depend on the connection type you choose:
- For an Einstein Discovery connection, click **Enable**.
  - For TabPy, RServer and Analytics Extensions API connections, enter the following information:
    - **Connection Name** (Required): Specify the server type you are connecting to. RSERVE supports connections to R using the RServe package. TABPY supports connections to Python using TabPy, or to other analytics extensions.
    - **Require SSL** (Recommended): Select this option to encrypt the connection to the analytics service. If you specify a `HTTPS` URL in the **Hostname** field, then you must select this option.
    - **Hostname** (Required): Specify the computer name or URL where the analytics service is running. This field is case sensitive.
    - **Port** (Required): Specify the port for the service.

- **Sign in with a username and password** (Recommended): Select this option to specify username and password that is used to authenticate to the analytics service.

7. Click **Create**.

Edit or delete an analytics extension connection

To edit or delete a configuration, navigate to **Analytics Extensions** on the **Extensions** tab of your site.



Click the **Edit** or **Delete** icon and follow the prompts to change the configuration.

## Client requirement: Intermediate certificate chain for Rserve external service

As of Tableau Server version 2020.1, you must install a full certificate chain on Tableau Desktop computers (Windows and Mac) that are connecting to a Rserve external connection through Tableau Server. This requirement is due to how Rserve manages the handshake on secure connections.

Importing a root certificate on the Tableau Desktop is not sufficient, the entire certificate chain must be imported onto the client computer.

## Script errors

Tableau cannot verify that workbooks that use an analytics extension will render properly on Tableau Server. There might be scenarios where a required statistical library is available on a

user's computer but not on the analytics extension instance that Tableau Server is using.

A warning will be displayed when you publish a workbook if it contains views that use an analytics extension.

This worksheet contains external service scripts, which cannot be viewed on the target platform until the administrator configures an external service connection.

## Determining analytics extensions usage

Beginning with version 2021.2, analytics extensions configurations are mapped at the workbook level. This allows administrators to use custom views to query the Tableau Repository and determine which workbooks are using which extensions, and how often they are used.

To do this you need to join the workbook connections table to tables showing workbook usage. For details about creating and using custom administrative views, see [Collect Data with the Tableau Server Repository and Create Custom Administrative Views](#).

## Changing the Identity Store

Infrastructure or business changes may require you to change the identity store on Tableau Server. There are two kinds of identity stores: local and external. When you installed Tableau Server you configured either a local identity store or an external identity store.

When you configure Tableau Server with a local identity store, all user and group information is stored and managed in the Tableau Server repository. In the local identity store scenario, there is no external source for users and groups.

When you configure Tableau Server with an external store, all user and group information is stored and managed by an external directory service. Tableau Server must synchronise with the external identity store so that local copies of the users and groups exist in the Tableau Server repository, but the external identity store is the authoritative source for all user and group data. Examples of external identity stores are OpenLDAP and Active Directory.

For more information about the Tableau identity store, see [Identity Store](#).



You can change from local store to an external store, or you can change from an external store to a local store. In either case, to change the identity store type, you complete these steps:

1. Uninstall and then reinstall Tableau Server. The procedures for full uninstall and clean install are at the end of this topic.
2. Restore content and permissions.

In these steps, the term "restore" does not refer to using the `TSM maintenance restore` command to restore the backup you are making. You cannot restore a backup (.tsbak) created on a Tableau Server instance that uses a different identity store than the target Tableau Server. The backup is a best practice safeguard, in case you need to go back to your original Tableau Server configuration.



### Warning

Changing the installation type on Tableau Server can be a complicated and time-consuming process. To avoid data loss or orphaning of content or users, you'll need to plan this process carefully. In all cases, user filters applied to workbooks and data sources will need to be updated manually after the change.

Most importantly, determine how you will transition content and permissions to the new identity store after you reinstall Tableau Server.

## Methods for restoring content and permissions

The following list describes two methods for restoring content and permissions after you reinstall Tableau Server. Select the method that best fits with your environmental requirements.

- **Method 1: Use site export and import** – In this method, you start by exporting each site in your existing deployment. Then, you install the new server and configure it for the new identity store type. Next, you create new users in the default site on the new server. Finally, you import all the original sites. During the import stage, you can map the

original identities to the new users that you created in the default site.

**Note:** When migrating sites between instances of Tableau Server, the target site must be on a version of Tableau Server that is the equal to or later than the version of Tableau Server for the source site. Both the source and target sites must be from supported versions of Tableau Server.

Because this method exports all content and permissions at each site, it is the best method for organisations that require a high fidelity replica of the content and permissions after the identity store change is complete. Some organisations require an identity store change as the result of an authentication change. In these cases, a different user name syntax is often a requirement in the new model. This method, which includes a process of mapping original user names to new names, provides flexibility for such scenarios.

- **Method 2: Fresh installation; users republish content** – In this method, you install a new version of Tableau Server and select the new identity store type during setup. You also create new sites. You then create users and give them access, and they republish their workbooks and data sources. Unlike the other method, in this one, you do not reuse any of your existing Tableau Server infrastructure.

This method is most appropriate for smaller deployments with fairly autonomous and data savvy users. From an administrative perspective, this method is the simplest, since you're not actively porting over content. However, because you rely entirely on users to republish content, this method may not be successful for large organisations or for those where centralised oversight of content is required.

## User filters

User filters are domain-specific. Therefore, when the domain of Tableau Server changes or authentication type changes, filters no longer function as expected. Although the user filters are generated by Tableau Server, after they are set by the user, the filters are stored in the

workbooks and data sources. Neither of these methods for changing the identity store modifies the contents of the workbooks or data sources.

As you plan the identity store change, you must also include a final task to correct user filtering in all workbooks and data sources with Tableau Desktop.

## User names and the Tableau Identity store

If you are using Method 1, it's helpful to understand how Tableau Server stores user names in the Tableau identity store. Tableau stores all user identities in the repository, which coordinates content permissions and site membership with various services in Tableau Server. Generally, an identity store configured for Active Directory store user names in the format, `domain\username`. Some organisations use a UPN (`jsmith@domain.lan`).

On the other hand, organisations that configure Tableau Server with local identity store usually create standard, truncated user names, such as `jsmith`.

In all cases, these user names are literal strings that must be unique in the Tableau identity store. If you are changing from one identity store type to another, then your target authentication, SSO, or user provisioning solution may require a specific user name format.

Therefore, to maintain all permissions, content, and user viability, one of the following must be true after you change the identity store type:

- The new user names must match the original user names, or
- The original user names must be updated to match a new format.

If an authentication change is driving the identity store change, then the target authentication scheme will likely impose a user name syntax that is different than your original user names. Method 1 includes a process where you can map original user names to new user names.

It's possible that the original user name format will work with the new authentication type. For example, if you used UPN names in a local identity store deployment, you might be able to use the same user names in an Active Directory deployment. You could also use the `domain\username` format for local identity store, as long as users continue to use that format to sign in to Tableau Server.

If you are changing from local identity store to an external Active Directory store, review the topic, [User Management in Deployments with External Identity Stores](#), as part of your planning process.

## Method 1: Use site export and import

You must use the same version of Tableau Server for the export and import operations.

1. Export all sites on your server. See [Export or Import a Site](#).
2. Back up, remove, and then reinstall.
3. Create new users on Tableau Server. You should have a new user that corresponds to each user on the original server.
4. Import the sites that you exported in Step 1. See [Export or Import a Site](#). During import, you will be prompted to map the new users to the original users.

## Method 2: Fresh installation—users republish content

Even if you do not plan to port content as part of your identity store change, we recommend that you back up the server.

1. Back up, remove, and then reinstall.
2. Create users, sites, and groups.
3. Inform your users of the new Tableau Server, provide them with credentials, and allow them to republish their content.

## Back up, remove, and then reinstall

Both methods include the following steps:

1. Back up Tableau Server
2. Remove Tableau Server.
3. Reinstall Tableau Server with the new identity store type.

### Step 1: Back up Tableau Server

As a best practice, you should back up the server before proceeding.

Follow the procedure, [Create a backup using the TSM command line interface \(CLI\)](#). Run the `backup` command with the `-d` option. The `-d` option adds the timestamp.

When you are finished, copy the backup file (.tsbak) to a safe location that is not a part of your Tableau Server installation.

#### Step 2: Remove Tableau Server

You must completely remove Tableau Server from the computer. See [Remove Tableau Server from Your Computer](#).

#### Step 3: Reinstall Tableau Server with new authentication type

1. Go to the Tableau Customer Portal, sign in with your Tableau user name and password, and then download Tableau Server.
2. Install Tableau Server. See [Install and Configure Tableau Server](#) more information. During installation, you will select the new identity store type. See [Configure Initial Node Settings](#).

## External Identity Store Configuration Reference

Tableau Server supports connecting to an external directory using LDAP. In this scenario, Tableau Server imports users from the external LDAP directory into the Tableau Server repository as system users.

This topic provides a description of all LDAP-related configuration options Tableau Server supports. If you are connecting to Active Directory, we strongly recommend that you automatically configure the LDAP connection with Tableau Server as part of Setup, rather than configuring the connection manually. See [Configure Initial Node Settings](#).

The options listed in this reference can be used for any LDAP-compliant directory. If you do not have experience configuring LDAP, then work with your directory administrator, or with an LDAP expert.

This is a reference topic. For more information about how Tableau Server stores and manages users, start with [Identity Store](#).

## Configuration methods

Configuration parameters that enable Tableau Server to connect to your LDAP directory are stored in .yaml files. These files are managed and synchronised by various services in Tableau Server. Updating the .yaml files must be done using a Tableau Services Manager (TSM) interface.

Do not attempt to update .yaml files directly with a text editor. TSM must manage all updates for proper operation.

The .yaml configuration files are composed of key-value pairs. For example, the key, `wgserver.domain.username`, takes a username as a value. This key defines the username that will be used to authenticate to the LDAP directory during the bind operation.

There are four different TSM methods that can set yaml key values. The four methods are described here, using the `wgserver.domain.username` key as an example to illustrate the different methods:

- **configKey key-value pairs** – You can update a .yaml configuration file key by updating the `wgserver.domain.username` key running `tsm configuration set Options`, or by including the key in a JSON configuration file under a `configKey` entity. See [Configuration File Example](#).

The `configKey` key-value pairs in a JSON configuration file are the same as those used for `tsm configuration set` but they are set differently. This topic refers to both of these methods as *configKey*.

Unlike when using `configEntities` and native `tsm` commands that are described below, `configKey` input is not validated. When you set an option with a `configKey`, the value that you enter is copied as a literal string to the underlying .yaml configuration files. For example, for a key where `true` or `false` are the valid inputs, when you configure the key using a `configKey` key-value pair, you can enter an arbitrary string value and it will be saved for the key. In such cases, invalid values will undoubtedly lead to LDAP configuration errors.

We recommend using `configKeys` only when no option exists to set the configuration with the other three options listed below (`configEntities`, a native tsm command or the TSM Web UI). When using `configKeys` be sure to double-check your values and be sure to mind case-sensitivity.

- **configEntities JSON** – You can update a .yaml configuration file by passing the `user-name` option in a *configEntities* JSON.

When you configure a value using `configEntities` options in a JSON file, the values are validated before they are saved. Values are case-sensitive. For details on how to configure a value using `configEntities`, see the `identityStore` Entity example. The JSON file is imported with the `tsm settings import` command. The options available for `configEntities` are a subset of all the .yaml key-value pairs.

Validation means that the import command will only succeed if all the values in the JSON file are valid data types. For example, if you enter `no` for a value that only accepts `true` or `false`, then you will receive an error and the configuration is not imported.

You can only import JSON configuration files only as part of the initial configuration. If you need to make LDAP changes after you have imported the JSON configuration file and initialised Tableau Server, do not attempt to re-import the JSON file. Instead, make individual key changes with native tsm commands if available, or using `configKeys` and `tsm configuration set`.

- **Native tsm commands** – You can update a .yaml configuration file by passing the `ldapuser` option with the *native tsm command* `tsm user-identity-store`. As with `configEntities`, values that you enter with the native tsm command are validated before they are saved.

Not all key-value pairs in a .yaml file can be set using native tsm commands.

- **TSM GUI** – You can set configuration values during Setup, using the TSM GUI. If you are connecting to Active Directory, and configure the Tableau identity store during Setup, with the GUI, then you are prompted for an account with AD read access. The

`wgserver.domain.username` key is set when you enter credentials.

This scenario only works if you are connecting to Active Directory. Tableau Server does not support arbitrary LDAP configuration as part of the GUI Setup process.

Consider using the [Tableau Identity Store Configuration Tool](#) to generate your LDAP json configuration file. The Tableau Identity Store Configuration Tool will also generate a list of key/-value pairs that you can set by running tsm configuration set Options. The tool itself is not supported by Tableau. However, using a JSON file created by the tool instead of creating a file manually does not change the supported status of your server.

## Configuring Active Directory

If you are configuring Tableau Server to use Active Directory, we recommend using the TSM Web UI during installation. The TSM Web UI is optimised to configure Tableau Server for Active Directory with the minimum necessary input. See [Configure Initial Node Settings](#).

## Configuration reference table

con- figEntities option  (Options are case sensitive)	Native tsm com- mand	configKey  (Used with tsm con- figuration set com- mand or in the configKeys section of a JSON file)	Sc- en- ari- o	Notes
type	N/A	wgserv- er.authenticate	A- D, L- D- A- P, Lo- cal	Where you want to store user identity information. Values: <code>local</code> or <code>activedirectory</code> .  If you want to connect to any LDAP server, enter <code>activedirectory</code> .



sslPort	N/A	wgserv- er.domain.ssl_port	A- D, L- D- A- P	Use this option to specify the secure port of the LDAP server. We recommend secure LDAP for simple bind. LDAPS is usually port 636.
port	N/A	wgserv- er.domain.port	A- D, L- D- A- P	Use this option to specify the non-secure port of the LDAP server. Plain-text is usually 389.
domain	dom- ain	wgserv- er.domain.default	A- D	<p>In Active Directory environments, specify the domain where Tableau Server is installed, for example, "example.lan".</p> <p>For non-AD LDAP: the string you enter for this value is displayed in the "Domain" column of user management tools. You can enter an arbitrary string, but the key cannot be blank.</p> <p>This key is redundant with wgserv-er.domain.fqdn. The values for both keys must be the same.</p> <p>Native tsm command: Uses tsm user-identity-store set-connection [options] command.</p>
username	ldapu-	wgserv-	A-	The user name that you want to use

	ser- name	er.domain.username	D, L- D- A- P	<p>to connect to the directory service.</p> <p>The account that you specify must have permission to query the directory service.</p> <p>For Active Directory, enter the username, for example, <code>jsmith</code>.</p> <p>For LDAP servers, enter the distinguished name (DN) of the user that you want to use to connect. For example, <code>"cn==jsmith,dc=example,dc=lan"</code>.</p> <p>Native tsm command: Uses <code>tsm user-identity-store set-connection [options]</code> command.</p>
password	ldap- pass- word	wgserv- er.domain.password	A- D, L- D- A- P	<p>The password of the user account that you will use to connect to the LDAP server.</p> <p>Native tsm command: Uses <code>tsm user-identity-store set-connection [options]</code> command.</p>
dir- ect- orySer- viceType	N/A	wgserv- er.- domain.- directoryservice.type	A- D, L- D- A- P	<p>The type of LDAP directory service that you want to connect to.</p> <p>Values: <code>activedirectory</code> or <code>openldap</code>.</p>
ker- ber-	ker- bprin-	wgserv- er.-	A-	The service principal name for

osPrincipal	principal	domain.ldap.principal	D, L- D- A- P	<p>Tableau Server on the host machine. The keytab must have permission for this principal. Do not use an existing keytab for the system. Rather, we recommend that you register a new service principal name. To see principals in a given keytab, run the <code>klist -k</code> command. See Understanding Keytab Requirements.</p> <p>Native tsm command: Uses tsm user-identity-store set-connection [options] command.</p>
hostname	host-name	wgserv-er.-domain.ldap.host-name	A- D, L- D- A- P	<p>The hostname of the LDAP server. You can enter a hostname or an IP address for this value. The host that you specify here will be used for user-/group queries on the primary domain. In the case where user-/group queries are in other domains, Tableau Server will query DNS to identify the appropriate domain controller.</p> <p>Native tsm command: Uses tsm user-identity-store set-connection [options] command.</p>
member-sRetrievalPageSize	N/A	wgserv-er.-domain.ldap.member-s.retrieval.page.size	A- D, L- D- A- P	<p>This option determines the maximum number of results returned by an LDAP query.</p> <p>For example, consider a scenario where Tableau Server is importing an</p>

				<p>LDAP group that contains 50,000 users. Attempting to import such a large number of users in a single operation is not a best practice. When this option is set to 1500, Tableau Server imports the first 1500 users in the first response. After those users are processed, Tableau Server requests the next 1500 users from the LDAP server, and so forth.</p> <p>We recommend that you modify this option only to accommodate the requirements of your LDAP server.</p>
N/A	N/A	wgserv- er.- domain.ldap.- con- nectionpool.enabled	A- D, L- D- A- P	<p>When this options is set to <code>true</code>, Tableau Server will attempt to reuse the same connection when sending queries to the LDAP server. This behaviour decreases the overhead of having to re-authenticate with the LDAP server on each new request. Connection pooling only works with simple bind and TSL/SSL bind connections. Connection pooling is not supported for GSSAPI bind connections.</p>
N/A	N/A	wgserv- er.domain.accept_list	A- D	<p>Allows connection from Tableau Server to secondary Active Directory domains. A secondary domain is one that Tableau Server connects to for user synchronisation, but is a domain where Tableau Server is not installed.</p>

				<p>To ensure that Tableau Server can connect to other Active Directory domains, you must specify the trusted domains by setting the <code>wgserver.domain.accept_list</code> option with TSM. For more information, see <code>wgserver.domain.accept_list</code>.</p>
N/A	N/A	<code>wgserver.domain.allowlist</code>	A-D	<p><b>Important:</b> Deprecated as of version 2020.4.0. Use <code>wgserver.domain.accept_list</code> instead.</p> <p>Allows connection from Tableau Server to secondary Active Directory domains. A secondary domain is one that Tableau Server connects to for user synchronisation, but is a domain where Tableau Server is not installed. To ensure that Tableau Server can connect to other Active Directory domains, you must specify the trusted domains by setting the <code>wgserver.domain.whitelist</code> option with TSM. For more information, see <code>wgserver.domain.allowlist</code>.</p>
kerberosConfig	kerbconfig	No direct mapping	A-D, L-D-A-P	<p>The path to the Kerberos configuration file on the local computer. If you are installing into Active Directory, we don't recommend using the existing Kerberos configuration file or keytab file that may already be on the domain-joined computer. See</p>

				<p>Identity Store</p> <p>Native tsm command: Uses tsm user-identity-store set-connection [options] command.</p>
kerberosKeytab	kerb-keytab	No direct mapping	A-D, L-D-A-P	<p>The path to the Kerberos keytab file on the local computer. It is recommended that you create a keytab file with keys specifically for Tableau Server service and that you do not share the keytab file with other applications on the computer.</p> <p>Native tsm command: Uses tsm user-identity-store set-connection [options] command.</p>
nickname	N/A	wgserv-er.domain.nickname	A-D, L-D-A-P	<p>The nickname of the domain. This is also referred to as the NetBIOS name in Windows/Active Directory environments. The <code>nickname</code> option is required for all LDAP entities. The value cannot be null. If your organisation does not require a nickname/NetBIOS, then pass a blank key, for example: "".</p>
root	N/A	wgserv-er.domain.ldap.root	L-D-A-P	<p>If you do not use a dc component in the LDAP root or you want to specify a more complex root you need to set the LDAP root. Use the "o=my,-,u=root" format. For example, for the domain, <code>example.lan</code>, the root</p>

				would be "o=example,u=lan".
server-SideSorting	N/A	wgserv-er.-domain.ldap.server_side_sorting	L-D-A-P	Whether the LDAP server is configured for server-side sorting of query results. If your LDAP server supports server-side sorting, set this option to <code>true</code> . If you are unsure whether your LDAP server supports this, enter <code>false</code> , as mis-configuration may cause errors.
rangeRetrieval	N/A	wgserv-er.-domain.ldap.range_retrieval	L-D-A-P	Whether the LDAP server is configured to return a range of query results for a request. This means that groups with many users will be requested in small sets instead of all at once. LDAP servers that support range retrieval will perform better for large queries. If your LDAP server supports range retrieval, set this option to <code>true</code> . If you are unsure whether your LDAP server supports range retrieval, enter <code>false</code> , as mis-configuration may cause errors.
bind	N/A	wgserv-er.domain.ldap.bind	L-D-A-P	The way that you want to secure communication to the directory service. Enter <code>simple</code> for LDAP unless you are connecting to an LDAP server with Kerberos. For Kerberos, enter <code>gssapi</code> .
N/A	N/A	wgserv-er.-domain.ldap.domain_custom_ports	L-D-A-P	<div> <b>Note:</b> This key is only supported for Tableau Server on Linux. </div>

				<p>Allows you to map child domains and their LDAP ports. Domain and port are separated by a colon (:) and each domain:port pair is separated by a comma (,) using this format: <code>FQDN1:port,FQDN2:port</code></p> <p><b>Example:</b> <code>tsm configuration set -k wgserv-er.domain.ldap.domain_custom_ports -v child-domain1.lan:3269,child-domain2.lan:3269,child-domain3.lan:389</code></p>
dis- tin- guishedNameAttribute	N/A	wgserv- er.- domain.ldap.dnAttribute	L- D- A- P	<p>The attribute that stores the distinguished names of users. This attribute is optional, but it greatly improves the performance of LDAP queries.</p> <div> <p><b>Important:</b> Do not set this option as part of the initial configuration. Only set this after you have validated overall LDAP functionality. You must have a <code>dnAttribute</code> set in your organisation before setting this key.</p> </div>
groupBaseDn	N/A	wgserv- er.-	L- D-	Use this option to specify an alternative root for groups. For example, if



		domain.ldap.-group.baseDn	A-P	all of your group are stored in the base organisation called "groups," then enter "o=groups".
N/A	class-names	wgserv-er.-domain.ldap.-group.classnames	L-D-A-P	<p>By default Tableau Server looks for LDAP group object classes containing the string "group". If your LDAP group objects do not fit the default class name, override the default by setting this value. You can provide multiple classnames separated by commas.</p> <p>If your group names include commas, you must avoid them by using a backslash (\). For example, if you have a group name, groupOfNames, top, then enter "groupOfNames\, top".</p> <p>Tableau LDAP implementation interprets LDAP objects as either user or group. Therefore, be sure that you are entering the most specific class name. Overlapping class names between users and groups may cause conflicts.</p> <p>Native tsm command: Uses tsm user-identity-store set-group-mappings [options] command.</p>
groupBase-	base-	wgserv-	L-	The filter that you want to use for

Filter	filter	er.- domain.ldap.- group.baseFilter	D- A- P	<p>groups of users of Tableau Server. You might specify an object class attribute and an organisation unit attribute. For example:</p> <pre>" (&amp; (objectClass=s=groupofNames) (ou=Group) ) "</pre> <p>If " (&amp; (objectClass=s=inetOrgPerson) (ou=People) ) " doesn't work in your LDAP implementation, then specify the base filter that works for your Tableau user base.</p> <p>This is a required key. It cannot be blank.</p> <p>Native tsm command: Uses tsm user-identity-store set-group-mappings [options] command.</p>
groupName	groupname	wgserv- er.- domain.ldap.- group.name	L- D- A- P	<p>The attribute that corresponds to group names on your LDAP server.</p> <p>Native tsm command: Uses tsm user-identity-store set-group-mappings [options] command.</p>
groupEmail	groupemail	wgserv- er.- domain.ldap.- group.email	L- D- A- P	<p>The attribute that corresponds to group email addresses on your LDAP server.</p> <p>Native tsm command: Uses tsm user-</p>

				identity-store set-group-mappings [options] command.
groupDescription	description	wgserv-er.-domain.ldap.-group.description	L-D-A-P	<p>The attribute that corresponds to group descriptions on your LDAP server.</p> <p>Native tsm command: Uses tsm user-identity-store set-group-mappings [options] command.</p>
member	member	wgserv-er.-domain.ldap.-group.member	L-D-A-P	<p>Specify the LDAP attribute that contains a list of distinguished names of users that are part of that group.</p> <p>Native tsm command: Uses tsm user-identity-store set-group-mappings [options] command.</p>
N/A	N/A	wgserv-er.-domain.ldap.-group.memberURL	L-D-A-P	Specify the name of the LDAP attribute that stores the LDAP query for dynamic groups.
user-BaseDn	N/A	wgserv-er.-domain.ldap.user-.baseDn	L-D-A-P	Use this option to specify an alternative root for users. For example, if all of your users are stored in the base organisation called "users," then enter "o=users".
N/A	class-names	wgserv-er.-domain.ldap.user-.classnames	L-D-A-P	<p>By default Tableau Server looks for LDAP user object classes containing the string "user" and "inetOrgPerson".</p> <p>If your LDAP user objects do not use these default class names, override</p>

				<p>the default by setting this value. You can provide multiple classnames separated by commas. For example:</p> <pre>"userclass1, userclass2".</pre> <p>If your names include commas, you must escape them with a backslash (\). For example, if you have a name, <code>Names, top</code>, then enter <code>"Names\, top"</code>.</p> <p>Native tsm command: Uses tsm user-identity-store set-user-mappings [options] command.</p>
user-BaseFilter	base-filter	wgserv-er.-domain.ldap.user-.baseFilter	L-D-A-P	<p>The filter that you want to use for users of Tableau Server. You might specify an object class attribute and an organisation unit attribute.</p> <p>For example:</p> <pre>" (&amp;(objectClass=s=inetOrgPerson)(ou=People) ) "</pre> <p>Native tsm command: Uses tsm user-identity-store set-user-mappings [options] command.</p>
user-Username	ldapuser-name	wgserv-er.-domain.ldap.user-.username	L-D-A-P	<p>The attribute that corresponds to user names on your LDAP server.</p> <p>Native tsm command: Uses tsm user-</p>

				identity-store set-user-mappings [options] command.
user- Dis- playName	dis- play- name	wgserv- er.- domain.ldap.user- .displayname	L- D- A- P	The attribute that corresponds to user display names on your LDAP server.  Native tsm command: Uses tsm user- identity-store set-user-mappings [options] command.
userEmail	email	wgserv- er.- domain.ldap.user- .email	L- D- A- P	The attribute that corresponds to user email addresses on your LDAP server.  Native tsm command: Uses tsm user- identity-store set-user-mappings [options] command.
user- Certificate	cer- tific- ate	wgserv- er.- domain.ldap.user- .usercertificate	L- D- A- P	The attribute that corresponds to user certificates on your LDAP server.  Native tsm command: Uses tsm user- identity-store set-user-mappings [options] command.
N/A	thum- bnail	wgserv- er.- domain.ldap.user- .thumbnail	L- D- A- P	The attribute that corresponds to user thumbnail images on your LDAP server.  Native tsm command: Uses tsm user- identity-store set-user-mappings [options] command.
user- JpegPhoto	jpeg- photo	wgserv- er.-	L- D-	The attribute that corresponds to user profile images on your LDAP server.

		domain.ldap.user-jpegphoto	A-P	Native tsm command: Uses tsm user-identity-store set-user-mappings [options] command.
memberOf	memberof	wgserv-er.-domain.ldap.user.-memberof	L-D-A-P	Group that the user is a member of.  Native tsm command: Uses tsm user-identity-store set-user-mappings [options] command.
groupClassNames	N/A	wgserv-er.-domain.ldap.-group.classnames	L-D-A-P	By default Tableau Server looks for LDAP group object classes containing the string “group”. If your LDAP group objects do not fit the default class name, override the default by setting this value.  For configEntity: This option takes a list of strings, which requires passing each class in quotes, separated by a comma (no space) and within brackets. For example:  ["basegroup", "othergroup"].  For configKey: Enter each class, separated by a comma (no space) and within double quotes. For example:  "basegroup, othergroup".
user-ClassNames	N/A	wgserv-er.-domain.ldap.user.-classnames	L-D-A-P	By default Tableau Server looks for LDAP user object classes containing the string “user” and “inetOrgPerson”. If your LDAP user objects do not use

				<p>these default class names, override the default by setting this value.</p> <p>For configEntity: This option takes a list of strings, which requires passing each class in quotes, separated by a comma (no space) and within brackets. For example: ["userclass1",userclass2"].</p> <p>For configKey: Enter each class, separated by a comma (no space) and within double quotes. For example: "userclass1,userclass2".</p>
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Calculated configKeys

The following Kerberos-related configKeys are calculated and set according to multiple environmental inputs. As such, they must be set by the native tsm command or configEntities. Do not attempt to set these configKeys manually.

Calculated configKey	To use the native TSM command:	To use configEntity json:
wgserver.domain.ldap.kerberos.conf, cfs.ldap.kerberos.conf	Set the Kerberos configuration file location with the <code>kerbconfig</code> option of <code>tsm user-identity-store set-connection [options]</code> command.	Set the Kerberos configuration file location with the <code>kerberosConfig configEntity</code> option.
wgserver.domain.ldap.kerberos.keytab, cfs.ldap.kerberos.keytab	Set the Kerberos keytab file location	Set the Kerberos keytab file location

	with the <code>kerberosKeytab</code> option of <code>tsm user-identity-store set-connection [options]</code> command.	with the <code>kerberosKeytab configEntity</code> option.
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### Unsupported configKeys

Some unsupported configKeys are present in underlying .yaml configuration files. The following keys are not intended for standard deployments. Do not configure these keys:

- `wgserver.domain.ldap.kerberos.login`
- `wgserver.domain.ldap.guid`
- `wgserver.domain.fqdn`: this key is redundant with `wgserver.domain.default`. The values for both keys must be the same. Only update `wgserver.domain.fqdn` if the value does not match `wgserver.domain.default`.

## Basic Product Data

By default Tableau products send usage data to Tableau so that we can understand how customers use our software, and gain insights into where they are successful and where they might run into problems that we can address. For example, this data can help us learn where upgrades are commonly failing and allow us to make product changes to address those issues, or identify what portion of our user base needs informed about a security issue that applies to a specific version of Tableau Server. You can disable the sending of this data at installation time, or later. For details on how to do this, see the instructions for [Tableau Desktop](#) or [Tableau Server](#).

Even when you disable the sending of product usage data, certain basic product data is sent to Tableau. This Basic Product Data includes information about products and their processes, including which product or process is running, when they start up, what operating system they are running on, licensing information, which machine or cluster of machines has sent the data (using unique pseudonymised identifiers), and whether the product is configured to send product usage data.



You can disable the sending of Basic Product Data at the machine level, or at the enterprise level, by blocking traffic sent to **prod.telemetry.tableausoftware.com**.

### Disabling sharing of Basic Product Data on individual computers

**Important:** This procedure involves modifying your local `hosts` file. If you do not know what this is, you should not change it. You should only make this change if you understand the implications of making changes to the file, know how to change the file, and have made a backup of the file for safety.

Modifying `hosts` files changes network behavior for computers. Detailed instructions for modifying `hosts` files are provided by operating system providers such as Microsoft, Apple or Linux Distributions.

1. Make a copy of your existing `hosts` file and save it to a computer that is not your Tableau computer. This is your backup, in case you need to reverse your changes. Do not start modifying the file until you have made a backup copy of it.
2. Modify your computer's `hosts` file to include these lines:

```
# Stops sending Product Usage to Tableau (prod.telemetry.tableausoftware.com).  
# Learn more here: http:\\tableau.com\\derived-data  
127.0.0.1    prod.telemetry.tableausoftware.com
```

The first and second lines are comments, explaining the third line.

The third line prevents all traffic to `prod.telemetry.tableausoftware.com` (`http://-prod.telemetry.tableausoftware.com/`) from leaving your local machine by sending it to the Internal host loopback address. The data does not get sent outside the computer.

### Disabling the sharing of Basic Product Data at the enterprise level

To disable sending of Basic Product Data on an enterprise level, modify your Network Firewall to prevent outbound traffic to `prod.telemetry.tableausoftware.com`.

This domain is used by Tableau to receive the Basic Product Data about process launch and shutdown. It is also used for the more general Product Usage Data. Blocking traffic to this domain if you will prevent both kinds of data from being sent.

Traffic to this domain will occur on Ports 80 (for initial registration of our Product Data clients) and on Port 443 (for all subsequent traffic). To completely prevent product data from being sent, block all traffic to this domain.

For details on how to configure your network firewall, refer to your vendor or your internal IT department. Tableau cannot provide these instructions.

## Archived Content

### This is archived content

Deployments on public clouds continue to be supported but the content for third-party public cloud deployments is no longer updated.

For the latest Tableau Server deployment content, see the [Enterprise Deployment Guide](#) and the [Deploy](#) section of Tableau Server help.

For those customers who have access, we recommend Tableau Cloud. For more details, see:

- [Tableau Cloud Manual Migration Guide](#)
- [Tableau Cloud Trial for Admin](#)
- [Tableau Cloud: Get Started for Admin](#)

## Self-Host Tableau Server in a Public Cloud Service

### This is archived content

Deployments on public clouds continue to be supported but the content for third-party public cloud deployments is no longer updated.

For the latest Tableau Server deployment content, see the [Enterprise Deployment Guide](#) and the [Deploy](#) section of Tableau Server help.

For those customers who have access, we recommend Tableau Cloud. For more details, see:

- [Tableau Cloud Manual Migration Guide](#)
- [Tableau Cloud Trial for Admin](#)
- [Tableau Cloud: Get Started for Admin](#)

## Introduction

Even if you don't have your own infrastructure and server hardware, you can deploy an enterprise-level Tableau Server installation in the cloud. Building a cloud-based solution has many benefits over an on-premises installation. For example, the overall total cost of ownership for building a Tableau Server solution in the cloud is normally much less than a similar on-premises solution because you don't need to buy all the expensive hardware. In addition, the cloud can provide better uptime, reliability, and fault-tolerance, especially if you deploy your solution across different regions and availability zones.

Looking for Tableau Server on Linux? See [Self-Host Tableau Server in a Public Cloud Service](#).

You can build and scale your Tableau environment in the following cloud environments:

- **Amazon Web Services** – You install and manage Tableau Server on Amazon Web Services (AWS). For more information, see [Install Tableau Server in the AWS Cloud](#).
- **Google Cloud Platform** - You install and manage Tableau Server on the Google Cloud Platform. For more information, see [Install Tableau Server on the Google Cloud Platform](#).
- **Microsoft Azure** – You install and manage Tableau Server on Microsoft Azure. For more information, see [Install Tableau Server on Microsoft Azure](#).
- **Alibaba Cloud** - You install and manage Tableau Server on Alibaba Cloud. For more information, see [Install Tableau Server in the Alibaba Cloud](#).

# About Tableau Advanced Management on Tableau Server

**Important:** Beginning 15 September 2024, Advanced Management will no longer be sold as an independent add-on option. After 15 September 2024, features and functionality in Advanced Management will be offered via certain licence editions. Existing deployments with Advanced Management remain unaffected. More details will be announced in the coming months. For more information, contact your Sales Account team.

Tableau Advanced Management is a separately licensed collection of features for Tableau Server, which provide enhanced security, manageability and scalability capabilities.

**Note:** Tableau Advanced Management includes several Tableau Server features and two separately installed tools: Tableau Content Migration Tool and the Tableau Resource Monitoring Tool. For more information, see the [feature table](#) later in this topic.

## Advanced Management Licensing Requirements

Advanced Management is licensed on a per Deployment basis, which may be User-Based or Core-Based. A Deployment includes a licensed production Tableau Server installation and two licensed non-production Tableau Server installations that support the production installation. For more information on Deployment, see the [EULA Documentation](#).

- The Advanced Management can only be activated on a licensed Tableau Server Deployment. This means that your Tableau Server must be first activated with a valid key that is either User-Based or Core-Based, before applying the Advanced Management product key. For more information on how to purchase Advanced

Management and get the product key, contact your account manager.

- When the product key is active and enabled, you can use all the features that are included in Advanced Management.
- When the Advanced Management product key is removed or deactivated, you will no longer be able to use the features that require a valid Advanced Management licence. Any associated data will not be deleted. Each feature might have slight differences on what happens when the licence expires. For more information on the individual features use the links in the table below.

The following table lists the features that are included and require a valid Advanced Management licence:

Feature	Description	Requirements to use the feature	Version
About Tableau Resource Monitoring Tool	Provides a comprehensive look at the health of Tableau Server. With the Resource Monitoring Tool you can identify issues that cause slow load times, extract failures and other critical issues and can help you proactively address the issues that impact end user experience.	The installation of Tableau Server that you are monitoring must have an Advanced Management licence.	Available in 2019.3 and later.  Linux support was introduced in version 2020.4.
About Tableau Content Migration Tool	The Content Migration Tool provides an easy way to copy or migrate content between Tableau Server projects, sites and deployments. You can do this between projects on separate Tableau Server installations (for instance, between a	<ul style="list-style-type: none"> <li>Both the source Tableau Server (Server that you are moving the content from) and the target Tableau Server</li> </ul>	Available in version 2019.3 and later.

Feature	Description	Requirements to use the feature	Version
	development instance of Tableau Server and a production instance of Tableau Server) or between projects on a single Tableau Server installation.	<p>(Server that you are moving the content to) must have a valid Advanced Management licence.</p> <ul style="list-style-type: none"> <li>The Content Migration Tool must be installed on a version of Microsoft Windows that supports .NET 4.6.1 (Windows 7 or later, Windows Server 2008R2 or later).</li> </ul>	
Activity Log	The Activity Log writes log events to the vizportal logs folder on the local hard drive for further analysis and auditing.	The Tableau Server must have a valid Advanced Management licence.	Available in version 2022.3 and later.
Tableau Server External Repository	Allows you to deploy Tableau Server Repository external to Tableau Server. The Tableau Server Repository is a PostgreSQL database that stores data about all user interactions, extract refreshes and more.	The Tableau Server that is using an external repository must have a valid Advanced Management licence.	<p>Available in version 2019.3 and later.</p> <p>- AWS supported on</p>

Feature	Description	Requirements to use the feature	Version
			Tableau Server version 2019.3 and later.
			- Azure supported on Tableau Server version 2020.4 and later.
Workload Management through Node Roles	Using node roles, you can configure where certain types of workloads are processed on your Tableau Server installation. The node roles features allows you to dedicate and scale resources to specific workloads (ex: extract refreshes, subscriptions).	The Tableau Server must have a valid Advanced Management licence.	Available in version 2019.3 and later.
Tableau Server Key Management System	Gives you additional functionality to configure Tableau Server to use AWS as the KMS for extract encryption.	Tableau Server must have a valid Advanced Management licence.	Available in version 2019.3 and later.
			- AWS supported on Tableau Server version 2019.3

Feature	Description	Requirements to use the feature	Version
			and later.
			- Azure supported on Tableau Server version 2021.1 and later.
Tableau Server External File Store	Allows you to use network attached storage(NAS) as your File Store. This removes the need to run File Store locally on your Tableau Server	Tableau Server must have a valid Advanced Management licence.	Available in version 2020.1 and later.
Tableau Backgrounder Resource Limits	The Tableau Server Resource Limits Manager tracks backgrounder resource usage in relation to the set resource limits to make sure the resource limits are applied correctly.	Tableau Server must have a valid Advanced Management licence.	Available in version 2022.1 and later.
Tableau Server Independent Gateway	Tableau Server Independent Gateway allows you to install a Tableau Server-managed reverse proxy on a separate computer. Install Independent Gateway in your DMZ to provide security for your Server installation and all your data. The Independent Gateway can be used in a variety of configurations and can be scaled to meet your client connection	Tableau Server must have a valid Advanced Management licence.	Available in version 2022.1 and later.



Feature	Description	Requirements to use the feature	Version
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demands.

## Activating the Advanced Management licence

The Advanced Management licence is applied to a Tableau Server Installation and can be used for both User-Based and Core-Based installations.

Here is a quick overview of how you can activate the Advanced Management licence on your Tableau Server Installation.

### Use the TSM web interface

1. Open TSM in a browser:  
  
`https://<tsm-computer-name>:8850`
2. Click **Licensing** on the **Configuration** tab. Click **Activate Licence**.
3. Enter or paste your Advanced Management product key and click **Activate**.
4. On the **Register** page, enter your registration information and click **Register**.
5. Follow the prompts and restart Tableau Server after registration is complete.

**Note:** If this is a new Tableau Server installation, and you apply an Advanced Management Key before you apply the Tableau Server product key, you will see an error. You may however, continue the installation and apply the Tableau Server product key using the same steps described above.

### Use the TSM CLI

1. Open a command prompt as administrator on a node in the Tableau Server cluster.
2. Run the following command with your Advanced Management product key to activate the licence:

```
tsm licenses activate -k <server-management-add-on-product key>
```

**Note:** If this is a new Tableau Server installation, run the command twice, first with the Tableau Server product key and then with an Advanced Management product key.

3. Apply the changes and restart the Server:

```
tsm pending-changes apply
```

## Who can do this

Only Server Administrators can activate Advanced Management licence keys.

## About Tableau Resource Monitoring Tool

This document gives you an overview of the Tableau Resource Monitoring Tool.

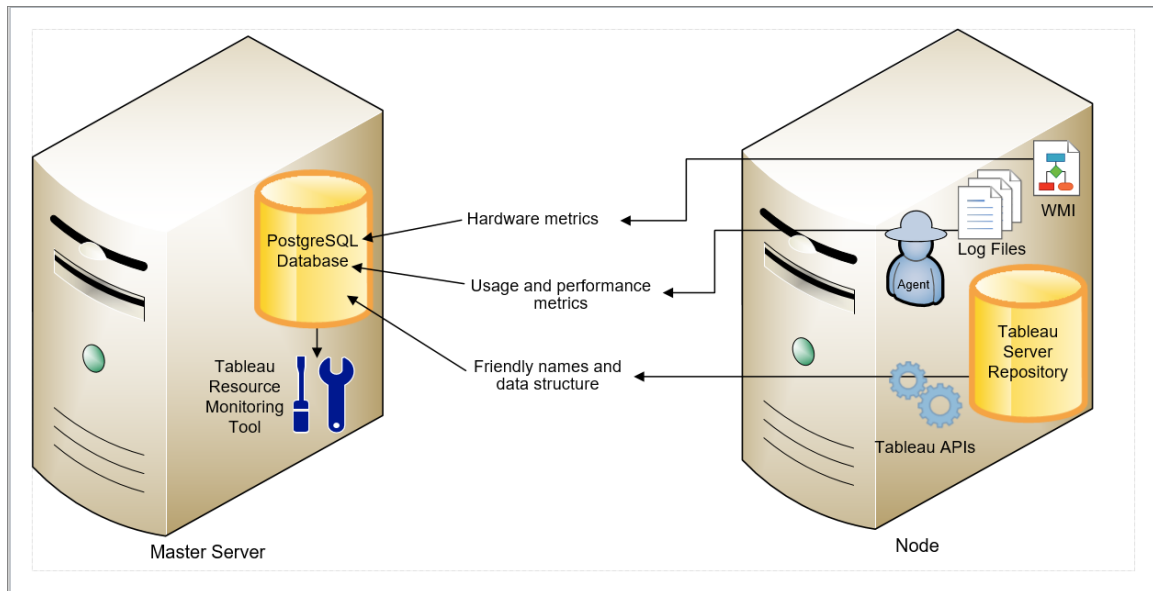
### What is Resource Monitoring Tool?

The Resource Monitoring Tool is a tool that you can use to monitor the health and performance of your Tableau Server. It gathers data from your Tableau Server to provide a comprehensive look at the health of Tableau Server. Using this tool, you can identify the cause of slow loading times, extract failures and other critical issues. To use the Resource Monitoring Tool, you must have the Advanced Management enabled on your server. For more information on the Advanced Management, see [About Tableau Advanced Management on Tableau Server](#)

The Resource Monitoring Tool has two main components: Resource Monitoring Tool Server (RMT Server) and Agent.

## Tableau Server on Windows Help

- The RMT Server is where the data from Tableau Server is collated and served up through a web interface. This is also where you can configure, monitor and analyse the health and performance of Tableau Server.
- An Agent runs on each of the nodes in your Tableau cluster to monitor their performance and activity. The following diagram illustrates the interaction between a Tableau Server node and the RMT Server.



## Get Started with Tableau Resource Monitoring Tool

This article will help you get started with Tableau Resource Monitoring Tool. It contains links to other articles about information you need to prepare before installing Resource Monitoring Tool, links to upgrade and other useful resources.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

## Pre-Installation

## Product Compatibility with Tableau Server

The Resource Monitoring Tool can be installed to monitor supported Tableau Server versions.

The table below lists the version compatibility between Resource Monitoring Tool(RMT) and Tableau Server:

<b>RMT Ver- sion</b>	<b>OS support</b>	<b>Tableau Server Version</b>
2023.3.x	Windows, Linux	2021.1.x-2022.1.x , 2022.3.x, 2023.1.x, 2023.3.x
2023.1.x	Windows, Linux	2021.1.x-2022.1.x , 2022.3.x, 2023.1.x
2022.3.x	Windows, Linux	2021.1.x - 2022.1.x, 2022.3.x
2022.1.x	Windows. Linux	2021.1.x - 2022.1.x
2021.4.x	Windows, Linux	2021.1.x - 2021.4.x
2021.3.x	Windows, Linux	2021.1.x - 2021.3.x
2021.2.x	Windows, Linux	2021.1.x - 2021.2.x
2021.1.x	Windows, Linux	2021.1.x

### Resource Monitoring Tool Server (RMT Server) and Agent Compatibility

Generally, we recommend that you install the same version of RMT Server and Agent to be sure that they are compatible. If you have Agents using versions not compatible with the RMT Server version, a critical incident is logged. For more information, see [Agent Incidents](#).

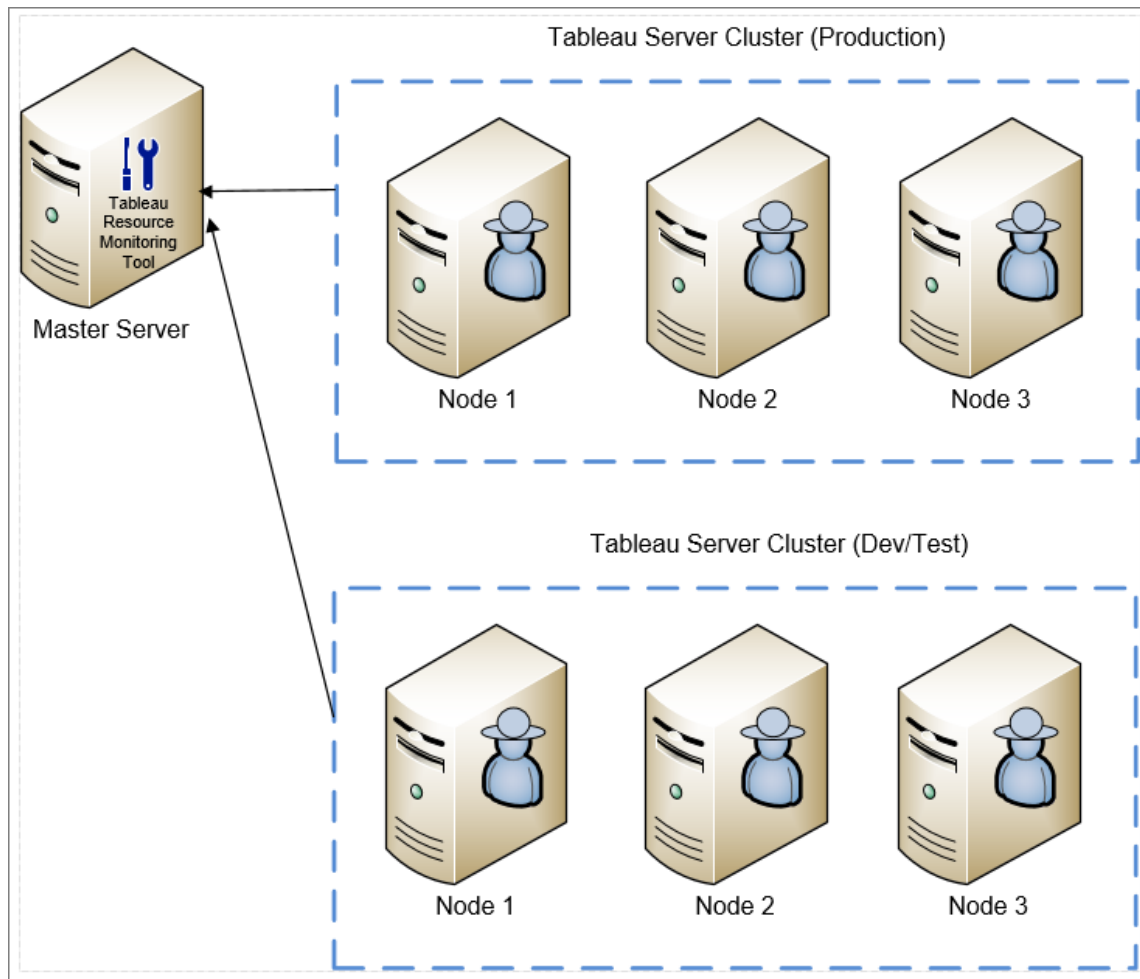
### Concepts and Terms

Get familiar with the concepts and terms used in the Resource Monitoring Tool topics. For more information, see [Concepts](#).

### Setup Architecture

The Resource Monitoring Tool has two main components: Resource Monitoring Tool Server (RMT Server) and Agent. The RMT Server should be installed on its own machine, and the Agent is installed on each node of your Tableau Server Cluster. For a more details about the setup architecture, see [Install the Tableau Resource Monitoring Tool](#).

A high-level view of the Resource Monitoring Tool setup. This diagram shows a three node Tableau Server Cluster.



### Minimum Hardware Requirements and Recommendations for Resource Monitoring Tool

Resource Monitoring Tool handles all of the processing, aggregation, storage and web interface to the monitoring data collected from your Tableau Server installation. For production use, the machine you install Resource Monitoring Tool on should meet or exceed the minimum hardware recommendations. For more details, see [Minimum Hardware Requirements and Recommendations for Tableau Resource Monitoring Tool](#).

## Tableau Server on Windows Help

### Pre-Installation Checklist for Resource Monitoring Tool

Before you install Resource Monitoring Tool, review these action items and complete any necessary steps: [Pre-Installation Checklist – Tableau Resource Monitoring Tool](#)

### Upgrading Resource Monitoring Tool

For instructions on how to upgrade Resource Monitoring Tool, see [Upgrading Resource Monitoring Tool](#).

### Troubleshoot

Be sure to check our [Troubleshoot Tableau Resource Monitoring Tool Issues](#) for answers to common questions before contacting support.

### Concepts

This document briefly explains some of Tableau Resource Monitoring Tool core concepts and defines some terminology you will see often.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. However, you may continue to see the terms in CLI commands and options and other instances. For more information, see [About Tableau Help](#).

### Agent

Resource Monitoring Tool Agent runs as a background service on each of your Tableau servers. It must be installed on all the nodes in a Tableau Server installation that you want to monitor.

The agent is a lightweight process that monitors the Tableau activity and general performance of the server it is installed on. It reports those details back to the Resource Monitoring Tool Server.

### Resource Monitoring Tool Server (RMT Server)

The Resource Monitoring Tool Server hosts the web application that users interact with. It also does much of the background processing to collate and monitor the data from the agents. We

will use the term **RMT Server** to refer to this component.

## Environment

**Environment** is the term used to refer to a single node Tableau Server installation, or a Tableau Server cluster. In the RMT Server web interface, each node of the Tableau Server is called a **Server**.

Resource Monitoring Tool can monitor multiple Tableau Server installations. For example, you may have both production and staging Tableau Servers. In Resource Monitoring Tool, you can create two environments (*Production* and *Staging*) and monitor both of those Tableau Server clusters.

## Environment Status

The *environment status* indicates the state of the current Tableau environment. The status is determined by the number and type of incidents and the status of Tableau's various processes. The following sections will describe what each status means in these terms.

### OK



No warning or critical incidents have occurred today and there are not currently any failed processes.

### Warning



The Environment is in a **Warning** state when any of the following are true:

- At least one warning incident has occurred today.
- A process is **Unlicensed**.
- A process is **Offline**.



## Critical



The Environment is in a **Critical** state when any of the following are true:

- At least one critical incident has occurred today.
- The Primary Gateway is **Offline**.
- All instances of a process are **Unlicensed**.
- All instances of a process are **Offline**.

## Server

**Server** is the term used to refer to each of nodes in the Tableau Server installation. Every machine that you install the Resource Monitoring Tool Agent on is considered a Server.

## Pre-Installation Checklist – Tableau Resource Monitoring Tool

### Machine, Network and Account Requirements

**Note:** Resource Monitoring Tool (RMT) server and agent are not Federal Information Processing Standard (FIPS) 140-2 compliant, and will not function properly on operating systems running with FIPS mode enabled.

Complete the following prerequisites before installing the Tableau Resource Monitoring Tool.

1. Make sure you have administrative privileges for all computers that will run the Resource Monitoring Tool. This includes the computer running the RMT Server, and all the Tableau Server nodes in the installation you will be monitoring with Resource Monitoring Tool.
2. Open port 5672 to inbound TCP traffic on the computer running the RMT Server

The Resource Monitoring Tool Agent application sends the data that it collects through port 5672, so the machine where the RMT Server is installed will need to allow inbound TCP traffic on that port.

Windows Firewall is a common blocker of this traffic.

3. Open the following ports:

- Open port 80 to inbound TCP traffic on the computer running the RMT Server

This is the port on which the RMT Server will host the web interface. Note that we can change the port number during installation if there is a third-party service already using it. To make the web interface accessible from outside the RMT Server, this port will need to be opened.

- Open port 443 to inbound TCP traffic on the computer running the Resource Monitoring Tool RMT Server.

This is the port on which connections come from the Agent when testing the connection to the RMT Server.

- Open port 5672 and 5671 (TLS connections) to outbound TCP traffic on all Agent nodes.

The Agent application sends the data that it collects to the RMT Server using this port.

- Open port 80 to outbound TCP traffic on all Agent computers.

Periodically, the Agent will make requests to the RMT Server web interface.

- Open port 443 to outbound TCP traffic on all Agent computers.

This is the port on which the Agent tests its connection to the RMT Server.

For more information on ports and communications, see Tableau Resource Monitoring Tool Communication Ports.

4. Verify that all Agent computers can contact the RMT Server.

The web interface hosted by the RMT Server is bound to a specific hostname or IP address during the setup process. It will only answer requests sent to that specific hostname. For example, if the RMT Server is configured to be hosted at `http://RMTServer/` but the Agents can only contact the RMT Server through `http://myrmt-server.myserver.com/` then the requests will not go through.

5. Gather credentials for a Tableau Server Administrator account.

Resource Monitoring Tool will use the Tableau Server web API to collect information about the content, so it will need credentials for a user that is a Tableau server administrator and can access all sites, projects, etc. We recommend creating one dedicated to Resource Monitoring Tool, but it can be any user that is a Tableau Server administrator.

6. Enable access to the Tableau Server repository database. **This is required starting in version 2022.3.**

Resource Monitoring Tool accesses the repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the "readonly" database user. For details, see Enable access to the Tableau Server repository.

7. If you want to use SSL connections between Resource Monitoring Tool and Tableau Server Repository, make sure Tableau Server is configured to use SSL for internal Postgres connections. For more information, see Configure SSL for Internal Postgres Communication.

The Resource Monitoring Tool allows you to use either the certificate file (`server.crt`) or thumbprint for the SSL connections. The certificate file for the Postgres database is installed to:

```
C:/ProgramData/Tableau/Tableau Server-  
/data/tabsvc/config/pgsql<version>/security
```

If you plan to use the certificate file (`server.crt`), copy the certificate file generated by Tableau Server for internal Postgres SSL connections, to the machine where you plan to install the RMT Server. Copy this to the machine certificate store.

8. Confirm that the REST API is enabled on Tableau Server (this is the default). Use the `tsm configuration get -k api.server.enabled` command to do this. A return value of `true` means the REST API is enabled. To enable the REST API, use the `tsm configuration set` command. For more information, see `api.server.enabled`.
9. Review the size of Tableau Server logs. Once Agent Server is installed and configured, the Resource Monitoring Tool processes relevant historical data from Tableau Server logs before data is displayed. If there is a large amount of historical log data, it may take a while to process the information. This might result in a delay of processing newer events on the Server.

If you are concerned about the delay, and not having historical information does not concern you, you can do the following to clean up the existing files:

- Remove Unneeded Files, and consider Log File Snapshots (Archive Logs) before you remove log files.

**Note:** Performance data like CPU usage and memory usage are not gathered using historical log data and are collected after Agent is installed and configured so cleaning up historical data does not affect performance data.

10. (Optional) Gather connection information for an SMTP server that the RMT Server can access.

If you want email notifications, you need to provide the RMT Server with the server name, username and password (if any), and the port number for an SMTP Server that it can use to send the email, as well as the TLS version. Currently, TLS version 1.2 is required, but TLS version 1.3 is also supported. If you want to use TLS version 1.3, make sure you have Open SSL 1.1.1f or greater on the machine where RMT Server will be installed. For more information, see [Email notifications](#)

## Who can do this

To do all the steps described above you need be an admin on the machine that you are installing Resource Monitoring Tool, and be a Tableau Server Administrator.

### Minimum Hardware Requirements and Recommendations for Tableau Resource Monitoring Tool

Tableau Resource Monitoring Tool handles all of the processing, aggregation, storage and web interface to the monitoring data collected from your Tableau Server installation.

#### RMT Server Minimum Hardware Recommendations

For production use, the machine that you install Resource Monitoring Tool on should meet or exceed the hardware recommendations below:

- 8 physical CPU cores (16 vCPUs)
- CPUs must support SSE4.2 and POPCNT instruction sets
- 64GB RAM
- 500 GB Disk Space for RMT Server
- SSD drive or similar for performance

For RMT Server installations that match the minimum hardware specified above, the Resource Monitoring Tool can provide performance reporting for Tableau Server deployments serving up to 10,000 views per hour.

For deployments with more view loads per hour, or very high numbers of background jobs, data delays may occur. In these cases, you may need to upgrade your hardware.

## Resource Monitoring Tool Agent - Resource Utilisation

The Resource Monitoring Tool Agent monitors the operating system and Tableau Server processes and log files and sends performance metrics and Tableau log data to the Resource Monitoring Tool for near real-time processing. The Agent needs to be installed on every machine that is running Tableau Server.

On Tableau Server installations that match Minimum Hardware Requirements and Recommendations for Tableau Server, here is what to expect:

- We typically see the Agent using 0–5% CPU on average with infrequent spikes above that. Our performance target is an average of 10% CPU usage or less.
- The agent typically uses 200 MB RAM or less with infrequent spikes during periods of heavier Tableau Server activity.
- A minimum of 10 GB free disk space is recommended for the machine where Agent is installed.

## Installing in a Cloud Environment

Resource Monitoring Tool can be installed on a virtual machine in any cloud environment that you may be using for your Tableau Servers. The virtual machine where RMT Server is installed will need to meet the same minimum hardware requirements [described above](#).

Who can do this

To install Resource Monitoring Tool, you must be all the following:

- Administrator on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator.
- Resource Monitoring Tool Administrator.

## Install the Tableau Resource Monitoring Tool

The Tableau Resource Monitoring Tool has two components: RMT Server and Agent.

Resource Monitoring Tool prerequisites and the RMT Server must be installed on dedicated hardware to guarantee they have the necessary resources, and that there is no contention for machine resources with other programs or software. These should not be installed on your

Tableau Server computer, except in exceptional cases (for example, for limited demonstration purposes in non-production environments).

Agents are installed on all nodes of Tableau Server that you want to monitor.

For information about upgrading from Power Tools for Tableau Server to the Resource Monitoring Tool, see [Upgrade Power Tools for Server to Tableau Resource Monitoring Tool](#).

The installer for installing Resource Monitoring Tool can be found on the [Advanced Management Download site](#). Download all the files that start with **Tabrmt**.

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### Installation version history

This section calls out significant changes to the installation process. Use this section to understand what changes have been made depending on your current version and the version you are upgrading to.

- Starting in version **2022.3**, you have the option to configure RabbitMQ messaging service and the PostgreSQL database used by Resource Monitoring Tool on a cloud platform. Currently, the AWS AMQ for RabbitMQ and Amazon RDS for PostgreSQL databases are supported. With this addition, you can choose to install the repository and message queue service with RMT Server on the same machine or separately on the AWS platform.
- Starting in version **2020.4**, the Resource Monitoring Tool can be installed on Linux machines. Previously, Resource Monitoring Tool installation was only supported on Windows machines.
- Starting in **2020.2**, a single installer will install the prerequisites and the RMT Server. You will need only two installers: One for RMT Server that includes prerequisites, and one for installing the Agent.

## Before Installing the Resource Monitoring Tool

- Review the following requirements and instructions:
  - Minimum Hardware Requirements and Recommendations for Tableau Resource Monitoring Tool
  - Pre-Installation Checklist – Tableau Resource Monitoring Tool
  - The following OS is supported:
    - Windows Server 2022 (starting in version 2023.3.1)
    - Windows Server 2016
    - Windows Server 2019
- Make sure the Tableau Server installation you are going to be monitoring is licensed with the Advanced Management licence. You must have a valid Advanced Management licence to use the Resource Monitoring Tool.
- Review the size of Tableau Server logs. Once Agent is installed and configured, the Resource Monitoring Tool processes relevant historical data from Tableau Server logs before data is displayed. If there is a large amount of historical log data, it may take a while to process the information which in turn might result in a delay of processing newer events on the Server.

If you are concerned about the delay, and not having historical information does not concern you, you can do the following to clean up the existing files:

- Remove Unneeded Files, and consider Log File Snapshots (Archive Logs) before you remove log files.

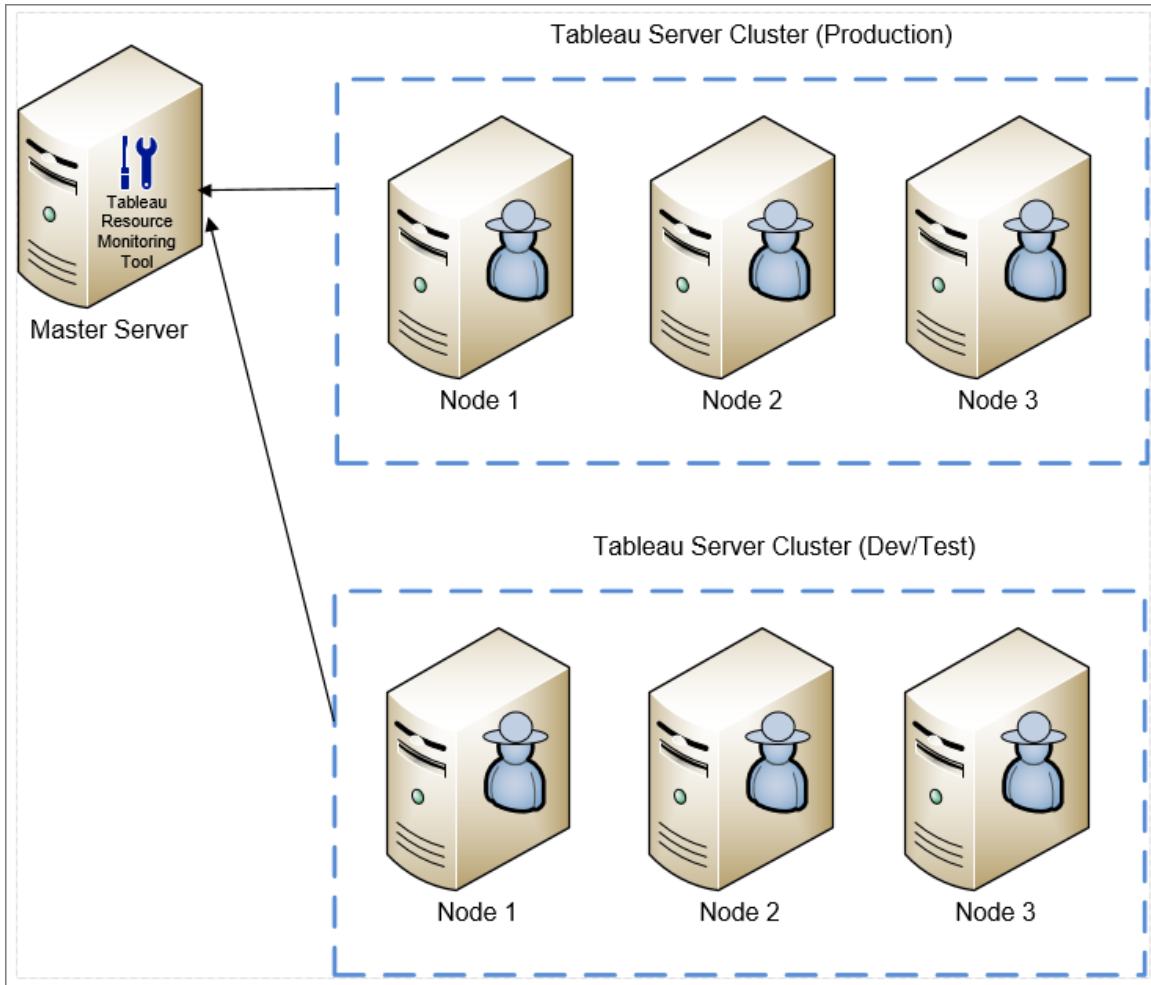
**Note:** Performance data like CPU usage and memory usage are not gathered using historical log data and are collected after Agent is installed and configured so cleaning up historical data does not affect performance data.

- Enable the read only built-in user for Tableau Server Repository. This user is used when installing the Resource Monitoring Tool Agent. **This is required starting in version 2022.3.** For more information, see Collect Data with the Tableau Server Repository.
- Determine if you want to configure the repository and message queue service external to Resource Monitoring Tool.

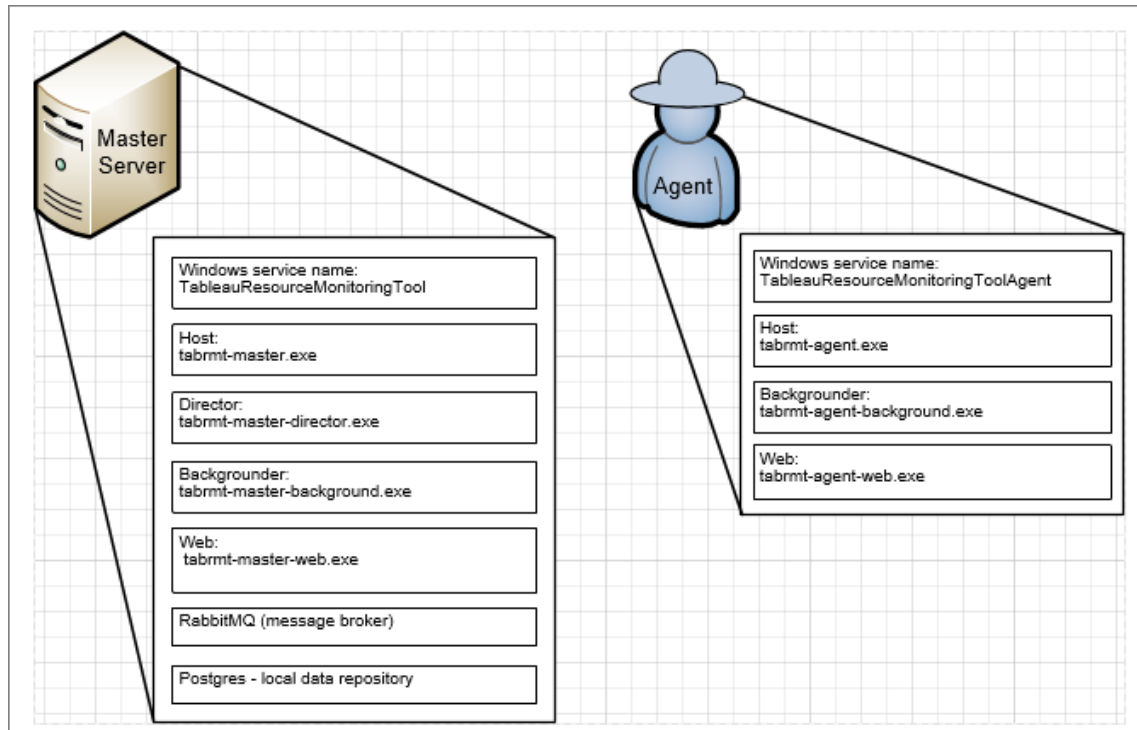


## Setup Architecture

A high-level view of the Resource Monitoring Tool setup. This diagram shows two Tableau Server clusters monitored by the RMT Server.



A detailed view of the Resource Monitoring Tool components installed on the RMT Server and Agent.



## Installation Overview

The RMT Server can be installed on either operating system and does not depend on the operating system that Agent is installed on. This means you can install RMT Server and Agent on different operating systems.

However, Agent is installed on the Tableau Server Cluster nodes, so the operating system choice for the Agent depends on the Tableau Server installation.

You can monitor multiple Tableau Server clusters using the same Resource Monitoring Tool. Each Tableau cluster should be set up as a separate environment.

## External Configuration

The repository and the message queue service can both be hosted external to RMT Server on the AWS platform. For hosting the repository, use the AWS RDS instance, and for mes-

sage queue, use AWS AMQ. For more details on the configuration, step-by-step instructions and other details, see:

- External Repository for Tableau Resource Monitoring Tool
- External Message Queue Service (RabbitMQ) for Tableau Resource Monitoring Tool

### Installation on Windows

You can use the web interface or the command line to install RMT Server and Agent.

Here are the steps to installing Resource Monitoring Tool:

1. Install the RMT Server [using the web interface](#) or [using command line](#).

When you start the Resource Monitoring Tool installer, the setup program will install certain programs required to run Resource Monitoring Tool first. The programs installed are RabbitMQ, Erlang and a dedicated PostgreSQL database. It will then proceed to install the RMT Server.

2. Install the Agent [using the web interface](#) or [using command line](#).

Install the Agent on every one of your Tableau Server nodes. The Agent sends information about Tableau Server usage and performance to the RMT Server for reporting.

### Antivirus

We recommend that you exclude Tableau Resource Monitoring Tool Log Files from your anti-virus scans. This will improve performance by avoiding contention when Resource Monitoring Tool writes to the log files.

### HTTPS

As a best practice, you should use HTTPS to protect sensitive information and user credentials.

The **Require HTTPS** setting in the Server configuration is used for communications between the users and the RMT Server. It is also used when you register an Agent. Regular agent communications between Agent and RMT Server to collect data is done through Rabbit MQ.

By default, the RMT Server is installed with a self-signed certificate and will use that certificate for HTTPS communication which includes communication during Agent registration. You can use your own certificate to replace the self-signed certificate. This can be done during RMT Server installation in the Server Configuration page or after the installation is complete. The following section describes the requirements:

## SSL Certificate Mode and Requirements

The resource monitoring tool supports the following modes of using SSL Certificates:

- **Default:** This mode uses the default self-signed certificate supplied by the installer.
- **Store:** This mode allows you to enter the thumbprint of a certificate in the Windows certificate store.
- **Local:** This mode allows you to specify a file-based certificate in the `<installation directory>\config` folder. By default this is `C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config`.

If you are using your own certificate, you can either select **Local** or **Store**.

- If you choose **Local**, you must have the certificate, the certificate authority and private keys available in the grouped files or in a single file.
- If you choose the **Store** option, you can store the certificate and the thumbprint in advance and refer to it during install. The certificate and private key need to be packaged together and must be able to be referenced from a single thumbprint. The packaged certificate must be stored in a specific location which is defined by .NET requirements and are documented on the Microsoft website [here](#). Once you have the certificate imported on the machine, you can then use this certificate to configure HTTPS.

Follow these guidelines and requirements for your certificate:

- You must have an HTTPS certificate (like X.509) for the appropriate domains. This depends on your local security policies and certificate requirements. For example, if the Resource Monitoring Tool is using a CName or SSL passthrough proxy, you might need to use a SAN certificate. For multiple sub-domains, wildcard certificates are supported.
- The Resource Monitoring Tool supports only PKCS #12 and PEM formats.

## Tableau Server on Windows Help

- The Resource Monitoring Tool web server requires a certificate and a private key, and optionally, a chain-of-trust.

The private key can be either RSA or DSA.

These can be provided in a single file or grouped files.

- Single file examples:
  - PKCS #12: A single file with the .pfx or .p12 file extensions.
  - PEM: PEM-encoded certificate + private key (plus optionally intermediate CAs chaining up to root CA), in a single file with the .pem extension. The items in the file does not have to be in any specific order.
- Grouped file examples:
  - PEM-encoded certificate in a .crt or .cer file PLUS
  - PEM-encoded private key in a .key file PLUS (optionally)
  - PEM-encoded certificate authority in one or more .ca files

Default File and Directory locations:

### RMT Server:

- **Installation Directory:** C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master
- **Configuration File:** C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config.json
- **Log Directory:** C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\logs

### Agent:

- **Installation Directory:** C:\Program Files\Tableau\Tableau Resource Monitoring Tool\agent
- **Log Directory:** C:\Program Files\Tableau\Tableau Resource Monitoring Tool\agent\logs

Who can do this

To install Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

## Next Step

Install the RMT Server:

- [Using web interface](#)
- [Using command line](#)

## Install the RMT Server Using Web Interface

The Resource Monitoring Tool Server (RMT Server) hosts the web application that users interact with. It also does much of the background processing to collate and monitor the data from the Agents. The RMT Server must be installed on dedicated hardware.

Installation through web interface is currently only supported for Windows Installations. If you want to install on Linux, see [Install the RMT Server Using Command Line](#).

## To install the RMT Server:

There are three main steps to installing the RMT Server:

- Installing the Server software
- Configuring the RMT Server
- Creating a new environment.

The detailed step by step process is described below:

### 1. Installing the Server software:

1. Run the RMT Server setup program.
2. After reading the EULA, select **I agree to the license terms and conditions** and click **Install**.

**Note:** If you are planning to install to a non-default location, use the guidelines provided in the Installing to a Non-Default Location. The default location is **C:\Program Files\Tableau\Tableau Resource Monitoring Tool\**.

3. If the User Account Control dialog opens, click **Yes** to allow the installer to make changes.
4. The RMT Server installer will first install certain prerequisites as the first step. The prerequisites include RabbitMQ, Erlang and a PostgreSQL database. The PostgreSQL database is used to store usage data gathered from Tableau Server. It will then proceed to install the RMT Server.
5. At the end of the installation, a **Server Configuration** web page opens.

## 2. Configure the RMT Server:

1. The page should already be filled in. Make any updates to the values if needed.

**Note:** Make a note of the **Host Name**. The web interface used to access the RMT Server uses this format: *https://<hostname>*.

2. By default, Resource Monitoring Tool uses a self-signed certificate to use for the HTTPS communications with the RMT Server. To leverage your own certificate, replace the thumbprint value with the one for the certificate you want to use. Check the **Require HTTPS** option if you want to mandate secure HTTPS communications.

Checking the **Require HTTPS** option will also require you to choose a certificate mode and provide additional details if necessary. Mainly there are three options to choose from:

1. **Default:** This mode uses the default self-signed certificate supplied by the installer.

2. **Local:** This mode allows you to specify a file-based certificate in the Resource Monitoring Tool/**config** folder. When **Local** mode is selected, the **Certificate Name** field becomes available. The options listed will correspond with the certificate file groups located in the **/config** folder.
3. **Store:** This mode allows you to enter the thumbprint of a certificate in the Windows certificate store.

The **Password** field will only be used if the selected certificate requires a password.

3. Test the Server Configuration by clicking **Test Server Configuration**.

**Note:** If you see the following error, use the instructions provided in Troubleshoot SSL Certificate Errors topic:

*Certificate doesn't include accessible private key*

4. The **Password** section allows you to configure the password requirements that will apply to the user accounts and will be applied to the Administrative user account you will create a little later.
5. In the **Authentication** section, you can configure the timeout period for the sessions. If the user does not access the session for the set timeout period then the session will expire and they will need to log in again. By default, this is set to 240 minutes. You can also enable the **Sliding Expiration** option to reset the time out period when a session is accessed within the time out period.
6. Click **Save and Restart Server**.

**Note:** If you see the following error, use the instructions provided in Troubleshoot SSL Certificate Errors topic:

*Certificate doesn't include accessible private key*

7. When the server has restarted, you are prompted to create an administrative user and password.



8. After signing in using the administrative credentials you just created in the previous step, the Resource Monitoring Tool you will see a message that no Environment has been created. Click **Add an environment** to setup a new environment.

### 3. Create a New Environment:

1. Create a new environment: Fill in the details of the environment, like the name and identifier. The Tableau Server REST API and the Tableau Server Repository configurations are used to communicate with Tableau Server. The Tableau Server Repository configuration is optional, but is a preferred method to access Tableau Server.

You have the option to configure secure encrypted connection when RMT connects to Tableau Server Repository. In order to use SSL connections between RMT and Tableau Server Repository database, Tableau Server must be configured to use SSL. For more information, see [Configure SSL for Internal Postgres Communication](#).

2. Tableau Repository Configuration:

In the **Tableau Repository Configuration** section:

1. In the **SSL Mode** drop-down box, select **Prefer SSL** or **Require SSL** to configure SSL connections to Tableau Repository. Choosing **Disable** means SSL will never be used to make Tableau Server Repository connections.

In the **Prefer SSL** mode, the Resource Monitoring Tool will use SSL in the first attempt, and if that fails, the subsequently attempts a non-encrypted connection.

In the **Require SSL** mode, if the SSL connection fails, the connections to Tableau Server Repository will fail entirely. In this case, Tableau Server REST API connections will be used to communicate with Tableau Server.

2. You can choose to either supply the thumbprint that was generated by Tableau Server, or copy the **server.crt** file to the Resource Monitoring Tool Master Server machine. If you choose to copy the certificate file, you don't have to supply the thumbprint. For more information, see [Configure Postgres SSL to Allow Direct Connections from Clients](#).
4. Click **Save**. You will see a new section added to the page - **Agent Configuration**. This section allows you to download the bootstrap file needed to install and configure Agents.

**Note:** If you make any updates to the Environment configurations, you must click **Save** before downloading the Bootstrap file.

The screenshot displays the Tableau Server configuration interface. It is divided into several sections:

- Environment Details:** Includes fields for Name (Test Environment), Identifier (Test-Environment), Gateway URL (https://10.000000.111/), Tableau Version (v2021.1), and Tableau API Username (tuser). There are buttons for 'Test Connection' and 'Change Password'.
- Tableau Repository Configuration:** Includes fields for Server (test-repo-db), Port (8090), Database (workgroup), SSL Mode (Prefer SSL), SSL Certificate Thumbprint (Optional SHA2 certificate hash to validate), and Username (readonly). There are buttons for 'Test Connection' and 'Change Password'.
- Agent Configuration:** Shows 'Agents Connected: 16'. It includes instructions on how to install and configure an agent, a 'Download Bootstrap' button, and a link to 'agent setup documentation'.

At the bottom right, there are 'Cancel' and 'Save' buttons.

## Installing to a Non-Default Location

## RMT Server

Tableau recommends using `\Tableau\Tableau Resource Monitoring Tool` as the location for installing the RMT Server. Example non-default location: **D:\Tableau\Tableau Resource Monitoring Tool**.

**To choose a non-default location during installation, use the following steps:**

## Tableau Server on Windows Help

1. Run the RMT Server installer.
2. On the EULA page, choose **Customise**.
3. Under **Setup Options**, in the **Install location** field, enter the location.
4. Continue with Step 2 of the installation as described Install the RMT Server Using Web Interface.

### Who can do this

To install Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

### Next Step

#### Install the Agent Using the Web Interface

#### Install the Agent Using the Web Interface

The Agent is a lightweight process that consumes minimal server resources and sends data to the Resource Monitoring Tool Server (RMT Server). Install the Resource Monitoring Tool Agent on each of your Tableau Server nodes. To install and register an Agent, download the Agent bootstrap configuration file and save it to a location that is accessible from the Resource Monitoring Tool Agent nodes.

Installation through web interface is currently only supported for Windows Installations. If you want to install on Linux, see Install the Agent Using Command Line.

### Before you install

- Download the bootstrap file. **Bootstrap files are only valid for 24 hours after downloading. You will need to regenerate the bootstrap file if the one you are using is older than 24 hours.**
- Starting in version 2021.3, Agent registration will need to communicate both through an https endpoint and RabbitMQ to complete the Agent registration. Make sure both ports 443 and 5672 are open for these communications.

### Steps to download the Agent bootstrap file

Use the following steps if you have not yet downloaded the bootstrap file from the RMT Server.

1. Using the web interface (<https://<hostname>>) on the RMT Server, from the **Admin** menu, select **Environments**.
2. The bootstrap file can be downloaded directly from the environment overview tab on the home page.

**Note:** If you haven't created an environment as part of the RMT Server setup, follow steps 12–15 described in the [Install the RMT Server Using Web Interface](#) topic.

3. Save the bootstrap configuration file to a location that is accessible from the Tableau Server nodes where you will be installing Resource Monitoring Tool Agent.

### Steps to install Agent

#### To install the Agent on each of your Tableau Server nodes:

1. Run the Agent setup program.
2. After reading the EULA, select **I agree to the license terms and conditions** and click **Next**.
3. On this page, you will have the option of changing the install location and specify the Run As User account for Agent.

If you are planning to install to a non-default location, use the guidelines provided in the [Installing to a Non-Default Location](#). The default location is **C:\Program Files\Tableau\Tableau Resource Monitoring Tool\agent**.

Starting in 2021.4, you must specify a Run As User account for Agent. This account is used to access Tableau Server for gathering monitoring information from Tableau Server nodes.

**For the Agent Run As User account, you must specify the same account that you currently use for the Tableau Server Run As User account.** If the account information you provide is not the same as that on Tableau Server, Agent will not be able to gather the monitoring data on that node.

4. If the **User Account Control** dialog opens, click **Yes** to allow the installer to make changes.
5. When the installer is finished an **Agent Registration** web page opens.

**Tip!** It may take a while for the web page to open. If the web page fails to open for some reason, use the following URL on the machine that you are installing:

<http://localhost:9002/setup/register>

6. Review the information on this page about the Tableau Server log file size, historical data and the implications. Once you proceed to the next step, you will no longer see this information.

Once Agent is installed and registered, the Resource Monitoring Tool processes relevant historical data from Tableau Server logs before data is displayed. If there is a large amount of historical log data, it may take a while to process the information which in turn might result in a delay of processing newer events on the Server.

If you are concerned about the delay, and not having historical information does not concern you, you can do the following to clean up the existing Tableau log files:

Remove Unneeded Files, and consider Log File Snapshots (Archive Logs) before you remove log files.

**Note:** Performance data like CPU usage and memory usage are not gathered using historical log data and are collected after Agent is installed and configured so cleaning up historical data does not affect performance data.

7. Browse to the location of the bootstrap file you downloaded from the RMT Server. Click **Import Bootstrap File**. **Bootstrap files are only valid for 24 hours after downloading. You will need to regenerate the bootstrap file if the one you are using is older than 24 hours.**
8. Once the import is successfully completed, a web page to enter the Server information is displayed. In the **Tableau Server gateway URL** field, enter the URL you use to access Tableau Server.

Here are some examples on what the URL might look like:

- <https://MarketingServer/> (if you know the server's name)
  - <https://10.0.0.2/> (if you know the server's IP address)
  - <http://10.0.0.4/> (If your Tableau Server is not enabled to use SSL)
9. Enter the username and password. You can use the admin user credentials that you created when you installed the RMT server. This username and password is used for communications between RMT Server and Agent.
  10. Click **Test Tableau Server Connection** to verify the Agent is able to reach Tableau Server.

A **Success** message displays to confirm the Agent can connect to Tableau.

11. The **RMT Server URL** field should already be populated from the information in the bootstrap file. This is the URL of the web page used to do administration tasks, monitor performance and other tasks.

Here is an example of what the URL might look like:

- [https://<hostname>\)](https://<hostname>)

12. Click **Test RMT Server Connection** to verify the Agent is able to reach the Resource Monitoring Tool RMT Server.

A **Success** message displays to confirm the connection to the RMT Server works.

13. The **RMT Server certificate thumbprint** field should already be populated using the information in bootstrap file. The bootstrap file you saved should have this and the RMT Server URL information. Enter the RMT Server username and password. This user must have the **Server/Environment Management** role.

Click **Get Registration Options**.

This takes you to the **Agent Registration - Message Queue** page.

14. Click **Test Message Queue Connection** to verify the message queue connection is working.

A **Success** message displays if the connection works.

**Note:** The **Enable TLS** setting under the message queue section allows you to enable encryption when data is transmitted between the RMT Server and the Agents. It requires additional RabbitMQ setup. For more information, see Encrypted Data Collection.

15. On the final Agent Registration page the environment section should already be filled in. Verify the information and add any Tableau Server node details.
16. Click **Connect to Message Queue**.
17. Click **Register Agent** to complete the agent installation and configuration.

You will see an option to disable the web interface. After registration the web interface is no longer necessary for the agent and can optionally be disabled. If you need to re-enable the web interface, use the following command:

```
rmtadmin set server.web.run true
```

For more information on Resource Monitoring Tool commands, see `rmtadmin` Command Line Utility

18. You can verify that the Agent is connected by navigating to the RMT Server web interface. From the **Admin** menu, select **Environments**, and under environment details you can see the number of Agents that are currently connected.

## Installing Agent on a Multi-Node Tableau Server Installation

1. Follow the steps described above to install the Agent on the Tableau Server initial node to connect to the Resource Monitoring Tool.
2. In the **Server** section on the final registration page, tick the **Primary Server** option.
3. On the Tableau Server additional nodes, install the Agent using the same bootstrap file that you used to install Agent on the initial node and follow the steps described above.
4. On the final registration page, in the **Environment** section, select the environment you created when installing the Agent on the initial node.
5. In the **Server** section, select the **New Environment Server** option. The Primary Server option should remain unselected.
6. The agent registration process automatically adds this node to your existing environment.

### Installing to a Non-Default Location

Tableau recommends using `\Tableau\Tableau Resource Monitoring Tool\agent` as the location for the prerequisites. Example non-default location: **D:\Tableau\Tableau Resource Monitoring Tool\agent**.

**To choose a non-default location during installation, use the following steps:**

1. Run the Agent installer.
2. On the EULA page, choose **Customise**.
3. Under **Setup Options**, in the **Install location** field, enter the location.
4. Continue with Step 2 of the installation as described [Install the Agent Using the Web Interface](#).

Who can do this

To install Resource Monitoring Tool, you must have all the following:



## Tableau Server on Windows Help

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.

### Next Steps

### Resource Monitoring Tool Server Configuration

#### Install the RMT Server Using Command Line

The Resource Monitoring Tool Server (RMT Server) hosts the web application that users interact with. It also does much of the background processing to collate and monitor the data from the Agents. The RMT Server must be installed on dedicated hardware.

This topic describes the steps you can use to install the RMT Server using command line. Command line installation is supported on both Windows and Linux operating systems.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

#### Install on Windows

##### To install the RMT Server:

###### 1. Run the RMT Server setup program

1. Download the RMT Server installer and save it to a location that you can access from the machine where you plan to install the RMT Server.
2. Open the command prompt as an administrator.
3. Navigate to the location of the RMT Server installer and run the exe file using the following command

```
Tabrmt-Master-64bit-<version>.exe /silent ACCEPTTEULA=1
```

**Note:** Use the `/silent` or `/quiet` switch to run the setup unattended and without displaying any UI or prompts.

The default install folder is usually like this: `C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master`. To provide a different install location, run the following command:

```
Tabrmt-Master-64bit-<version>.exe /silent ACCEPTTEULA=1
InstallFolder="D:\Tableau Resource Monitoring Tool\master"
```

Full list of all the install command properties and switches can be found in [this section](#) below.

This installs the package and the prerequisites including RabbitMQ, Erlang and a PostgreSQL database. The PostgreSQL database is used to store usage data gathered from Tableau Server. It will then proceed to install the RMT Server.

## 2. Configure the RMT Server.

1. Run the following command and provide the options:

```
rmtadmin master-setup [options]
```

The configuration options can be supplied either through the command prompt, a configuration file. If you do not supply the options, the default values will be applied except for the administrator password. The administrator user name will be set to admin and you will be prompted to provide the password.

Example command including the required password parameter:

```
rmtadmin master-setup --admin-username=<name the administrator user> --admin-password=<administrator user password>
```

The following table lists the required and some commonly used options used to configure the RMT Server. For a full list of the configurations options, see `rmtadmin` Command Line Utility.

**Note:** Require HTTPS option ensures secure communications between the RMT Server and users. When you require HTTPS for communications, you must also select a mode for the certificate that should be used for these communications. The table below includes the various options. To learn more about these modes and certificates, see [SSL Certificate Mode and Requirements](#)

Option	Required?	Default	Description
admin-pass-word	Yes  Password can be supplied in the command line or provide a file with the password to use. If neither is provided, you will be prompted for the password.	n/a	The password for the administrator user.
admin-pass-word-file	No  Password can be supplied in the command line or provide a file with the password to	n/a	The file where the password for the administrator user is stored.

Option	Required?	Default	Description
	use. If neither is provided, you will be prompted for the password.		
admin-user-name	No	admin	The username for the administrator user.
http-port	No	80	
require-https	No	False	<p>If <code>True</code>, http is not available.</p> <p>If <code>False</code>, http will forward to https.</p>
https-certificate-mode	No	<p>'Default'</p> <p>Available options:</p> <ul style="list-style-type: none"> <li>• Default</li> <li>• Store</li> <li>• Local</li> </ul>	<p>The type of certificate search to perform for the HTTPS certificate.</p> <p><b>Default:</b> This mode uses the default self-signed certificate supplied by the installer.</p> <p><b>Store:</b> This allows you to enter the thumbprint of a certificate in the Win-</p>

Option	Required?	Default	Description
			<p>dows certificate store.</p> <p><b>Local:</b> Allows you to specify a file-based certificate in the <b>config</b> folder.</p>
https-certificate-store-thumbprint	No	Null	The HTTPS certificate hash/thumbprint to search for in 'store' certificate mode.
https-certificate-local-name	No	Null  Note: If not specified, the Resource Monitoring Tool is installed with a self-signed certificate and will use that certificate for HTTPS communications.	The name of the HTTPS certificate file without the file extension.
https-certificate-local-password	No	Null	The password to use for the HTTPS certificate.
https-certificate-local-password-file	No	Null	The path to the file containing the password to use for the HTTPS cer-

Option	Required?	Default	Description
			tificate.

### 3. Create an environment

#### 1. Run the following command to create an environment:

```
rmtadmin create-env --name=<myenvironment> --api-user-  
name=<TableauServer API user name> --api-pass-  
word=<password for the Tableau Server API user account>
```

Configure the environment using the options available for this command. Here are some key configuration options to consider:

- The Tableau Server REST API and the Tableau Server Repository configurations are used to communicate with Tableau Server. The Tableau Server Repository configuration is optional, but is a preferred method to access Tableau Server.
- You have the option to configure secure encrypted connection when RMT connects to Tableau Server Repository. In order to use SSL connections between RMT and Tableau Server Repository database, Tableau Server must be configured to use SSL. For more information, see [Configure SSL for Internal Postgres Communication](#).

The following table lists some of the common options. To see a full list of options, see [rmtadmin Command Line Utility](#).

Option	Required?	Default	Description
--name	Yes	n/a	The name of the environment.
--gateway-url	Yes	n/a	URL used to access the Tableau Server gateway.

Option	Required?	Default	Description
--version	Yes	n/a	Tableau Server version that this environment will be monitoring.
--api-user-name	No	Null	Username of the account used to connect to Tableau Server APIs. The user account should be a Tableau Server administrator with access to all Tableau Server sites.
--api-password	No  (If you specify the Tableau API username, you will either provide the password or specify the file path and file that has the password)	Null	Password of the Tableau Server API user account used to connect to Tableau Server APIs.
--api-password-file	No	Null	The path to the file and the name of the file containing the password of the Tableau Server API user account.
--repository-server	No	Null	This is the server name for the PostgreSQL database that is installed with Tableau Server

Option	Required?	Default	Description
--repository-port	No	Null	The port number of the Tableau Server Repository database.
--repository-username	No	Null	<p>Username used to connect to PostgreSQL database installed with the Tableau Server Repository.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.</p>
--repository-password	No	Null	<p>Password for the user account used to connect to the PostgreSQL database that is installed with the Tableau Server.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database</p>



Option	Required?	Default	Description
			directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.
--repository-password-file	No	Null	The path including the file-name where the password for the user account used to connect to the PostgreSQL database that is installed with Tableau Server.
--repository-ssl-mode	No	Prefer	Tableau Server Repository SSL Mode:  <b>Prefer SSL</b> or <b>Require SSL</b> to configure SSL connections to Tableau Repository.  <b>Disable</b> to never use SSL to make Tableau Server Repository connections.
--repository-ssl-thumbprint	No	Null	You can choose to either supply the thumbprint that was generated by Tableau

Option	Required?	Default	Description
			Server, or copy the <b>serv-er.crt</b> file to the Resource Monitoring Tool Server (RMT Server) machine. If you choose to copy the certificate file, you don't have to supply the thumbprint. For more information, see <a href="#">Configure Postgres SSL to Allow Direct Connections from Clients</a> .

2. Download the bootstrap file to a location that can be accessed from the Tableau Server nodes.

```
rmtadmin bootstrap-file --env=<myenvironment> --file-
name<The absolute or relative path including the file
name>
```

## Windows install properties and switches

### Switches:

Switch	Description	Comments
/install   /uninstall	Run Setup to either install or uninstall Resource Monitoring Tool.	Default is to install, displaying UI and all prompts. If no directory is specified using the InstallFolder property on a fresh install, C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master is assumed. If Resource Monitoring Tool is already installed, Setup will assume the same location as the current

Switch	Description	Comments
		<p>installation.</p> <p>To completely remove Resource Monitoring Tool, including the data directory, use, /uninstall DELTEDATADIR=1</p>
/passive	Run Setup with minimal UI and no prompts.	
/quiet   /silent	Run Setup in unattended, fully silent mode. No web interface or prompts are displayed.	Use either /quiet or /silent, not both.
/norestart	Run Setup without restarting Windows, even if a restart is necessary.	In certain rare cases, a restart cannot be suppressed, even when this option is used. This is most likely when an earlier system restart was skipped. For example, if restart was skipped during installation of other software.
/log <log-file>	Log information to the specified file and path. By default log files are created in %TEMP% with a naming convention of Tableau_Resource_Monitoring_Tool_<version_code>.	<p>If no file location is specified, the log file is written to the TEMP folder - C:\Users\&lt;username&gt;\AppData\Local\Temp. Check this log file for errors after installation.</p> <p>For example: &lt;Setup file&gt; /quiet /log="C:\Tableau\Logs\RmtInstall</p>

**Properties:**

Property	Description	Comments
InstallFolder= =<path\to\i- installation\directory>	Install to the specified non-default install location.	Specifies the location to install RMT. If not used, RMT is installed to <i>C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master</i> .  Example: <Setup file> /silent InstallFolder="D:\Tableau\Tableau Resource Monitoring Tool\master"
ACCEPTTEULA=1   0	Accept the End User Licence Agreement (EULA). Required for quiet, silent and passive install on both initial and additional nodes.	If not included when using /passive, /silent or /quiet, Setup fails silently. If included but set to 0, Setup fails.

Property	Description	Comments
	1 = true, accept the EULA, 0 = false, do not accept the EULA.	

### Install on Linux

#### To install the RMT Server:

1. Install the RMT Server:
  - a. Download the rpm or .deb RMT Server installer and save it to a location that you can access from the machine where you plan to install the RMT Server.
  - b. Log in to the machine where you want the RMT Server installed as a user that has sudo access.
  - c. Run the following command to install the RMT Server, where <version> is formatted as major-minor-maintenance:

For RHEL like distribution including CentOS:

```
sudo yum install <path/to/rmtserverinstaller>/Tabrmt-Master-x86_64-<version>.rpm
```

For Ubuntu distributions:

```
sudo apt install ./ <path/to/rmtserverinstaller>/Tabrmt-Master-amd64-<version>.deb
```

This installs the package and the prerequisites including RabbitMQ, Erlang and a PostgreSQL database. The PostgreSQL database is used to store usage data gathered from Tableau Server. It will then proceed to install the RMT Server.

## 2. Initialise RMT Server:

You must explicitly accept the End User Licence Agreement (EULA) when you initialize RMT Server. You also have the option to specify non-default configurations. To initialise RMT Server with a default configuration, run this command :

```
sudo /opt/tableau/tabrmt/master/install-scripts/initialize-rmt-master --accepteula
```

The EULA can be found in the `/opt/tableau/tabrmt/master/docs` folder.

Beginning in version 2023.1 you can specify a custom Run As account to be used by RMT, as well as other configuration options. By default RMT creates and uses an account called `rmt-master` to run under. To specify a custom Run As account to be used by RMT Server, include the `--unprivileged-user` option when you run the initialisation script. For information about all the available switches for the `initialize-rmt-master` script, see [RMT Server Initialisation Script Options](#).

## 3. Configure the RMT Server

### 1. Run the following command as the `tabrmt-master` user:

```
sudo su --login tabrmt-master

rmtadmin master-setup [options]
```

The configuration options can be supplied either through the command prompt, a configuration file. If you do not supply the options, the default values will be applied except for the administrator password. The administrator user name will be set to `admin` and you will be prompted to provide the password.

Example command including the required password parameter:

Tableau Server on Windows Help

```
rmtadmin master-setup --admin-username=<name of the admin-
istrator user> --admin-password=<administrator user pass-
word>
```

The following table lists the required and some commonly used options to configure the RMT Server. For a full list of the configurations options, see rmtadmin Command Line Utility.

**Note:** Require HTTPS option ensures secure communications between the RMT Server and users. When you require HTTPS for communications, you must also select a mode for the certificate that should be used for these communications. The table below includes the various options. To learn more about these modes and certificates, see Install the Tableau Resource Monitoring Tool

Option	Required?	Default	Description
admin-pass-word	Yes  Password can be supplied in the command line or provide a file with the password to use. If neither is provided, you will be prompted for the password.	n/a	The password for the administrator user.
admin-pass-word-file	No  Password can be	n/a	The file where the password for the administrator user is stored.

Option	Required?	Default	Description
	supplied in the command line or provide a file with the password to use. If neither is provided, you will be prompted for the password.		<p><b>Note:</b> <code>tabrmt-master</code> user must have access to this file.</p>
admin-user-name	No	admin	The username for the administrator user.
http-port	No	80	
require-https	No	False	Redirect http traffic to HTTPS.
https-certificate-mode	No	Available Options: <ul style="list-style-type: none"> <li>• Default</li> <li>• Local</li> </ul>	<p>The type of certificate search to perform for the HTTPS certificate.</p> <p><b>Default:</b> This mode uses the default self-signed certificate supplied by the installer.</p> <p><b>Local:</b> Allows you to specify a file-based certificate in the <i>&lt;installation directory&gt;\config</i> folder. By default this is <i>C:\Program Files\T-</i></p>



Option	Required?	Default	Description
			<i>ableau\Tableau Resource Monitoring Tool\master\config.</i>
https-certificate-local-name	No  Note: If not specified, the Resource Monitoring Tool is installed with a self-signed certificate and will use that certificate for HTTPS communications.	Null	The name of the HTTPS certificate file without the file extension.
https-certificate-local-password	No	Null	The password to use for the HTTPS certificate.
https-certificate-local-password-file	No	Null	The path to the file containing the password to use for the HTTPS certificate.

#### 4. Create an environment

1. Run the following command to create an environment:

```
rmtadmin create-env --name=<myenvironment> --api-user-  
name=<TableauServer API user name> --api-pass-  
word=<password for the Tableau Server API user account>
```

Configure the environment using the options available for this command. Here are some key configuration options to consider:

- The Tableau Server REST API and the Tableau Server Repository configurations are used to communicate with Tableau Server. The Tableau Server Repository configuration is optional, but is a preferred method to access Tableau Server.
- You have the option to configure secure encrypted connection when RMT connects to Tableau Server Repository. In order to use SSL connections between RMT and Tableau Server Repository database, Tableau Server must be configured to use SSL. For more information, see [Configure SSL for Internal Postgres Communication](#).

The following table lists some of the common options. To see a full list of options, see [rmtadmin Command Line Utility](#).

Option	Required?	Default	Description
--name	Yes	n/a	The name of the environment.
--gateway-url	Yes	n/a	URL used to access the Tableau Server gateway.
--version	Yes	n/a	Tableau Server version that this environment will be monitoring.
--api-user-	No	Null	Username of the account

Option	Required?	Default	Description
name			used to connect to Tableau Server APIs. The user account should be a Tableau Server administrator with access to all Tableau Server sites.
--api-password	No  (If you specify the Tableau API username, you will either provide the password or specify the file path and file that has the password)	Null	Password of the Tableau Server API user account used to connect to Tableau Server APIs.
--api-password-file	No	Null	The path to the file and the name of the file containing the password of the Tableau Server API user account.
--repository-server	No	Null	This is the server name for the PostgreSQL database that is installed with Tableau Server
--repository-port	No	Null	The port number of the Tableau Server Repository database.
--repository-	No	Null	Username used to connect

Option	Required?	Default	Description
username			<p>to PostgreSQL database installed with the Tableau Server Repository.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.</p>
--repository-password	No	Null	<p>Password for the user account used to connect to the PostgreSQL database that is installed with the Tableau Server.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a</p>

Option	Required?	Default	Description
			password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.
--repository-password-file	No	Null	The path including the file-name where the password for the user account used to connect to the PostgreSQL database that is installed with Tableau Server.
--repository-ssl-mode	No	Prefer	Tableau Server Repository SSL Mode:  <b>Prefer</b> SSL or <b>Require</b> SSL to configure SSL connections to Tableau Repository.  <b>Disable</b> to never use SSL to make Tableau Server Repository connections.
--repository-ssl-thumbprint	No	Null	You can choose to either supply the thumbprint that was generated by Tableau Server, or copy the <b>server.crt</b> file to the Resource Monitoring Tool Server (RMT Server) machine. If you choose to copy the cer-

Option	Required?	Default	Description
			tificate file, you don't have to supply the thumbprint. For more information, see <a href="#">Configure Postgres SSL to Allow Direct Connections from Clients</a> .

2. Download the bootstrap file to a location that can be accessed from the Tableau Server nodes.

```
rmtadmin bootstrap-file --env=<myenvironment> --file-
name<The absolute or relative path including the file
name>
```

5. **Optional step - only if not using SSD:** The Resource Monitoring Tool is optimised for SSD by default. If you are not using SSD hardware, run the command:

```
sudo /opt/tableau/tabrmt/master/tabrmt-master optimize --no-ssd
```

Who can do this

To install Resource Monitoring Tool, you must have all the following:

### Windows

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

### Linux

- Full sudo access for the user account that is used to install the Agent.
- Resource Monitoring Tool Administrator account

## Next Step

### Install the Agent Using Command Line

#### RMT Server Initialisation Script Options

After installing the RMT Server you need to initialise the Server. By default the only required flag you must include when running the initialisation script is `--accepteula`. Other options give you flexibility to customise the installation based on your environment and the security requirements of your enterprise.

#### `--accepteula`

Required.

Indicates you have read and accepted the terms of the End User Licence Agreement (EULA).

#### `-a <username>`

Optional.

Add the provided username to the appropriate groups, instead of the user running the initialise script. This gives the user access to the resources owned by the groups. This is not the same as the Run As user account.

Default: the user running the initialisation script

#### `-f`

Optional.

Bypass warning messages or distribution version check.

#### `-h | -?`

Optional.

Displays the script's help text.

`-q`

Optional.

Quiet, suppress output except for errors and warnings.

`--debug`

Optional.

Print each command as it is run for debugging purposes. Produces extensive output.

`--default-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that allows authorisation to access Tableau RMT Agent. If specified then `--unprivileged-user` must also be specified.

`---disable-account-creation`

**Version:** Added in version 2023.1.0.

Optional.

Accounts/groups, that do not exist, will not be created. If specified, then you must also specify the `--unprivileged-user` parameter and a combination of the `--default-group` and/or other `--rmt-<...>-group` parameters. The user ID and groups those parameters refer to must already exist.

`--rmt-authorised-group=<value>`

**Version:** Added in version 2023.1.0.



Optional.

Name of the group that owns the install base install directory and the `install_dir/-prerequisites` folder. If specified then `--unprivileged-user` must also be specified.

Default: "rmtmasterapp" or `--default-group` value

`--rmt-config-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/master/config` directory. If specified then `--unprivileged-user` must also be specified.

Default: "rmtmasterconfig" or `--default-group` value

`--rmt-logs-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/master/logs` directory. If specified then `--unprivileged-user` must also be specified.

Default: "rmtmasterlogs" or `--default-group` value

`--rmt-openssl-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/prerequisites/openssl` directory.

**Default:** "rmtopenssl" or --default-group value

--rmt-postgres-app-group=<value>

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/prerequisites/postgresql13` directory.

**Default:** "rmtpostgresapp" or --default-group value

--rmt-postgres-data-group=<value>

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/master/logs` directory. If specified then --unprivileged-user must also be specified.

**Default:** "rmtmasterlogs" or --default-group value

--rmt-rabbitmq-app-group=<value>

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/prerequisites/rabbitmq` directory.

**Default:** "rmtrabbitmqapp" or --default-group value

--rmt-rabbitmq-data-group=<value>

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/data/rabbitmq` directory.

Default: `"rmtrabbitmqdata"` or `--default-group value`

`--unprivileged-user=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the unprivileged user account to run Tableau RMT Master. You cannot change the account after initialising RMT.

Default: `"tabrmt-master"`

### Install the Agent Using Command Line

The Agent is a lightweight process that consumes minimal server resources and sends data to the Resource Monitoring Tool Server (RMT Server). Install the Resource Monitoring Tool Agent on each of your Tableau Server nodes. To install and register an Agent, download the Agent bootstrap configuration file and save it to a location that is accessible from the Resource Monitoring Tool Agent nodes.

This topic describes the steps you can use to install the Resource Monitoring Tool Agent using command line. Command line installation is supported on both Windows and Linux operating systems.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

### Before you install

- Download the bootstrap file and save it to a location that is accessible to the nodes on which you are going to install RMT Agent. **Bootstrap files are only valid for 24 hours**

**after downloading. You will need to regenerate the bootstrap file if the one you are using is older than 24 hours.**

- Starting in version 2021.3, Agent registration will need to communicate both through an https endpoint and RabbitMQ to complete Agent registration. Make sure both ports 443 and 5672 are open for these communications.

## Install on Windows

### To install and configure the Agent:

1. Download the bootstrap file to a location that can be accessed from the Tableau Server nodes.

```
rmtadmin bootstrap-file --env=<myenvironment> --filename<The
absolute or relative path including the file name>
```

2. Run the Agent setup program:
  1. Download the Agent installer and save it to a location that you can access from Tableau Server machines.
  2. Open the command prompt as an administrator.
  3. Navigate to the location of the Agent installer and run the **exe** file using the following command

```
Tabrmt-Agent-64bit-<version>.exe /silent ACCEPTEULA=1 RUN_
AS_USER_CUSTOM=1 RUN_AS_USERNAME=<username> RUN_AS_
PASSWORD=<password>
```

Starting in 2021.4, you must specify a Run As User account for Agent. This account is used to access Tableau Server for gathering monitoring information.

For the Run As User account, specify the same account that you currently use for the Tableau Server User account. If the account information you provide is not the same as that on Tableau Server, Agent will not be able to gather the monitoring data on that node.

- Use RUN\_AS\_NETWORK\_SERVICE=1 if your Tableau Server is configured to use the Network Service account as the Run As User account.
- Use RUN\_AS\_USER\_CUSTOM=1 if your Tableau Server is configured to use a custom user. Use the same account credentials as what is specified for Tableau Server.

The default install folder is usually like this: *C:\Program Files\Tableau\Tableau Resource Monitoring Tool\agent*. To provide a different install location, run the following command:

```
Tabrmt-Agent-64bit-<version>.exe/silent ACCEPTEULA=1 RUN_
AS_USER_CUSTOM=1 RUN_AS_USERNAME=<username> RUN_AS_PASSWORD=
D=<password> InstallFolder="D:\Tableau Resource Monitoring
Tool\agent"
```

**Note:** Use the /silent or /quiet switch to run the setup unattended and without displaying any UI or prompts.

3. Register the Agent:

1. Run the following command to register the Agent:

```
rmtadmin register <bootstrap file path\file> --server-name-
e=<Friendly name of machine> --server-description=<server
description> --username <name of the RMT admin user> --pass-
word <password for the user account>
```

The following table lists the configuration options used to register the Agent:

Option		Required?	Default	Description
--bootstrap file	Yes		<none>	The location of the bootstrap file.
--username	Yes		<none>	This is typically the admin user you created during RMT Server installation.

Option	Required?	Default	Description
--password	Yes	<none>	This is the password for the user account
--password-file	No  Password can be supplied in the command line or a file that contains the password. If neither is provided, you will be prompted for the password.	<none>	Path including the file name where the password is stored.
--server-name	No	Host name of machine	Name of the computer that has the Agent Installed. If no option is provided, this field will default to the host name of the machine.
--server-description	No	<none>	Description of the computer that has the Agent installed. If no option is provided, this field will remain blank.

## Windows install properties and switches

### Switches:

Switch	Description	Comments
/passive	Run Setup with minimal UI and no prompts.	
/quiet   /silent	Run Setup in unattended, fully silent mode. No web interface or prompts are displayed.	Use either /quiet or /silent, not both.

**Properties:**

Property	Description	Comments
InstallFolder= =<path\to\i- installation\directory>	Install to the specified non-default install location.	Specifies the location to install RMT. If not used, RMT is installed to <i>C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master</i> .  Example: <Setup file> /silent InstallFolder= ="D:\- \Tableau\Tableau Resource Monitoring Tool\agent"
ACCEPTTEULA=1   0	Accept the End User	If not included when using /passive, /silent or /quiet, Setup fails silently. If included but set to 0, Setup fails.

Property	Description	Comments
	Licence Agreement (EULA). Required for quiet, silent and passive install on both initial and additional nodes. 1 = true, accept the EULA, 0 = false, do not accept the EULA.	



## Install on Linux

### To install and configure the Agent:

#### 1. Install:

1. Download the .rpm or .deb Agent Installer and save it to a location that you can access from the machine where you plan to install the Agent.
2. Run the following command to install the Agent where <version> is formatted as major-minor-maintenance:

For RHEL like distributions including CentOS:

```
sudo yum install Tabrmt-Agent-x86_64-<version>.rpm
```

For Ubuntu:

```
sudo apt install Tabrmt-Agent-amd64-<version>.deb
```

#### 2. Initialise RMT Agent:

You must explicitly accept the End User Licence Agreement (EULA) when you initialise RMT Agent. You also have the option to specify non-default configurations. To initialise RMT Agent with a default configuration, run this command :

```
sudo /opt/tableau/tabrmt/agent/install-scripts/initialize-rmt-agent --accepteula
```

The EULA can be found in the `/opt/tableau/tabrmt/agent/docs` folder.

Beginning in version 2023.1 you can specify a custom Run As account to be used by RMT, as well as other configuration options. By default RMT creates and uses an account called `rmt-agent` to run under. To specify a custom Run As account to be

used by RMT Agent, include the `--unprivileged-user` option when you run the initialisation script. For information about all the available switches for the `initialize-rmt-agent` script, see RMT Agent Initialisation Script Options.

### 3. Register:

1. Log off and log on as the *tabrmt-agent* user so you can run `rmtadmin` commands, which always require that you run as the *tabrmt-agent* user. Also, when you log on again, you create a new session in which group membership changes have taken effect.

```
sudo su --login tabrmt-agent
```

2. Run the following command and provide the path where the bootstrap file is located. Provide the friendly name and a description of the node where the Agent is being installed.

```
rmtadmin register <bootstrap file path\file> --server-name=  
e=<Friendly name of machine> --agent-description=<server  
description> --username=<name of the RMT admin user>
```

You will be prompted for the password of the RMT admin user.

**Note:** The *tabrmt-agent* user defaults to run commands from the base working directory: `/var/opt/tableau/tabrmt/agent`, so you must specify the full file path accordingly. For example, if you placed the bootstrap file in the `/var/opt/tableau/tabrmt/agent/bootstrap/` folder as recommended, the file path would be `/var/opt/tableau/tabrmt/agent/bootstrap/<bootstrap_file_name>.json`

The following table lists the configuration options used to register the Agent:

Option	Required?	Default	Description
--bootstrap file	Yes	<none>	The location of the bootstrap file.
--username	Yes	<none>	This is typically the admin user you created during RMT Server installation.
--password	Yes	<none>	This is the password for the user account
	No	<none>	Path including the file name where the password is stored.
	Password can be supplied in the command line or a file that contains the password. If neither is provided, you will be prompted for the password.		
--server-name	No	Host name of machine	Name of the computer that has the Agent Installed. If no option is provided, this field will default to the host name of the machine.
--server-description	No	<none>	Description of the computer that has the Agent installed. If no option is provided, this field will remain blank.

## Installing Agent on Multi-Node Tableau Server

Run the steps described above on each of the nodes of Tableau Server. On the web interface of the RMT Server, you should be able to see all the nodes where the Agent is installed.

Who can do this

To install Resource Monitoring Tool, you must have all the following:

### Windows:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.

### Linux:

- Full sudo access for the user account that is used to install the Agent.

Next Step

Configure Tableau Resource Monitoring Tool

RMT Agent Initialisation Script Options

After installing the RMT Agent you need to initialise the Agent. By default the only required flag you must include when running the initialisation script is `--accepteula`. Other options give you flexibility to customise the installation based on your environment and the security requirements of your enterprise.

RMT Agent initialisation options

`--accepteula`

Required.

Indicates you have read and accepted the terms of the End User Licence Agreement (EULA).

`-a <username>`

## Tableau Server on Windows Help

Optional.

Add the provided username to the appropriate groups, instead of the user running the initialise script. This gives the user access to the resources owned by the groups. This is not the same as the Run As user account.

Default: the user running the initialisation script

`-f`

Optional.

Bypass warning messages or distribution version check.

`-h` | `-?`

Optional.

Displays the script's help text.

`-q`

Optional.

Quiet, suppress output except for errors and warnings.

`--debug`

Optional.

Print each command as it is run for debugging purposes. Produces extensive output.

`--default-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that allows authorisation to access Tableau RMT Agent. If specified then `--unprivileged-user` must also be specified.

`---disable-account-creation`

**Version:** Added in version 2023.1.0.

Optional.

Accounts/groups, that do not exist, will not be created. If specified, then you must also specify the `--unprivileged-user` parameter and a combination of the `--default-group` and/or other `--rmt-<...>-group` parameters. The user ID and groups those parameters refer to must already exist.

`--rmt-authorized-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the install base install directory and the `install_dir/-prerequisites` folder. If specified then `--unprivileged-user` must also be specified.

**Default:** "rmtagentapp" or `--default-group` value

`--rmt-config-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/agent/config` directory. If specified then `--unprivileged-user` must also be specified.

**Default:** "rmtagentconfig" or `--default-group` value

`--rmt-logs-group=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the group that owns the `install_dir/agent/logs` directory. If specified then `--unprivileged-user` must also be specified.

**Default:** `"rmtagentlogs"` or `--default-group` value

`--unprivileged-user=<value>`

**Version:** Added in version 2023.1.0.

Optional.

Name of the unprivileged user account used to run Tableau RMT Agent. You cannot change the account after initialising RMT.

**Default:** `"tabrmt-agent"`

## External Repository for Tableau Resource Monitoring Tool

The Tableau Resource Monitoring Tool uses a PostgreSQL database as its repository to gather and store Tableau Server monitoring data that is used to provide performance and usage information.

Before the 2022.3 release, this PostgreSQL repository was automatically installed with the RMT Server on the same machine as the RMT Server, and this was the only option available. Starting in version 2022.3, you can reconfigure RMT Server to use an externally hosted PostgreSQL database instead of the locally installed database. When RMT Server is configured to use an externally hosted PostgreSQL database, we refer to it as the external repository.

The supported platform for hosting the external repository is an AWS RDS instance. Hosting the repository database externally allows you to manage the availability, backups and disaster recovery of the repository component of the RMT Server.

With the addition of this option to configure an external repository, RMT Server can be configured in the following ways:

- **Continue to use the locally installed repository:** This means that the PostgreSQL database that is automatically installed with RMT Server on the same machine will be used as the repository for RMT Server, and no further changes are made to this configuration.
- **Configure RMT Server to use an external repository:** This means that the PostgreSQL database that RMT uses is hosted external to RMT Server. This requires making some configuration changes post installation. Currently only AWS RDS instances are supported as the hosting platform for PostgreSQL database.

In order to set up and manage the external repository, you should have a good understanding of the AWS RDS platform and PostgreSQL database. We recommend that you use the [documentation on the AWS site](#) for platform-related instructions.

You will also need to know how to configure and manage the external repository configuration for Resource Monitoring Tool. This topic will provide you with that information in the sections below.

### New installation of Resource Monitoring Tool

The instructions detailed in this section apply to a new installation of Resource Monitoring Tool. If you have an existing deployment of RMT and want to move to an external repository configuration, see the Existing Resource Monitoring Tool installation section of this topic.

When you install RMT Server, it automatically installs the repository database on the same machine as the RMT Server. The process to configure the external repository is a post-installation configuration where you will reconfigure RMT Server to use an externally hosted PostgreSQL database.

Use the following steps to install Resource Monitoring Tool and reconfigure RMT Server to use an external repository:

1. **Create the external repository:** Create an RDS instance to host the external repository with the following recommendations.



- **Minimum recommended PostgreSQL instance specifications:**
  - db.m6g.2xlarge (8 vcpu, 32 GiB RAM)
  - SSD Storage with 500 GB disk space
- **Instance configuration values:**
  - Max. Worker Processes: Total Logical Processors
  - Max. Workers per Gather: Min. (Total Logical Processors / 2, 4)
  - Max. Parallel Workers: Total Logical Processors
  - Max. Parallel Maintenance Workers: Min. (Total Logical Processors / 2, 4)
  - Shared Buffers: Total Memory / 4
  - Effective Cache Size: 75% of Total Memory
  - Maintenance Work Memory: Total Memory / 16 Linux, Max. 2 GB – 1 MB in Windows
  - Wal Buffers: Derived from Shared Buffers, likely around 16 MB
  - Work Memory: Derived from Shared Buffers and Max. Workers per Gather

To learn how to create and connect to a PostgreSQL DB instance on AWS, see [this page on AWS documentation site](#).

2. **Install RMT:** Follow the instructions [Install the RMT Server Using Command Line](#) to install RMT Server, but **skip the steps for creating an environment. You will do that later after configuring RMT Server to use the external repository. Note that this will initially install a local PostgreSQL database.**
3. **Test the connection to the external repository:** Test the connection to the new database using psql, a PostgreSQL administrative tool that is installed with the RMT Server;

Navigate to the 'bin' folder of the locally installed PostgreSQL installation directory.

```
C:\Program Files\Tableau\Tableau Resource Monitoring Tool\prerequisites\postgresql<version number>\bin
```

Run the following command to test the connection. Substitute your own value below for **aws\_rds\_servername** and provide the PostgreSQL password you created in AWS when prompted.

```
.\psql.exe -h <aws_rds_servername> -p 5432 -d postgres -U postgres
```

If you receive an error at this point and cannot connect successfully, review the parameter values in the command against the values from the AWS RDS console.

Once the connection has been successfully established, you can close the psql session with the following command:

```
\q
```

4. Run `rmtadmin master-setup` **to configure RMT Server to use the external repository**. Use the following command examples and edit the command to reflect your Resource Monitoring Tool installation path, AWS RDS instance name, port number and the RDS PostgreSQL admin user password:

Navigate to the Resource Monitoring Tool RMT Server installation directory: `cd 'c:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\'`

Run the command to configure external repository: `./rmtadmin master-setup --db-config=external --db-server=aws_rds_servername --db-port=5432 --db-admin-user-name=postgres --db-admin-password='postgres_user_password'`

5. Now **create an environment** and download the bootstrap file:

- Run the following command to create an environment:

```
rmtadmin create-env --name=<myenvironment> --api-user-  
name=<TableauServer API user name> --api-password=<password  
for the Tableau Server API user account>
```

- Download the bootstrap file to register Agents:

```
rmtadmin bootstrap-file --env=<myenvironment> --file-  
name<The absolute or relative path including the file name>
```

The steps are described in full detail here: [Install the RMT Server Using Command Line](#).

6. Follow the instructions [Install the Agent Using Command Line](#) to Install and register Agents on Tableau Server Nodes.

### Existing Resource Monitoring Tool installation

There are two paths to migrating an existing RMT installations that are currently using a local repository to an external repository: the path you choose depends on the size and complexity of your environment.

1. **Migration with environment recreation:** This is suited to RMT installations that have a small-sized environment with not a lot of configuration and alerts since this path involves recreating the environment and starting again and will lose data that has been collected so far.

This involves reconfiguring the RMT Server to use an external repository, recreating the environments and redoing all the custom configurations like incident thresholds and re-registering the Agents. This is very similar to doing a new installation of RMT described [in the section above](#) except that you will not be installing RMT in this case.

2. **Manual migration with minimal data loss:** This is specifically for customers who have large and complex environments and do not want to start fresh again. This migration is manual and not a built-in migration feature for RMT. The instructions to do this are

described below:

## Manually migrating local Resource Monitoring Tool repository to an external AWS PostgreSQL DB instance

### Step 1: Create an RDS instance to host the external repository

Use the following recommendations when creating the new RDS instance:

- **Minimum recommended PostgreSQL instance specifications:**
  - db.m6g.2xlarge (8 vcpu, 32 GiB RAM)
  - SSD Storage with 500 GB disk space
- **Instance configuration values:**
  - Max. Worker Processes: Total Logical Processors
  - Max. Workers per Gather: Min. (Total Logical Processors / 2, 4)
  - Max. Parallel Workers: Total Logical Processors
  - Max. Parallel Maintenance Workers: Min. (Total Logical Processors / 2, 4)
  - Shared Buffers: Total Memory / 4
  - Effective Cache Size: 75% of Total Memory
  - Maintenance Work Memory: Total Memory / 16 Linux, Max. 2 GB – 1 MB in Windows
  - Wal Buffers: Derived from Shared Buffers, likely around 16 MB
  - Work Memory: Derived from Shared Buffers and Max. Workers per Gather

To learn how to create and connect to a PostgreSQL DB instance on AWS, see [this page on AWS documentation site](#).

## Step 2: Test to make sure you are able to connect to the new database

- Test the connection to the new database using psql, a PostgreSQL administrative tool that is bundled with RMT Server. Substitute your own value below for **aws\_rds\_servername** and provide the PostgreSQL password you created in AWS when prompted.
- Navigate to the 'bin' folder of the locally installed PostgreSQL installation directory.

```
C:\Program Files\Tableau\Tableau Resource Monitoring Tool\prerequisites\postgresql<version number>\bin
```

Run the following command to test the connection. Substitute your own value below for **aws\_rds\_servername** and provide the PostgreSQL password you created in AWS when prompted.

```
.\psql.exe -h <aws_rds_servername> -p 5432 -d postgres -U postgres
```

If you receive an error at this point and cannot connect successfully, review the parameter values in the command against the values from the AWS RDS console.

Once the connection has been successfully established, you can close the psql session with the following command:

```
\q
```

## Step 3: Obtain the admin password for the local PostgreSQL database currently used by RMT

Run the following commands to get the admin password from the local repository. This is needed to make a backup of the data in your local repository before doing the

migration.

Navigate to the RMT Server installation folder: `cd 'c:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\'`

Get the admin password: `rmtadmin get db.adminPassword`

## Step 4: Take a backup of the existing PostgreSQL database

- First, Stop RMT in preparation for taking the database backup.

```
rmtadmin stop
```

- Now restart just the DB service so you can take the backup: `rmtadmin start -db`
- Use the following example scripts and substitute your own values for the file path. If you have customised the port, update that as well. Provide the password from the previous step when prompted:
  - Navigate to the bin folder of the local repository: `cd 'C:\Program Files\Tableau\Tableau Resource Monitoring Tool\prerequisites\postgresql<version number>\bin'`
- Take a backup: `pg_dump -f your_file_name.dump -F d -j 10 -Z 5 -d tabrmt -h localhost -p 5555 -U postgres`
  - -F d: Output a directory-format archive suitable for input into `pg_restore`
  - -j 10: Run the backup in parallel by backing up 10 tables simultaneously
  - -Z 5: Specify the compression level to use

**Note:** Data collected by Resource Monitoring Tool in the time between this step and the final one will not be retained once the migration is complete.

## Step 5: Configure RMT Server to point to the external repository

- Restart all RMT services: `rmtadmin restart --all`
- Use the following command as an example. Edit the command to reflect the RDS server name, port and the RDS postgres user password.

Navigate to the RMT Server installation folder: `cd 'c:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\'`

Configure external repository: `rmtadmin master-setup --db-config=external --db-server=<aws_rds_servername> --db-port=5432 --db-admin-username=postgres --db-admin-password=<postgres_user_password>`

## Step 6: Restore the back up to the external repository

- First, stop RMT Server:

```
rmtadmin stop
```

- Restore the backup you created in step 4 to the new AWS RDS PostgreSQL instance. Edit the example script provided below to reflect your AWS RDS server name and port, and make sure the dump file path and name are accurate. When prompted, provide the password for the "postgres" user in RDS.

```
pg_restore -j 5 -c -h <aws_rds_servername> -p 5432 -U postgres -d tabrmt <your_file_name>.dump
```

- -j 5: Run the restore in parallel by restoring 5 tables simultaneously
- -c: Clean (drop) database objects before recreating them

## Step 7: Start the RMT Server

```
rmtadmin start
```

## Step 8: Re-register Agents

Once the service changes are performed successfully, restart each Agent, then re-register it using the web interface, following the steps below.

1. Download a new bootstrap file from RMT Server.
2. Access the Agent web interface by navigating to `http://localhost:9002/setup/register` and import the bootstrap.
3. Click Test Message Queue. Review the previous inputs if you receive an error.
4. Click Connect to Message Queue.
5. Under the Server section, click the drop-down with “New Environment Server” pre-selected, and rather than accepting the default, pick the server you are trying to register from the list. Scroll to the bottom and click the “Register Agent” button.

For more details on registering Agents, see [Install the Agent Using Command Line](#).

## Step 9: Verify that RMT Server is running and you are seeing the historical data

Log in to RMT Server and verify that data from older time periods is present and that new data is being processed. Also review any custom configuration values to make sure everything is migrated correctly.

### Upgrade best practices

Here are the general steps you need to follow if you want to upgrade Tableau Resource Monitoring Tool and migrate to an external repository at the same time:

#### Migration with environment recreation:

1. **Upgrade RMT Server and all Agents** to 2022.3 or later.
2. Steps 2–4 are very similar to the steps you would take to do a new installation – see [New installation of Resource Monitoring Tool](#) above. This mainly involves:
  - Creating an AWS PostgreSQL DB instance.
  - Configuring RMT Server to use the external repository.
  - Recreate environments and re-register all the Agents.
3. Reconfiguring any custom configurations.



**Note:** You will lose historical data and also need to reconfigure any custom configurations.

### Manual migration with minimal data loss:

1. [Upgrade RMT Server and all Agents](#) to version 2022.3 or later
2. Follow the steps detailed in the [migration section](#). This mainly involves:
  - Creating a AWS PostgreSQL DB instance.
  - Taking a back up of the PostgreSQL database.
  - Configuring RMT Server to use the external repository (PostgreSQL DB instance).
  - Restoring the backup to the external repository.
  - Re-registering the agents.

## Upgrading when the new version of RMT requires a major version PostgreSQL upgrade

When there is a change in the PostgreSQL major version requirement for Resource Monitoring Tool, it is a best practice to upgrade the external repository PostgreSQL version first before you upgrade Resource Monitoring Tool. More details are provided below. To see if you should upgrade your external repository PostgreSQL version, see the [product compatibility table](#).

Use the following steps to upgrade RMT and the RDS instance when a PostgreSQL major version upgrade is required

1. Make a backup of your RDS instance. You will need this in case you need to roll back the upgrade. For more information, see [Backing up and restoring an Amazon RDS DB instance](#) topic on the AWS site.
2. Make a copy of the configuration file in the Resource Monitoring Tool directory. The configuration file is located at:  
`C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config.json`
3. Upgrade the RDS instance to the new version of PostgreSQL. For more information, see [Upgrading the PostgreSQL DB engine for Amazon RDS](#) topic on the AWS site.

4. Upgrade RMT Server. If the upgrade including the database migration is completed successfully, proceed to the next step. If the upgrade fails, see the instructions in this section on how to recover and roll back the upgrade.
5. Upgrade all the Agents on Tableau Server nodes to the new RMT version. For more information, see [Upgrading Resource Monitoring Tool](#).

## Recovering from a failed upgrade

1. Uninstall the upgraded RMT Server.
2. Restore the AWS RDS instance to the version previous to the upgrade. For more information, see the [Backing up and restoring an Amazon RDS DB instance](#) topic on the AWS site.
3. Replace the config file that you backed up prior to the upgrade in the following location. You may have to create this folder as it might have been deleted during uninstallation:

```
C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config.json
```

4. Install RMT Server, which installs a local repository.
5. Configure RMT Server to use the external repository: `rmtadmin master-setup --db-config=external --db-server=<aws_rds_servername> --db-port=5432 --db-admin-username=postgres --db-admin-password=<postgres_user_password>.`

## RMT and PostgreSQL version compatibility

This table lists RMT version 2022.3 and later only, since the external repository is only available from version 2022.3 and later.

RMT Version	PostgreSQL Version shipped with RMT	Supported PostgreSQL Version for external repository
2022.3	13.7	13.7

Who can do this

To install Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

### External Message Queue Service (RabbitMQ) for Tableau Resource Monitoring Tool

The Tableau Resource Monitoring Tool uses RabbitMQ as its message queue service to collect data from Agents and bring them to the RMT Server. This information in the queue is processed and eventually stored in the RMT repository (PostgreSQL database).

Before the 2022.3 release, the RabbitMQ message queue service was automatically installed with the RMT Server and this was the only configuration available. Starting in RMT version 2022.3, you can reconfigure RMT Server to use an externally hosted RabbitMQ service. When RMT Server is configured to use an externally hosted message queue service, we refer to it as the external message queue service.

With this new option added in version 2022.3, RMT Server can be configured in the following ways:

- **Continue to use the locally installed message queue service:** This means that RabbitMQ that is automatically installed with RMT Server on the same machine will be used as the message service for RMT Server, and no further changes are made to this configuration.
- **Configure RMT Server to use an external message queue service:** This means that RabbitMQ that RMT uses is hosted external to RMT Server. Currently, only AWS AMQ is supported as the hosting platform for RabbitMQ. Since all messages from the Agents go through RabbitMQ, hosting this externally frees up resources from the machine where RMT Server is installed.

To set up and manage the external message queue service, you should have a good understanding of the AWS AMQ platform. We recommend reviewing the [documentation on the AWS site](#). You will also need to know how to configure and manage the external message queue service for RMT. This topic will provide you with that information in the sections below.

## New installation of Resource Monitoring Tool

The instructions provided in this section apply to a new installation of Resource Monitoring Tool. If you have an existing installation and want to move your local RabbitMQ to an externally hosted configuration, see the Existing installations of Tableau Resource Monitoring Tool section of this topic.

Use the following steps to install the Tableau Resource monitoring tool and reconfigure RMT Server to use an external message queue service:

1. **Create Amazon AMQ for RabbitMQ** to host the external message queue service with the following recommendations:
  - For engine type, use the RabbitMQ engine. For the version of RabbitMQ, see the Product compatibility section.
  - Use the same default version as the one used when RabbitMQ is installed locally. For more information, see the product compatibility table.
  - Use a single-instance broker.
  - Instance specification: mq.m5.large, 2 vCPU/8 GiB RAM.
  - Create a RabbitMQ username/password.

To learn more, see [Working with Amazon MQ for RabbitMQ](#) on AWS documentation site.

2. **Test the connection from RMT Server** to the message broker by copying the RabbitMQ web console URL from the AWS MQ page, and paste it into a web browser on RMT Server. Log in via the username and password you created when you set up the broker.
3. Follow the instructions in this topic to **install RMT Server**, but **skip the steps for creating an environment. You will do that later after configuring RMT Server to use the external repository.**

## Tableau Server on Windows Help

4. Run `rmtadmin setup` as follows to configure the external RabbitMQ message queue service:

```
rmtadmin master-setup --mq-config=external --mq-server=aws_amq_
servername --mq-vhost='/' --mq-port=5671 --mq-username=aws_amq_
username --mq-password='aws_amq_password' --mq-tls-certificate-
host=aws_amq_servername
```

5. Now create an environment and download the bootstrap file.

- Run the following command to create an environment: `rmtadmin create-env --name=<myenvironment> --api-username=<TableauServer API user name> --api-password=<password for the Tableau Server API user account>`
- Download the bootstrap file to register Agents: `rmtadmin bootstrap-file --env=<myenvironment> --filename<The absolute or relative path including the file name>`

The steps are described in full detail in the [Install the RMT Server Using Command Line](#) topic.

6. Re-register Agents on Tableau Server Nodes using the instructions in [Install the Agent Using Command Line](#) topic.

### Existing installations of Tableau Resource Monitoring Tool

There are two paths to migrating an existing RMT installation that are currently using a local message queue service to an external message queue service:

- **Migration with environment recreation:** This involves creating the external RabbitMQ service, configuring RMT Server to use the external message queue service, recreating the environments and redoing all the custom configurations like incident thresholds and re-registering the Agents.

When using this method, anything coming from Agent, hardware metrics, TS logs, viz loads and hyper queries in the queue but not yet processed will be lost during migration. This is very similar to doing a new installation of RMT described [in the section above](#) except that you will not be installing RMT in this case..

- **Manual migration with minimal data loss:** This is specifically for customers who are able to independently implement the instructions and do not want to deal with recreating the environments and recreating incident thresholds. This method will preserve event data against loss during the transition, but process counter information captured from Tableau Server node hardware during the transition will not be preserved. This migration is manual and not a built-in migration feature for Resource Monitoring Tool.

The instructions to do this are described below:

## Migrating to external AWS AMQ

**Step1: Create Amazon AMQ for RabbitMQ to host the external message queue service with the following recommendations.**

- Use RabbitMQ engine type.
- Default Version (3.9.13) is equal to RMT 22.2 bundled version.
- Use Single-Instance broker.
- Use default instance size (mq.m5.large, 2 vCPU/8 GiB RAM).
- Set RabbitMQ username/password.

To learn more, see [Working with Amazon MQ for RabbitMQ](#) on AWS documentation site.

## Step 2: Test the connection from RMT Server

Copy the RabbitMQ web console URL from the AWS MQ page and paste it into a web browser on RMT Server. Log in via the username and password you created when you set up the broker.

**Step 3: Stop RMT Agent services and de-register Agents**

Run the following commands on each node where Agent is running. Don't stop RMT Server. It should be kept running:

```
rmtadmin stop
```

```
rmtadmin deregister
```

### Step 4: Verify the queue.

On RMT Server, run the `rmtadmin status` and review the output. When all the values in the Total column for each of the queues reaches 0 (or nearly 0) and remains at that value, proceed to the next step.

### Step 5: Configure RMT Server to use the new Amazon MQ service

The `aws_amq_servername` value will be the same as the endpoint listed in Amazon MQ's page, except that the protocol prefix and port at the end should be removed. See the following example:

**Replace** `amqps://b-9512e888-a4a3-4b79-a9c0-07418c101941.mq.us-west-2.amazonaws.com:5671` **with** `B-9512e888-a4a3-4b79-a9c0-07418c101941.mq.us-west-2.amazonaws.com`

Now, run `rmtadmin master-setup`, substituting the username and password you created for Amazon MQ.

```
rmtadmin master-setup --mq-config=external --mq-server=aws_amq_servername --mq-vhost='/' --mq-port=5671 --mq-username=aws_amq_username --mq-password=<aws_amq_password> --mq-tls-certificate-host-t=<aws_amq_servername>
```

Note the following:

- Replace the name in the `--mq-vhost` argument below only if you created your own virtual host (doing so is optional).
- Similarly, change the port if the service is set up to run on a non-default port.

- The value for `--mq-tls-certificate-host` value must be the server name for your AWS MQ instance, as used earlier in the `--mq-server` argument, though it can be a wildcard for additional flexibility.

## Step 6: Start the RMT Server

Navigate to the RMT Server installation folder: `cd 'c:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\'`

Navigate to the RMT Server installation folder: `sudo /var/opt/tableau/tabrmt/master`

Start RMT Server: `rmtadmin start`

## Step 7: Re-register Agents

- Download a new bootstrap file from RMT Server.
- Accessing the Agent web interface by navigating to `http://localhost:9002/setup/register`, import the bootstrap file.
- Click Test Message Queue. Review the previous inputs if you receive an error.
- Click Connect to Message Queue
- Under the Server section, click the drop-down with “New Environment Server” pre-selected, and rather than accepting the default, pick the server you are trying to register from the list. Scroll to the bottom and click the “Register Agent” button.

## Step 8: Verify that RMT Server is running

Log in to RMT Server web interface tool and verify that new data is being processed.

Upgrade best practices

Here are the general steps you need to follow if you want to upgrade to a version 2022.3 or later and migrate to using an external message queue service at the same time.

### Migration with environment recreation:

1. Upgrade RMT Server and all Agents to 2022.3 or later
2. Create an Amazon AMQ broker service.
3. Configure RMT Server to use the external message queue service



4. Recreate environments and re-register all the Agents
5. Recreate any custom configurations.

**Note:** You will lose some event and hardware processing data, and you will also need to reconfigure the incident thresholds

#### Manual migration with minimal data loss:

- Upgrade RMT Server and all Agents to version 2022.3 or later
- Follow the steps detailed in the [migration section](#) of this topic. This mainly involves creating an Amazon AMQ broker service and pointing RMT Server to the external message queue service.
- Re-register the agents.

## Upgrade steps with enabling TLS for RabbitMQ

Since the agents in versions earlier than 2022.3 have been communicating using unencrypted connection to the RabbitMQ message queue service, when upgrading to version 2022.3 or later, those agents need to be updated to use the new secure connection details. The steps to do this are as follows:

1. After completing the upgrade steps described in the above section, stop all agents by running the following command:

```
rmtadmin stop --agent
```

2. Download the bootstrap file for the environment by running the following command:

```
rmtadmin bootstrap-file --env<myenvironment> --filename <The  
absolute or relative path including the file name>
```

3. Run the following command on each of the machines where the Agent is installed:

```
rmtadmin rotate-mq-certificate <BOOTSTRAP_FILE> --username=<RMT
Server Username> --password-file=<RMT Server Password file
name>
```

- Restart each Agent machine after successfully running the `rmtadmin rotate-mq-certificate` command.

## Product Compatibility

This table lists RMT version 2022.3 and later only, since the external message queue is only available from version 2022.3 and later.

RMT Ver- sion	RabbitMQ version shipped with RMT	Support RabbitMQ version for external mes- sage queue service
22.3	3.10.5	3.10.5

Who can do this

To install Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

## Tableau Resource Monitoring Tool Prerequisites - Licences

Tableau Resource Monitoring Tool contains the following open source applications:

RMT VERSION	OPENSSL VERSION	ERLANG VERSION	RABBITMQ VERSION	POSTGRESQL VERSION
2020.4	Mixed/Bundled	22.3	3.8.3	12.2
2021.1	Mixed/Bundled	23.1	3.8.9	12.4
2021.2	Mixed/Bundled	23.2	3.8.14	12.5
2021.3	Mixed/Bundled	24.0	3.8.16	12.6

RMT VERSION	OPENSSL VERSION	ERLANG VERSION	RABBITMQ VERSION	POSTGRESQL VERSION
2021.4	Mixed/Bundled	24.0.3	3.8.19	12.6
2022.1	Mixed/Bundled	24.1	3.9.7	13.3
2022.3	1.1.1q	24.3.4.2	3.10.5	13.7

- **Erlang:** Copyright 2016 Industrial Erlang User Group, Apache 2.0. For more information, see the [Erlang](#) and [Apache 2.0](#) sites.
- **RabbitMQ:** Copyright, MPL 2.0, Copyright (c) 2007-2021 VMware, Inc. or its affiliates. For more information, see [Mozilla Public Licence](#) site.

Resource Monitoring Tool contains a single modified RabbitMQ source file, which is available upon request.

- **PostgreSQL:** Copyright Portions Copyright © 1996-2021, The PostgreSQL Global Development Group, Portions Copyright © 1994, The Regents of the University of California, PostgreSQL licence. For more information, see [PostgreSQL](#) site.
- **OpenSSL:** Copyright (c) 1998-2019 The OpenSSL Project, Copyright (c) 1995-1998 Eric A. Young, Tim J. Hudson, OpenSSL licence, double licence under both the OpenSSL Licence and the original SSLeay licence. For more information, see [Open SSL Licence](#).

## Upgrading Resource Monitoring Tool

These instructions are for upgrading an existing installation of Tableau Resource Monitoring Tool.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

**Note:** The Resource Monitoring Tool performs an in-place upgrade, upgrading your current installation to the newer version. Do not uninstall your existing installation **before** upgrading.

## Upgrade Notes

### Consider the following before you start the upgrade process:

1. If you are planning to move to use an external repository (PostgreSQL) or external message queue service (RabbitMQ), make sure you review the upgrade best practices section in the following topics:
  - Upgrade best practices for external repository
  - Upgrade best practices for external message queue
2. Starting in version 2022.3, Tableau Resource Monitoring Tool has built-in encrypted communications between RMT Server and Agents. However, you will need to run `rmtadmin rotate-mq-certificates` on all the Agents to enable TLS. This applies to RabbitMQ that is configured locally on the same machine as RMT Server. For more details on how to do this, see **Upgrade steps with enabling TLS for RabbitMQ** below.
3. You may need to reboot the machine during an upgrade. This usually occurs if files are locked and cannot be updated by the installer. If necessary, you will be prompted by the installer. Because of this possibility, you may want to consider doing your upgrades during non-work hours.
4. When upgrading Resource Monitoring Tool (Server and Agent), if you run the installer as a different Windows user from the user who ran the original installation, any custom installation directory you used initially may not be detected by the upgrade and will result in the upgrade being installed into a different directory.
5. Sometimes, the Resource Monitoring Tool will modify the database and in such cases, the upgrade process will include a database migration. In case of a database

migration, you will see a message banner at the top of the RMT Server web page with a time estimate for completing the process. An example screen shot is shown below:

> As part of the upgrade process, the Tableau Resource Monitoring Tool database is being migrated to a new format. Current progress: **42% complete**. [Refresh this page](#) for an updated estimate.

On expanding the banner you can review the details of the impact of the upgrade. Changes are unique to each release and the details shown are specific to the release.

✓ As part of the upgrade process, the Tableau Resource Monitoring Tool database is being migrated to a new format. Current progress: **42% complete**. [Refresh this page](#) for an updated estimate.

During migration:

- Averages for events and content pages that existed before the upgrade will show a null value: '—', until the data aggregation is complete.
- Averages for new events and content pages that occurred after the upgrade will initially show as 0 until the data aggregation is complete.

[Learn More](#)

6. The Resource Monitoring Tool is backward compatible with Tableau Server versions, but not forward compatible. This means the Resource Monitoring Tool version should be equal to or greater than the Tableau Server version you are monitoring.

For compatibility reasons, Tableau recommends you upgrade the Resource Monitoring Tool first and then follow with a Tableau Server upgrade. For more information, see [Product Compatibility with Tableau Server](#).

### How to Upgrade the Resource Monitoring Tool

We recommend you do an in-place upgrade of Resource Monitoring Tool. If you uninstall Resource Monitoring Tool and install a new version of the database, it may result in data corruption and you will be prompted to reinstall the previous version and redo the upgrade process.

1. Log in to the Resource Monitoring Tool in a browser and confirm it is working before starting the upgrade.
2. Copy the new version of the RMT Server setup program to the RMT Server machine.
3. Copy the new version of the RMT Agent setup program to the machines where you have RMT Agents installed. RMT Agents are installed on Tableau Server nodes you are monitoring.

4. On each Tableau Server node running the RMT Agent service, stop each RMT Agent by using the following command:

```
rmtadmin stop
```

5. On the machine running the RMT Server service, stop the RMT Server by using the following command:

```
rmtadmin stop
```

6. In Task Manager on RMT Server and Agent machines, wait until there are not any running processes with Resource Monitoring Tool, tabrmt-master or tabrmt-agent in the name before continuing to the next step.
7. Run the RMT Server setup program on the machine where RMT Server is installed. This installs or upgrades any required prerequisites and then upgrades the RMT Server.

You cannot change the install location to a custom directory during the upgrade if the Resource Monitoring Tool was already installed in the default location.

8. Run the RMT Agent setup program on all the machines where RMT Agents are installed.

**Important:** Starting in 2021.4, you must specify a Run As User account for RMT Agent. This account is used to access Tableau Server for gathering monitoring information. For the Run As User account, specify the same account that you currently use for the Tableau Server Run As User account. If this account was previously set to a custom user account and not the default account (NT AUTHORITY/Network Service) during the upgrade process, it will revert to using the default account. You can use the `rmtadmin service-setup` command post installation to change it to the original custom user account.

9. Confirm the RMT Server and Agents are running. Start the RMT Server and Agents if they do not automatically restart after the upgrade is complete.
10. Log in to Resource Monitoring Tool in a browser and confirm that it is working. If your installation is not working, it may be due to an issue with the user account that is used to run the upgrade. See the [upgrade notes section](#) in the beginning of the topic about the user account to use for upgrade.

To verify the RMT Agents have been upgraded, go to the **Admin** menu, select **Environments** and click the **Edit Environment** icon to see the environment details. In the **Servers** tab, you can see the version of the RMT Agent. This can be useful to determine which RMT Agents have been upgraded when you have a multi-node Tableau Server cluster.

#### Upgrade steps with enabling TLS for RabbitMQ

Since the agents in versions earlier than 2022.3 have been communicating using unencrypted connection to the RabbitMQ message queue service, when upgrading to version 2022.3 or later, those agents need to be updated to use the new secure connection details. The steps to do this are as follows:

1. After completing the upgrade steps described in the above section, stop all agents by running the following command:

```
rmtadmin stop --agent
```

2. Download the bootstrap file for the environment by running the following command:

```
rmtadmin bootstrap-file --env<myenvironment> --filename <The  
absolute or relative path including the file name>
```

3. Run the following command on each of the machines where the Agent is installed:

```
rmtadmin rotate-mq-certificate <BOOTSTRAP_FILE> --username=<RMT
Server Username> --password-file=<RMT Server Password file
name>
```

4. Restart each Agent machine after successfully running the `rmtadmin rotate-mq-certificate` command.

Who can do this

To upgrade Resource Monitoring Tool, you will need to have the following permissions:

- Administrator on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator.
- Resource Monitoring Tool Administrator.

## Uninstalling Resource Monitoring Tool

The Resource Monitoring Tool installers include uninstallers. If you are running on Windows then you should be able to run uninstall from **Add/Remove Programs**.

**Note:** If you have issues while attempting to uninstall the Resource Monitoring Tool, see [Troubleshoot RMT Uninstall Errors](#).

Use the following steps to uninstall the Resource Monitoring Tool.

1. To ensure you have a clean uninstall, remove all of the following programs:

Programs installed on the RMT Server:

- Tableau Resource Monitoring Tool
- Tableau Resource Monitoring Tool Erlang Configuration
- Tableau Resource Monitoring Tool PostgreSQL Configuration
- Tableau Resource Monitoring Tool Prerequisites
- Tableau Resource Monitoring Tool Prerequisites Setup
- Tableau Resource Monitoring Tool RabbitMQ Configuration

On the Agent machines, uninstall the Tableau Resource Monitoring Tool Agent.



2. After uninstalling all the programs listed above, delete the Tableau Resource Monitoring Tool directory on the RMT Server and Agent machines. The default location of the data directory is `C:\Program Files\Tableau\Tableau Resource Monitoring Tool`.

**Note:** If you do not delete the Tableau Resource Monitoring Tool directory, certain information like the usernames, passwords and configuration settings are retained and re-used if you do a subsequent reinstall of the Resource Monitoring Tool.

Who can do this

To uninstall Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

## Configure Tableau Resource Monitoring Tool

This section includes topics that provide information on how to configure Tableau Resource Monitoring Tool to suit your requirements.

### Resource Monitoring Tool Server Configuration

This topic describes the Resource Monitoring Tool Server (RMT Server) configuration options you can set using the web interface.

### Post install setup configurations

You can update the configurations you specified during the setup.

Following are the two recommended ways to make configuration changes:

- **To do this using the web interface:** On the machine where RMT Server is installed, go to: `http://<hostname>/setup/server`.

- **To do this using command line**, use `rmtadmin master-setup` command with the `--skip-admin-creation` option to make sure you are not prompted to create the admin user post installation. For more information, see `rmtadmin master-setup`.

**Note:** Configuration values are saved in the **configuration file**. Changes can be made directly to this file, but it is advised to leverage the configuration options in the UI and through the `rmtadmin` command line utility. Changes to the config file will require a restart to be applied.

Here are some examples of the type of updates you might want to do after the initial setup.

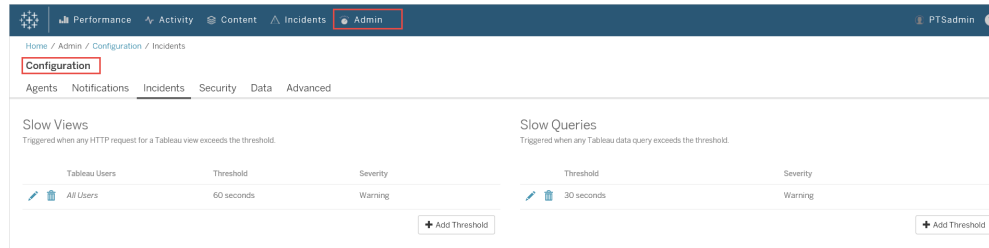
- **Changing SSL Configuration:** The default configuration is set to false. You can change this configuration to require HTTPS. Use the `rmtadmin master-setup` command to update this setting.
- **SSL Certificate Updates:** You might have completed your initial RMT Server setup using the default certification mode for secure communications, and want to update the certification with your own certificate.
- **Changes Ports:** Sometimes you will need to use different port numbers than the default based on your network requirements. To learn more about ports and communications between the various components of Resource Monitoring Tool, see [Tableau Resource Monitoring Tool Communication Ports](#).
- **Update session expiry:** If the user does not access the session for the set timeout period then the session will expire and they will need to log in again. By default, this is set to 240 minutes. You can also enable the **Sliding Expiration** option to reset the time out period when a session is accessed within the time out period.

**Note:** Adding or removing a Tableau Server node: If you add a new node to the Tableau Server Cluster that you are monitoring using Resource Monitoring Tool, you will need to install and register this node. For more information, see [Tableau Server Topology Changes](#).

To do this through command line, use `rmtadmin-master-setup` command. For more information, see [rmtadmin Command Line Utility](#).

## Tableau Server on Windows Help

You can configure Resource Monitoring Tool by clicking on “Configuration” under the Admin menu. Configuration sections are divided by tabs. To do this using a configuration file, see [RMT Server Configuration File](#).



### Notifications

Notifications can be set at a global level and at the environment level.

You can choose how you want to receive your notifications – through email or Slack, or through both email and Slack.

#### The following applies to both email and Slack notifications:

Both email and Slack notifications can be set at a global level and at the environment level. To send any notifications, global configurations must be enabled, not just at the environment level. You can also configure different minimum severity levels at which to send notifications – they can be different for email and slack, they can also be different at global and environment levels.

Global configurations are applied to existing environments or any new environments created, unless the environment is using custom thresholds.

### Slack notification settings

Slack notifications were introduced in Resource Monitoring Tool version 2022.1.

**Before** you set up Slack notifications in Resource Monitoring Tool, there is some initial setup you need to do in Slack. The full details are described in [this Slack article](#), but here are the main things you will need to do:

1. Create a new or use an existing Slack workspace or app and make sure it is enabled to receive incoming webhooks.
2. Authorise a channel where the notifications should be posted.
3. Copy the Webhook URL that is generated for your workspace.

To set up Slack notification in the Resource Monitoring Tool:

1. From the **Admin** menu, select **Global Configuration**.
2. Under the **Notifications** tab, in the **Slack** section, use the toggle button at the top of the section to enable Slack notifications.
3. Configure the following settings:
  1. **Minimum Severity**: The minimum severity level at which you want to receive Slack notifications.
  2. **Webhook URL**: URL of the incoming webhooks for your Slack workspace. This URL is automatically generated when you enable incoming webhooks for your Slack workspace.
4. Test it using the **Send a Test Message** button to make sure that your settings are valid and that they work.

To specify the notifications for each environment:

1. From the **Admin** menu, select the environment that you want to modify and choose **Edit Environment**.
2. In the **Notifications** tab, choose **Custom** for configuration type to override the global settings.
3. Set the minimum severity and the Webhook URL
4. Test it using the **Send a Test Message** button to make sure that your settings are valid and that they work.

## Email notifications

To set up email notification, start by configuring SMTP server settings at the global level. The SMTP server settings configured at the global level are applied automatically to all environments. You can customise certain settings like the minimum severity level and the sender and recipient emails for each environment.

Here are some technical details about how the TLS configuration works:

- RMT Server uses the STARTTLS SMTP option, which upgrades the SMTP connection to TLS after it has been initiated but before the mail content is sent. RMT does not support the REQUIRETLS SMTP option.
- RMT Server uses STARTTLS to encrypt mail in transit to the SMTP server. Whether or not the SMTP server stores the mail encrypted at rest is subject to the SMTP server configuration.

Before you can configure email notifications in the Resource Monitoring Tool, you must have an SMTP server set up and have the following pieces of information:

- Name of the SMTP server.
- If you are planning to use encrypted communications, make a note of the **TLS version** that the SMTP server accepts. Currently, **TLS 1.2 is required** by Resource Monitoring Tool and **TLS 1.3 is supported**.
- The **certificate thumbprint** (optional).
- **Port number** for the SMTP server.
- **Username and password** (optional). Needed only if the SMTP server is configured to authenticate using a username and password.
- **Sender and recipient email addresses** that will be used to send and receive notifications.

**To specify the SMTP server settings in the Resource Monitoring Tool:**

1. From the Admin menu, select **Global Configuration**.
2. In the **Notifications** tab in the **Email** section, select the toggle button at the top of the sections to enable email notifications.
  1. Configure the following SMTP server settings:
    1. **Server:** Provide the fully qualified DNS name of the SMTP server.
    2. **Encryption:** Specify whether you want the communications between the RMT Server and the SMTP server encrypted. The option you choose will depend on the SMTP server configuration for encryption and your preference for using encrypted communications between the RTM Server and

the SMTP server.

1. **Required:** Use this when your SMTP server is enabled to use encrypted communications and you want to make sure communications are always encrypted. When set to required, the connection will always be attempted using encryption. If the SMTP server is not enabled to use encryption, the RMT server will be unable to communicate with the SMTP server.
2. **Preferred:** Use this if you are not sure about the encryption settings of your SMTP server but prefer that encrypted communications be used when possible. If the SMTP server is not enabled to use encryption, in this case, non-encrypted communication is used.
3. **Disabled:** Use this if your SMTP is not enabled to use encrypted communications. Communications between the RMT Server and the SMTP server are not encrypted.

**Note:** If the SMTP server requires encryption, the connection will fail. If the SMTP server is enabled for encryption but does not require it, the connection will succeed.

4. **Options:** This determines how the SMTP server will be verified. You have the following options:
  1. **Check Server identity:** RMT will verify if the name of the certificate used matches the SMTP server name. If there is no match, the connection will fail.
  2. **Trust all hosts:** All certificate errors are ignored and overrides the Check Server identity. This should be used only if you are confident that the certificate that the RMT server is using is from your server.

5. **TLS version:** The version of TLS that is supported by your SMTP server. There is a default version already selected, but you can select other versions. If multiple TLS versions are selected, the RMT server will use the most secure version compatible with the RMT and the SMTP server. TLS version 1.3 requires Open SSL 1.1.1f. If you are planning to use TLS 1.3, make sure the machine where the RMT Server is installed has Open SSL 1.1.1f.
6. **Certificate Thumbprint:** This is optional. The SHA1 certificate is used when provided and it must be valid and one that the SMTP server uses. A valid thumbprint will override other certificate errors like expiry dates and Server name mismatches.
7. **Port:** Port setting for the email server.
8. **Username:** Optional. The name of the account used to authenticate to the email server, if the SMTP server is configured with a username and password for authentication.
9. **Password:** Optional. The password for the account used to authenticate to the email server if the SMTP server is configured with username and password for authentication.
10. **Minimum Severity:** The minimum severity level at which you want to receive email notifications. This will be applied to all environments unless modified at the environment level.
11. **Sender email:** The email address that is used to send the notifications. This will be applied to all environments unless modified at the environment level.
12. **Recipient email(s):** Email addresses of the people who should receive these notifications. This will be applied to all environments unless modified at the environment level.

13. **Test** it using the Send a Test Message button to ensure your settings are valid and can be used to successfully send an email notification.

**To customise the settings for an environment:**

1. From the **Admin** menu, select the environment that you want to modify and choose **Edit Environment**.
2. In the **Notifications** tab, choose **Custom** for configuration type to override the global settings.
3. Set the severity level and sender and recipient email information.
4. Test it using the Send a Test Message button to make sure your settings are valid and you are able to send an email notification.

## Troubleshoot connection failures

**Connection failures** can happen due to various reasons, but here are some that could be caused due to configuration issues:

- **Encryption setting errors:** Happens if there is a mismatch of encryption settings between the RMT Server and the SMTP server. For example, if the RMT server is set to require encryption but the SMTP server is not configured to use encryption. The reverse is also true. If the SMTP server requires encrypted communication and RMT Server is set to disable encryption, the connection will fail.
- **Certificate errors:** When using encrypted communications, things like certificate authority and match between certificate name and the SMTP server are considered unless you choose to explicitly **Trust all hosts** under **Options**.
- **TLS errors:** TLS version support is dependent on the Operating System (OS) on which the RMT Server is installed. Check to see if the version of TLS you selected is supported by the OS. TLS 1.2 is required, but TSL 1.3 is also supported. TLS 1.3 requires Open SSL 1.1.1f or greater. Make sure you have Open SSL 1.1.1f on the machine where RMT Server is installed.



## Tableau Server on Windows Help

### Incident thresholds

Configure the global incident notification settings. These global thresholds apply to all environments by default unless overridden by the individual environments.

See [Incidents](#) for information on what incident options are available and how to configure them.

### Security

Configure the security settings for Resource Monitoring Tool user accounts.

### Data

By default, Resource Monitoring Tool stores two weeks of detailed activity data and ten years of aggregated reporting data.

**Data Retention:** Detailed activity data from your Tableau Server powers the dashboards and incidents for diagnosis of recent performance incidents. Due to the associated storage and processing requirements, this data is only stored for two weeks by default.

**Reporting Data:** Aggregated activity data from your Tableau Server is stored for reporting purposes (e.g. the [Chargeback](#) report). This data is compact and can easily be stored for many years of historical reporting.

### Advanced

Allows configuration of the Resource Monitoring Tool diagnostic logging levels.

See the [Log Files](#) for more information about logging.

### Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

## RMT Server Configuration File

This topic describes the configuration options you can use using the configuration file. To do this using the web interface, see [Resource Monitoring Tool Server Configuration](#).

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

The configuration file is located at `%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\master\config\config.json`. This path may vary depending on your installation.

**Note:** Configuration values are saved in the configuration file. Changes can be made directly to this file, but it is advised to leverage the configuration options in the UI and through the `rmtadmin` command line utility. Changes to the config file will require a restart to be applied.

You will need to restart the RMT Server after making changes to the configuration file.

## Data Retention

By default the Resource Monitoring Tool stores two weeks of detail data and ten years of aggregated reporting data.

This is configurable. Here is an example snippet defining the data retention settings:

```
{
  "db": {
    "cleanup": {
      "afterDays": 14,
      "aggregate": {
        "afterDays": 3650
      }
    }
  }
}
```

```
}  
}  
}
```

## SMTP Configuration

An example `config.json` snippet defining the SMTP information:

```
{  
  "smtp": {  
    "server": "localhost",  
    "port": 25,  
    "username": "my-username",  
    "password": "my-password",  
    "requireSSL": true  
  }  
}
```

The full list of configuration values available in the `smtp` configuration section:

Key	Data Type	Required?	Description
server	String	Optional	The SMTP server to use. Default value: localhost
port	Number	Optional	The SMTP server's port number. Default value: 25
username	String	Optional	The username to use if authentication is required by the server.
password	String	Optional	The password to use if authentication is required by the server.
requireSSL	Boolean	Optional	true if your SMTP

Key	Data Type	Required?	Description
			server requires SSL, otherwise <code>false</code> . Default value: <code>false</code>

## Notification Configuration

An example `config.json` snippet defining the notification information:

```
{
  "notifications": {
    "email": {
      "from": "sender@domain.com",
      "to": "recipient1@domain.com,recipient2@domain.com"
    }
  }
}
```

Global notification information (as shown above) can be overridden per environment in the `environments` section:

```
{
  "environments": {
    "Environment1": {
      "notifications": {
        "email": {
          "from": "sender@domain.com",
          "to": "recipient1@domain.com,recipient2@domain.com"
        }
      }
    }
  }
}
```

The full list of configuration values available in the `notifications.email` configuration section:

Key	Data Type	Required?	Description
<code>from</code>	String	Required	The sender's email address.
<code>to</code>	String	Required	The recipient email address (es). Multiple addresses must be separated by commas or semi-colons.
<code>minimumIncidentSeverity</code>	String	Optional	The minimum incident severity at which emails will be sent. Default value: <code>critical</code> . Also see Tableau Resource Monitoring Tool - Incidents.

### Histogram Configuration

The boundaries used to generate histograms in the web interface are configurable, using an array of values that represent each boundary.

The full list of configurable histograms in the `monitoring.histograms` section:

Key	Data Type	Required?	Description
<code>viewLoadDuration</code>	Array of Numbers	Optional	The histogram boundaries for view loads. Values are in milliseconds.

Key	Data Type	Required?	Description
			Default value: [1000, 3000, 6000, 10000]
<code>externalDataRequestDuration</code>	Array of Numbers	Optional	The histogram boundaries for external data requests. Values are in milliseconds. Default value: [1000, 3000, 6000, 10000]
<code>backgroundTaskDuration</code>	Array of Numbers	Optional	The histogram boundaries for background tasks. Values are in milliseconds. Default value: [60000, 300000, 600000, 1800000]

As an example, to use the following histogram buckets for everything at a global level:

- $\leq 1$  second
- $> 1$  second and  $\leq 10$  seconds
- $> 10$  seconds and  $\leq 30$  seconds
- $> 30$  seconds

The configuration would look like:

```
{
  "monitoring": {
    "histograms": {
      "viewLoadDuration": [1000, 10000, 30000],
      "externalDataRequestDuration": [1000, 10000, 30000],
      "backgroundTaskDuration": [1000, 10000, 30000]
    }
  }
}
```

Histogram boundaries can also be set per environment. As an example, for an environment whose identifier is “staging-environment” to use the following view histogram buckets:

- $\leq 2.5$  seconds
- $> 2.5$  seconds and  $\leq 5$  seconds
- $> 5$  seconds and  $\leq 30$  seconds
- $> 30$  seconds and  $\leq 1$  minute
- $> 1$  minute and  $\leq 10$  minutes
- $> 10$  minutes

The configuration would look like:

```
{
  "environments": {
    "staging-environment": {
      "monitoring": {
        "histograms": {
          "viewLoadDuration": [2500, 5000, 30000, 60000,
600000]
        }
      }
    }
  }
}
```

The “staging-environment” would fall back to the global histogram configuration for background tasks.

## Incident Configuration

See [Incidents](#) for information on what incident options are available and how to configure them.

## RMT Server Logging

See Tableau Resource Monitoring Tool Log Files.

### Agent

The agent service's configuration file is located at `%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\agent\config\config.json`. This path may vary depending on your installation.

You will need to restart the agent service after making changes to the config file.

## Tableau Server Detection

In almost all situations agents will automatically detect the Tableau Server installation and no configuration is needed beyond the standard [agent setup process](#). If desired, you can however manually configure the Tableau Server information through the `config.json` file.

An example `config.json` snippet defining the Tableau Server information needed to run the agent:

```
{
  "agent": {
    "tableauServer": {
      "override": true,
      "productVersion": 2021.4,
      "applicationDirectory": "C:\\Tableau\\Tableau
Server\\2021.4"
    }
  }
}
```



Backslashes should be escaped as shown above for the JSON format.

The full list of configuration values available in the `agent.tableauServer` configuration section:

Key	Data Type	Required?	Description
<code>applicationDirectory</code>	String	Required	The Tableau Server application root directory.
<code>dataDirectory</code>	String	Optional	The directory to get Tableau Server data files.
<code>override</code>	Boolean	Optional	<code>true</code> to have the configuration values take precedent over any automatically detected values. <code>false</code> to have the configuration values act as a fall-back to the automatically detected values.
<code>productVersion</code>	Number	Required	The version number of the Tableau Server.

## Agent Logging

See Tableau Resource Monitoring Tool Log Files.

## Common

Common configuration values are available in both RMT Server and Agent applications. See application-specific sections for guidance on locating the configuration file.

You will need to restart the application service after making changes to the config file.

## Encrypted Messaging

To enable encrypted messaging, the RabbitMQ server must be first configured to allow TLS.

See the [Encrypted Data Collection](#) administrator guide for more details.

When configuring the RMT Server or Agent(s) for encrypted messaging:

- Both the `enabled` flag and the `certificateHostName` must be configured for encryption to be enabled.
- The `certificateHostName` variable MUST match the canonical name (CN=) on the server certificate or the connection will fail.
- The `port` setting in the `mq` section will likely need to be changed based on the TLS port you configured RabbitMQ.

```
{
  "mq": {
    "port": 5671,
    "tls": {
      "enabled": true,
      "certificateHostName": "foo"
    }
  }
}
```

The full list of configuration values available in the `mq.tls` configuration section:

Key	Data Type	Required?	Description
<code>enabled</code>	Boolean	Optional	<code>true</code> enables TLS encryption for messaging connections. <code>false</code> uses unencrypted connections

Key	Data Type	Required?	Description
			for messaging. Default value: <code>false</code>
<code>certificateHostName</code>	String	Optional	<code>certificateHostName</code> MUST match the canonical name (CN=) of the server certificate or the connection will fail. Default value: ""

Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-/Environment Management** role.

rmtadmin Command Line Utility

Resource Monitoring Tool includes a command line interface, `rmtadmin.cmd`, located in the installation folder. The default installation folder is:

- **RMT Server** `%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\Master`
- **Agent**: `%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\agent`

**Note:** You must run the command prompt as an Administrator for these commands to run successfully.

`rmtadmin` is included in both the **RMT Server** and **Agent** installations. Some commands may vary based on whether you are using the RMT Server or Agent `rmtadmin` command line utility. E.g. the `users` command only works from the **RMT Server**. The `ziplogs` command is available everywhere but only includes the log files from the application the command is run on.

Here are the commands that can be used with the `rmtadmin` command line:

**Note:** The `rmtadmin` commands use both positional parameters and options.

The positional parameters should be specified using only the values. You don't need to specify the actual keyword. The option keyword and the value should be specified using an equals sign.

Example:

```
rmtadmin <command> <positional parameter value> --<option
keyword>=<value>
```

- [rmtadmin agents](#)
- [rmtadmin bootstrap-file](#)
- [rmtadmin cleanup](#)
- `rmtadmin create-admin-user`
- [rmtadmin create-env](#)
- [rmtadmin delete-env](#)
- [rmtadmin data-access](#)
- `rmtadmin delete-env-data`
- [rmtadmin delete-server](#)
- [rmtadmin delete-server-data](#)
- [rmtadmin deregister-agent](#)
- [rmtadmin environments](#)
- `rmtadmin get`
- `rmtadmin help`
- [rmtadmin master-setup](#)
- `rmtadmin passwd`
- `rmtadmin query`
- `rmtadmin register`
- `rmtadmin restart`
- `rmtadmin rotate-mq-certificate`
- `rmtadmin rotate-mq-certificates`
- [rmtadmin-servers](#)
- [rmtadmin-service-setup](#)
- `rmtadmin set`
- `rmtadmin start`
- `rmtadmin stop`
- `rmtadmin status`

- `rmtadmin test-env`
- `rmtadmin update-baseline`
- `rmtadmin update-env`
- `rmtadmin users`
- `rmtadmin version`
- `rmtadmin ziplogs`

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`rmtadmin agents`

**Note:** Added in version 2021.2

Lists all the registered Agents on Tableau Server nodes for all environments.

This is useful to see where the Resource Monitoring Tool Agent is installed on Tableau Server.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin agents [options][global option]
```

## Options

`--env`

Optional: Use this option to see the list of Agents for the specific environment. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

`--keys`

Optional: includes the agent key in the output.

**Example:** `rmtadmin agents --env=<myenvironmentidentifier> --keys`

`rmtadmin bootstrap-file`

**Note:** Added in version 2021.2

Creates and saves the bootstrap file used to register Agents on Tableau Server nodes.

Bootstrap file will be created and saved to the specified absolute path or relative path. Relative paths are resolved to the current working directory.

**This command only works on the RMT Server.**

## Synopsis

`rmtadmin bootstrap-file [options][global option]`

## Options

`--env`

Required. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

The Agent on a Tableau Server node can only be registered to one environment at a time.

`--filename`

Optional. The absolute or relative path including the file name. The relative paths are resolved to the current working directory. If not specified, the default output filename is used.

`--force`

Optional. Overwrites the existing file with the same name.

**Example:** `rmtadmin bootstrap-file --env=<myenvironmentidentifier>`

`rmtadmin cleanup`

**Note:** Added in version 2021.2

Deletes the log files that are older than a certain number of days. By default it deletes log files older than 31 days.

**This command works on both the RMT Server and Agent.**

**Note:** If the Resource Monitoring Tool processes are running, the active log files will not be cleaned up by the command. If you want to be sure that all files are deleted, you will need to stop RMT using the `rmtadmin_stop` command and then run cleanup using the following command, `rmtadmin cleanup --log-files-retention=0`, and then restart the processes using the `rmtadmin_start` command.

## Synopsis

`rmtadmin cleanup [option][global option]`

## Option

`--log-files-retention`

Optional. Deletes the log files older than the specified number of days.

**Example:** `rmtadmin cleanup --log-files-retention=<number of days>`

`rmtadmin create-admin-user`

**Version:** Added in version 2022.1

Creates an initial admin user if no other users exist.

**Note:** Beginning in version 2023.1 you can create multiple admin users.

**This command is only on RMT Server.**

## Synopsis

```
rmtadmin create-admin-user [options][global option]
```

## Options

`--username`

Optional. The username for the admin user account. Defaults to "admin" if not specified.

`--password`

Required. The password for the admin user account.

`--password-file`

Optional. The path to the file containing the password for the admin user account. You can use this if you do not want to type in the password directly and have the password stored in a file that can be accessed.

**Example:** `rmtadmin create-admin-user --username<admin user name> --password <password for the admin user account>`

`rmtadmin create-env`

**Note:** Added in version 2021.2

Creates a new environment.

**This command only works on the RMT Server.**



## Synopsis

```
rmtadmin create-env [options][global option]
```

## Options

Option	Required?	Default	Description
--name	Yes	n/a	The name of the environment.
--gateway-url	Yes	n/a	URL used to access the Tableau Server gateway.
--version	Yes	n/a	Tableau Server version that this environment will be monitoring.
--non-interactive	No	Interactive prompts are enabled by default.	Disables all interactive prompts.
--no-test	No	API and Repository connection testing is enabled by default.	Disables testing API and repository connections.
--api-username	No	Null	Username of the account used to connect to Tableau Server APIs. The user account should be a Tableau Server administrator with access to all Tableau Server sites.
--api-password	No	Null	Password of the Tableau Server API user account used to connect to

Option	Required?	Default	Description
	(If you specify the Tableau API username, you will either provide the password or specify the file path and file that has the password)		Tableau Server APIs.
--api-password-file	No	Null	The path to the file and the name of the file containing the password of the Tableau Server API user account.
--repository-server	Yes	Null	This is the server name for the PostgreSQL database that is installed with Tableau Server.
--repository-database	Yes	Null	This is the name of the PostgreSQL database that is installed with Tableau Server.
--repository-port	Yes	Null	The port number of the Tableau Server Repository database.
--repository-username	Yes	Null	<p>Username used to connect to PostgreSQL database installed with the Tableau Server Repository.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the</p>

Option	Required?	Default	Description
			repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.
--repository-password	Yes	Null	<p>Password for the user account used to connect to the PostgreSQL database that is installed with the Tableau Server.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.</p>
--repository-password-file	No, but required if you are not providing the password in command prompt or in a script directly.	Null	The path including the filename where the password for the user account used to connect to the PostgreSQL database that is installed with Tableau Server.
--repository-ssl-mode	No	Prefer	<p>Tableau Server Repository SSL Mode:</p> <p><b>Prefer</b> SSL or <b>Require</b> SSL to con-</p>

Option	Required?	Default	Description
			figure SSL connections to Tableau Repository.  <b>Disable</b> to never use SSL to make Tableau Server Repository connections.
--repository-ssl-thumbprint	No	Null	When configuring Tableau Server PostgreSQL to allow direct connections, Tableau Server creates a certificate and keys. You can choose to either supply the thumbprint for the certificate that was generated by Tableau Server, or copy the <b>server.crt</b> file to the Resource Monitoring Tool Server machine. If you choose to copy the certificate file, you don't have to supply the thumbprint. For more information, see <a href="#">Configure Postgres SSL to Allow Direct Connections from Clients</a> .

**Example:** `rmtadmin create-env --name=<myenvironment> --api-user-name=<TableauServer API user name> --api-password=<password for the Tableau Server API user account> --gateway-url <Tableau Server Gateway URL> --version <Tableau Server version>`

`rmtadmin data-access`

**Note:** Added in version 2022.3

Enables or disables access to the PostgreSQL database. Note: Access to the PostgreSQL database is required starting in version 2022.3 for Resource Monitoring Tool to successfully gather all monitoring data from Tableau Server.

**This command only works on the RMT Server**

**Note:** The PostgreSQL database must be restarted for this configuration to take effect.

## Synopsis

```
rmtadmin data-access [positional parameter][options] [global option]
```

## Positional Parameter

mode

Required. The mode that should be used for remote data access to PostgreSQL database. The values should be one of: *None*, *ReadOnly*, *Admin*. When set to *None*, the data access is disabled. *ReadOnly* and *Admin* specify which user account to use to access the database..

## Options

--

### Example:

```
rmtadmin data-access ReadOnly
```

```
rmtadmin restart --db
```

```
rmtadmin delete-env
```

**Note:** Added in version 2021.2

Deletes a specific environment and all data that has been collected for that environment. It also removes the connection and topology information about the Tableau Server that the environment is monitoring and deregisters all the Resource Monitoring Tool Agents.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin delete-env [positional parameter][options] [global option]
```

## Positional Parameter

env

Required. This is the system-generated identifier. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

## Options

--confirm

Optional. Confirm that you want to delete the environment. If you do not provide this option, you will be prompted to confirm.

--skip-agent-disconnect

Optional. Skips disconnecting the Agent and continues with deregistering the Agent. Use this option if you think the Agent is inaccessible - for example, if the Tableau Server node has been removed or if the Agent has been uninstalled on that node.

**Example:** `rmtadmin delete-env <myenvironmentidentifier>`

rmtadmin delete-env-data

Permanently deletes all Tableau Server-related data collected for a specific environment. Environment configuration, Tableau Server information and Agent registration will not be removed.

This is useful for clearing all the existing data in an environment without removing the environment itself. After deleting the existing data, new data sent by the Agents will continue to be processed.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin delete-env-data [positional parameter] [option] [global  
option]
```

## Positional Parameter

env

The identifier of the environment for which the data should be deleted. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

## Option

--confirm

Optional. Confirm that you want to delete the environment data. If you do not provide this option, you will be prompted to confirm.

**Example:** `rmtadmin delete-env-data <myenvironmentidentifier>`

```
rmtadmin delete-server
```

**Note:** Added in version 2021.2

Deletes the configuration information of the Tableau Server node from the environment, deregisters the Agent on that node and deletes all monitoring data collected specific to that node.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin delete-server [options][global option]
```

## Options

`--env`

Required. The identifier of the environment that the Tableau Server node is connected to. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

`--hostname`

Required to delete information about one or more connected to the environment and if **--all** is not specified.

This is the machine name of the Tableau Server node. Use commas to separate multiple values if specifying more than one host name.

`--all`

Optional, but required if **--hostname** is not specified.

Deletes the information for all the Tableau Server nodes connected to the environment.



`--skip-agent-disconnect`

Optional. Skips disconnecting the Agent and continues with deregistering the Agent. Use this option if the Agent is inaccessible - for example, if the node has been removed from Tableau Server or if the Agent has been uninstalled on that node.

`--confirm`

Confirm that you want to delete all the information about the Tableau Server node. If you do not provide this option, you will be prompted to confirm.

**Example:** `rmtadmin delete-server --hostname=<machine name of the Tableau Server node>`

`rmtadmin delete-server-data`

**Note:** Added in version 2021.2

Deletes the data collected from one or more Tableau Server nodes. Data removed only pertains to the nodes that are specified. If you specify *all*, then all the data collected from all the nodes will be deleted. Environment configuration, Tableau Server information and Agent registrations will not be deleted.

**This command only works on the RMT Server.**

## Synopsis

`rmtadmin delete-server-data [options][global option]`

## Options

`--env`

Required. The identifier of the environment that the Tableau Server node is connected to. This is the system-generated identifier. You can find this by going to **Admin > Envir-**

**Comments > Edit Environment.** On this page, in the **Environment Details** section, you will see the identifier for the environment.

`--hostname`

Required to delete information about one or more connected to the environment and if `--all` is not specified.

This is the machine name of the Tableau Server node. Use commas to separate multiple values if specifying more than one host name.

`--all`

Optional, but required if `--hostname` is not specified.

Deletes the monitoring data for all the Tableau Server nodes connected to the environment.

`--confirm`

Confirm that you want to delete all the monitoring data from the Tableau Server nodes. If you do not provide this option, you will be prompted to confirm.

**Example:** `rmtadmin delete-server-data --all`

`rmtadmin deregister`

**Note:** Added in version 2021.2

Deregisters the Agent from the environment. Monitoring data from this node will no longer be collected. Existing data will remain and not be deleted.

**This command only works when run on the RMT Agent. Run this on the Agent you want to deregister.**

## Synopsis

`rmtadmin deregister [options]`

## Options

`--confirm`

Optional. Confirm that you want to deregister the Agent. This bypasses the confirmation prompt.

`--ignore-master-errors`

Optional. Ignores any errors that occur while communicating with the RTM Server during this process.

**Example:** `rmtadmin deregister --confirm`

`rmtadmin deregister-agent`

**Note:** Added in version 2021.2

Deregisters the specified Agent from the environment. Monitoring data from this node will no longer be collected. Existing data will remain and not be deleted.

**This command only works when run on the RMT Server.**

## Synopsis

```
rmtadmin deregister-agent [options][global option]
```

## Options

`--env`

Required if `--key` is not specified.

This is the identifier of the environment where the Agent is currently registered. This is the system-generated identifier. This is the system-generated identifier. You can find

this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

`--key`

Optional if `--env` is specified.

This is the Agent key. Use commas to separate multiple values. You can get the key values by running the `rmtadmin agents` command.

`--hostname`

Optional. Machine name of the Tableau Server node where the Agent is installed. Use commas to separate multiple values.

`--all`

Optional. Use this option to deregister Agents on all the nodes.

`--ignore-agent-errors`

Optional. Ignores any errors that occur if unable to connect with the Agents during this process.

`--skip-agent-disconnect`

Optional. Skips disconnecting the Agent and continues with deregistering the Agent. Use this option if you think the Agent is inaccessible - for example, if the node has been removed from Tableau Server or if the Agent has been uninstalled on that node.

`--confirm`

Optional. Confirm that you want to deregister the Agents. If you do not provide this option, you will be prompted to confirm.

**Example:** `rmtadmin deregister-agent --env=<myenvironmentidentifier> --all`

`rmtadmin environments`

**Note:** Added in version 2021.2

Lists all the environments on the Resource Monitoring Tool Server.

**This command only works on the RMT Server.**

## Synopsis

`rmtadmin environments [global option]`

`rmtadmin get`

Gets the value of a specified configuration key.

**This command can be used both on the RMT Server and Agent.**

## Synopsis

`rmtadmin get <config.key> [global option]`

## Positional Parameter

`key`

Name of the configuration key.

**Example:** `rmtadmin get db:database`

## Supported configuration keys

Key	Data Type	Applies To	DEFAULT	Description
<code>db:database</code>	String	RMT Server	<code>tabrmtdb</code>	Name of the PostgreSQL database that RMT uses.
<code>db:readOnlyUsername</code>	String	RMT Server	<code>read only</code>	Username of a PostgreSQL user account which has only read-only access to the RMT data.
<code>db:readOnlyPassword</code>	String	RMT Server	Generated by the installer program.	Password of the PostgreSQL read-only user.
<code>mq:tls:certificateHostName</code>	String	RMT Server and Agent	<code>n/a</code>	Host name in the certificate to use when connecting to RabbitMQ via TLS.
<code>mq:tls:enabled</code>	Boolean	RMT Server and Agent	<code>FALSE</code>	Enable/disable TLS connection to RabbitMQ.
<code>mq:port</code>	Integer	RMT Server	<code>5672</code>	RabbitMQ host port number.

Key	Data Type	Applies To	DEFAULT	Description
		and Agent		
<code>mq:virtualHost</code>	String	RMT Server and Agent	<code>tabrmt</code>	Connection to the RMT Server or Agent. For Agent, you can modify this setting by registering the Agent with a bootstrap file. For the RMT Server, the value is managed by the installer.
<code>server.web.run</code>	Boolean	Agent	<code>TRUE</code>	Enable or disable the Agent's web interface.

Use the `set` command to change the current configuration value.

`rmtadmin help`

Shows general help about the command line interface and the available commands.

**This command can be used both on the RMT Server and Agent.**

## Synopsis

`rmtadmin help`

Show help and usage information for a specific command:

**This command can be used both on the RMT Server and Agent.**

```
rmtadmin help [command]
```

```
rmtadmin master-setup
```

Configures the RMT Server with specified options. Used both during install and post installation configurations.

## Synopsis

```
rmtadmin master-setup [options][global option]
```

The configuration options are listed below:

Option	Required?	Default	Description
--admin-password	Yes (Required for initial installation only)  Password can be supplied in the command line or provide a file with the password to use. If neither is provided, you will be prompted for the password.	n/a	The password for the administrator user.
--admin-password-file	Yes (Required for initial installation only)  Password can be supplied in the com-	n/a	The password for the administrator user.



Option	Required?	Default	Description
	mand line or provide a file with the password to use. If neither is provided, you will be prompted for the password.		
--admin-user-name	No	admin	The username for the administrator user.
--skip-admin-creation  <b>Added:</b> version 2020.4.0  <b>Retired:</b> version 2022.3.0	No  This option must be and only used when you making configuration updates post installation.  In versions where this option is valid (2020.4.0 - 2022.2.x), if not used during post installation configuration updates, the command will fail and no updates will be made.  In versions 2022.3.0 and later, the command will create the	False	Skip creating the administrator user and password.

Option	Required?	Default	Description
	admin where necessary.		
--http-port	No	80	
--require-https	No	False	Redirect http traffic to HTTPS.
--https-certificate-mode	No	'Default'  Available options: <ul style="list-style-type: none"> <li>• Default</li> <li>• Store (Windows only)</li> <li>• Local</li> </ul>	The type of certificate search to perform for the HTTPS certificate.  <b>Default:</b> This mode uses the default self-signed certificate supplied by the installer.  <b>Store:</b> This allows you to enter the thumbprint of a certificate in the Windows certificate store.  <b>Local:</b> Allows you to specify a file-based certificate in the <b>config</b> folder.
--https-certificate-store-thumbprint	No	Null	The HTTPS certificate hash/thumbprint to search for in 'store' certificate mode.
--https-certificate-local-name	No	Null	The name of the HTTPS certificate file.

Option	Required?	Default	Description
		Note: If not specified, the Resource Monitoring Tool is installed with a self-signed certificate and will use that certificate for HTTPS communications.	
--https-certificate-local-password	No	Null	The password to use for the HTTPS certificate.
--https-certificate-local-password-file	No	Null	The path to the file containing the password to use for the HTTPS certificate.
--confirm	No	Prompt for confirmation.	Confirms the restart of the RMT Server.
--host	No <div> <b>Note:</b> We don't recommended changing this value. </div>	Current configuration value or machine name.	The preferred URL for accessing the Resource Monitoring Tool server. The server will listen to all the IPs regardless of the host name.
--db-config=external	No	None. This is only used	Use this to configure RMT Server to use an

Option	Required?	Default	Description
		when the repository is configured external to RMT Server.	external repository. You do not need to specify this if you want the PostgreSQL database to be installed locally.
--db-server	No	Current configuration value or installer default.	This is the server name for the PostgreSQL database that is installed with the Resource Monitoring Tool.  If you are using an external repository hosted on AWS RDS, this should be the RDS instance name.
--db-ssl-mode  Version: Added in version 2023.1.0	No	Prefer	This determines the SSL/TLS encryption for the connection to the PostgreSQL database that is installed with the Resource Monitoring Tool.  Options are <code>Prefer</code> (the default), <code>VerifyCA</code> and <code>VerifyFull</code> . For details, see the <a href="#">Npgsql doc-</a>

Option	Required?	Default	Description
			<a href="#">documentation</a> .
--db-port	No	Current configuration value or installer default.	Port number for the database server.
--db-username	No	Current configuration value or installer default.	Username used to connect to PostgreSQL database installed with the Resource Monitoring Tool.  If you are using an external repository hosted on AWS RDS, this should be "postgres".
--db-password	No	Current configuration value or installer default.	Password for the user account used to connect to the PostgreSQL database that is installed with the Resource Monitoring Tool.  If you are using an external repository hosted on AWS RDS, this is the user password you created when creating the RDS instance.
--mq-con-	No	None	This option configures

Option	Required?	Default	Description
fig=external		This option is only specified when the messaging service is hosted external to RMT Server.	RMT Server to use an external RabbitMQ messaging service.
--mq-server	No	Current configuration value or installer default.	The name of the message queue server.
--mq-port	No	Current configuration value or installer default.	The message queue port.
--mq-vhost	No	Current configuration value or installer default.	The message queue virtual host.
--mq-username	No	Current configuration value or installer default.	The username used to connect to the message queue.
--mq-password	No	Current configuration value or installer default.	The password for the user account used to connect to the message queue.
--mq-enable-tls	No	Current configuration value or <b>false</b> .	Requires TLS connection to connect to the message queue.
--mq-tls-certificate-host	No	Current configuration value or <b>null</b> .	The canonical name of the message queue server. This must match the name on the certificate.

Option	Required?	Default	Description
--password-salt	No	Random	<p>A global salt to use to hash the password.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>
--password-min-length	No	Current configuration value or <b>10</b> .	<p>The minimum length for the password.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>
--password-min-numeric	No	Current configuration value or <b>1</b> .	<p>The minimum required numeric characters in the password.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>
--password-min-special	No	Current configuration value or <b>1</b> .	<p>The minimum required special characters in the password.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>

Option	Required?	Default	Description
<code>--password-min-latin</code>	No	Current configuration value or <b>5</b> .	<p>The minimum required latin characters in the password.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>
<code>--password-require-mixed-case</code>	No	Current configuration value or <b>true</b> .	<p>Requires mixed case characters in passwords.</p> <p>This applies to the local user accounts created in the Resource Monitoring Tool.</p>
<code>--auth-timeout-minutes</code>	No	Current configuration value or <b>240</b> .	The number of minutes before the user authentication expires for the session.
<code>--auth-sliding-expiration</code>	No	Current configuration or <b>true</b> .	Whether or not to reset the authentication timeout period with user activity.

**Examples:**

**To specify the admin password:** `rmtadmin master-setup --admin-password=<password> --skip-admin-creation`



**To update the port post install:** `rmtadmin master-setup --http-port=8000 --skip-admin-creation`

`rmtadmin passwd`

Resets the password for a specific Resource Monitoring Tool user account.

**This command works only on the RMT Server.**

## Synopsis

`rmtadmin passwd [positional parameter][global option]`

## Positional Parameter

`username`

Name of the user that you want to change the password for.

**Example:** `rmtadmin passwd <username>`

`rmtadmin query`

Executes a raw SQL query against the Resource Monitoring Tool database and saves the results to an output file.

**This command works only on the RMT Server.**

## Synopsis

`rmtadmin query [positional parameter][options] [global option]`

## Positional Parameter

`sql`

SQL command text to run. You can provide multiple SQL commands. To use a file with the SQL commands, use **@** as a prefix to the name of the file.

## Options

`--outfile=VALUE`

Name of the zip file you want to output the query results. Default is *queryresults.zip*

`--force`

Overwrites the existing file.

`--timeout=VALUE`

timeout for the query. Specify this in seconds

`--commit`

Commits any changes made by the SQL command to the database. By default, the SQL command is run as a transaction, but is rolled back on completion.

**Example:** `rmtadmin query <SQLCommand> --outfile=<path and the output file name>`

`rmtadmin register`

**Note:** Added in version 2020.2

Registers the Agent using a bootstrap file. The bootstrap file can be downloaded using the `rmtadmin bootstrap-file` command.

**This command is can only be used on the Agent and should be run on the machine where you want to install the Agent.**

## Synopsis

```
rmtadmin register [options][positional parameter] [global option]
```

## Positional Parameter

`bootstrap`

The file path including the name of the bootstrap file.

## Options

`--username`

Required. Name of the admin user created during the RMT Server installation.

`--password`

Required. Password for the user account.

`--password-file`

Path including the file name that contains the password information. Password can be supplied in the command line or a file that contains the password. If neither is provided, you will be prompted for the password.

`--server-name`

Name of the node where Agent is being installed. It defaults to the machine name if no name is specified.

`--server-description`

Custom description for the Server.

**Example:** `rmtadmin register <bootstrap file name and path> --server-name=<server name>`

`rmtadmin restart`

Restarts the Resource Monitoring Tool applications. When run from the machine where RMT Server is installed, it restarts the RMT Server application. When run on a node where the Agent is installed, it restarts just the Agent application on that particular node.

**This command can be run from both the RMT Server and Agent.**

## Synopsis

`rmtadmin restart [options] [global option]`

## Options

At least one option must be specified:

### **RMT Server:**

`--all`

Restarts all services.

`--master`

Restarts the RMT Server.

## Tableau Server on Windows Help

`--mq`

Restarts the message queue service.

`--db`

Restarts the database service.

### **Agent:**

`--agent`

Restarts the Agent service running on the machine.

**Example:** `rmtadmin restart --db`

`rmtadmin rotate-mq-certificate`

Rotates the Agent message queue client certificate on the agent machine. Run this command after running `rmtadmin rotate-mq-certificate` on the Server machine.

**This command must be run from the RMT Agent.**

## Synopsis

`rmtadmin rotate-mq-certificate [options] [positional parameter]`

## Positional Parameter

`bootstrap`

The file path including the name of the bootstrap file.

## Options

`--username`

Required. The username for the master server.

`--password`

Required. Password for the master server user account.

`--password-file`

Path including the file name that contains the master server password information. Password can be supplied in the command line or a file that contains the password. If neither is provided, you will be prompted for the password.

`--confirm-restart`

Confirms service restart and bypasses confirmation prompt.

`rmtadmin rotate-mq-certificates`

Rotates message queue server and client certificates on the Server machine.

**This command must be run from the RMT Server.**

## Synopsis

`rmtadmin rotate-mq-certificates [options]`

## Options

`--confirm-restart`

Confirms service restart and bypasses confirmation prompt.

`rmtadmin servers`

**Note:** Added in version 2021.2

Lists all the Tableau Server nodes across all environments or a specific environment.

**This command only works on the RMT Server.**

## Synopsis

`rmtadmin servers [positional parameter][global option]`

## Positional Parameter

`env`

Optional. Specify the identifier of the environment to get a list of Tableau Server nodes registered in that environment. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

`rmtadmin service-setup`

**Note:** Added in version 2021.4. Used to install or update the user credential for Resource Monitoring Tool services including RMT Server, Agent, RabbitMQ and PostgreSQL database. This is useful to update service information post-installation.

**This command works on both RMT Server and Agent.**

## Synopsis

```
rmtadmin service-setup [positional parameter] [options] [global  
option]
```

## Positional Parameter

At least one of the following values must be specified:

`all`

Updates all available services. Can be run on both RMT and Agent. When run on a Tableau Server node, updates the Agent on that node.

`master`

Updates the RMT Server.

`agent`

Updates the Agent. Can only be run on the Agent (Tableau Server node).

`db`

Updates the database service. Can only be run on RMT Server.

`mq`

Updates the message queue service. Can only be run on RMT Server.



## Options

`--confirm`

Optional. Confirm that you want to make updates. Can be run on both RMT and Agent.  
When run on a Tableau Server node, updates the Agent on that node.

`--user-type`

Required for RMT Server and Agent. The type of account that is used to run RMT Server or Agent. Allowed values are:

- Virtual account (RMT Server only)
- network-service
- local-system
- local-service
- username (username of local or domain user account)

`--username`

Specifies the username of the account. Required if using a local or domain user account.

`--password`

Specifies the password for the account. Required if using a local or domain user account.

`--password-file`

Optional. The path to the location of the file, including the file name where the password information is stored.

`--append-permissions`

Optional. Appends new permissions. Use this if you do not want to overwrite the existing permissions.

`rmtadmin set`

Sets the value of a specified configuration key.

**This command works both on the RMT Server and Agent.**

## Synopsis

```
rmtadmin set [positional parameter] [global option]
```

## Positional Parameters

`key`

The configuration key you want to change the value for.

`value`

The new value you want to use.

**Example:** `rmtadmin set mq:port <port number>` where `mq:port` is the key and the `<port number>` is the value.

## Supported configuration keys

Key	Data Type	Applies To	DEFAULT	Description
<code>mq:tls:certificateHostName</code>	String	RMT Server and Agent	n/a	Host name in the certificate to use when connecting to RabbitMQ via TLS

Key	Data Type	Applies To	DEFAULT	Description
<code>mq:tls:enabled</code>	Boolean	RMT Server and Agent	FALSE	Enable/disable TLS connection to RabbitMQ
<code>mq:port</code>	Integer	RMT Server and Agent	5672	RabbitMQ host port number.
<code>server.web.run</code>	Boolean	Agent	TRUE	Enable or disable the Agent's web interface.

## Options

`--backup`

Creates a backup of the configuration file before making changes.

Use the `get` command to view the current configuration value.

`rmtadmin start`

Starts the Resource Monitoring Tool services. When this is run on the RMT Server, it will start the RMT Server only. When run on an Agent, it will start the Agent on the machine you are running the command from.

**This command works both on the RMT Server and Agent**

## Synopsis

```
rmtadmin start [options] [global option]
```

## Options

At least one option must be specified:

### **RMT Server:**

`--all`

Starts all services.

`--master`

Starts the RMT Server.

`--mq`

Starts the message queue service.

`--db`

Starts the database service.

### **Agent:**

`--agent`

Starts the Agent service running on the machine.

**Example:** `rmtadmin start --all`

## `rmtadmin status`

Checks the status of the application and running services on the machine you are running this command on. For RMT Server, the status report confirms that the RMT Server is connected to the database and message queue. For Agents, the status report confirms that the agent is connected to the RMT Server.

**This command can be run both on the RMT Server and the Agent.**

This command returns the following:

- Application status (running or not)
- Licence status
- MQ connection
- Queue details
- Memory used
- Disk space used
- Tableau server version on machine
- Process topology of Tableau Server that is stored in Agent config file.

Beginning with version 2024.2.0, when run on the RMT Server, the command returns:

- Disk space usage warning if messaging tables in the local database are using more space than the warning threshold (4 GB). For more information, see [Troubleshoot Messaging Tables Disk Usage Warnings](#)

## Synopsis

```
rmtadmin status [global option]
```

## `rmtadmin stop`

Stops the Resource Monitoring Tool services. When this command is run on the RMT Server, it will only stop the RMT Server. When run on a machine where Agent is installed, it will only stop the Agent on that machine.

**This command can be run both on the RMT Server and the Agent.**

## Synopsis

```
rmtadmin stop [options] [global option]
```

## Options

At least one option must be specified:

### **RMT Server:**

```
--all
```

Stops all services.

```
--master
```

Stops the RMT Server.

```
--mq
```

Stops the message queue service.

```
--db
```

Stops the database service.

### **Agent:**

```
--agent
```

Stops the Agent service running on the machine.

**Example:** `rmtadmin stop --db`

`rmtadmin test-env`

**Note:** Added in version 2021.2

Tests the various connection points between Resource Monitoring Tool and Tableau Server. This includes testing Tableau Server Repository connection, Tableau Server API connections and Advanced Management (formerly Server Management Add-on) licensing.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin test-env [positional parameter][global option]
```

## Positional Parameter

`--env`

Optional. The identifier of the environment that the Resource Monitoring Tool is monitoring. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

`--force`

Optional. Use this option to update the baseline immediately even if enough data is not available. By default the command will wait for 50 successful loads to calculate the baseline

`rmtadmin update-baseline`

**Note:** Added in version 2021.4

Updates the baseline for all view loads. Baseline is the 95th percentile of 50 successful initial load times for a view.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin update-baseline [options][global option]
```

## Options

env

Required. This is the system-generated identifier. You can find this by going to **Admin > Environments > Edit Environment**. On this page, in the **Environment Details** section, you will see the identifier for the environment.

```
rmtadmin update-env
```

**Note:** Added in version 2021.2

Updates the environment settings.

**This command only works on the RMT Server.**

## Synopsis

```
rmtadmin update-env [options][global option]
```

## Options

Option	Required?	Description
--non-interactive	No	Disables all interactive prompts.
--no-test	No	Disables testing API and repository connections.
--name	Yes	The name of the environment.



Option	Required?	Description
--id	No	<p>Identifier of the environment used in web interface URLs.</p> <p>This is the system-generated identifier. You can find this by going to <b>Admin &gt; Environments &gt; Edit Environment</b>. On this page, in the <b>Environment Details</b> section, you will see the identifier for the environment.</p>
--gateway-url	No	URL used to access the Tableau Server gateway.
--version	No	Tableau Server version that this environment will be monitoring.
--api-username	No	<p>Username of the account used to connect to Tableau Server APIs.</p> <p>The user account should be a Tableau Server administrator with access to all Tableau Server sites.</p>
--api-password	No	Password of the Tableau Server API user account used to connect to Tableau Server APIs.
--api-password-file	No	The path to the file containing the password of the Tableau Server API user account.
--repository-server	No	This is the server name for the PostgreSQL database that is installed with the Resource Monitoring Tool.

Option	Required?	Description
--repository-port	No	The port number of the Tableau Server Repository database.
--repository-username	No	<p>Username used to connect to PostgreSQL database installed with the Tableau Server Repository.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.</p>
--repository-password	No	<p>Password for the user account used to connect to the PostgreSQL database that is installed with the Tableau Server.</p> <p>Resource Monitoring Tool accesses the Tableau Server Repository database directly for performance reasons. For this to work, access to the repository must be enabled, with a password set for the <b>readonly</b> database user. For details, see Enable access to the Tableau Server repository.</p>

Option	Required?	Description
<code>--repository-password</code>	No	The path including the filename where the password for the user account used to connect to the PostgreSQL database that is installed with Tableau Server.
<code>--repository-ssl-mode</code>	No	<p>Tableau Server Repository SSL Mode:</p> <p><b>Prefer</b> SSL or <b>Require</b> SSL to configure SSL connections to Tableau Repository.</p> <p><b>Disable</b> to never use SSL to make Tableau Server Repository connections.</p>
<code>--repository-ssl-thumbprint</code>	No	<p>When configuring Tableau Server PostgreSQL to allow direct connections, Tableau Server creates a certificate and keys. You can choose to either supply the thumbprint for the certificate that was generated by Tableau Server, or copy the <b>server.crt</b> file to the Resource Monitoring Tool Server machine. If you choose to copy the certificate file, you don't have to supply the thumbprint. For more information, see <a href="#">Configure Postgres SSL to Allow Direct Connections from Clients</a>.</p>

**Example:** `rmtadmin update-env --name=<new name>`

```
rmtadmin users
```

Shows a list of the Resource Monitoring Tool user accounts.

**This command works only on the RMT Server.**

## Synopsis

```
rmtadmin users
```

```
rmtadmin version
```

Shows the current version information for the RMT Server when run on the RMT Server machine. It shows the current version information of the Agent installed on the machine that you are running the command from.

**This command can be run both on the RMT Server and the Agent.**

## Synopsis

```
rmtadmin version
```

```
rmtadmin ziplogs
```

Creates a ZIP archive file containing the Resource Monitoring Tool log files.

**This command works both on the RMT Server and Agent but only includes the log files from the application the command is run on.**

## Synopsis

```
rmtadmin ziplogs [positional parameter] [option] [global option]
```

## Positional Parameter

`filename`

Name of the output zip file. Defaults to log.zip if no name is provided.

## Option

`--force`

Overwrites the existing file.

**Example:** `rmtadmin ziplogs <zip file name> --force`

Global Option

`--help`

Shows the help for the command.

## Tableau Resource Monitoring Tool Communication Ports

This article lists the communication ports the Tableau Resource Monitoring Tool uses, the default port configuration and how to change these ports when your network requirements needs them to be different than what is set by default.

### RMT Server

You can change or update the port information using:

- `rmtadmin master-setup` command
- Web interface: From the machine where RMT Server is installed, go to: `http://localhost/setup/server`

## RMT Server Communications

Ports used: 9001, 443, and 80

- Setup initially defaults to port 9001, but changes the default to 80 after initial configuration.
- The SSL self signed certificate on initial installation is for port 443. RMT Server listens on port 80 by default and will attempt to forward traffic to 443 for SSL. Any user-specified certificate will also be for port 443.
  - The certificates are used during user traffic to the RMT Server and when the Agent is registered using the Web interface.
  - We generally do not recommend changing port 443. If, however, you need to change this due to your environment restrictions, you will need to explicitly list the port number when connecting to RMT Server. If you are registering the Agent using the web interface, you must explicitly specify the port number to connect to the RMT Server.
- Port 80 is used for non SSL traffic and can be changed either during initial setup or post installation.
- The RMT Server will reach out directly to the Tableau Server gateway for REST API calls.
- The RMT Server will reach out directly to the Tableau Server repository to query information if PostgreSQL info is supplied (optional). For information about configuring SSL between RMT server and the Tableau Server repository, see Pre-Installation Checklist – Tableau Resource Monitoring Tool.

## RabbitMQ

RabbitMQ is the component (message queue) used to broker information between Agents and the RMT Server.

Ports used: 5671, 5672

- RabbitMQ is installed and listens to port 5671 (TSL), 5672 (non-TSL).
- TLS communication for RabbitMQ is enabled by default.

## PostgreSQL Database

Ports used: 5555

- PostgreSQL database is installed and listens to port 5555. This cannot be changed.
- PostgreSQL has an `admin` user that is used by the Resource Monitoring Tool. The `readonly` user is used to connect to the Resource Monitoring Tool PostgreSQL database in `.tds` files downloaded from the Resource Monitoring Tool web interface. For more information about downloading the `.tds` files, see [Explore Monitoring Data Using Tableau Data Source Files](#).
- PostgreSQL requires SCRAM-SHA-256 authentication. For more information, see [Explore Monitoring Data Using Tableau Data Source Files](#).

## Agent

Ports used: 9002, 443, 5672

- During installation, the Agent installer opens a web browser that is only used for registration that listens on port 9002.
- If Agent registration is done using the web interface, the registration process uses port 443. If the registration is done using the command line, the registration process goes through RabbitMQ and uses port 5672.
- Agent sends log files and WMI information through RabbitMQ over port 5672.

## Manage Users

When you install Resource Monitoring Tool, you create an admin user during configuration. That user has permissions to perform all tasks on the RMT Server. You can later add other users and specify which tasks they are able to perform related to RMT.

## Add a local user

To add users to RMT, click the **Admin** menu and select **Users** (this option may not be available if you have not configured an environment).

To add a new user in Resource Monitoring Tool:

1. From the **Admin** menu, select **Users**.
2. Click **New User**.
3. Provide a username and password, and apply the server roles.
4. Click **Save**.

## Add a delegated user

Beginning in version 2023.1 users can be authenticated using their domain account credentials rather than using a separate password stored locally in RMT. When a user configured for delegated authentication signs into RMT, RMT passes the user and the password they entered to the computer operating system (OS) for verification.

To add a new, delegated user in Resource Monitoring Tool:

1. From the **Admin** menu, select **Users**.
2. Click **New User**. The default is a local user.
3. Select **Operating System (Delegated)**.
4. Provide a **Username**.

Be sure to type *just* the user name. Do not include any domain.

When signing into RMT, the user will provide their standard network password and the OS will verify this.

5. Select the server roles the user should have. For more details about server roles, see below.
6. Click **Save**.



Change user authentication

With version 2023.1.0 or later you can change an existing user from one auth type to another.

To change an existing user's authentication:

1. Click the Edit icon.
2. Select the **Authentication Mode** you want:
  - If you are changing to **Operating System (Delegated)** mode, you only need to enter the username (without domain). The user will provide their own password at sign in. And existing password stored in RMT is deleted and cannot be restored.
  - If you are changing to **RMT (Local)** mode, you need to enter a username and password. These are stored locally by RMT.
3. Confirm the **Server Roles** selected for the user.
4. Click **Save** to save your changes.

Server Roles in Tableau Resource Monitoring Tool

The Tableau Resource Monitoring Tool has various server roles that you can assign to a user to give them permissions to perform certain tasks.

The following table lists the available roles and what each roles allows the user to do:

Server Roles	Role Description
Download Log Bundles	Download log files.
Download TDS Files	Download <b>.tds</b> files.
Generate Chargeback Reports	Create chargeback reports.
Server/Environment Management	Has permissions to update all configurations.
User Management	Create and edit users.
Webhook Management	Manage Slack notification settings.

## Troubleshoot authentication issues

For details on how to troubleshoot user sign in and authentication issues, see [Troubleshoot User Authentication](#).

### Tableau Resource Monitoring Tool - Incidents

Incidents are reported for events that are unusual and may require human attention. Incidents can be configured for a variety of events either at a global level or can be customised for each environment.

To see current incidents reported for an environment, after selecting an environment, from the **Incidents** menu, select **All Incidents** to see a list of all incidents logged and reported.

You may also receive a notification through email or Slack depending on your settings for notifications. To learn more about how notifications work, see [Notifications](#).

You can generally categorise incidents into two types:

1. Incidents that are set by default and cannot be changed. We will refer to these as “**system-defined incidents**”.
2. Incidents that can be configured by you. We will refer to these as “**configurable incidents**”.

All incidents have an incident severity level. The severity level is something that is specifically defined. For system-defined incidents, Resource Monitoring Tool sets the severity levels, and for configurable incidents, you set the severity level depending on what is right for your environment.

Here is the list of severity levels:

Severity Level	Key	Description
Info	information	When you wish to be informed of an incident that does not cause service disruption.

Severity Level	Key	Description
Warning	warning	Incidents causing possible service disruptions.
Critical	critical	Incidents causing major service disruption or the service is down entirely.

### System-defined incidents

The following is a list of system incidents that are set by default and cannot be changed.

Incident	Incident Level	Description
Agent Down	warning	An incident is logged and reported when either one or more Agents are down and the RMT Server is unable to communicate with the Agent.
Agent Unlicensed	critical	This can happen if Tableau Server is not properly licensed to use Tableau Resource Monitoring Tool, or due to connection issues. For more information on the possible causes, see Agent Incidents
Environment Down	critical	An incident is logged and reported when Tableau Server is offline.

### Configurable incidents

These incidents can be configured based on your environment characteristics and organisational priorities. Following are the events for which you can configure severity levels and/or thresholds. The links provide more details on what you can configure for each of the events.

- Extract Failure Incidents
- Hardware Incidents: Includes CPU and memory usage, memory availability, disk space and disk queue length.
- Hyper Spooling Incidents

- Slow Query Incidents
- Slow Views Incidents

To configure incidents at the global level:

1. From the **Admin** menu, select Global Configuration.
2. In the **Incidents** tab, configure the threshold and severity levels for the incidents.

Global configurations are applied to existing environments or any new environments created, unless the environment is using custom thresholds.

### Environment Down Incidents

*Environment Down* incidents will be logged as critical when we detect that your Tableau Server is offline. Following are couple of use cases where Tableau Server is considered off-line by Tableau Resource Monitoring Tool:

- Resource Monitoring Tool is unable to get a response from Tableau Server. Resource Monitoring Tool will retry three times before the incident is logged.
- If Resource Monitoring Tool detects that a process is down across all the nodes, an environment down incident will be logged.

Resource Monitoring Tool polls Tableau Server's `http://{Tableau-ServerUrl}/admin/systeminfo.xml` page every 30 seconds (by default) to check the status. If the 30 second polling interval is not sufficient, increase the interval to 60 seconds. If the status is offline, or does not reply within the set value for three consecutive polling intervals then a critical incident is created.

**Note:** The polling interval cannot be set using the `rmtadmin set` command. This setting can only be changed by editing the `config.json` file."

An example `config.json` snippet is below:

```
{
  "background": {
```

```
"run":true,
"loglevel":"Information",
"pollRates": {
  "processStatus": 30000
}
}
```

Key	Data Type	Required?	Description
processStatus	Number	Optional	The amount of time in milliseconds to pause between Tableau Server status polling.

# Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-/Environment Management** role.

Agent Incidents

Agents Unlicensed (critical)

Incompatible Agent Version (critical)

Agent Message Queue Credential Rotation Failure (critical)

Agent Down (warning)

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

# Agents Unlicensed

**Agents Unlicensed** incidents will be logged as critical when we detect that your Tableau Server has not been properly licensed to use Tableau Resource Monitoring Tool.

To monitor a Tableau Server using the Resource Monitoring Tool your Tableau Server must be licensed with the Tableau Advanced Management.

Agents will no longer collect data in the unlicensed state and send to the RMT Server. You can, however, continue to see the data that was previously collected when the environment was properly licensed.

To resolve this issue, licence Tableau Server with a valid Advanced Management product key. For more information, see [About Tableau Advanced Management on Tableau Server](#).

**Note:** It may take up to an hour after adding a valid licence to Tableau Server, for the incident to be cleared.

There are other possible causes that can cause an **Agents Unlicensed** incident:

- Tableau Server API credentials may not be correct. In the environment configuration page, verify that the username and password are correct and that the account used has the Server Administrator role on Tableau Server.
- Unable to connect to Tableau Server REST API. Make sure that REST API is enabled on Tableau Server and that Tableau Server is running.

To resolve the REST API connectivity issue, from the **Admin** menu, select **Environments**, click **Edit Environment** on the environment you want to modify, and in the **Environment Details** tab, click the **Test Connection** button in the **Tableau Server REST API** section on the right side of the page.

- The RMT Server was unable to connect to Tableau Server, likely due to a network connectivity or similar issue.

## Incompatible Agent Version

Agent-incompatible incidents will be logged as critical when one or more Agents in the environment are on a version that is not compatible with the RMT Server version.

To resolve the issue, you need to make sure that the Agent is on a version that is compatible with the current RMT Server version.

Use one of the following to resolve this issue:

We recommend that the RMT Server and all Agents be on the same version.

- If the Agent is on a version that is earlier than the minimum compatible version, then you must upgrade the Agent to at least the minimum compatible version that is listed in the incident report.
- If the Agent is on a version that is later than the RMT Server version, we recommend that you upgrade the RMT Server to that same later version as well. You may need to upgrade other Agents depending on the version that they are currently on.

## Upgrading Agents:

Use the following steps to upgrade the Agent:

1. Download the Agent setup program and copy it to the Tableau Server node where the Agent needs to be upgraded. The Agent should be on the same version as the RMT Server or use a version that is compatible with the RMT Server version. The incident details provide the minimum compatible version.
2. Stop the **Tableau Resource Monitoring Tool** Agent service on all Tableau Server nodes using the following command:

```
rmtadmin stop --agent
```

3. Run the Agent setup program on the Agent that needs to be upgraded.

**Note:** If you are using a non-default location, provide the custom install location by clicking **Customize** on the EULA page. Tableau recommends using `\Tableau-Tableau Resource Monitoring Tool` as the location for installing the Agent.

Example non-default location: **D:\Tableau\Tableau Resource Monitoring Tool**.

4. Confirm that the Agent is running and has been upgraded. You can view Agent registration status by navigating to **Admin -> Environments -> Edit the Environment -> servers** tab to see a full list of Tableau Server nodes and the status of the Agent.

## Upgrading RMT Server

Upgrade the RMT Server if one or more Agents are on a later version.

Use the following steps to upgrade RMT Server:

1. Log in to the Resource Monitoring Tool in the browser and confirm it is working before starting the upgrade.
2. Copy the RMT Server setup program to the machine where RMT Server is installed.
3. Stop the **Tableau Resource Monitoring Tool Agent** Windows service on all Agents.
4. Stop the **Tableau Resource Monitoring Tool** Windows service on the RMT server.

**Note:** Once the services have been stopped, it is best practice to check for any Resource Monitoring Tool processes that are running after the services have been stopped: Any with `tabrmt-agent` or `tabrmt-master`. This does not include PostgreSQL or RabbitMQ.

5. It can take a little time to fully stop all of the processes running on the RMT Server, so in Task Manager, wait until there are not any running processes with Resource Monitoring Tool in the name before the next step.



6. Run the setup program on the RMT Server. This installs or upgrades any required pre-requisites and then upgrades the RMT Server.

**Note:** If you are using a non-default location, provide the custom install location by clicking **Customize** on the EULA page. Tableau recommends using `\Tableau-  
\Tableau Resource Monitoring Tool` as the location for installing the RMT Server.  
Example non-default location: **D:\Tableau\Tableau Resource Monitoring Tool**.

7. Confirm that the Agent and RMT Server are running. Start the Agent and RMT Server if they do not automatically restart after the upgrade is complete.

## Agent Message Queue Credential Rotation Failure

Starting in version 2021.3, as a security best practice, the credentials for connections between Agent and Rabbit MQ must be unique to that Agent. The unique credentials are created during a new installation or updated when upgrading to 2021.3.

During upgrade, if there are network issues, the credential update process can fail, resulting in a critical incident report. This, however, does not interrupt the upgrade process and the upgrade process will continue. After upgrade is complete, the Resource Monitoring tool will retry daily to create the unique credentials. A critical incident report is created for the initial failure and every subsequently failed retry. During this time, Agent will continue to work using the previous credentials until new credentials have been created.

The issue might resolve by itself, but if it persists, do the following:

- Verify that the Agents can connect to RMT Server.
- Check for firewall issues between Agent and RMT Server.

# Agent Down

Agent Down incidents will be logged as warning when the Tableau Resource Monitoring Tool is unable to communicate with the Agents on Tableau Server.

Use the following steps to troubleshoot this issue:

1. Make sure that the hardware that hosts the Agents is running and available to communicate with the RMT Server.
2. Make sure that the Agent service is successfully registered and is running. You can view Agent registration status by navigating to **Admin -> Environments -> Edit the Environment -> servers** tab to see a full list of Tableau Server nodes and the status of the Agent.

## Agent polling and incident creation times

- Agent sends a *heartbeat message* to the Resource Monitoring Tool server every 5 minutes.
- The Resource Monitoring Tool server checks to see if the most recent *heartbeat message* from Agent is less than 15 minutes old.
  - If the latest *heartbeat message* received from the Agent is less than 15 minutes old, then the Agent is considered to be online and no incident is created, and any existing **Agent Down** incidents are cleared.
  - If the latest *heartbeat message* received from Agent is more than 15 minutes old, then it is considered to be the first failed attempt. Every minute thereafter, a check is done two more times. If after three attempts (first attempt and two retries) there is still no recent heartbeat message, then an **Agent Down** incident is created.

**Note:** Based on the polling interval described above, it takes about 17 (15+1+1) minutes for an **Agent down** incident to be created after the Agent is offline.

## Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

### Extract Failure Incidents

*Extract Failure* incidents will be logged as a warning when there is an extract failure in Tableau.

## Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

### Hardware Incidents

**Hardware** incidents monitor the server itself. These can be used to help identify server issues that may affect Tableau Server's performance.

You can set thresholds for the following issues:

- CPU Usage
- Available Memory
- Memory Usage
- Free Disk Space

The following incidents are configured by default when you install a new Tableau Resource Monitoring Tool:

- When the available disk space falls below 10 GB for 10 minutes or more a warning incident is logged, and when available disk falls below 5 GB for 10 minutes or more, a critical incident is logged.
- When available memory falls below 8 GB for over 10 minutes, a warning incident is logged.
- When the CPU usage for the entire server is 80% or more for 5 minutes, a warning incident is logged.

**Note:** Memory related incidents are configured in binary multiples of bytes.

You can configure thresholds using the RMT Server web interface or by updating the configuration file `config.json`.

## Use the RMT Server web interface

To set the thresholds for hardware incidents, under the **Admin** menu, select **Configuration**, and go to the **Incidents** tab.

For **CPU Usage**, set the following:

To set the thresholds for hardware incidents, under the **Admin** menu, select **Configuration**, and go to the **Incidents** tab.

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Process</b>	Required	The threshold applies to the entire Tableau Server or for a single process as specified.
<b>Start Threshold</b>	Required	The CPU usage must surpass the value specified before an incident is created and monitored. Set the percent and the duration for this threshold.
<b>End Threshold</b>	Optional	The CPU usage that must fall below the value specified before an incident is considered resolved.

For **Available Memory**, set the following:

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Start</b>	Required	The available memory must fall below the value specified

Key	Required?	Description
<b>Threshold</b>		before an incident is created and monitored. Set the percent and the duration for this threshold.
<b>End Threshold</b>	Optional	The available memory must be above the value specified before an incident is considered resolved.

For **Memory Usage**, set the following:

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Process</b>	Required	The threshold applies to the entire Tableau Server or for a single process as specified.
<b>Start Threshold</b>	Required	The memory usage must be equal to the value specified before an incident is created and monitored. Set the percent and the duration for this threshold.
<b>End Threshold</b>	Optional	The memory usage must be below the value specified before an incident is considered resolved.

For **Free Disk Space**, set the following:

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Start Threshold</b>	Required	The free disk space must fall below the value specified before an incident is created and monitored. Set the percent and the duration for this threshold.
<b>End Threshold</b>	Optional	The free disk space must be above the value specified before an incident is considered resolved.

For **Disk Queue Length**, set the following:

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Start Threshold</b>	Required	The disk queue length must be equal to the value specified before an incident is created and monitored. Set the percent and the duration for this threshold.
<b>End Threshold</b>	Optional	The disk queue length must be below the value specified before an incident is considered resolved.

## Use the configuration file (config.json)

An example `config.json` snippet defining two hardware incidents:

```
{
  "monitoring": {
    "incidents": {
      "triggers": [
        {
          "counter": "DiskSpaceAvailableKB",
          "severity": "warning",
          "threshold": 1048576
        },
        {
          "counter": "ProcessorTimePercent",
          "severity": "warning",
          "threshold": 0.95,
          "thresholdDuration": 300000,
          "endThreshold": 0.90,
          "endThresholdDuration": 5000
        }
      ]
    }
  }
}
```

- The **DiskSpaceAvailableKB** incident will trigger a warning once the available disk space falls below 10 GB.
- The **ProcessorTimePercent** incident will trigger a warning once the CPU has had at least 95% utilisation for over 5 minutes. The incident will be considered resolved once the CPU is below 90% utilisation for 5 seconds.

The default settings may or may not meet your requirements and can be changed based on your environment. As an example, for an environment whose identifier was “staging-environment” to trigger a warning when the available disk space falls below 2 GB, the configuration would look like:

```
{
  "environments": {
    "staging-environment": {
      "monitoring": {
        "incidents": {
          "triggers": [
            {
              "counter": "DiskSpaceAvailableKB",
              "severity": "warning",
              "threshold": 2097152
            }
          ]
        }
      }
    }
  }
}
```

Key	Data Type	Required?	Description
counter	String	Required	The identifier for the hardware incident to monitor. available options are: <ul style="list-style-type: none"><li>• ProcessorTimePercent</li><li>• DiskSpaceAvailableKB</li></ul>

Key	Data Type	Required?	Description
			<ul style="list-style-type: none"> <li>DiskQueueTotalLength</li> <li>MemoryAvailableKB</li> <li>MemoryCommittedKB</li> </ul>
severity	String	Optional	See <a href="#">Incident Severity Level</a> . Default value: Warning
threshold	Number	Required	The threshold that must be surpassed before an incident is monitored.
thresholdDuration	Number	Optional	The amount of time in milliseconds to monitor the situation before triggering an incident. If not specified, an incident will be triggered as soon as the <code>threshold</code> is reached.
endThreshold	Number	Optional	The threshold that must be surpassed before an incident is considered resolved.
endThresholdDuration	Number	Optional	The amount of time in milliseconds to monitor the situation before completing the incident. If not specified, an incident will be resolved as soon as the <code>endThreshold</code> is reached. If <code>endThreshold</code> is not defined, then <code>threshold</code> is used.

## Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-/Environment Management** role.



### Hyper Spooling Incidents

*Hyper Spooling* incidents will be logged as a warning when Hyper queries are spooled to disk. Typically, this happens when there is not enough available memory and the Tableau Server Data Engine process shifts to spooling by temporarily writing to disk. The Tableau Server Data Engine topic describes this in more detail in the memory usage section.

## Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

### Slow Query Incidents

*Slow Query* incidents are triggered when any data query takes too long to complete. By default, a Slow Query incident will trigger a warning if any data query takes at least 30 seconds to execute.

You can configure thresholds using the RMT Server web interface or by updating the configuration file `config.json`.

## Use the RMT Server web interface

To set the thresholds for slow query incidents, under the **Admin** menu, select **Configuration**, and go the **Incidents** tab.

Key	Required?	Description
Severity	Required	See <a href="#">Incident Severity Level</a> .
Duration	Required	The minimum duration for a query to be considered slow. Values are in seconds.

## Use the configuration file (config.json)

An example `config.json` snippet defining a Slow Query incident:

```
{
  "monitoring": {
    "incidents": {
      "triggers": [
        {
          "counter": "DataQueryDuration",
          "severity": "critical",
          "threshold": 45000
        }
      ]
    }
  }
}
```

This Slow Query incident will trigger if a data query takes at least 45 seconds to execute.

Incidents can be configured per environment. As an example, for an environment whose identifier was “staging-environment” to trigger a warning when a data query takes longer than 30 seconds to execute, the configuration would look like:

```
{
  "environments": {
    "staging-environment": {
      "monitoring": {
        "incidents": {
          "triggers": [
            {
              "counter": "DataQueryDuration",
              "severity": "warning",
              "threshold": 30000
            }
          ]
        }
      }
    }
  }
}
```

```
}  
}  
}
```

Key	Data Type	Required?	Description
counter	String	Required	Slow Query incidents use the DataQueryDuration identifier.
severity	String	Optional	See <a href="#">Incident Severity Level</a> . Default value: Warning
threshold	Number	Required	The minimum duration for a query to be considered slow. Values are in milliseconds.

## Who can do this

Resource Monitoring ToolAdministrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

### Slow Views Incidents

*Slow View* incidents are triggered when any view request takes too long to load.

By default, a slow view incident will trigger a warning if any view request takes at least 1 minute to load.

## Configure Slow View Incident Thresholds

To set the thresholds for slow view incidents, under the **Admin** menu, select **Configuration**, and go the **Incidents** tab.

Key	Required?	Description
<b>Severity</b>	Required	See <a href="#">Incident Severity Level</a> .
<b>Duration</b>	Required	The minimum duration for a query to be considered slow. Values are in seconds.
<b>Tableau Users</b>	Required	This threshold is can be either applied to specific users when they make view requests or for all users. Default is <b>All Users</b> .
<b>Content</b>	Required	<p>Content includes workbooks and views. This threshold can be applied to a single view or all views. If a workbook is specified, the threshold would be applied to all the views in that workbook. To specify a view, use the share URL. For more information, see <a href="#">How View URLs are structured</a>.</p> <p>You can also exclude certain views or workbooks by specifying exceptions.</p> <p>Default is <b>All Views</b>.</p>

Only one incident is created per view request. The Resource Monitoring Tool evaluates all the incident triggers, and if multiple triggers match a specific view request, then the triggers are ranked in order of priority and specificity. The highest ranking trigger is used to create the incident.

For example, a trigger with a severity of critical is ranked higher than a severity of warning.

### Encrypted Data Collection

To make sure the data collection from Tableau Server to Tableau Resource Monitoring Tool is encrypted, communications between RMT Server and Agents and connections to Tableau Server Repository have to be enabled to use encrypted messaging.

For versions 2022.3 and later

- If RabbitMQ is installed on the same machine as the RMT Server (local configuration), Tableau Resource Monitoring Tool has built-in encrypted communications between

RMT Server and agents. There is no setup required for encryption between RabbitMQ and RMT Server.

- If RabbitMQ is hosted external to RMT Server (external configuration), you must follow the same steps as described in the For versions 2022.2 and earlier section in this topic

You still need to enable and configure the [encrypted communications to Tableau Server](#) repository database in both cases stated above.

### Tableau Repository SSL Configuration

1. Make sure Tableau Server is configured to use SSL connections for internal Postgres connections. For more information, see [Configure SSL for Internal Postgres Communication](#). The Resource Monitoring Tool allows you to use either the certificate file or thumbprint for the SSL connections. If you plan to use the certificate file, copy the certificate file generated by Tableau Server for internal Postgres SSL connections to the machine where you plan to install the RMT Server. For more information, see [Configure Postgres SSL to Allow Direct Connections from Clients](#).
2. On the RMT Server web interface, from the Admin menus, select Environments. Click on the edit environment icon.

In the **Tableau Repository Configuration** section:

1. In the **SSL Mode** drop-down box, select **Prefer SSL** or **Require SSL** to configure SSL connections to Tableau Repository. Choosing **Disable** means SSL will never be used to make Tableau Server Repository connections.

In the **Prefer SSL** mode, the Resource Monitoring Tool will use SSL in the first attempt, and if that fails, the subsequently attempts a non-encrypted connection.

In the **Require SSL** mode, if the SSL connection fails, the connections to Tableau Server Repository will fail entirely. In this case, Tableau Server REST API connections will be used to communicate with Tableau Server.

2. You can choose to either supply the thumbprint that was generated by Tableau Server, or copy the **server.crt** file to the Resource Monitoring Tool Master Server machine. If you choose to copy the certificate file, you don't have to supply the

thumbprint. For more information, see [Configure Postgres SSL to Allow Direct Connections from Clients](#).

For versions 2022.2 and earlier

Encrypted communication between the Agent(s) and RMT Server is possible by performing the following:

- [Configuring RabbitMQ with SSL/TLS certificates](#).
- [Configuring the RMT Server and Agent\(s\) to enable encrypted messaging](#).
- [Configuring encrypted connections to Tableau Repository](#).

### RabbitMQ Setup

For details on RabbitMQ server setup please reference RabbitMQ's documentation for [TLS Setup](#).

### Tableau Resource Monitoring Tool Setup

After RabbitMQ has been configured for TLS all-client applications, the Tableau Resource Monitoring Tool RMT Server and all Agents will need to be configured to enable encrypted messaging. Do the following on the RMT Server web interface:

1. On the machine where RMT Server is installed, go to: `http://<hostname>/setup/server`.
2. In the Message Queue section, tick the Enable TLS box, and provide the Certificate Host Name.
3. Update the port information if needed.

When configuring the RMT Server and agent(s) for encrypted messaging:

- Both the `enabled` flag and the `certificateHostName` must be configured for encryption to be enabled.
- The `certificateHostName` variable must match the canonical name (CN=) on the server certificate or the connection will fail.
- The `port` number will likely need to be changed based on the TLS port you configured on RabbitMQ.

**Note:** If the Agents were already registered before SSL was configured, then you must re-register the agent. To do this, download the new bootstrap file and re-register the Agent using the new bootstrap file. For more information on re-registering the Agent, see Re-registering an Agent.

#### Who can do this

To configure encrypted data collection you must be both a Tableau Server Administrator and Resource Monitoring Tool.

#### Hardware Changes to RMT Server - Tuning PostgreSQL Database

Sometimes you may need to upgrade or change hardware on the machine where RMT Server is installed. Whenever you make any hardware changes, specifically to memory and CPU, it would be beneficial to tune the underlying PostgreSQL database that is installed with the RMT Server.

When you install RMT Server, the setup program configures the PostgreSQL database to optimise the use of available hardware on the machine. Example optimisations include managing the buffer and cache size. When you change the hardware on your machine, it may affect the performance.

Use the following steps to make sure the configuration is updated to reflect the change in hardware:

1. Open PowerShell command prompt. Run as an administrator.
2. Navigate to the prerequisites directory under Tableau Resource Monitoring Tool. By default it is located at: *C:\Program Files\Tableau Resource Monitoring Tool\prerequisites*.

```
cd C:\Program Files\Tableau Resource Monitoring Tool\master\
```

3. Run the following command:

```
.\tunePostgres.psl
```

You should see a message that indicates that the configuration file has been updated. It will also state that a restart of the PostgreSQL service is required for the changes to take effect. The updates to the configuration file does not require downtime of the server.

4. Restart the PostgreSQL database. You can do this outside of working hours when the Resource Monitoring Tool is not in use.

## Tableau Server Topology Changes

This article will help you understand what you need to do when you make certain topology changes to Tableau Server. The changes include: adding or removing a node, adding or removing a process from a node and changing the number of processes on a node.

### Adding a Node

When you add a new node to Tableau Server, you must install the agent on this node. For more information on installing Agent on Tableau Server cluster, see [Install the Tableau Resource Monitoring Tool](#). Until you install the agent, information about this node will not be included in the reports.

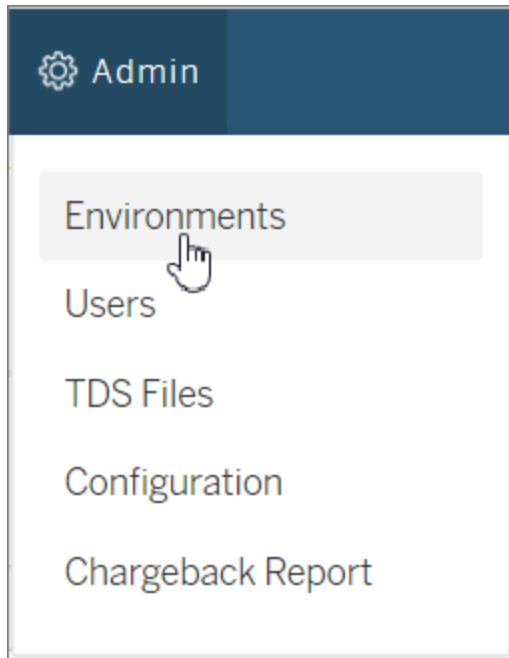
### Removing a Node

When you remove an existing node from a Tableau Server cluster, you must update the environment on the RMT Server.

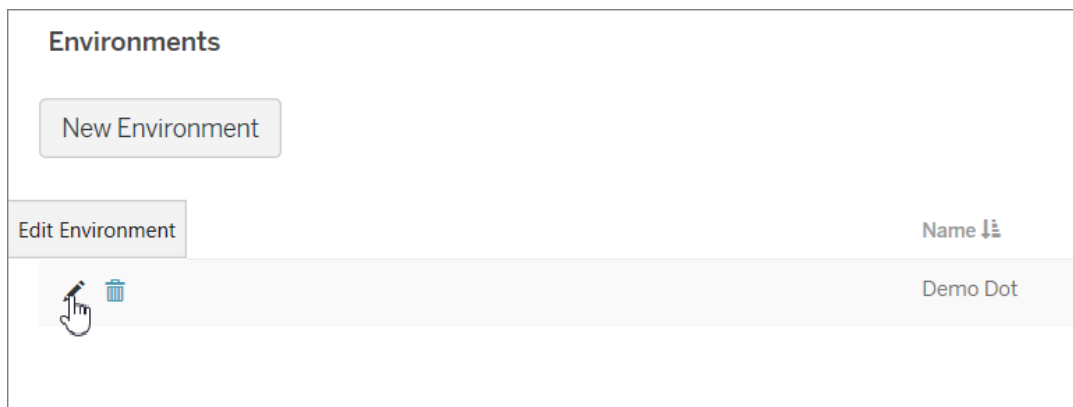
### Use the following steps to update the environment:

1. Log in to the RMT Server web interface.
2. From the **Admin** menu, choose **Environments**. Select the environment that should reflect this change.



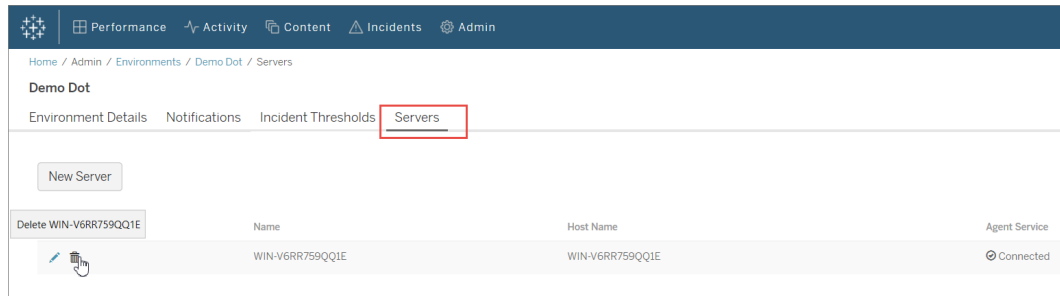


3. Choose **Edit Environment**. This opens more detailed information about the environment.



4. From the **Servers** tab, select the node that was removed from Tableau Server, and choose **Delete**.

Note: The host name should match the name or the IP address of the node.



## Re-registering an Agent

There can be situations when you might want to re-register an Agent. One such use case might be when you want to point one node or the entire Tableau Cluster to a different environment. Another example might be if you had to re-image a Tableau Server node and need to install and re-register the Agent. Use the following instructions to re-register the Agent.

There are two ways of re-registering the Agent depending on whether you want to preserve historical monitoring data:

1. On the RMT Server web interface, navigate to **Admin -> Environments**. Select the environment. From the **Servers** tab, click to edit the node you want to re-register the Agent on. This brings up the **Server Details** page. Select **De-register** which removes the Agent registration for this node on this environment. You can now run the `rmtadmin register` command and register the Agent on this node. This method preserves the monitoring history that has been collected from this node.
2. On the RMT Server web interface, navigate to **Admin -> Environments**. Select the environment. From the **Servers** tab, click delete to completely remove the Agent registration for this node on this environment. This also removes historical monitoring data that has been collected on this node. Use this for scenarios where you are ok with losing the history. For example, if you planning to point this node to a new environment, it might be acceptable to remove the historical data and start fresh.

**Note:** In the RMT Server web interface, each node in a Tableau Server is referred to as a **Server**. The entire Tableau Server constitutes an environment. For more information, see Concepts

Who can do this

To make topology changes, you must be both a Tableau Server Administrator and a Resource Monitoring Tool Administrator.

### Tableau Resource Monitoring Tool Log Files

#### Log Files

Tableau Resource Monitoring Tool includes many components. Each component maintains its own set of log files.

By default, 31 log files with a max file size of 1 GB each will be retained in each set. Excess log files beyond that will be deleted automatically.

In an effort to align with our company values of Equality, we have changed non-inclusive terminology where possible. Because changing terms in certain places can cause a breaking change, we maintain the existing terminology. So, you may continue to see the terms in CLI commands and options, installation folders, configuration files and other instances. For more information, see [About Tableau Help](#).

## Components

Component	Log File Location	Description
	C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\logs\	
Backgrounder	background\YYYYMMDD-pts.-log	Logs generated by the general background processor.
Director	director\YYYYMMDD-pts.log	Logs generated by the director background processor.
Host	host\YYYYMMDD.log	Logs generated by the

Component	Log File Location	Description
	C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\logs\	
		host.
Web Server	web\YYYYMMDD-pts.log	Logs generated by the web server.
RabbitMQ (Message Broker)	rabbitmq/*.log	Logs generated by RabbitMQ
PostgreSQL (local data repository)	pgsql/*.log and *.csv	Logs generated by the local PostgreSQL database.

For advanced troubleshooting, verbose logging can also be enabled for more internal activities. These activity logs are stored in the associated component's log directory.

Activity	Log File Location	Description
Database	logs\*\YYYYMMDD-ef.log	Logs of internal database queries. By default, only errors are written to this log. Enable by changing <code>db.logLevel</code> to <code>Debug</code> or higher.
Message Queue	logs\*\YYYYMMDD-mq.log	Logs of internal message queue communication. By default, this log will not be generated. Enable by changing <code>mq.logLevel</code> to <code>Debug</code> or higher.

Log Level Configuration

Resource Monitoring Tool log levels can be adjusted in the following ways:

- Resource Monitoring Tool web interface: From the Admin menu, navigate to Configuration and select the Advanced tab. You can set the log levels and also specify if you want to include database queries and message queue communications.

Logging levels you can set using the web interface:

Level
Default: Includes Information, Warning, Error and Critical levels
Verbose: Includes Information, Warning, Error, Critical (everything in the default) and Debug levels

- Settings in the `config.json` files. Log levels are configured independently for each component. The default config file paths are below. This may vary depending on your installation folder.

Install	Default Location
Tableau Resource Monitoring Tool	%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\master\config\config.json
Tableau Resource Monitoring Tool Agent	%PROGRAMFILES%\Tableau\Tableau Resource Monitoring Tool\agent\config\config.json

Logging levels that can be configured using the configuration file:

Level
Trace
Debug
Information
Warning
Error
Critical
None

Below is a snippet demonstrating some default log level settings:

```
{
  "db": {
    "logLevel": "Error"
  },
  "mq": {
    "logLevel": "Warning"
  },
  "server": {
    "background": {
      "logLevel": "Information"
    },
    "director": {
      "logLevel": "Information"
    },
    "web": {
      "logLevel": "Information"
    }
  }
}
```

# Sending Log Files to Tableau Customer Support

If you are working with Tableau Support and they ask you to send log files, zip the files up before you send them:

- 1. Connect to RMT Server and each server that has the Resource Monitoring ToolAgent installed.
- 2. Open a command prompt and run: `rmtadmin ziplogs <output file path>`, to create a ZIP archive of the log files.

For more information on sending log files to Tableau, see the [Tableau Knowledge Base](#).

Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-Environment Management** role.

## Tableau Log Files

Tableau Resource Monitoring Tool agents monitor the Tableau log files in near real time and send log messages to the RMT Server for processing and reporting.

Below is a list of the specific Tableau log files that are monitored.

All directory paths are relative to the Tableau Server data directory. By default, this is located at: `%PROGRAMDATA%\Tableau\Tableau Server\data\tabsvc`

Directory	File Name
logs\backgrounder	backgrounder-*.log
logs\httpd	*.log
logs\vizportal	vizportal-*.log
logs\dataserver	dataserver_*.txt
logs\vizqlserver	vizqlserver_*.txt

## Upgrading Tableau

When upgrading a Tableau Server installation that is monitored by Tableau Resource Monitoring Tool, there are a few additional steps that need to be followed.

Ensure Resource Monitoring Tool supports the new Tableau version

Before upgrading Tableau, you'll want to make sure that the version of Resource Monitoring Tool you have installed supports the version of Tableau that you are upgrading to.

The quickest way to check is to log in to the Resource Monitoring Tool web interface and navigate to the **Admin | Environments** screen. Edit the environment you are upgrading and check the **Tableau Version** drop down for the version you are upgrading to.

## Stop Agents

Resource Monitoring Tool agents should be stopped while you upgrade Tableau Server. Follow these steps on each machine in your Tableau Server cluster:

1. Click **Start**, click in the search box, type `services.msc`, and then press ENTER.
2. Find Tableau Resource Monitoring Tool Agent service and right-click on it.
3. Click **Stop** in the context menu.

## Upgrade Tableau

Follow the normal process for upgrading Tableau Server. This process is outlined in [the Tableau Server documentation](#).

## Update Tableau Version in Resource Monitoring Tool

1. Log in to the Resource Monitoring Tool web interface.
2. Go to **Admin | Environments**
3. Edit the environment you upgraded.
4. Modify the **Tableau Version** to match

## Restart Agents

After the upgrade is complete you are ready to restart the Resource Monitoring Tool agents. Follow these steps on each machine in your Tableau Server cluster:



## Tableau Server on Windows Help

1. Click **Start**, click in the search box, type `services.msc`, and then press ENTER.
2. Find Tableau Resource Monitoring Tool Agent service and right-click on it.
3. Click **Start** in the context menu.

Who can do this

To upgrade Resource Monitoring Tool, you must have all the following:

- Administrator permissions on the machine you are installing Resource Monitoring Tool.
- Tableau Server Administrator site role.
- Resource Monitoring Tool Administrator account.

## Monitor Tableau Server Performance

Tableau Resource Monitoring Tool is used to monitor and analyse Tableau Server health and performance. Performance, usage and hardware metrics are collected through the Agents installed on the Tableau Server nodes and sent to the RMT Server. The aggregated and analysed data is then displayed in the form of charts and views on the web interface of the RMT Server.

The web interface of the RMT Server has built-in charts and views that you can use to identify what is causing slow loading times, extract failures and other critical issues. For more information, see [Monitor Tableau Server Performance with Tableau Resource Monitoring Tool](#).

You can also download the data that is used to create the pre-built charts and explore it further. For more information, see [Explore Monitoring Data Using Tableau Data Source Files](#).

### Monitor Tableau Server Performance with Tableau Resource Monitoring Tool

Tableau Resource Monitoring Tool makes it easy to detect and resolve health and performance problems within your Tableau Server environments. One instance of the Resource Monitoring Tool can provide a single unified interface for administrators to monitor multiple Tableau Servers.

The Resource Monitoring Tool consists of two components:

- Agent, which collects resource usage and performance recording of interactions on Tableau Server.

- RMT Server, which aggregates and displays this performance data in the form of charts on a web interface.

The Resource Monitoring Tool may not be able to provide information for Tableau Server process that are external:

- External Repository: The process status is not monitored and not included in the charts
- External File Store: The process status is not monitored and the extract file size information is not tracked. The extract failure and time taken to complete is still available.
- External Gateway: The process status is not monitored and not included in the charts.

### Pre-built Charts

The web interface of the RMT Server has built-in dashboards and charts that can be used to identify performance bottlenecks and issues. These built-in charts and metrics can be found on the **Performance**, **Activity** and **Content** pages. You can also set up alerts (called **incidents**) to report outliers or unusual behaviour based on thresholds that you configure.

Here is a full list of capabilities that the Resource Monitoring Tool offers to help with monitoring your Tableau Server:

Capability	Component	Where to find it on RMT Server
Configuring Incidents/Alerts	<ul style="list-style-type: none"> <li>• Hardware resources at Tableau Server node and process level.</li> <li>• View load times.</li> <li>• Query times.</li> <li>• Tableau Server node down events.</li> </ul>	<p><b>Admin -&gt; Environments -&gt;Edit Environment -&gt; Incidents or Notifications</b> tabs.</p> <ul style="list-style-type: none"> <li>• Use the <b>Incidents</b> tab to configure incident thresholds.</li> <li>• Use the <b>Notifications</b> tab to configure when and how you want to receive notifications.</li> </ul>
Hardware Resources	<ul style="list-style-type: none"> <li>• CPU</li> <li>• Memory</li> <li>• Disk</li> <li>• Network</li> </ul>	For a high-level view, go to <b>Performance -&gt; Select environment -&gt;Environment</b>

Capability	Component	Where to find it on RMT Server
		For a more detailed view, go to <b>Performance</b> -> <b>Select environment</b> -> <b>Servers</b>
Tableau Server Usage	<ul style="list-style-type: none"> <li>• Concurrent users</li> <li>• Aggregated-view load times across the server</li> <li>• Background tasks <ul style="list-style-type: none"> <li>• Duration, state and detailed errors for failed tasks.</li> <li>• Log snippets for failed tasks.</li> </ul> </li> <li>• Query details <ul style="list-style-type: none"> <li>• Duration, state and query text for long-running or expensive queries.</li> </ul> </li> <li>• Log information for: <ul style="list-style-type: none"> <li>• Individual view load times.</li> <li>• VizQL session information.</li> <li>• Duration of events during view loads.</li> <li>• Query text, load time and number of rows returned</li> <li>• Background</li> </ul> </li> </ul>	<p>Most of this information is on the <b>Environment</b> tab of the performance dashboard.</p> <p><b>Performance</b> -&gt; <b>Select environment</b> -&gt; <b>Environment</b></p> <p>To see query details, go to <b>Activity</b> -&gt; <b>Data Queries</b> and select a query for more details.</p> <p>To see log information, go to <b>Activity</b> -&gt; make a selection from the list to see more details.</p>

Capability	Component	Where to find it on RMT Server
	tasks and run times.	

## Custom Charts

You can also download the data that is used to create the pre-built charts and explore it further in Tableau. For more information, see [Explore Monitoring Data Using Tableau Data Source Files](#).

## Who can do this

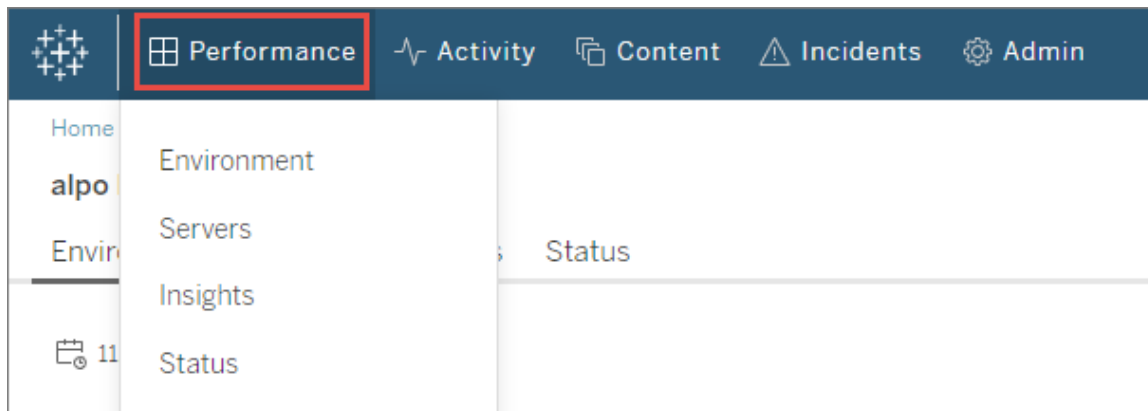
Any Resource Monitoring Tool user can view the charts.

## Tableau Resource Monitoring Tool Performance Charts

The Tableau Resource Monitoring Tool includes dashboards that help you monitor and analyse various performance metrics like hardware resource usage, user activity and the status of Tableau Server processes. They can be useful in identifying performance bottlenecks and the overall health of your Tableau Server.

This topic describes the information on the charts on the **Performance** page. The performance page provides a dashboard view of the overall health of the Tableau Server and includes the following tabs:

1. **Environment:** A dashboard of the performance metrics specific to the environment you selected.
2. **Servers:** Focuses on the hardware resource metrics.
3. **Insights:** Highlights the slowest views and the longest extract refreshes.
4. **Status:** Tableau Server processes status. Information about each process on the nodes whether they are active, busy or down. This is similar to what you might see on the Tableau Server Settings page.



## Environment Tab

The charts on the environment tab give you an all-up view of the health of the Tableau Server.

- The left side of the page has resource-related metrics: Performance, Tableau Processes and Background Tasks.
- The right-hand side charts focus on the user activity and the impact: Concurrent Users, Slow View Load Requests and Total View Load Requests.

### Navigation Tips:

At the top left corner of the page, you can select a time line that is applied to all the charts on this page. You can also select a time range by selecting a part of a specific chart (range selection).

- When you make a range selection in the hardware performance and background task charts, the time line acts as a filter for all the charts on this tab.

- When you make a range selection in the slow view load, and user activity charts, you will automatically be navigated to the Activity page which provides more details for the selected time range.

## Performance Chart

The information on this chart shows you the overall health and usage of the hardware resources for each Tableau Server node. The hardware resources included in this chart are CPU, memory, disk queue and network.

**Note:** Network information is not available and not currently supported for Tableau Server running on Linux.

## Tableau Processes Chart

Use this chart to get more details about a specific node and the processes running on that node. **Starting in 2021.4**, almost all Tableau Server processes are tracked with a few exceptions like cluster controller and process that are configured externally to Tableau Server cluster, like the External Repository, External File Store and Independent Gateway. This chart allows you to identify the processes that are driving CPU or memory utilisation on a particular node. The chart is dynamically updated to highlight the top ten processes that are using the most resources on a node for the selected time period.

**Note:** Some Tableau Server sub-processes like tabprotosrv, postgres and gateway are not captured by RMT Server and can cause apparent discrepancies between the Performance chart and the sum of all the values from the Tableau Processes chart.

## Background Tasks Chart

The chart is an overview of the volume of background tasks, categorised by the task type. Use the toggle button to see the total number of tasks, the median duration of those tasks and a histogram that shows you the runtime for the selected time period. This can be a quick way to drill down to see which tasks are taking a long time to run.

## Concurrent Users Chart

This chart shows you the number of users that have been sending requests in the time period that is selected.

**Note:** When you select a portion of this chart, it automatically takes you to the related activity page and shows you the information for that specific time period.

## Slow View Load Requests Chart

This chart uses a **baseline** that is established for each view and is then uses it to compare the time it takes to render that view to determine if the view is taking longer than expected.

**In version 2021.4**, the baseline is established by calculating the median value of the first 10 times a specific workbook is rendered successfully.

**In version 2021.4.1** and later, the baseline is established by calculating the 95th percentile of 50 times a specific workbook is rendered successfully.

Once the baseline is established, every time that same workbook is rendered in the future, the time taken for a workbook to load is then compared to its baseline. Depending on whether the time taken to render the view falls within the expected range or at varying degrees outside of the expected range, they are categorised as follows:

- **Normal:**  $\leq 2\times$  baseline
- **Long:**  $> 2\times$  baseline
- **Very Long:**  $> 4\times$  baseline
- **Failed:** Failed to load or resulted in an error

This baseline and the comparisons only apply to initial rendering of the view. It does apply to subsequent actions like filter selections. Also, when you publish a new version of the workbook, it triggers a recalculation of the baseline.

**Note:** When you select a portion of this chart, it automatically takes you to the related activity page and shows you the information for that specific time period.

For a detailed walk through on how to use this chart and investigate performance with view rendering, see [Investigating Slow View Load Requests](#).

## Total View Load Requests Chart

This chart gives you an overall feel for how many views have been rendered over a period of time. This chart is useful to assess the scope of the impact of a particular incident.

**Note:** When you select a portion of this chart, it automatically takes you to the related activity page and shows you the information for that specific time period.

## Server Tab

The charts on this tab provide a more detailed view of the **Performance** chart on the **Environment** tab.

## Insights Tab

### Slowest Views

This chart shows the slowest views ordered by average view load duration. The orange dot indicator represents that view's longest load duration. The time period that is represented here is the full range of data that is available, default is 2 weeks.

### Longest Extract Refreshes

This chart shows the slowest Refresh Extract tasks ordered by duration. Both data source extracts and workbook extracts are considered. They can be distinguished by the icon next to their name. The time period that is represented here is the full range of data that is available, default is 2 weeks.



## Status Tab

This tab lists the Tableau Server processes and their status on each node of the Tableau Server Cluster. This does not include Tableau Server processes that are configured externally to Tableau Server cluster, like External Repository, External File Store and Independent Gateway.

## Who can do this

Any Resource Monitoring Tool user can view the charts.

## Related Topics

- Monitor Tableau Server Performance with Tableau Resource Monitoring Tool
- Tableau Resource Monitoring Tool Activity Pages
- Tableau Resource Monitoring Tool Content Pages

### Tableau Resource Monitoring Tool Activity Pages

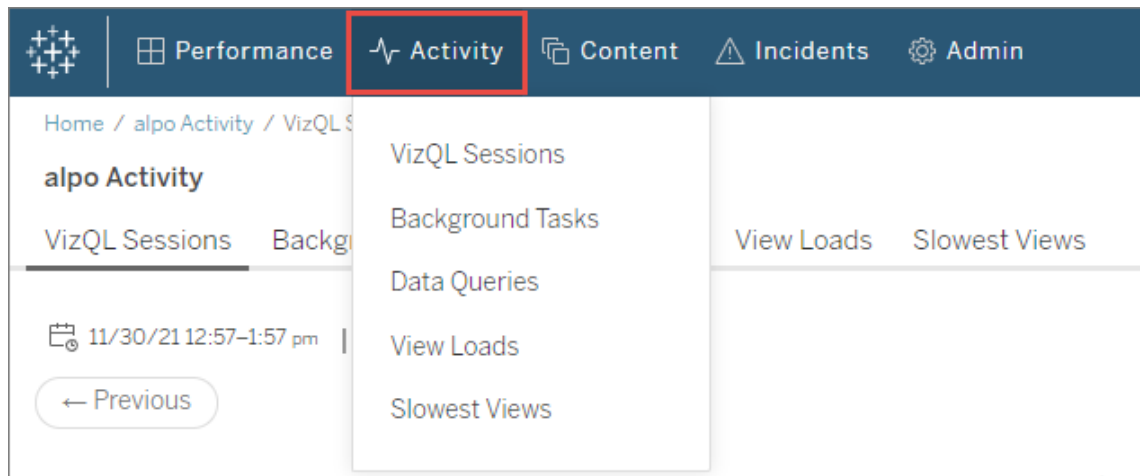
The Tableau Resource Monitoring Tool includes dashboards that help you monitor and analyse various performance metrics like hardware resource usage, user activity and the status of Tableau Server processes. They can be useful in identifying performance bottlenecks and the overall health of your Tableau Server.

This topic describes the information on the **Activity** page. The activity page provides the next level of detail to what is seen on the charts on the **Performance** page. The filter selections on either of these dashboards are carried over to the other so you can see corresponding information as you are trying to identify any performance issues.

The activity page includes detailed information about the following:

- VizQL Sessions
- Background Tasks
- Data Queries

- View Loads
- Slowest Views



## VizQL Sessions

Shows you a list of all the VizQL sessions in the selected time range. A VizQL session is a set of interactions that a user has with a workbook on Tableau Server.

Click on a session ID to see a summary chart and more details such as the requests made during the session, request duration and related workbook sessions. You can also see any related data queries, incidents that have been reported and the environment activity filtered to the same time period as the VizQL session's time frame.

## Background Tasks

Shows you a list of all the background tasks in the selected time range.

Click on the start time of the task to see more details about the background task including a summary that shows you a comparison of the time it took to complete the task versus the average duration of time taken to complete similar tasks. You can also see any related incidents that have been reported and the overall environment activity during the time this task was run.

Click on the site name to see more information about the site including the number of workbooks, views and VizQL sessions for each project on that site.

## Data Queries

Shows you a list of all the data queries during the selected time range.

Click on a query to see query performance details, the full query text and the connection details.

## View Loads

Shows you the list of rendered views in the selected time range.

The **Load Time Severity Category** filter allows you to filter views are taking much more time to load than is normally expected. This uses the same baseline concept and comparisons used on the **Slow View Load Request** Chart. The baseline is established by calculating the median value of the first 10 times a specific workbook is rendered. Once the baseline is established, every time that same workbook is rendered in the future, the time taken for a workbook to load is then compared to its own baseline.

The categories for the load time severity are as follows:

- **Normal:**  $\leq 2x$  baseline
- **Long:**  $\geq 2x$  baseline
- **Very Long:**  $\geq 4x$  baseline
- **Failed:** Failed to load or resulted in an error
- **Processing:** The baseline calculation is in process and is not yet established.

## Slow Views

Shows you the list of all views that have taken the longest time in descending order. This list is based on average load duration time rather than a comparison against a baseline. You can narrow this list by filtering by duration, publisher, site or a specific view.

- Click on the view to see more details about the load times. You can also see any related incidents that have been reported and the overall environment activity during the time this task was run.
- Click on the workbook to see more details about a specific workbook.

## Who can do this

Any Resource Monitoring Tool user can view the charts.

## Related Topics

- Monitor Tableau Server Performance with Tableau Resource Monitoring Tool
- Tableau Resource Monitoring Tool Performance Charts
- Tableau Resource Monitoring Tool Content Pages

### Tableau Resource Monitoring Tool Content Pages

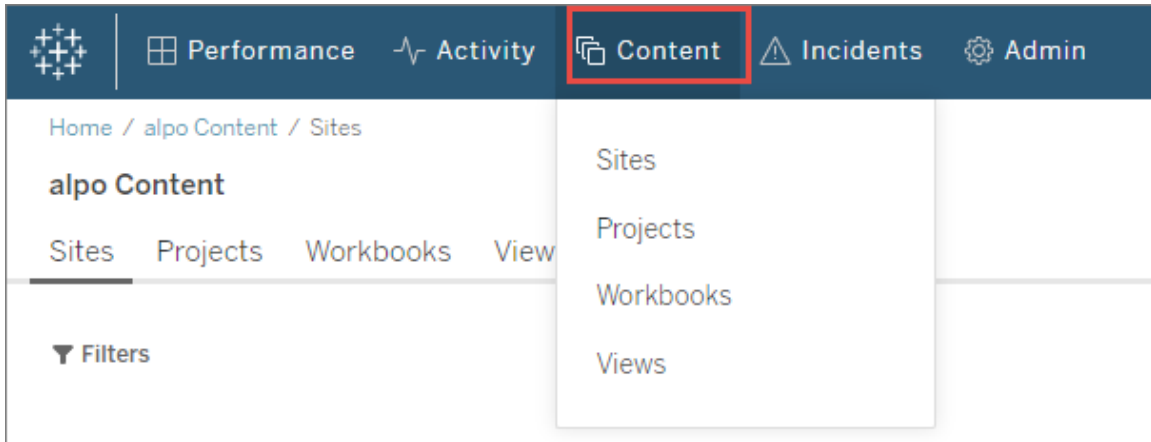
The Tableau Resource Monitoring Tool includes dashboards that help you monitor and analyse various performance metrics like hardware resource usage, user activity and the status of Tableau Server processes. They can be useful in identifying performance bottlenecks and the overall health of your Tableau Server.

This topic describes the information on the charts on the **Content** page. This page is the main way to look at the details for a specific content item. It is a useful place to start when you need to investigate performance for a specific workbook or a view.

The content page includes detailed information about the following:

- Tableau Sites
- Projects in each Tableau Site
- Workbooks
- Views

You can see performance metrics for the VizQL sessions and data queries related to a project, workbook or a view. You can also see any related incidents specific to workbooks or views.



## Sites

Shows you a list of sites on your Tableau Server environment including the total number of projects, workbooks and VizQL sessions.

## Projects

Shows you a list of all the projects on a site. Click on the project to see a list of all the workbooks, views and related VizQL sessions, and data queries.

## Workbooks

Shows you a list of all the workbooks on a site. Click on a workbook to see the load times, VizQL session information, related data queries and any reported incidents specific to this workbook.

# Views

Shows you a list of all the Views on a site. Click on view to see the load times for the view, VizQL session information, related data queries and any reported incidents specific to the view.

## Who can do this

Any Resource Monitoring Tool user can view the charts.

## Related Topics

- Monitor Tableau Server Performance with Tableau Resource Monitoring Tool
- Tableau Resource Monitoring Tool Performance Charts
- Tableau Resource Monitoring Tool Activity Pages

### Investigating Slow View Load Requests

The **Slow View Load Requests** chart on the performance page is a useful metric for understanding the performance of views and the resulting impact on user interactions on Tableau Server.

The Slow View Load Requests chart shows when views are rendering more slowly than normal on Tableau Server. To do this, the chart uses a **baseline** that is established for each view and then uses it to compare the time it takes to render that view to determine if the view is taking longer than expected.

**In version 2021.4**, the baseline is established by calculating the median value of the first 10 times a specific workbook is rendered successfully.

**In version 2021.4.1** and later, the baseline is established by calculating the 95th percentile of 50 times a specific workbook is rendered successfully.

Once the baseline is established, every time that same workbook is rendered in the future, the time taken for a workbook to load is then compared to its baseline. Depending on whether the

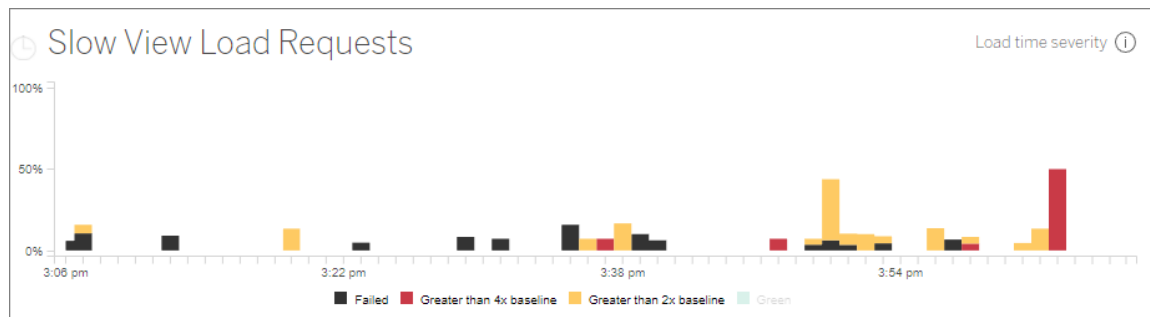
time taken to render the view falls within the expected range or at varying degrees outside of the expected range, they are categorised as follows:

- **Normal:**  $\leq 2\times$  baseline
- **Long:**  $\geq 2\times$  baseline
- **Very Long:**  $\geq 4\times$  baseline
- **Failed:** Failed to load or resulted in an error

**Note:** This baseline and the comparisons only apply to initial rendering of the view. It does apply to subsequent actions like filter selections. Also, when you publish a new version of the workbook, it triggers a recalculation of the baseline.

The chart shows the percentage of view loads that are outside of the normal range for the selected time range. So, if you see yellow (Long) or red (Very Long) spikes on this chart, that is the first indication that there is likely a problem.

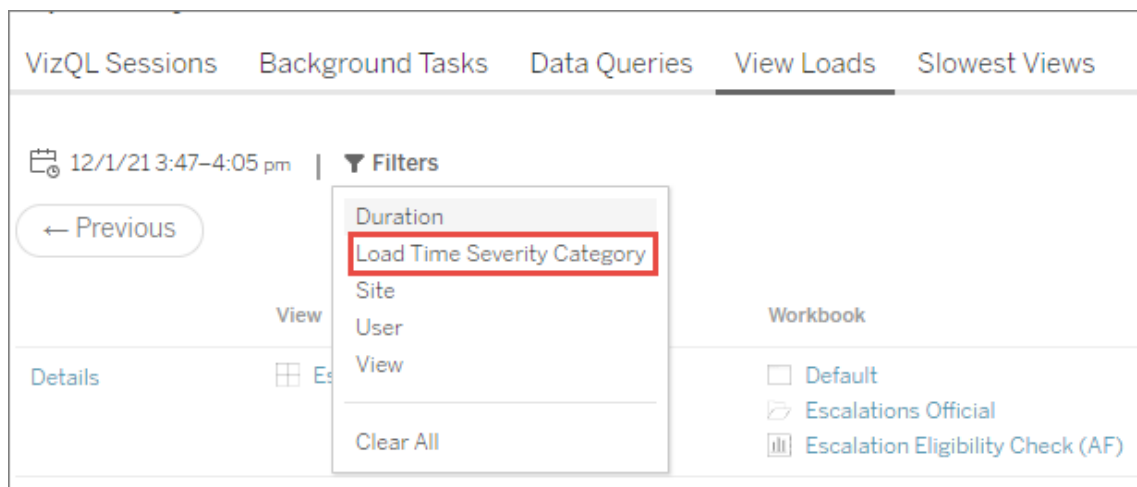
**Tip:** Selecting the “Past 48 hours” time range might be a good place to start as it will give you some context on activity in the past versus current.



The **Concurrent Users** and the **Total View Load Requests** charts on the same page can be used to see the scope of the impact resulting from slow view loads in the same time range. You can also use the **Tableau Processes** chart to identify any correlations between the slow view load performance and resource usage – for example, you might see high VizQL Server resource usage on specific nodes during the same time that you are seeing spikes in the **Slow View Load Requests** chart.

If you see a spike in the slow view load request chart, you can then start to drill down further to identify what might be causing the issue – whether the problem is due to a single view or a much broader issue. To do this, within the **Slow View Load Requests** chart, select a range to include a large portion of the slow views. This will take you to the **View Loads** activity page, showing you view load requests for the same time frame.

Filter by **Load Time Severity Category** and select the appropriate category for the view loads you want to investigate.

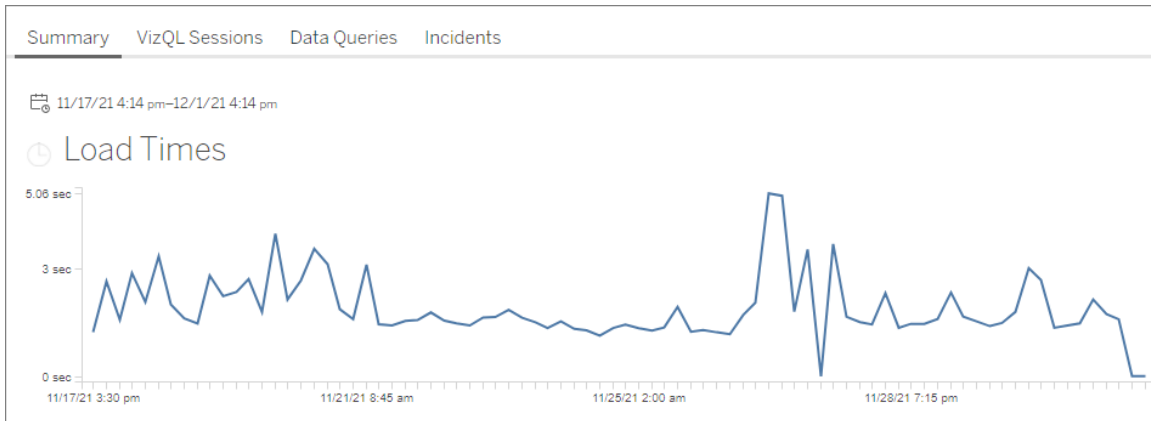


The list should indicate which views might have caused the chart results and can be understood in the following ways:

**Multiple views:** If the list shows multiple views, this is likely a broader issue with Tableau Server. Go back to the performance page, and have a look at the **Performance** and **Tableau Server Processes** chart to investigate the resource usage. The **Status** tab on the performance page will show the status of the processes whether they are active, busy or down. Look for the VizQL Server, Data Server and the Data Engine processes on this list.

**Same view:** If the list is mostly one single view, this could mean that there is an issue with that view or workbook. Further investigation might be needed to see what might be causing the problem. Click on the **view name** in the list to see more information about load times, related data queries and VizQL sessions.





**Important!** On the **Load Times** chart, if the average load time is consistent even when adjusting the date range to span just before and after the spike began, it means that the baseline calculation was likely created when view loads were heavily cached, causing subsequent view loads to be considered 'slow'. This scenario does not reflect an issue with Tableau Server or the view. If this is the case, you can trigger a recalculation of the baseline by publishing a new version of the workbook.

Here are some resources to help with performance troubleshooting for a specific view:

- [Optimise Workbook Performance](#)
- [Record and Analyse Workbook Performance](#)

## Who can do this

Any Resource Monitoring Tool user can view the charts.

### WMI Classes

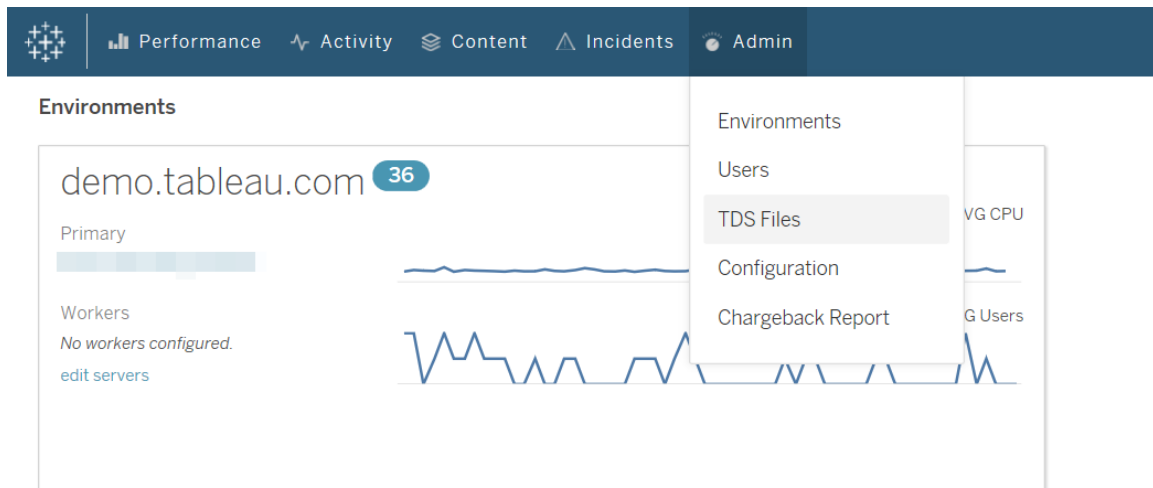
Tableau Resource Monitoring Tool agents query several WMI classes at regular intervals in order to monitor various aspects of your server performance.

Below is a list of the specific WMI classes that are queried.

Class	Monitoring Category
__InstanceCreationEvent	Processes
__InstanceDeletionEvent	Processes
Win32_LogicalDisk	Disk
Win32_NetworkAdapter	Network
Win32_OperatingSystem	Memory
Win32_PerfFormattedData_Tcpip_NetworkInterface	Network
win32_perfrawdata_perfdisk_physicaldisk	Disk
Win32_PerfRawData_PerfOS_Processor	CPU
Win32_PerfRawData_PerfProc_Process	CPU
Win32_PerfRawData_Tcpip_NetworkInterface	Network
Win32_Process	Processes
Win32_Service	Processes

### Explore Monitoring Data Using Tableau Data Source Files

The Tableau Resource Monitoring Tool includes built-in charts that you can use to monitor and analyse Tableau Server health and performance. The data Tableau Resource Monitoring Tool leverages can be downloaded as Tableau data source (.tds) files for exploration within Tableau Desktop. You can download the .tds files from the **Admin** menu using the Resource Monitoring Tool web interface. This method works for both local and external repository configurations.



The following is a list of Tableau data source (.tds) files you can download:

- **Background Tasks:** Includes information about scheduled background tasks like extract refreshes, subscriptions and flows.
- **Data Queries:** Information about all queries executed by Tableau Server.
- **Gateway Requests:** HTTP requests handled by Tableau Server including VizQL Server session details.
- **Incidents:** Incidents recorded by the Resource Monitoring Tool .
- **Server Performance:** Tableau Server hardware and process information that is gathered by the Resource Monitoring Tool.
- **Tableau Entities:** Information about the Tableau Server sites, projects, workbooks and views gathered by the Resource Monitoring Tool.

### Requirements

- Encryption used is SCRAM-SHA-256 which is supported by Tableau Desktop 2020.4 and later.

### Enable access to the Resource Monitoring Tool PostgreSQL database

The Tableau data source (.tds) file contains a connection to the Resource Monitoring Tool PostgreSQL database. Before you can connect to a downloaded .tds file, you need to enable access for the `readonly` user to the Resource Monitoring Tool PostgreSQL database. Once the `readonly` user has access, you can then use the `readonly` username and password to

connect to the Resource Monitoring Tool PostgreSQL database from the .tds file in Tableau Desktop.

## Resource Monitoring Tool versions 2022.3 and later:

### Resource Monitoring Tool with local repository:

1. On the RMT Server machine, enable access to the Resource Monitoring Tool PostgreSQL database for the `readonly` user:

```
rmtadmin data-access ReadOnly
```

2. Restart the Resource Monitoring Tool PostgreSQL database for the configuration change to take effect:

```
rmtadmin restart --db
```

3. Retrieve the password for the `readonly` user:

```
rmtadmin get db.readOnlyPassword
```

### Resource Monitoring Tool with external repository:

You must configure the RDS instance to allow access from Tableau Desktop. Retrieve the username and password for the Resource Monitoring Tool PostgreSQL database and use it to download .tds files. For more information, see the [documentation on AWS site](#).

## Resource Monitoring Tool versions 2022.2 and earlier:

1. Open the `postgresql.conf` file in a text editor. By default, the file is located at:

```
C:\Program Files\Tableau\Tableau Resource Monitoring Tool\data\-postgresql<version>
```

2. Update `Listen_addresses = 'localhost'` to `Listen_addresses = '*'`.

**Note:** You must remove the '#' from this line.

3. Open the `pg_hba.conf` file in a text editor. This file is also located in the same directory as the `postgresql.conf` file. By default the file is located at: `C:\Program Files\Tableau\Tableau Resource Monitoring Tool\data\postgresql<version>`

4. Add the following to the end of the `pg_hba.conf` file and then save the file:

```
host all all 0.0.0.0/0 scram-sha-256
```

```
host all all ::/0 scram-sha-256
```

5. Restart the Resource Monitoring Tool PostgreSQL database for the configuration changes to take effect:

```
rmtadmin restart --db
```

6. Retrieve the password for the `readonly` user:

```
rmtadmin get db.readOnlyPassword
```

#### Connect to the RMT .tds files from Tableau Desktop

After access to the Resource Monitoring Tool PostgreSQL database has been enabled for the `readonly` user, you can then connect to the downloaded .tds files from Tableau Desktop.

1. In Tableau Desktop, go to **File > Open** and select the .tds file downloaded from the Resource Monitoring Tool web interface.

**Note:** You might need to install the PostgreSQL database drivers. You can download drivers from [www.tableau.com/en-gb/support/drivers](http://www.tableau.com/en-gb/support/drivers).

If Tableau Desktop does not automatically connect to the Resource Monitoring Tool Postgres database after opening the .tds file, you might need to manually enter the `readonly` username and password into the edit connection window in Tableau Desktop.

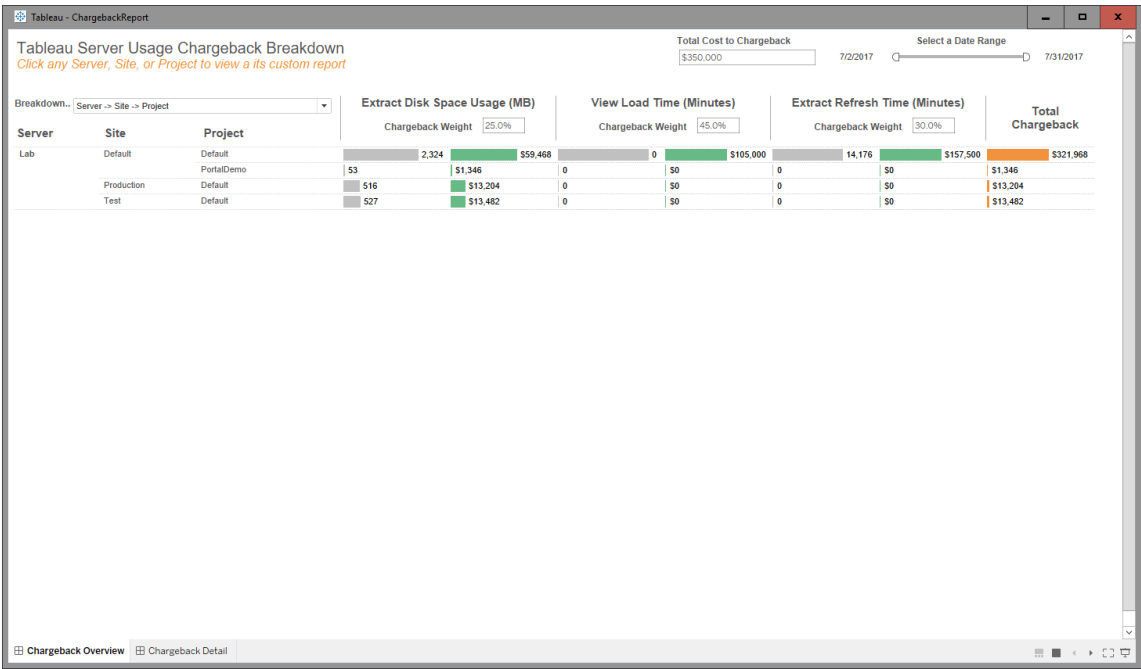
Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Download TDS Files** server role.

Chargeback Reports

Chargeback reports show usage on a per-project or per-site basis and are available for allowed users through the **Admin** menu. The report is generated as a Tableau workbook using a generated extract, allowing you to modify the report or reuse the extract as needed.

The **Chargeback Overview** worksheet shows a breakdown of various metrics based on site and/or project:

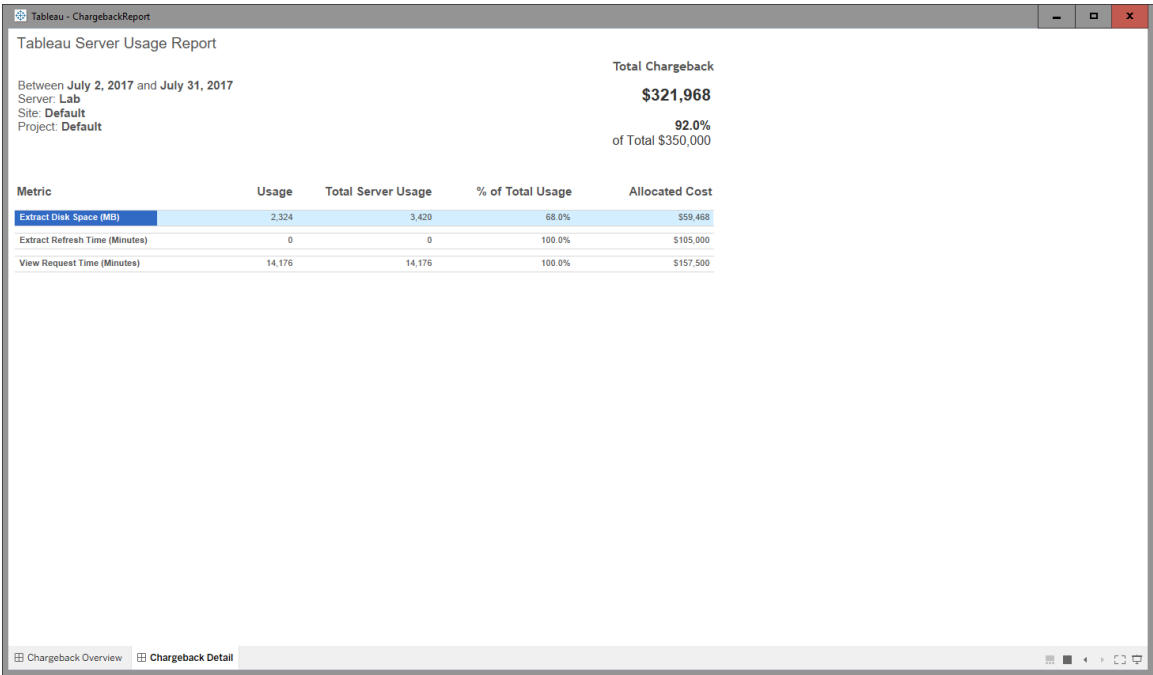


Overview

Tableau Server on Windows Help

Dollar amounts can be customised using the total cost field, and by adjusting the cost weights for each metric.

Clicking on a project or site navigates to a customised invoice-style detail report for that project/site:



Detail

Security

User access is controlled through the **Generate Chargeback Reports** server role.

Data Generation

Data for the chargeback report is aggregated at the daily level, with the following metrics included in the data set:

Metric	Description
Extract File Usage	The size, in Kilobytes, of extract files is collected once per day. For the default report this is simply totalled across the time period

Metric	Description
	for ratio/comparison purposes between projects/sites.
Extract Query Duration	The length of time, in milliseconds, that queries running against extract files ran, totalled per day.
Extract Refresh Task Duration	The length of time, in milliseconds, that extract refresh background tasks ran, totalled per day.
Query Duration	The length of time, in milliseconds, that queries ran, totalled per day. This includes both extract and non-extract queries.
View Request Duration	The length of time, in milliseconds, that requests to render views ran, totalled per day. This includes the duration of any data queries that blocked view rendering.

## Who can do this

Resource Monitoring Tool Administrator or a Resource Monitoring Tool user with **Server-/Environment Management** role.

## Troubleshoot Tableau Resource Monitoring Tool Issues

This section includes articles that describe troubleshooting steps and tips. If you have any questions or encounter other issues not described here, contact [Tableau customer support](#).

### Troubleshoot Missing Hardware Performance Data

Processor (CPU) usage, memory usage, disk queue and network performance stats are considered hardware performance data in the Tableau Resource Monitoring Tool. The most common places to see this data are:



## Tableau Server on Windows Help

- On the **Environment Overview** dashboard in the Performance and Tableau Processes charts
- On the **Servers** dashboard

This data is reported in near real time by the Resource Monitoring Tool agent processes running on each of your Tableau Server machines.

If these charts show no data for an extended period of time, this may be due to the following reasons:

1. Tableau Server is not licensed correctly. This may be due to missing Advanced Management licensed to use Tableau Resource Monitoring Tool with Tableau Server. Make sure Tableau Server has the required licence. For more information on Advanced Management licence, see About Tableau Advanced Management on Tableau Server.
2. Connectivity issues between Agent and Tableau Server. Use the steps below to troubleshoot and isolate these issues.

### Step 1: Check the Agent connection status

First, check that the Agents are currently connected to the Resource Monitoring Tool. The Agents send a regular heartbeat message to the RMT Server to indicate their connection status.

1. Log in to the Resource Monitoring Tool as an administrator.
2. Navigate to the **Admin > Environments** page.
3. Click the Edit link for the environment that is missing performance data.
4. Locate the **Servers** list and ensure that each server shows the Agent Service as **Connected**. You can hover over the **Connected** status for a timestamp of when the last heartbeat message was received.

### Step 2: Ensure the Agent is running

If the Agent shows as **Disconnected** in the Resource Monitoring Tool, the Agent's Windows service may not be running.

1. Connect to the machine the agent is running on.
2. Ensure that the Tableau Resource Monitoring Tool Agent Windows service is running.

### Step 3: Ensure the Agent is configured correctly

If the agent shows as **Disconnected** in the Resource Monitoring Tool, but the service is running, the agent may not be able to reach the Resource Monitoring Tool's message queue.

1. Connect to the machine the agent is running on.
2. Navigate to the agent's installation folder. For example: %Program Files\Tableau\Tableau Resource Monitoring Tool\agent
3. Run the *rmtadmin status* command.

The *rmtadmin status* command will test the agent's connectivity to the message queue and the Resource Monitoring Tool's RMT Server.

### Step 4: Restart the Agent

In some cases, the Agent may be running and all status indicators show success, but the agent continues to not send hardware performance data. This is a known issue that can result from transient connectivity errors between the Agent and the message queue. For example, when restarting the message queue server or during brief network interruptions.

To ensure this isn't the case, restart the Agent and wait a few minutes to confirm whether the performance data is working again.

1. Connect to the machine that the Agent is running on.
2. Restart the Tableau Resource Monitoring Tool Agent Windows service.
3. Ensure the service starts successfully.
4. Wait at least 10 minutes and then log in to Resource Monitoring Tool and check Servers dashboard to see if any hardware performance data has been received.

### Step 5: Verify Run As account configuration

Ensure the run-as accounts for the agents are configured to use the same run-as account that Tableau Server uses to connect to Tableau Server and get the performance and CPU data. It must be the same account that Tableau Server is configured with. Make sure this account has permissions to access Tableau Server logs.

### Step 6: Contact Support

If, after following the above steps, the issue is still not resolved, please contact support.

## Tableau Server on Windows Help

The support team will need a copy of the Resource Monitoring Tool log files from the RMT Server and from each of the agents that are having connection issues. For more information on how to collect log files and sending them to Tableau customer support, see [Sending Log Files to Tableau Customer Support](#).

Who can do this

Resource Monitoring Tool Administrators.

### Troubleshoot RMT Server Service Interruptions

You may be experiencing service interruptions due to RMT Server stopping on a regular basis. This is most likely because Resource Monitoring Tool has been configured with service accounts that do not conform to your internal IT policies. Many IT departments employ automation tools that will revoke privileges on accounts that are deemed non-compliant with their standards, and are the cause for the service interruptions.

**Temporary solution:** Restart RMT Server by running `rmtadmin start -master`.

**Long-term solution:** You can either configure the Resource Monitoring Tool to run under an account that is compliant with your internal governance policies (recommended), or alternatively, work with your IT department to obtain an exception from the policy.

Who can do this

You need to be an Administrator on the machine and be a Resource Monitoring Tool Administrator in order to make configuration and database changes.

### Troubleshoot SSL Certificate Errors

When you try to add a custom SSL certificate thumbprint to the RMT Server configuration, and select **Test Server Configuration**, you see the following error:

*Certificate doesn't include accessible private key.*

This is because the Resource Monitoring Tool is unable to access the private key because the key is not plain text exportable. To resolve the issue, do the following:

1. Make sure you have the private key using the **Windows Certificate Manager**.
2. After receiving the certificate using `certreq.exe`, run the following command from the folder where the certificate is saved:

```
certreq -accept <name of certificate file>
```

This should resolve the issue and allow you to add a custom SSL certificate thumbprint to use with your Resource Monitoring Tool.

Who can do this

You need to be a Administrator on the machine and be a Resource Monitoring Tool Administrator in order to troubleshoot WMI query issues.

### Troubleshoot Unknown Status of Tableau Server Processes

Under certain conditions you might see that the status of a Tableau Server process as reported as **Unknown**. This is often due to a change in the process configuration in Tableau Server which has not yet been updated in Tableau Resource Monitoring Tool.

**Note:** After updating any configuration, it may take a few minutes for the status reported by the Resource Monitoring Tool to refresh. By default, the Resource Monitoring Tool checks the Tableau Server status every 15 seconds but it may be longer if you configured it to check less frequently.

Use the following troubleshooting steps to resolve this issue:

#### Step 1: Check Tableau Server Environment Settings

The Resource Monitoring Tool connects to Tableau Server for monitoring and data collection. If the Tableau Server is upgraded, or the Tableau Server credentials expire, then Resource Monitoring Tool will not be able to monitor it as expected.

To confirm that the Resource Monitoring Tool is able to connect to your Tableau Server:

## Tableau Server on Windows Help

1. Go to **Admin > Environments list** page.
2. Edit the environment that is having the issue.
3. Confirm that the selected Tableau Server version is correct. When you upgrade your Tableau Server you may need to update the version in the Resource Monitoring Tool.
4. Test the Tableau Server REST API connection using the “Test Connection” button.

Optionally, test the Tableau Repository connection using the “Test Connection” button.

### Step 2: Update Tableau Server Machines and Processes

To correctly monitor a Tableau Server, the Resource Monitoring Tool needs to be configured with a complete record of your Tableau Server machine names and process ports. This information is automatically gathered when creating a new environment, but it may need to be manually updated if the Tableau Server configuration is changed.

1. Go to the **Admin > Environments** page.
2. Edit the environment that is having the issue.
3. Confirm that the list of **Servers** contains your initial node/gateway Tableau Server machine as well as all additional node machines.
4. Follow the steps below to confirm that each server is configured correctly.

### Step 3: Update Machine Name

1. Open this Tableau Server URL: *http://<your TableauServer URL>/admin/systeminfo.xml*.
2. Compare and update the Resource Monitoring Tool configuration with this page to ensure it is up-to-date:
  - Update the server's Host Name to exactly match the `<machine name="{HOST NAME}" />` attribute value.

### Step 4: Contact Support

If, after following the above steps the issue is still not resolved, contact [Tableau customer support](#).

VizQL Session details page says the VizQL process is unknown

HTTP requests for a Tableau view are linked to the VizQL process (the actual VizQL PID) that last locked the request's VizQL session ID.

In some cases we may not be able to find a matching VizQL process (PID) and in these cases you will see a message on the view session details page that the VizQL process is unknown.

This can happen in a few rare cases:

- The Tableau cluster has been modified with the addition of a new VizQL worker instance.
- Tableau adjusting the VizQL process' port number to avoid a conflict with another process.

If this happens, sign in to the Resource Monitoring Tool and navigate to the environment admin screen. You'll want to check the process definitions for your servers. Ensure that VizQL processes are defined on the expected servers and with the correct port numbers.

Who can do this

To troubleshoot Tableau Server processes issues, you need to be both a Tableau Server Administrator and a Resource Monitoring Tool Administrator.

### Troubleshoot User Authentication

When a Resource Management Tool user is unable to sign in to RMT, there are a few different reasons why this might happen. Your troubleshooting steps depend on what version of RMT you are using, and what kind of authentication the user is configured for.

### Troubleshoot RMT user authentication issues

When a user is unable to sign into Resource Management Tool, troubleshoot the problem by verifying the following:

## Tableau Server on Windows Help

- Is the user name they are entering added as a user in RMT?
- What type of authentication does the user have in RMT?
  - **Local:** If the user has local auth, reset the password and give them the new one.
  - **Delegated** (Version 2023.1.0 and later):
    - If the user has delegated auth, make sure their user name is correctly entered into RMT. It should not include the domain either before or after the user name:
      - **Correct:** <username>
      - **Incorrect:** <subnet.network>\<username> or <username@<subnet>.<network>
    - Have the user confirm their credentials by signing into another system that uses their domain credentials.
    - Make sure the user is not locked out due to excessive failed sign in attempts (this is not something RMT handles; they'll need to work with their IT help desk on this).

### Using logs to troubleshoot authentication problems

Logs for authentication issues can be found at: `\[Install Directory]\master\logs\web\tabrmt_YYMMDD.log`.

### Error strings to look for:

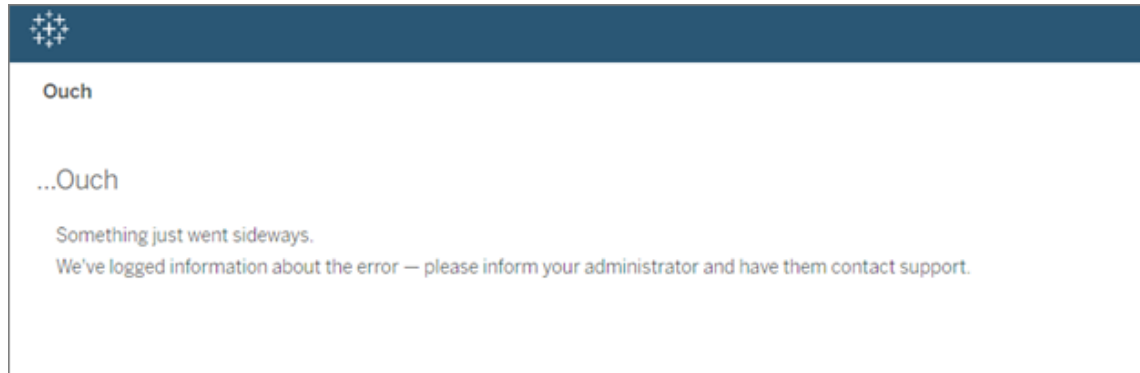
- "Invalid password for user" - A user entered the valid username, mapped to an RMT user assigned Local authentication, but provided an invalid password.
- "User failed to provide the correct password" - A user entered the correct username, mapped to an RMT user assigned delegated authentication, but provided an invalid password.
- "Executing action method \"Tableau.PowerTools.Server.Master.Web.Controllers.AuthenticationController.Login" - A sign in attempt is being made.

### Who can do this

You need to be a Administrator on the machine and be a Resource Monitoring Tool Administrator in order to troubleshoot user authentication issues.

## Troubleshoot Web Interface Timeouts

When you try to navigate to the Tableau Resource Monitoring Tool web interface, you see the following error:



This can happen when the load time takes longer than the default 30 seconds threshold. The load time can be affected by the following:

- The size of the underlying PostgreSQL database.
- If RMT is connected to Tableau Server environments that push the current scale that RMT can support, this may also have an affect on the load times.
- Port conflict. Make sure the port Resource Monitoring Tool is suing and is not in conflict with the ports that Tableau Server is using.

To resolve this issue you can either change the data retention time period or change the threshold to greater than 30 seconds.

### To change the data retention time period, use the following steps:

1. Navigate to the Configuration UI as described in [this topic](#).
2. Navigate to the Data tab.

There are two types of Data Configurations:

- Data retention that is set to 2 weeks by default. It includes detailed activity data and the data displayed in the charts.



## Tableau Server on Windows Help

- Reporting data that is set to 10 year time period by default. It includes aggregated historical data and data used for chargeback reports.
3. Tableau recommends changing the data retention time period to 1 week.

To change the timeout threshold, use the following steps:

1. Log in to the machine where the RMT Server is installed.
2. Find the "master" configuration file. The file when installed in the default location can be found at:

```
C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config\config.json
```

3. Add or change the key: **db:timeoutSeconds**

If you need to reduce the size of the PostgreSQL database immediately, use the `rmtadmin` command line utility to delete the data. For more information, see [rmtadmin Command Line Utility](#).

Who can do this

You need to be an Administrator on the machine and be a Resource Monitoring Tool Administrator in order to make configuration and database changes.

### Troubleshoot WMI Query Issues

If performance counters become corrupt you will see issues in the Resource Monitoring Tool agent. The issue will be reported in the background log file and will look similar to the following example:

```
{ ...
  "Level": "Error", ...
  "RenderedMessage": "Error getting network adapters",
  "Exception": "System.Management.ManagementException: * Invalid
query *
    at System-
tem.Management.ManagementException.ThrowWithExtendedInfo
```

```
(ManagementStatus errorCode) ..."  
... }
```

This may be due to some performance counters being missing on the server. To check this, run `perfmon.exe` and check for any warning messages.

If `perfmon.exe` confirms the performance counters are missing, you can attempt to fix it by rebuilding all of the counters. See below.

### Rebuilding all performance counters:

To rebuild all performance counters, type the following commands at an Administrative command prompt. Press ENTER after each command.

```
cd c:\windows\system32  
lodctr /R  
cd c:\windows\sysWOW64  
lodctr /R
```

Next, resync the counters with Windows Management Instrumentation (WMI):

```
WINMGMT.EXE /RESYNCPERF
```

Finally, stop and restart the Performance Logs and Alerts service.

Who can do this

You need to be a Administrator on the machine and be a Resource Monitoring Tool Administrator in order to troubleshoot WMI query issues.

### Troubleshoot RMT Uninstall Errors

When attempting to uninstall RMT, if you get this error:

*One or more issues caused the setup to fail. Please fix the issues and then retry setup.*

You will need to diagnose the issue and resolve it before reattempting to uninstall. For details on how to do this, see the Tableau Knowledge Base article: [Error Uninstalling RMT](#)

## Tableau Server on Windows Help

### Who can do this

You need to be a Administrator on the machine and be a Resource Monitoring Tool Administrator in order to troubleshoot uninstall issues.

### Troubleshoot Messaging Tables Disk Usage Warnings

In rare situations, you may see a disk space usage warning at the command line after running the `rmtadmin status` command:

```
Internal RMT messaging tables total disk usage is now: <nn.nn> KB.
```

A message displays when disk space reaches or exceeds the warning threshold of 4 GB.

The database usually cleans up unnecessary tables automatically, but if this warning displays, take the following steps to clean up the tables manually:

1. Stop RMT Server:

```
rmtadmin stop
```

2. Start the database service:

```
rmtadmin start --db
```

3. Clean up the unnecessary tables:

```
rmtadmin query "DROP SCHEMA hangfire CASCADE;" --outfile=drop_
hangfire_schema_output.zip --commit
```

4. Start RMT Server:

```
rmtadmin start
```

### Who can do this

You need to be an Resource Monitoring Tool Administrator in order to run the necessary commands.

## Upgrade Power Tools for Server to Tableau Resource Monitoring Tool

Power Tools Server has been rebranded to Tableau Resource Monitoring Tool. The installer has been changed to reflect this rebranding and new ownership. This means the product will install side-by-side with the legacy InterWorks product instead of upgrading it in place.

The 2019.3 version of Power Tools Server (now named the Tableau Resource Monitoring Tool) requires a licence key. For information about activating the licence key, see [Tableau Resource Monitoring Tool Legacy Licence Key Activation](#).

Follow these steps to upgrade to Resource Monitoring ToolThe recommended steps to upgrade are:

1. Stop all installed InterWorks agents.
2. Wait for the data processing to complete.
3. Stop and uninstall InterWorks master server.
4. Run the Tableau RMT Server installer to install Tableau RMT server.
5. Stop Tableau RMT server.
6. Copy over *config/config.json* from InterWorks RMT Server directory to Tableau RMT Server directory.
7. If you are using Postgres as your database, the following steps are necessary for the database to function with the security improvements in 2019.3. If using any other database, skip to step 8.

Postgres SQL Update Instructions:

- Locate the *postgres pg\_hba.config* file. It will be at *<PTS installation directory>\data\postgresql\pg\_hba.config*.
- Edit the *pg\_hba.config* file, entries at the end will look like this: host all all 127.0.0.1/32 trust. Change the last column for all lines from **trust** to **md5**. So the new line should look like this: host all all 127.0.0.1/32 md5.
- Save the *pg\_hba.config* file.
- Restart the PTS postgresql service.

## Tableau Server on Windows Help

8. Restart Tableau RMT Server.
9. Run the Tableau Agent installers to install Tableau agents.
10. Stop Tableau Agents.
11. Copy over *config/config.json* from InterWorks agent directory to Tableau Agent directory.
12. Once the Tableau Resource Monitoring Tool installation is complete, and you have confirmed it is working as expected, uninstall the InterWorks/Tableau Power Tools for Server.

## Tableau Resource Monitoring Tool Legacy Licence Key Activation

The 2019.3 version of Power Tools Server (now named the Tableau Resource Monitoring Tool) requires a licence key. The instructions below provide the steps to activate this key:

1. The licence key will be passed over as a file in format *.dat*.
2. The *.dat* file needs to be added to the config directory of the Master Server.

*The default location is: C:\Program Files\Tableau\Tableau Resource Monitoring Tool\master\config.*

3. Restart the Master Server service:

Navigate to **Windows Server Manager** and restart the **Tableau Resource Monitoring Tool** service.

## About Tableau Content Migration Tool

This set of articles guides you through setting up, using and maintaining the Tableau Content Migration Tool.

### What is Content Migration Tool?

The Content Migration Tool provides an easy way to copy or migrate content between Tableau Server sites. You can do this between sites on a single Tableau Server installation, or if you have user-based licensing, between sites on separate installations (for example, between a development instance of Tableau Server and a production installation). The Content Migration Tool user interface walks you through the steps necessary to build a "migration plan" that you can use once or as a template for multiple migrations.

Before migrating content, we recommend reviewing the [Content Governance](#) section in Tableau Blueprint.

### Help and Support

If you have problems that you cannot solve with this documentation, contact [Tableau Technical Support](#).

### Getting Started with Tableau Content Migration Tool

This article will help you get started with the Tableau Content Migration Tool. It contains links to other articles about information you need to prepare before installing the Content Migration Tool and steps to design a migration plan and upgrade existing installations.

#### Pre-installation

##### Installation requirements

The Content Migration Tool can only be installed on Windows operating systems. Before installing, you must be able to connect to the Tableau source site (the site you are migrating from) and the destination site (the site you are migrating to) from the computer where Content Migration Tool is installed. Both the source and destination sites must have a valid [Advanced](#)

[Management](#) licence. For more information about installing and upgrading Content Migration Tool, see [Install Tableau Content Migration Tool](#).

### Compatibility with Tableau Server

The Content Migration Tool supports content migration for Tableau Server versions 2019.3 and later.

The table lists compatible versions of Tableau Server based on the installed version of Content Migration Tool.

CMT Version	Tableau Server Version
2024.1x	2022.1x - 2024.1x
2023.1.x	2021.2.x - 2023.1.x
2022.4.x	2021.1.x - 2022.4.x
2022.3.x	2020.4.x - 2022.3.x
2022.2.x	2020.3.x - 2022.2.x
2022.1.x	2020.2.x - 2022.1.x
2021.4.x	2020.1.x - 2021.4.x
2021.3.x	2019.4.x - 2021.3.x
2021.2.x	2019.3.x - 2021.2.x
2021.1.x	2019.3.x - 2021.1.x
2020.4.x	2019.3.x - 2020.4.x
2020.3.x	2019.3.x - 2020.3.x

### Compatibility with Tableau Cloud

Content Migration Tool version 2022.2.1 and later support content migration for all Tableau Cloud deployments. We recommend installing the most recent version from the [Tableau](#)

[Advanced Management](#) downloads page to take advantage of the latest features and fixes.

### Compatibility with Tableau content

The Content Migration Tool supports migrating workbooks and published data sources saved in the eight most recent versions of Tableau. While you can migrate existing data sources, only data sources that use the connection types in the table below can be changed and modified during migration. For more information, see [Data Source Transformations in Migration Plans: Workbooks](#) and [Migration Plans: Published Data Sources](#).

Action Matrix	Google Drive	Pivotal Greenplum Database
Action Vectorwise	HortonWorks Hadoop Hive	PostgreSQL
Amazon Athena	HP Vertica	Progress OpenEdge
Amazon Aurora	IBM DB2	Salesforce
Amazon EMR	IBM Netezza	SAP HANA
Amazon Redshift	Map R Hadoop Hive	SAP Sybase ASE
Apache Drill	Microsoft Access	SAP Sybase IQ
Aster Database	Microsoft Analysis Services	Snowflake
Box	Microsoft Excel	Spark SQL
Cloudera Hadoop	Microsoft Excel Direct	Statistical File
Delimited Text File	Microsoft OneDrive	Tableau Extract
EXASOL	Microsoft SQL Server	Tableau Published Data Source
Firebird	MySQL	Teradata
Google Analytics	OData	Text File
Google BigQuery	Oracle	Web Data Connector



[Google Cloud SQL](#)

[Oracle Essbase](#)

[Other Databases \(ODBC\)](#)

[Post-installation](#)

[Limitations when migrating content](#)

Before you start, make sure you understand the limitations when migrating content using the Content Migration Tool. For more information, see [Migration Limitations](#).

[Create a migration plan](#)

The Content Migration Tool walks you through migrating content across projects on a single site, to a new site on the same Tableau Server instance and to sites that exist on different Tableau Server instances. The plan you create can be saved and used again for future migrations. For more information, see [Migration Plan Overview](#).

## Install Tableau Content Migration Tool

Installing Tableau Content Migration Tool is straightforward and easy.

[Installation requirements](#)

The Content Migration Tool tool is run from a Windows computer and can connect to Tableau Cloud sites and Tableau Server 19.3 and later with a valid Advanced Management licence. For more information about compatible versions, see [Getting Started with Tableau Content Migration Tool](#).

The computer that you install Content Migration Tool on must meet the requirements below:

- Microsoft Windows 10 or newer (x64)
- Intel Core i3 or AMD Ryzen 3 (Dual Core)
- 4 GB memory or larger
- Can connect to the source and destination sites. Both sites must have a valid [Advanced Management](#) licence to migrate content.
- 2 GB HDD or larger. The drive where the `\temp` folder resides must have enough disk space to hold a copy of all content being migrated in a single migration. All content is

stored locally on the disk and deleted when the migration is complete.

- Have enough free disk space to hold the application and its logs.

In addition, confirm that the REST API is enabled on Tableau Server (this is the default). Use the `tsm configuration get -k api.server.enabled` command to confirm this. A return value of `true` means the REST API is enabled. To enable the REST API, use the `tsm configuration set` command. For more information, see `api.server.enabled`.

## Install Content Migration Tool

To install the Content Migration Tool:

1. Download the Content Migration Tool installer (`Tabcmt-64bit-<version>.exe`) for your version of Tableau Server from the [Tableau Advanced Management](#) downloads page.
2. Run the Content Migration Tool Setup program.

**Note:** Running the Content Migration Tool Setup program overwrites the previous version.

3. After reading the EULA, select **I agree to the license terms and conditions** and click **Install**.
4. If the User Account Control dialog opens, click **Yes** to allow the installer to make changes.

## Upgrade Content Migration Tool

Upgrading to the latest version of Content Migration Tool ensures that you can take advantage of the latest features and fixes included with each new version.

### Important:

- Running the Content Migration Tool Setup program overwrites the previous version.
- Content Migration Tool doesn't support side-by-side installation of previous versions.

To upgrade Content Migration Tool:

## Tableau Server on Windows Help

1. Log on to the machine where Content Migration Tool is installed. If there are instances of Content Migration Tool open, save your migration plan and exit the application.
2. Follow the steps listed in [Install Content Migration Tool](#) to download the latest installer and complete the upgrade.

### Install Content Migration Tool from the command line

You can install Content Migration Tool from the command line if you're a local administrator on the machine.

### Install switches

Specify one or more switches in the command line for the installer. For example:

```
Tabcmt-64bit-2022-3-0.exe /quiet /norestart
```

Switch	Description	Comments
<code>/install   /repair   /uninstall   /layout "&lt;directory&gt;"</code>	Run Setup to either install, repair or uninstall Content Migration Tool, or with <code>/layout</code> , create a complete local copy of the installation bundle in the directory specified.	Default is to install, displaying UI and all prompts. If no directory is specified on a fresh install, <code>C:\Program Files\Tableau\Tableau Content Migration Tool</code> is assumed. If Content Migration Tool is already installed, Setup assumes the same location as the current installation.
<code>/passive</code>	Run Setup with minimal UI and no prompts.	Content Migration Tool doesn't start automatically when installed in <code>/passive</code> mode. To start Content Migration Tool, open the application manually.
<code>/quiet   /silent</code>	Run Setup in unattended, fully silent mode. No UI or prompts are displayed.	Content Migration Tool doesn't start automatically when installed in <code>/silent</code> or <code>/quiet</code> mode. To start Content Migration Tool, open the application manually.

		<b>Note:</b> Use either <code>/silent</code> or <code>/quiet</code> , not both.
<code>/norestart</code>	Run Setup without restarting Windows, even if a restart is necessary.	<b>Note:</b> In certain rare cases, a restart cannot be suppressed, even when this option is used. This is most likely when an earlier system restart was skipped, for example, during installation of other software.

Who can do this

A user with Administrator access on the machine.

## Using Tableau Content Migration Tool

The following steps are designed to guide you through using the Tableau Content Migration Tool:

- Migration Plan Overview
  - Migration Plans: Sites
  - Migration Plans: Source Projects
  - Migration Plans: Workbooks
  - Migration Plans: Published Data Sources
  - Migration Plans: Permissions and Ownership
  - Migration Plans: Migration Scripts
  - Migration Plans: Plan Options
- Using the Tableau Content Migration Tool Console Runner

## Tableau Content Migration Tool Use Cases

Tableau Content Migration Tool as the name suggests, is primarily used for moving Tableau Server content from one site to another. However, there are many features in the tool that

make it ideal for accomplishing several tasks related to content migration and maintenance.

**Note:** In many of the use cases, we use the term migration to describe moving content from one environment, site or project to another. However, technically the Content Migration Tool copies content and does not automatically delete or archive the original or source content.

The information below describes some common use cases where you can leverage the Content Migration Tool.

#### Content promotion

You can use the Content Migration Tool to create content for development sites and then perform routine migrations to promote content to staging or production environments.

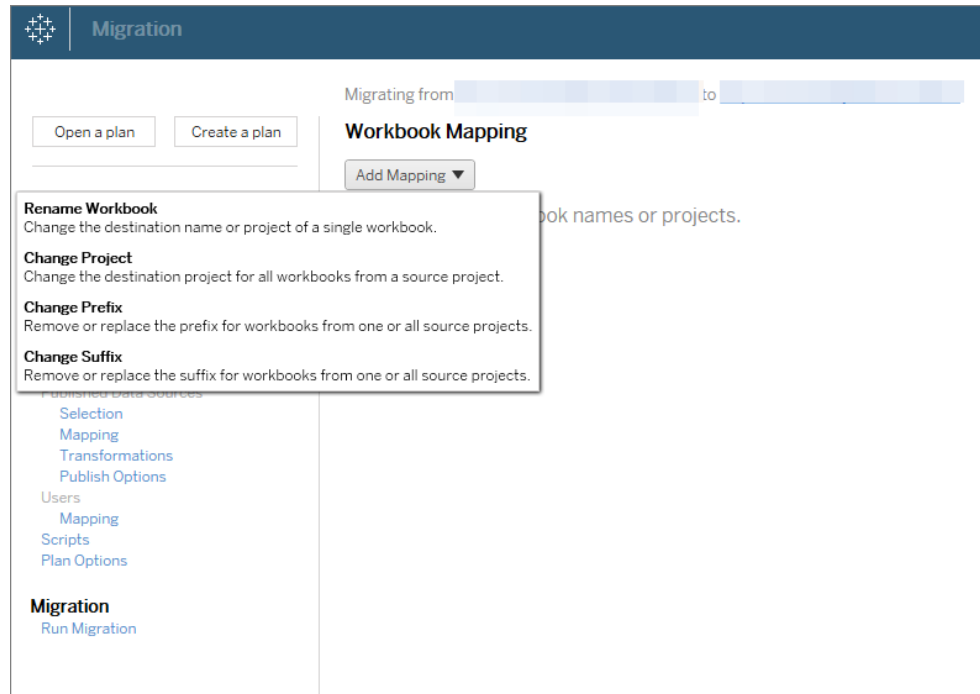
#### Use the following steps to promote content to production environments:

1. **Create a plan** and select the site used for development as the source and the staging or production site as the destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.

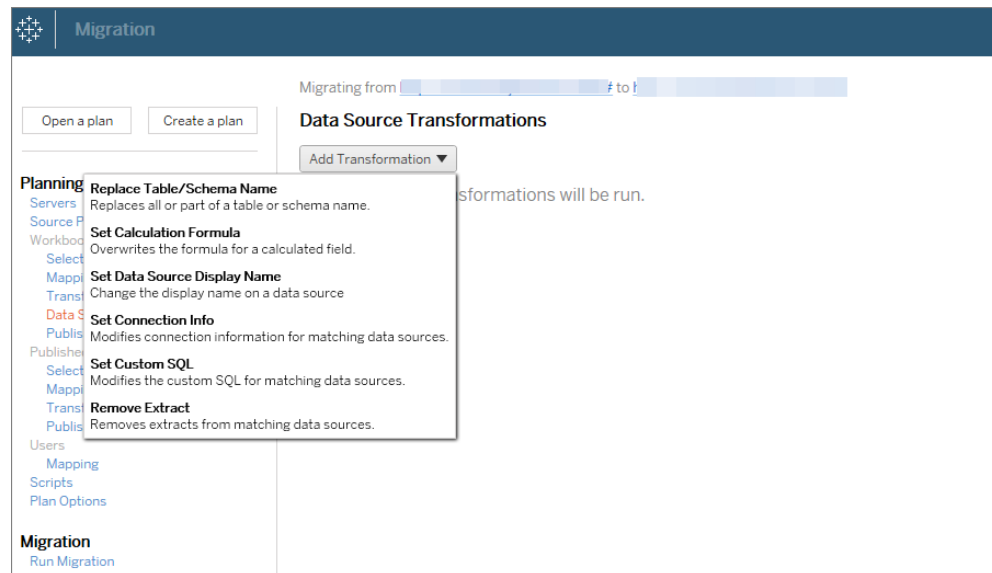
When migrating your workbooks between two projects on the same site, your sign-in credentials for the source and destination may be similar or identical. In this scenario, we recommend using personal access tokens for a more reusable connection. For more information, see [Personal Access Tokens](#).

2. **Select the content** you want to migrate from your source site. You can select entire projects, specific workbooks and data sources and user permissions. For more information, see [Planning in Migration Plan Overview](#) topic.
3. If you need to make any **changes or transformations** to the content during this migration, you can configure that in the plan as well. This is referred to as **Mapping**. The types of mapping you can make include:

- **Changes to workbooks:** Includes renaming workbooks and changing the destination project. For a full list of workbook transformations, see Migration Plans: Workbooks.



- **Changes to data sources:** Includes replacing table or schema names, settings calculation formulas, and setting connection information. For a full list of data source transformations, see Migration Plans: Workbooks (embedded data sources) and Migration Plans: Published Data Sources (published data sources).



- **Changes to Users:** Includes domain, user and group name changes in the destination.
4. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.
  5. **To schedule** this to run regularly, you can [script this as a job](#) using the Content Migration Tool Runner and schedule it. For more information on using the Content Migration Tool Runner, see [Using the Tableau Content Migration Tool Console Runner](#).

### Tailoring content for customers

When working in a consulting scenario, you can customise content for each of your customers using the Content Migration Tool. Each workbook functions as a template for your migration plan, allowing you to apply styling (text, images, etc.) and replace data sources for specific customers.

### Use the following steps to customise content for your customers:

1. **Create a plan** and select the production site as the source and the customer site as the destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.

2. **In the Workbooks** step of the Migration Plan, use workbook mappings and transformations to customise your content. Below are two examples of frequently used transformations. For a full list of workbook transformations, see Migration Plans: Workbooks.

- To personalise content, you can use the **Replace Image** and **Replace Text** transformations to update the workbook with a customer's company name and logo.
- When it comes to data sources, you can use the **Replace Table/Schema Name** or **Set Custom SQL** transformations to modify content for your customer.

3. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.

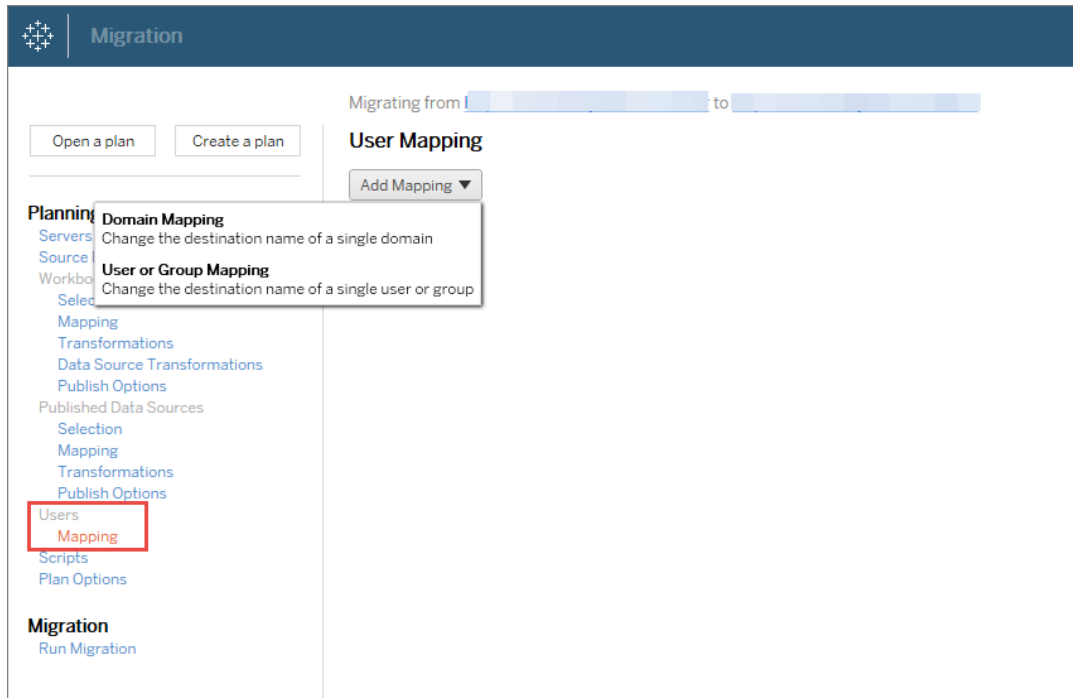
### Environment migration

You can use the Content Migration Tool to migrate content between Tableau Server environments.

### Use the following steps to migrate content between Tableau deployments:

1. **Create a plan** and **select the site** you want to migrate from as your source. For more information, see Create a Plan in Migration Plan Overview topic.
2. **Select the content** you want to migrate from your source site. You can select entire projects, specific workbooks and data sources and user permissions.
3. **Create user permissions mappings** to customise and secure content. For more information, see Migration Plans: Permissions and Ownership.





4. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.

### Tips

- Before you perform an environment migration, make sure you understand the Migration Limitations when using the Content Migration Tool.
- You can migrate your content in stages, test and validate content iteratively before final migration is complete. There is no server downtime when you use this method of migration. It can be a replacement for Site import/export.
- Content Migration Tool migration does not handle embedded credentials, subscriptions and custom views. These will have to be migrated manually.

### External content sharing

You can use the Content Migration Tool to share internal content with external collaborators, without allowing access to your site. This keeps your data secure and allows you to publish only select workbooks and data sources. Once content has been shared, collaborators sign in

to their Tableau Server site to view and make changes, without affecting content stored on your internal server.

Before you continue, make sure the content you share is compatible between the internal (source) and external (destination) sites. The external site should be running the same version of Tableau as the internal site or later. For more information about compatibility, see [Make Workbooks Compatible Between Versions](#) in Tableau Desktop help.

**Use the following steps to share content externally:**

1. **Work with** the external site administrator to determine a user account that has publishing rights on the site. You will use this user account to create the migration plan. For more information, see [Set Users' Site Roles and Permissions](#).
2. **Prepare internal content.** As a best practice, we recommend separating content on the internal server to a project, with locked permissions and strict governance rules. Workbooks and data sources should be clearly labeled to indicate the content is for external use. For more information, see [Use Projects to Manage Content Access](#).

**Note:** Content shared with external sites must use data extracts unless the data source is publicly accessible. For information about creating extracts and replacing data sources, see [Extract Your Data](#) and [Replace Data Sources](#) in Tableau Desktop help.

If you have implemented row level security, those data sources must be updated to reflect user filters and other details for the external site. For more information about row level security, see [Restrict Access at the Data Row Level](#) in Tableau Desktop help.

3. **Create a plan** and select the internal site as the source and the external site as the destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.

4. **Select the content** you want to share with the external site. You can select entire projects, specific workbooks and data sources and user permissions.
5. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.

#### Validating database migrations

This use case is when you intend to validate content after a migration of the underlying databases. One example of database migration is moving from SQL Server to Snowflake. CMT can help you validate the content built from both data sources is the same before you finalise your migration, but it cannot perform the actual database migration.

#### Use the following steps to validate database migrations:

1. **Create a plan** and select the Tableau site to use as your source. In this example, we describe a migration between projects on the same Tableau site, so select the same site for your destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.
2. **Configure the migration** to copy your content to a new project. Let's call the **source** project as **Project A**, and the new or the **destination** project as **Project B**.
  - Changes to workbooks: Create a workbook mapping to change Project A to Project B. For a full list of workbook transformations, see [Migration Plans: Workbooks](#).
  - Changes to data sources: Create a data source mapping to change the Project A to Project B. For a full list of data source transformations, see [Migration Plans: Published Data Sources](#).
3. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.
4. **Update the content** in **Project B** with the new database connections or replace the data sources. This needs to be done manually by authoring.

5. **Test each workbook** in **Project A** with the copy in **Project B** and review for any inconsistencies in the data due to the change in data source.
6. Once you have confirmed everything is working as expected, **overwrite the content** in Project A with the updated content in Project B.

**Note:** If the content already exists in the destination project and you do not select the **Overwrite Newer Workbooks** and **Overwrite Newer Data Sources** publish options, the content will not be copied to the destination project.

### Geographical content migration

If you are maintaining a geographically distributed, multi-site environment, you will need some of this content to be shared and accessible across all the servers. This use case describes how to migrate content between servers in different geographies. The server can be in the same country or across continents.

#### Best Practices:

- We recommend prioritising the content that you most need. Content Migration Tool shouldn't be used to copy entire server environments to multiple geographies.
- We recommend migrating content in one direction only meaning Primary to Secondary. Here we use the term Primary to indicate the source site and Secondary to indicate the destination. You can have one or more destination by creating multiple migration plans.

#### Use the following steps to migrate between Tableau Server that are distributed in different geographies:

1. **Create a plan** and select the Primary site as the source and the secondary site as the destination. For more information, see Create a Plan in Migration Plan Overview topic.
2. **Select content** that you want to share between the Primary and Secondary.

3. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.
4. **To schedule** this to run regularly, you can [script this as a job](#) using the Content Migration Tool Runner and schedule it. For more information on using the Content Migration Tool Runner, see, [Using the Tableau Content Migration Tool Console Runner](#).
5. **Review the content** on the source **periodically** to determine if new items should be added to the migration plan.

### Consolidate sites

If you need to combine the content of multiple sites into a single site (if, for example, organisational restructuring has changed how your sites should be arranged), you can use the Content Migration Tool to do this.

**Note:** Before consolidating sites, make sure you understand the limitations when migrating content using the Content Migration Tool. For more information, see [Migration Limitations](#).

Use the following steps to copy all the workbooks and data sources from one site to another:

1. Create a plan and select the site you want to consolidate as the source. For more information, see [Create a Plan in Migration Plan Overview](#) topic.
2. On the Source Projects page, select **All Projects** and click **Next**.

If a project with the same name exists on the destination site, the content will be migrated to the same folder.

3. On the Project Options page, select your preferences for the destination site and click **Next**.

If the content already exists in the destination project and you do not select the overwrite option, the content will not be copied to the destination project.

4. On the Workbook Selection screen, select **All Workbooks**.
5. (Optional) If you are copying published data sources:
  - From the left navigation menu, under Published Data Sources, click **Selection**.
  - Select **All Data Sources**.
6. Click **Run Migration** and review the migration plan. When you're ready, click **Run** at the bottom of the screen to run the migration.

Repeat these steps until you've consolidated all sites. For more information, see Planning in Migration Plan Overview topic.

## Maintenance tasks

You can use the Content Migration Tool to perform a variety of maintenance tasks.

### Tagging stale content

Using the Content Migration Tool, you can manage archiving stale content. For example, you can build a plan that runs on a regular schedule that can automatically pick up content tagged as Stale Content and move it to an Archive project. After a certain amount of time, the content in this project can be purged from the system. For more information see, Migration Plans: Workbooks.

### Restoring content

You can use the Content Migration Tool to restore content removed (accidentally or purposefully) from the production Tableau Server with content from a backup server. The restoration process is simple and does not require downtime, compared to restoring with a backup file.

**Use the following steps to restore content from a backup server:**

1. **Create a plan** and select the backup Tableau Server as the source and the production server as the destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.
2. **Select the content** you want to restore from the backup Tableau Server.
3. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.
4. **Review the content** on the production server.

### Partial backup

Once you have a backup Tableau Server environment, you can use the Content Migration Tool to transfer new content from production to the backup Tableau Server. If you have not configured a backup Tableau Server environment, see the [Disaster Recovery for Tableau Server](#) whitepaper for more information.

#### Notes:

- Before you perform a partial backup, make sure you understand the Migration Limitations when using the Content Migration Tool. You may still need to periodically perform a full backup and restore to backup all Tableau Server content. For more information, see [Perform a Full Backup and Restore of Tableau Server](#).
- The Content Migration Tool shouldn't be used to perform your first backup.

### Use the following steps to perform a partial backup of your content:

1. **Create a plan** and select the backup Tableau Server as the source and the production server as the destination. For more information, see [Create a Plan in Migration Plan Overview](#) topic.
2. **Select the content** you want to backup. You can select entire projects, specific workbooks and data sources and user permissions. To migrate only new content, make sure

the publish options **Overwrite Newer Workbooks** and **Overwrite Newer Data Sources** are not selected. For more information, see Migration Plans: Workbooks.

3. **Verify and run** the plan. When you are ready, click **Run Migration** to end the Planning phase and prepare to run your plan.
4. **To schedule** this to run on a regular basis, you can script this as a job using the Content Migration Tool Runner and schedule it. For more information on using the Content Migration Tool Runner, see Using the Tableau Content Migration Tool Console Runner.

## Migration Plan Overview

Tableau Content Migration Tool creates a streamlined process for migrating Tableau content between sites and projects. The easy-to-follow plan can be audited, is repeatable and works via a batch process so any number of workbooks and data sources can be migrated in a simple and efficient process.

The Content Migration Tool will display contextual tips to walk you through creating or editing a migration plan. Once you select the source and destination sites, a summary of your migration will be displayed at the top of the screen as follows:

Migrating from <http://admin@win-vj23dhvudie:80/#/site/Accounting-sandbox> to <http://admin@win-vj23dhvudie:80/#/site/Accounting>

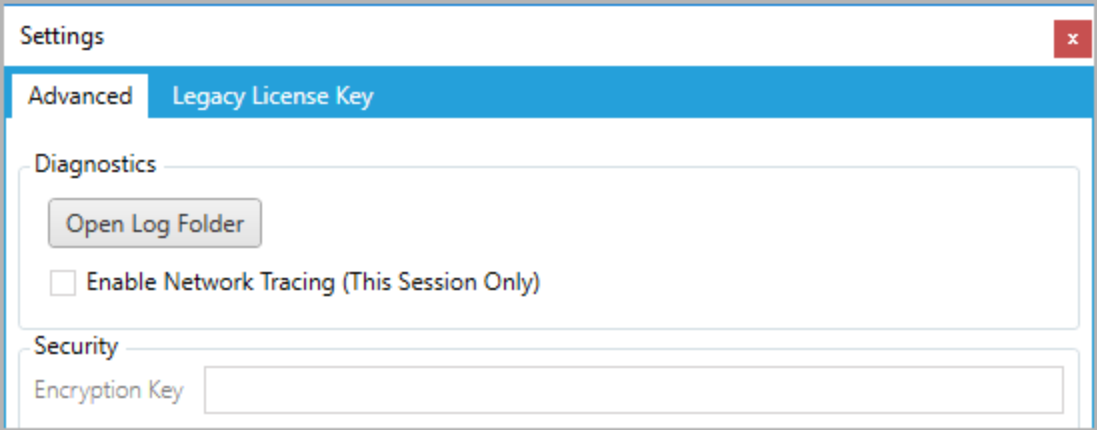
### Limitations when migrating content

Before you start, make sure you understand the limitations when migrating content using the Content Migration Tool. For more information, see Migration Limitations.

### Encryption keys

Each migration plan file is generated with an encryption key unique to the application that created the plan. Encryption keys can be shared if the migration plan needs to be run through an application that did not originally generate the file. When sharing encryption keys, you will need to overwrite the existing key in the application to run the migration plan. To view your encryption key, select **Help > Settings**.





If you will be using the Content Migration Tool Console Runner for migration plans, you must specify the encryption key using the `tabcmt-runner encryption` command before running the plan. For more information, see [Using the Tableau Content Migration Tool Console Runner](#).

Migration process

Step 1: Start

The core of the migration process is creating a plan, which you can save and re-use for future migrations or modify and update as needed. The first step is choosing whether to create a new plan, or select a previously saved plan.

To create a new plan, click **Create New Plan**. If you already created a migration plan and want to use it, click **Browse for a Plan**.



By default, all of your saved migration plans will be stored in the `Tableau Content Migration Tool Plans` folder in your My Documents folder. All migration plans are saved with a `.tcmx` extension, with recently accessed plans listed separately to make them easy to select:

<div>Create New Plan</div> <div>Browse for a Plan...</div>		
Recent Plans		Last Updated
<b>DefaultToDefault2.tcmx</b> C:\Users\jsmith\Documents\Tableau Content Migration Tool Plans\DefaultToDefault2.tcmx		7/12/2019 6:25 PM

You can select a recently accessed plan and duplicate it to modify the plan and save it as a new plan. Select the plan you want to copy and click **Duplicate**.



## Step 2: Planning


The Content Migration Tool guides you through building or editing your migration plan in six steps.

Click on each step for detailed instructions:

- Migration Plans: Sites
- Migration Plans: Source Projects
- Migration Plans: Workbooks
- Migration Plans: Published Data Sources
- Migration Plans: Permissions and Ownership
- Migration Plans: Migration Scripts
- Migration Plans: Plan Options

## Step 3: Migration

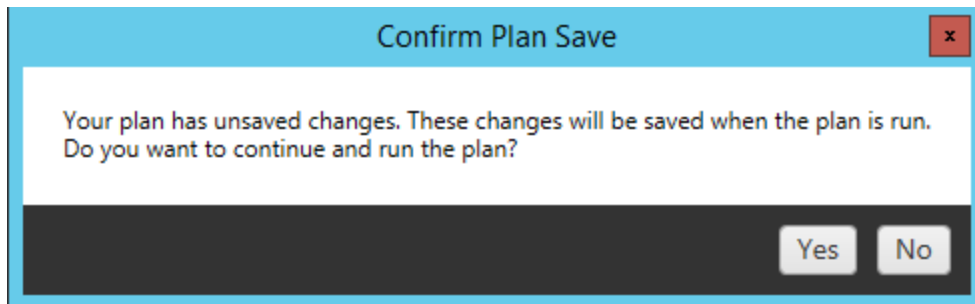
Once you have completed your plan, you are now ready to run the batch process for migration. When you reach the final step of the migration, a plan summary displays for your verification:

**Review**Need help? 

Source:	http://admin@win-vj23dhvudie:80/#/site/Accounting-sandbox
Destination:	http://admin@win-vj23dhvudie:80/#/site/Accounting
Projects:	Default Mkt-Q3 Mkt-Q4
Workbooks:	Test Data - 2019 [Project: Mkt-Q4]
Published Data Sources:	All data sources
Auto Archive:	No

If you want to change any aspects of your plan, you can click on a section in the left sidebar to go directly to that phase. When you are ready, click **Run** to begin your migration.

When you click **Run**, the migration tool will prompt you about any unsaved elements of your plan. By default, any unsaved elements will be saved when you click **Yes**. Remember you can always keep your previous plan without making any changes by duplicating it during the Start phase of the migration process.



Your migration plan will run and a status bar displays for the overall plan progress and each workbook being sent to the destination server.



When the plan finishes running, you can click the tabs at the bottom of the screen for more information about the migration.

Published workbooks

**Published Workbooks** details the newly published workbooks and the projects where they were migrated.

Published Workbooks	Published Data Sources	Output	Errors and Warnings
Workbook	Project		
Test Data - 2019	Mkt-Q4		<a href="#">View on Tableau Server</a>

Published data sources

**Published Data Sources** details the newly published data sources and the projects where they were migrated.

Output

The **Output** tab details the migration log of your plan.

Published WorkbooksPublished Data SourcesOutputErrors and Warnings

-----  
Tableau Content Migration Tool  
Version 2019.3.0  
Build 20193.19.0712.1501+165d952  
-----

Started : 7/15/2019 10:23:52 PM  
Plan : DefaultToDefault2.tcmx  
File : C:\Users\jsmith\Documents\Tableau Content Migration Tool Plans\DefaultToDe-  
Migration ID : 1d60b6bb-9eaf-48a7-878d-53f1887009ee  
  
Source : http://admin@win-vj23dhvudie:80/#/site/Accounting-sandbox  
Destination : http://admin@win-vj23dhvudie:80/#/site/Accounting

You can save this log by clicking **Save Log**.



Errors and warnings

The **Errors and Warnings** tab highlights any problems that occurred during the migration.

Published WorkbooksPublished Data SourcesOutputErrors and Warnings

	Message	Workbook or Data Source	Project
⊗	Destination project [Mkt-Q4] does not exist. To avoid this error, enable automatic destination project creation in Options or create the project manually.		
⊗	Migration failed.		

You can correct these and rerun your plan. When you have completed your migration and saved your plan, click **Done** to finish.



### Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).

### Migration Limitations

There are certain limitations to migrations when using the Tableau Content Migration Tool. Before creating your migration plan, review the sections below to learn about version compatibility and content that will not be migrated.

#### Compatibility with Tableau content

The Content Migration Tool supports migrating workbooks and published data sources saved in the eight most recent versions of Tableau. Workbooks and published data sources saved before version 2018.1.x are not supported by CMT. For more information, see [Getting Started with Tableau Content Migration Tool](#).

#### Configurations

The following configurations are not migrated to the destination site when using the Content Migration Tool.

- [Users](#)
- [Groups](#)
- [Site settings \(custom logos, view recommendations, etc.\)](#)

#### Data connections

While you can migrate existing data sources, only data sources that use the connection types in the table below can be changed and modified during migration. For more information, see

## Data Source Transformations in Migration Plans: Workbooks and Migration Plans: Published Data Sources.

Action Matrix	Google Drive	Pivotal Greenplum Database
Action Vectorwise	HortonWorks Hadoop Hive	PostgreSQL
Amazon Athena	HP Vertica	Progress OpenEdge
Amazon Aurora	IBM DB2	Salesforce
Amazon EMR	IBM Netezza	SAP HANA
Amazon Redshift	Map R Hadoop Hive	SAP Sybase ASE
Apache Drill	Microsoft Access	SAP Sybase IQ
Aster Database	Microsoft Analysis Services	Snowflake
Box	Microsoft Excel	Spark SQL
Cloudera Hadoop	Microsoft Excel Direct	Statistical File
Delimited Text File	Microsoft OneDrive	Tableau Extracts
EXASOL	Microsoft SQL Server	Tableau Server Data Sources
Firebird	MySQL	Teradata
Google Analytics	OData	Text File
Google BigQuery	Oracle	Web Data Connector
Google Cloud SQL	Oracle Essbase	Other Databases (ODBC)

### Unsupported content

The following content is not migrated to the destination site when using the Content Migration Tool and will require additional configuration.

Content	Action required
Ask Data lenses	Users must recreate Ask Data lenses on the destination site. For more information, see <a href="#">Create Lenses that Focus Ask Data for Specific Audiences</a> .
Collections	Users must recreate collections on the destination site. For more information, see <a href="#">Collections</a> in Tableau Desktop help.
Comments	Users must re-add comments to views on the destination site. For more information, see <a href="#">Comment on Views</a> in Tableau Desktop help.
Custom views	Users must recreate custom views on the destination site. For more information, see <a href="#">Use Custom Views</a> in Tableau Desktop help.
Data roles	Users must recreate data roles on the destination site. For more information see <a href="#">Use Data Roles to Validate your Data</a> in Tableau Prep Builder help.
Data source certifications	<p>If you have the following site roles and capabilities, you can certify data sources on the destination site.</p> <ul style="list-style-type: none"> <li>• Site Administrator Creator</li> <li>• Creator or Explorer (can publish) with Project Leader capability on the project containing the data source</li> </ul> <p>For more information, see <a href="#">Use Certification to Help Users Find Trusted Data</a>.</p>
Data-driven alerts	<p>Users must recreate data-driven alerts for dashboards and views on the destination site. After data-driven alerts are created, anyone with access to the view can add themselves to existing alerts.</p> <p>For more information, see <a href="#">Send Data-Driven Alerts from Tableau Cloud or Tableau Server</a> in Tableau Desktop help.</p>
Descriptions for workbooks and	If you own the content item or have the appropriate permissions, you can edit the item's description on the destination site. For more inform-



data sources	ation, see <a href="#">Add or edit descriptions</a> in Tableau Desktop help.
Embedded credentials	<p>For security purposes, Tableau Server removes embedded credentials from data sources during the download process.</p> <ul style="list-style-type: none"><li>• To include embedded credentials when migrating from Tableau Server to Tableau Cloud, use the Migrate Embedded Credentials for Workbooks and Migrate Embedded Credentials for Data Source publish options. For more information, see <a href="#">Migrate Workbooks and Data Sources with Embedded Credentials</a>.</li><li>• To include embedded credentials when publishing to Tableau Server sites, use the Set Connection Info data source transformation. For more information, see <a href="#">Migration Plans: Published Data Sources</a>.</li></ul>

**Note:** CMT does not support embedded credential migration for OAuth connections. To migrate OAuth credentials, use the Set Connection Info data source transformation.

External assets	Customised attributes for external assets are not migrated to the destination site. For example, tags, certifications, data quality warnings, descriptions, permissions, user contacts, tables and columns must be recreated. For more information, see <a href="#">Manage Permissions for External Assets</a> .
Extract refresh schedules	Extract refresh schedules cannot be migrated to Tableau Cloud destination sites. To refresh data on Tableau Cloud, you can run extract refreshes manually or create new extract refresh schedules. For more information, see <a href="#">Schedule Refreshes on Tableau Cloud</a> .
Favourites	Users must reselect their favourite content on the destination site. For more information, see <a href="#">Mark Favourites</a> in Tableau Desktop help.
Flows	To run flows on a schedule, users must republish flows to the des-

	<p>destination site with Tableau Prep. For more information, see <a href="#">Publish a Flow to Tableau Server or Tableau Cloud</a> in Tableau Prep help.</p>
Incremental extract refreshes	<p>Incremental extract refreshes are changed to full extract refreshes on the destination site. Users must reconfigure incremental refreshes in Tableau Desktop and publish extracts to the destination site after migration. For more information, see <a href="#">Refresh Extracts</a> in Tableau Desktop help.</p>
Metrics	<p>The historical values for metrics are removed from views, and users must recreate metrics on the destination site. For more information, see <a href="#">Create and Troubleshoot Metrics (Retired)</a>. The legacy Metrics feature was retired in February 2024 for Tableau Cloud and in Tableau Server version 2024.2. For more information, see <a href="#">Create and Troubleshoot Metrics (Retired)</a>.</p>
Revision history	<p>To migrate previous versions of workbooks to the destination site, users must download the versions they wish to keep and republish the workbook to the destination site. For more information, see <a href="#">Work with Content Revisions</a> in Tableau Desktop help.</p>
Subscriptions	<p>Users must resubscribe to views and workbooks on the destination site. For more information, see <a href="#">Create a Subscription to a View or Workbook</a>.</p>
Thumbnails for workbooks and views	<p>Workbooks and views that are migrated using the Content Migration Tool will retain their original thumbnails, even if the migration plan includes transformations that result in the views being rendered differently (for example, if data connections change).</p> <p>To update thumbnails, edit the workbook or view on the destination site and re-save it. For more information, see <a href="#">Edit Tableau Views on the Web</a> in Tableau Desktop help.</p>
Virtual connections	<p>Users must recreate virtual connections on the destination site. For more information, see <a href="#">Create a Virtual Connection</a>.</p>

### Migration Plans: Sites

The first step when creating a migration plan in the Tableau Content Migration Tool is to sign in to the source and destination sites.

In the Sites section of the planning phase, you'll sign in to the source and destination sites. The permissions of the user credentials you use govern the sites and projects you see when creating a migration plan. You can only migrate content that the user has access to.

The screenshot shows a window with two side-by-side panels. The left panel is titled 'Source' and the right panel is titled 'Destination'. Both panels have a light gray background and a thin border. Inside each panel, the text 'Select a connection for your source' (for Source) or 'Select a connection for your destination' (for Destination) is centered. Below this text is a button labeled 'Sign in to Tableau'.

### Required permissions and licences

The user account(s) used to sign in to the source and destination sites must have an Explorer role or higher, and the following permissions for the content you want to migrate:

- View
- Download Workbook/Save a Copy
- Optional: Administrator (to select workbooks, to access a user list)

Both the source and destination sites must have a valid Advanced Management licence. For more information, see [About Tableau Advanced Management on Tableau Server](#).

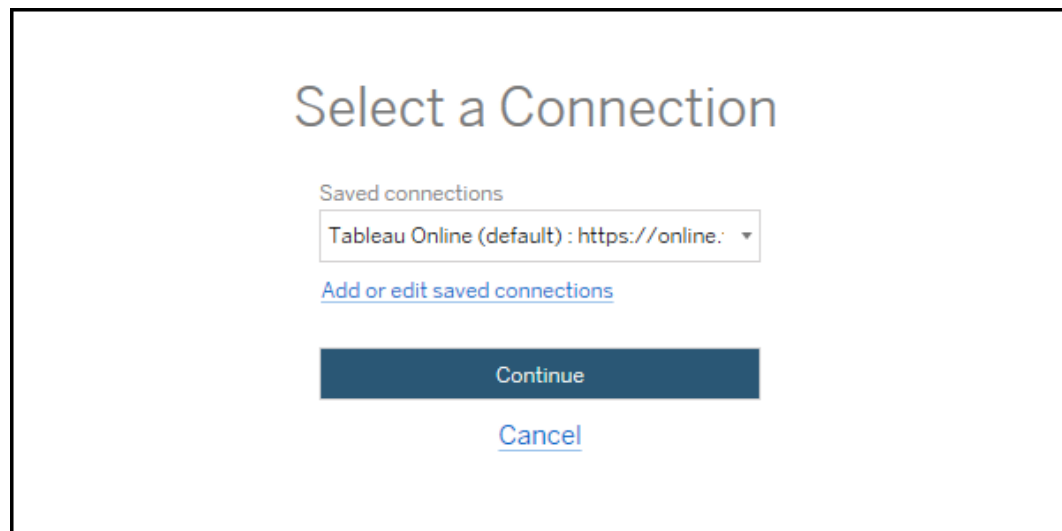
## Step 1: Source

Here is the starting point of the migration. Sign in to Tableau Server , then select your *site* to use as the source. Sites are independent silos of workbooks, data and user lists created within Tableau to group related content for selected users. You can only migrate content from one site at a time.

## Sign in to the source site

Use the steps below to sign in to Tableau Cloud or Tableau Server. For more information about signing in to Tableau Cloud with Single Sign-On and Tableau with MFA, see [Sign In to Tableau Cloud](#).

1. Click **Sign in to Tableau**.
2. In the **Select a Connection** dialog window, select a saved connection and click **Continue**.



If no connections are available, click **Add or edit saved connections** to add a new connection. For more information, see [Saved connections](#).

3. Enter your username and password, and click **Sign In**.

If your server is configured for SAML or Single Sign-On, you are redirected to the Identity Provider sign-in page to complete the authentication process.

4. Select the site you want to use.



To change the source server or update your site selection, click **Select a different source**.

### Step 2: Destination

Repeat the sign-in process for the destination site (the site you are migrating content to).

If you are migrating your workbooks between two projects on the same Tableau site, your sign-in credentials for the source and destination site will be identical (including the server URL and site name).

### Saved connections

Using saved connections allow you to quickly sign in to the source and destination sites by creating a reusable connection. When adding a saved connection, you must specify the preferred sign-in method for your site.

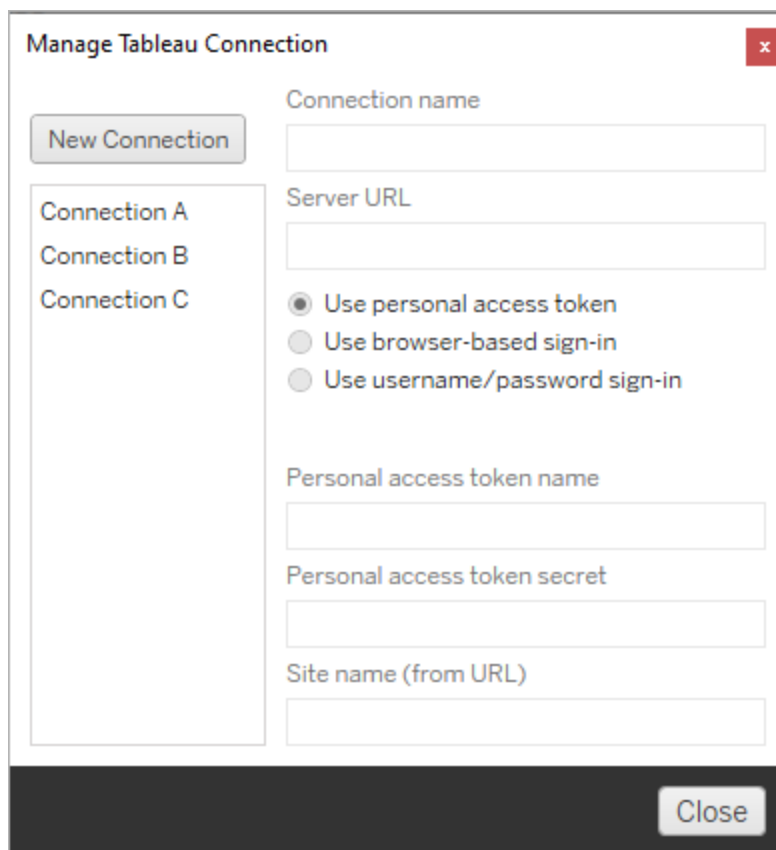
As of 2021.2, the Content Migration Tool supports the following sign-in methods:

- **Personal access tokens:** Allows users to create long-lived authentication tokens for improved security, auditing and automation of migration plans. Personal access tokens let users sign in without requiring interactive login in the Content Migration Tool. For more information, see [Personal Access Tokens](#).

- **Browser-based sign-in:** Users enter their credentials and complete authentication through an embedded web browser. This option may be similar to how you usually authenticate to Tableau.
- **Username and password sign-in:** Users authenticate through the Content Migration Tool instead of an embedded browser window. This option passes credentials to the server using Tableau REST APIs. You can use username and password sign-in to authenticate migration plans created before version 2020.3 and when troubleshooting issues that prevent the use of browser-based sign-in.

## Add or edit saved connections

A link to **Add or edit saved connections** is displayed at the bottom of the Content Migration Tool and when signing in to the source and destination sites. Clicking this link will open the **Manage Tableau Connections** window.



The image shows a 'Manage Tableau Connection' dialog box. It has a title bar with a close button (red 'x'). On the left is a list of connections: 'Connection A', 'Connection B', and 'Connection C'. Above this list is a 'New Connection' button. To the right of the list are input fields for 'Connection name', 'Server URL', 'Personal access token name', 'Personal access token secret', and 'Site name (from URL)'. Below the 'Server URL' field are three radio buttons: 'Use personal access token' (selected), 'Use browser-based sign-in', and 'Use username/password sign-in'. At the bottom right is a 'Close' button.

Use the steps below to add a saved connection:

1. On the **Manage Tableau Connections** window, click **New Connection**, or select an existing connection to make changes.
2. Enter a **Connection Name** (name to describe your server) and the **Server URL**.

If you don't include a prefix for the Server URL, the Content Migration Tool will use `http://`.

3. Select the sign-in method for your connection.

If you're using personal access tokens, see [Add saved connections with personal access tokens](#).

4. Click **Save**.

After you create a saved connection, it's listed in the Select a Connection window next time you sign in to the source and destination sites.

## Add saved connections with personal access tokens

Adding a saved connection with a personal access token requires more information than other sign-in methods. You will need to create a new personal access token on the source and destination sites to begin. Personal access tokens should not be shared between applications. For more information, see [Personal Access Tokens](#).

## Creating personal access tokens

1. In a web browser, sign in to your Tableau site.
2. At the top of the page, click your profile image or initials, and then select **My Account Settings**.

3. Under **Personal Access Tokens**, enter a descriptive name for your token in the **Token Name** field and then click **Create new token**.
4. In the resulting window, click **Copy to clipboard** and then close the window.
5. Paste the token secret to a file. Store the file in a safe location.

## Adding personal access tokens

1. In the Content Migration Tool, click **Add or edit saved connections**.
2. On the **Manage Tableau Connections** window, enter a **Connection name** and the **Server URL**.

If you are connecting to Tableau Cloud, you must enter the full pod URL of your site. For example, `https://10ay.online.tableau.com`. Your pod is shown in the first portion of the site URL after signing in to Tableau Cloud.

3. Enter the **Personal access token name** and **Personal access token secret**, obtained when creating a personal access token in the previous section.
4. In the **Site name** field, enter the site name as it appears in the URL, without spaces. This is different to the friendly site name. For example, "Site A" would be "sitea" in a browser URL.
5. Click **Save**.

Step 3: Continue to the next step

After successfully signing in to both source and destination sites, click **Next** to continue to the Migration Plans: Source Projects section of the planning phase.

Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and



**Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).


Migration Plans: Source Projects

The next step in creating a migration plan in the Tableau Content Migration Tool is to select the source projects. Source projects are the projects the workbooks and published data sources will be migrated from. The projects you choose determine which workbooks are available to migrate in the next step of the migration plan.


Step 1: Select your source project

There are two options when selecting source projects, **All Projects**, and **Specific Projects**:

**Source Projects**

Need help? 

☒ All Projects ☐ Specific Projects


 Refresh

Workbooks and data sources from **all projects** will be available for migration.


The **All Projects** option selects all projects from the source site you specified in the Servers step. The **Specific Projects** option allows you to select specific projects from the source site.

**Note:** Source projects must contain workbooks or data sources. Content Migration Tool will not migrate empty projects.

**Source Projects**

Need help? 

☐ All Projects ☒ Specific Projects

 Refresh

☐ Select All (3 of 4 selected)

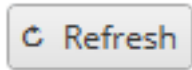
☒ Default

☒ Mkt-Q3

☒ Mkt-Q4

☐ Tableau Samples

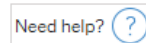
You can select each project individually or use the **Select All** button and then clear selections for the projects you don't want to include. If you make any changes on the source site while on this step, you can use the **Refresh** button to update the projects list.



## Step 2: Select project options

Once the source projects are selected, select which project options to apply for the destination location. There are options to create projects that don't exist, in addition to copying project permissions and ownership from the source location. To assign new content ownership based on user mappings, select **Apply User Mappings**.

### Project Options



☐ Create Destination Projects [?](#)

☐ Copy Project Permissions [?](#)

#### Content Owner Settings

☐ Copy Project Owner [?](#)

☒ Apply User Mappings [?](#)

- **Create Destination Projects:** Automatically create projects that don't exist in the destination location. Content Migration Tool will not create destination projects if the source project is empty or no workbooks or data sources are selected. By default, attempts to migrate to a non-existent project will result in a failed migration.
- **Copy Project Permissions:** Copy source project permissions as closely as possible.
- **Copy Project Owner:** Copy project ownership settings from the source location to assign the project owner.
- **Apply User Mappings:** Apply user mappings to assign content ownership of projects in the destination location. Content ownership won't be applied if the destination project

already exists. For more information, see [Migration Plans: Permissions and Ownership](#).

### Step 3: Continue to the next step

After selecting the source projects, click **Next** to continue to the Migration Plans: Workbooks section of the planning phase. If you are migrating workbooks between two projects on the same Tableau site, you'll choose your destination project in the next section.

### Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).


### Migration Plans: Workbooks


You have successfully signed in to your source and destination sites and selected projects. The next step is to prepare your workbooks for migration.

**Note:** If your workbooks or data sources include extracts, be sure you read and understand the information in [Migrate Workbooks and Data Sources with Extracts](#).

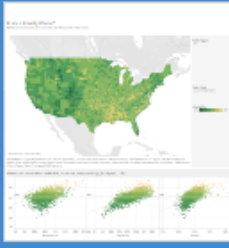
### Step 1: Workbook selection


All of the workbooks in the source site and selected projects appear on the **Workbook Selection** screen.

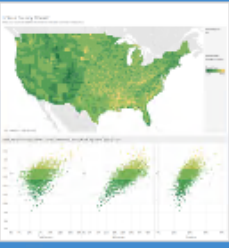
**Workbook Selection**Need help? 
☒ Specific Workbooks
 ☐ Rule Based
 ☐ All Workbooks


 Refresh

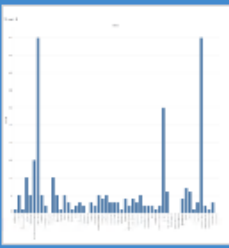
☒ Unselect All (9 of 9 selected)

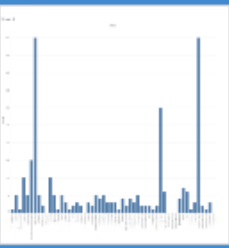

☒ **Regional**  
  
 18.1



☒ **Superstore [Project: Tabl...**  
  
 18.1

☒ **Test Data - 2019**  
  
 18.1

☒ **Superstore**  
  
 18.1

☒ **marketing test q3**  
  
 18.1

☒ **marketing test - sales b...**  
  
 18.1


  
 Back Next

If you make any changes to the workbooks in the source site while on this step, you can click **Refresh** to update the workbook listings. There are several different ways to select these workbooks.

## Specific Workbooks Selection

There are three buttons in the **Specific** section. Any choices from the Basic section will immediately include the specifically selected workbook in the migration plan. Alternatively, you can individually select specific workbooks by clicking on each one.

## Select All

This button will select or clear selection of all the workbooks in the site. If additional workbooks are added to the site after the plan is saved, they will not be automatically added the next time the plan is used.

## Display:

### Thumbnails

The default view shows your workbooks in thumbnail previews to help you differentiate each of them. In this view, hovering over the thumbnail will show previews of the other worksheets and dashboards within that workbook.

### List

The list view is a more succinct listing that also provides additional information, including Workbook Name, Project, Tableau Version and Last Modified.

Clicking on any of the column headers will sort the workbooks appropriately. Also, hovering over any of the workbooks will also provide a floating preview of the worksheets and dashboards within that workbook. List view is particularly useful if you have a large amount of workbooks in a site.

## Rule Based Selection

You can use **Rule Based** selection to choose workbooks based on specific criteria. Rule-based options will create workbook selection criteria to be used when the migration plan is run. Be aware that selecting "all" in any of the **Rule Based** options is different than the **Specific Workbooks** selection. A rule-based "all" selection will always include all workbooks, so any newly added workbooks are included in future migrations.

☐ In projects (None) ▼

☐ Tagged with Click to add tag...

☐ Published by (None) ▼

The **Rule Based** radio button allows you to select workbooks by using the following options:

## Workbooks in projects

This menu allows you to select workbooks from specific projects.

## Workbooks tagged with

This menu allows you to select workbooks by their tags.

## Workbooks published by

This menu allows you to select workbooks by their author.

With each option, you can select individually or multiple by clicking on the option next to each entry. All selected workbooks will appear in the **Selection Description** box.

## All Workbooks Selection

The last option is to select the **All Workbooks** radio button, which selects all workbooks in all projects in the site.

Using the **All Workbooks** radio button is different to selecting all of the workbooks using the **Specific Workbook** method because it will use every workbook in the source site each time the migration plan is used in the future.

☐ Specific Workbooks ☐ Rule Based ☒ All Workbooks

Refresh

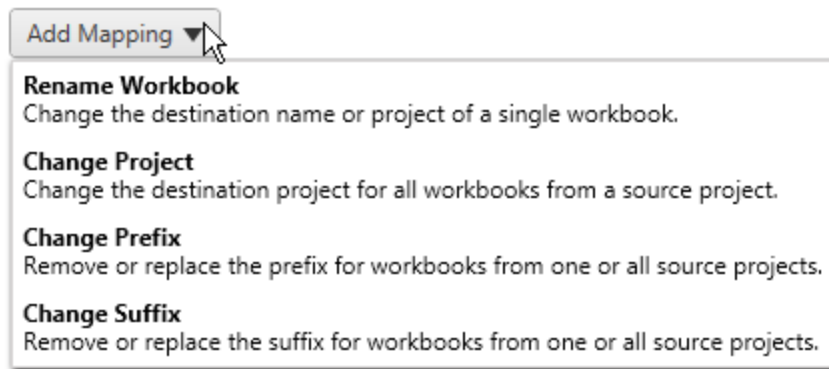
All workbooks in all projects

When you are satisfied with your workbook selections, click **Next**.

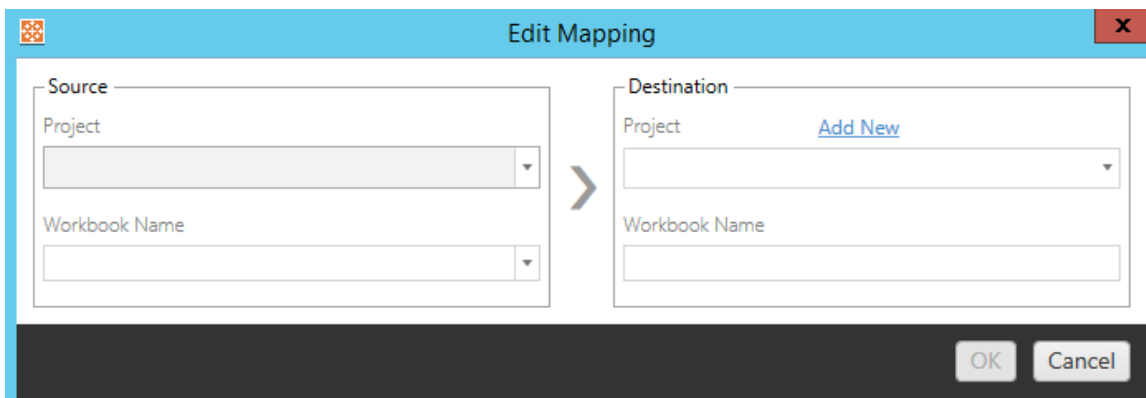
## Step 2: Workbook mapping

You can now map your selected workbooks from the source file to the destination file. Mapping allows you to rename source workbooks as they are migrated and choose different destinations. You can also add mapping to change the project, prefix or suffix for the workbooks as well. Projects can be added to the Destination in this section as well.

If you make no changes here, the selected workbooks will simply be migrated with the same name and into the same project as the source. If you have not defined projects in your destination site, they will be migrated into the Default project. To add workbook mapping click the **Add Mapping** button. The following options will appear in the mapping area.

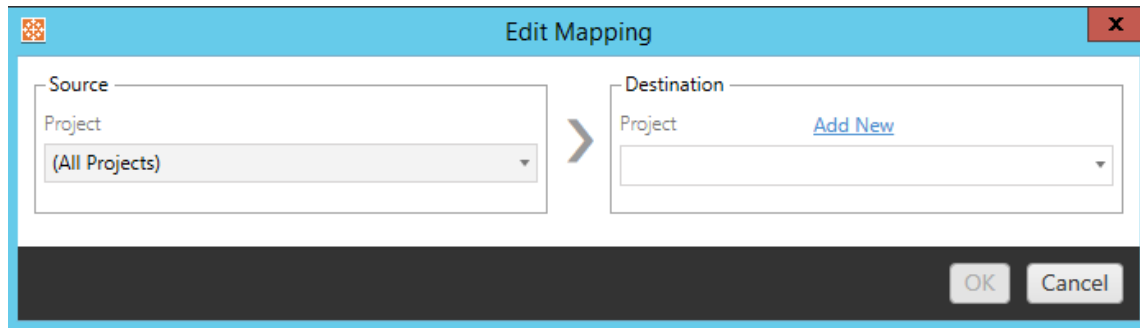


## Rename Workbook



This transformation allows you to filter by the **Source** project and select the desired workbook(s) to rename. In the **Destination** field, select which project you would like the workbook to be directed to and enter the desired name.

## Change Project



By default, the workbooks are migrated to the same project in the destination. This mapping allows you to change the destination project for all workbooks from a source project.

## Add Project

When renaming the workbook or changing the project, the **Add New** option allows you to create a destination project without having to sign in to the destination site and create the project manually. You can create both projects and nested projects using the **Add New** dialog box.



New Project

Destination

http://admin@win-vj23dhvudie:80/#/site/Accounting

Project Name

Parent Project

Description

OK

Cancel

Change Prefix

Edit Mapping

Source

Project

(All Projects)

Prefix

☒ Remove Prefix

☐ Replace Prefix With

OK

Cancel

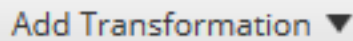
This allows you to remove or replace the prefix for workbooks from one or all source projects.

## Change Suffix

Like the prefix mapping, you can remove or replace the suffix for workbooks from one or all source projects.

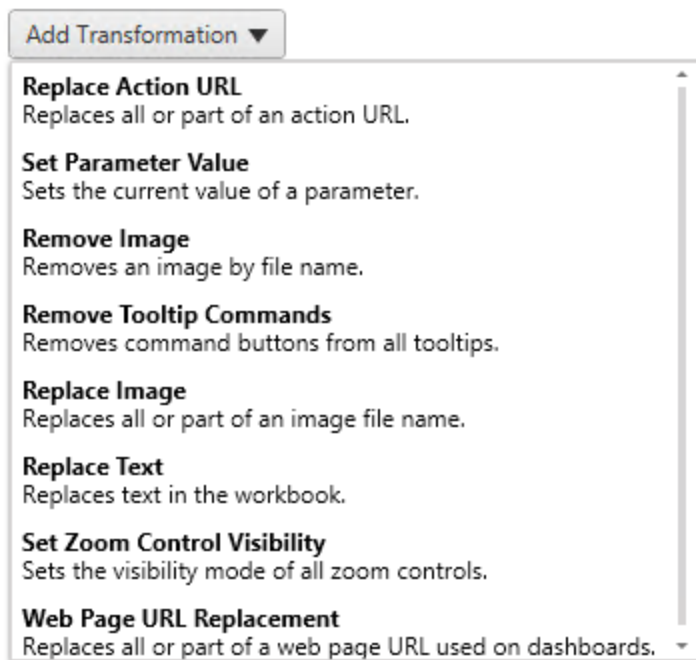
### Step 3: Workbook transformations

You can change and modify your workbooks by using the Transformation step.

A button with the text "Add Transformation" and a downward-pointing triangle icon.

Transformations modify your workbooks in a specified manner. Additional transformations can be included via plug-ins or will be added in future versions of the application. Click on the **Add Transformation** drop-down menu to see the selection of Transformations currently available.

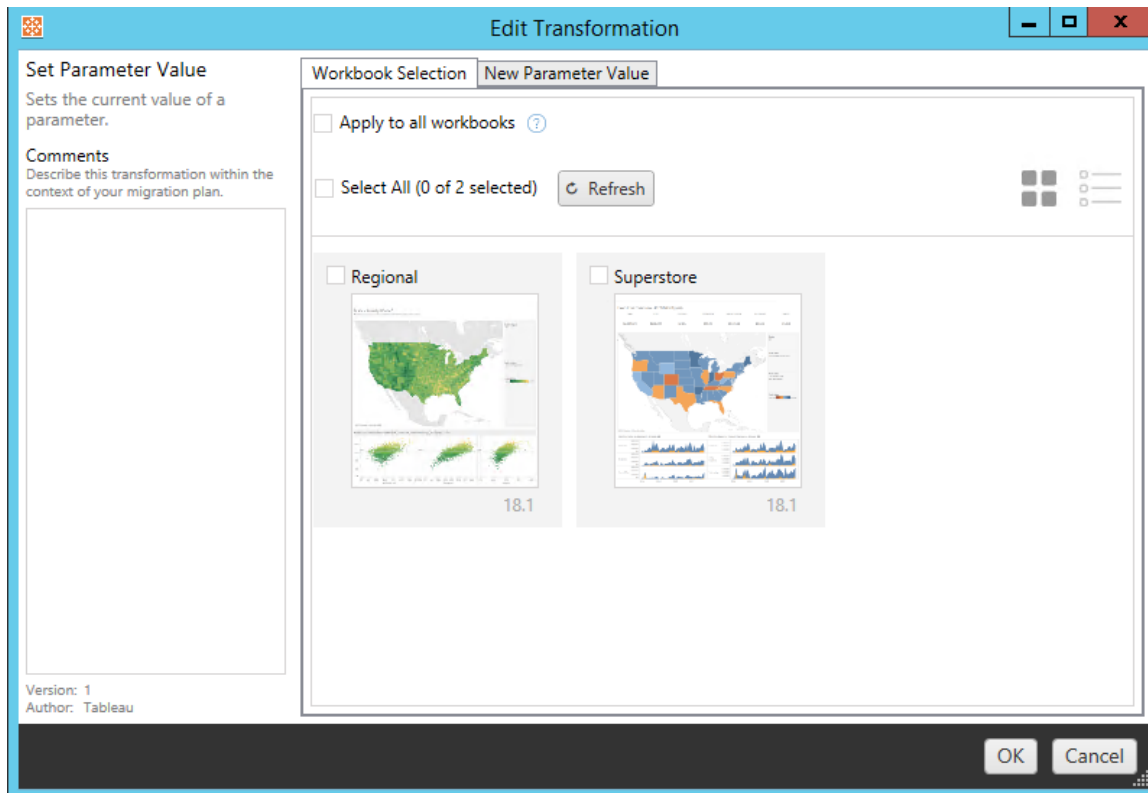
### Workbook Transformations



## Tableau Server on Windows Help

Selecting any of the transformations will bring up the Edit Transformation window, which will allow you to customise it to your selected workbooks. All transformations will be completed in the order that they are listed from top to bottom.

For all of the different types of transformations, there are two basic steps. The first step is to make your selection for the transformation. In this case, select the workbook(s) you want to transform. The selection area is similar to the Workbook Selection section of the Planning phase with all of the features of the Basic selection radio button: **Select/Unselect All**, **Refresh**, **Thumbnail Display** and **List Display**. At the top of the list, you can select **Select All** workbooks, which is an option to automatically select all workbooks for future transformations. You can also **Refresh** the workbook display window to reflect any changes or updates to the source site.



The second step is to use the options tab to enter the specific selections for whichever transformation you select.

**Edit Transformation**

**Set Parameter Value**  
Sets the current value of a parameter.

**Comments**  
Describe this transformation within the context of your migration plan.

Version: 1  
Author: Tableau

**Workbook Selection** | **New Parameter Value**

Parameter Name:

Data Type: **Float** ▼

Value:

OK Cancel

Each of the workbook transformations has different values to be entered on the options tab, and the tab will have different names depending on the transformation you're editing:

## Action URL Replacement

Replace part or all of an URL action inside of the workbook using this transformation. On the options tab, enter the text that should be matched and its replacement value.

**Match**

**Replacement**

**Example:**

URL: `www.exampledev.com`

Match: dev

Replacement: Prod

Result: www.exampleProd.com

## Set Parameter Value

Define a new parameter. On the options tab, enter the name of the Parameter, the data type from the drop-down menu and the value.

Parameter Name	<input type="text"/>
Data Type	<div>Float ▼</div>
Value	<input type="text" value="0"/>

## Remove Images

Remove any images (such as a watermark) in the selected workbooks by entering in the file name on the options tab. There is an additional tick box to receive a warning during migration if no image is found.

File Name	<input type="text"/>
<input checked="" type="checkbox"/> Warn when no matching images are found in a workbook.	

## Remove Tooltip Commands

Remove all of the tooltip commands from the selected workbooks. There are no additional options to define for this transformation.

## Replace Images

Replace images embedded in the selected workbooks. On the options tab, enter the file name of the current image and the replacement image. You can replace images using a local file path or URL.

File Name	<input type="text"/>
Replacement Image URL	<input type="text"/>
<input type="checkbox"/> Warn when no matching images are found in a workbook.	

### Example:

File Name: `image.png`

Replacement Image URL: `https://www.exampledev.com/replacementImage.png`

## Zoom Control Visibility

Set the visibility mode from the drop-down menu: **Automatic**, **Show on Hover**, or **Hide** on the options tab.

Visibility Mode	<input type="text" value="Automatic"/>
-----------------	----------------------------------------

## Web Page URL Replacement

Replace part or all of a web page URL used on dashboards using this transformation. On the options tab, enter the text that should be matched and its replacement value.

Match	<input type="text"/>
Replacement	<input type="text"/>

## Example:

URL: `www.exampledev.com`

Match: `dev`

Replacement: `Prod`

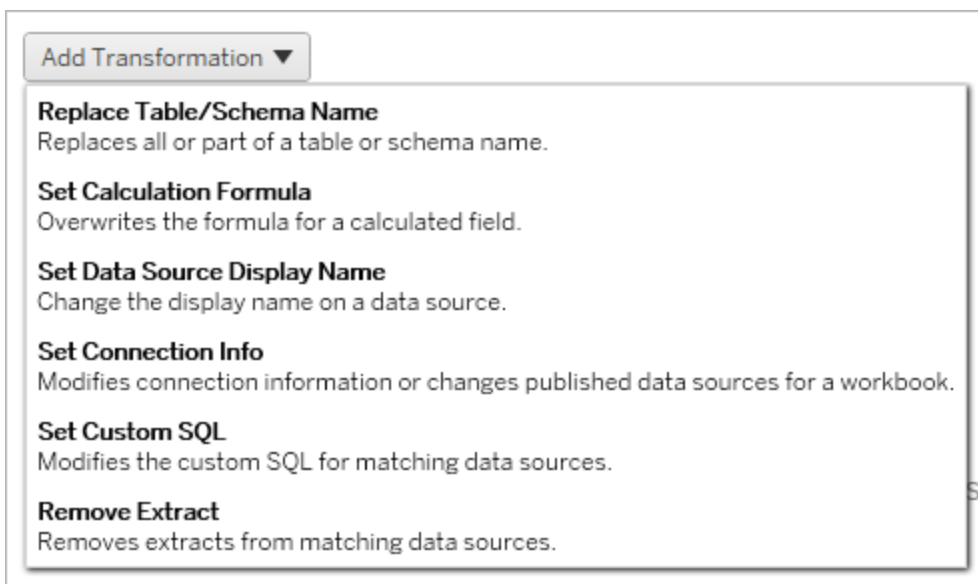
Result: `www.exampleProd.com`

### Step 4: Data source transformations

The next step in planning your workbooks for your enterprise migration are your data source transformations. It is similar in function to the Workbook Transformations step. These are for data sources that are packaged within the workbooks. Published data sources are handled in a different step in the process.

Add Transformation ▼

Click on the **Add Transformation** drop-down menu and the following options will appear:



Selecting any of the data source transformations will bring up the Edit Transformation window, which will allow you to customise it to your selected data sources. All transformations will be completed in the order that they are listed from top to bottom.

For all of the different types of data source transformations, there are two basic steps. The first step is to enter in the match criteria for the desired data source. Depending on which connection type you select, more fields will appear on the **Match Criteria** tab.

**Edit Transformation**

**Set Connection Info**  
Modifies connection information for matching data sources.

**Comments**  
Describe this transformation within the context of your migration plan.

**Match Criteria** **New Connection Values**

Data Source Name: (Match Any)

Connection Type: (Match Any)

With or without an extract

Preview Matching Connections

Version: 3  
Author: Tableau

OK Cancel

Click on the **Preview Source Connections** to find any connections that match the criteria entered.



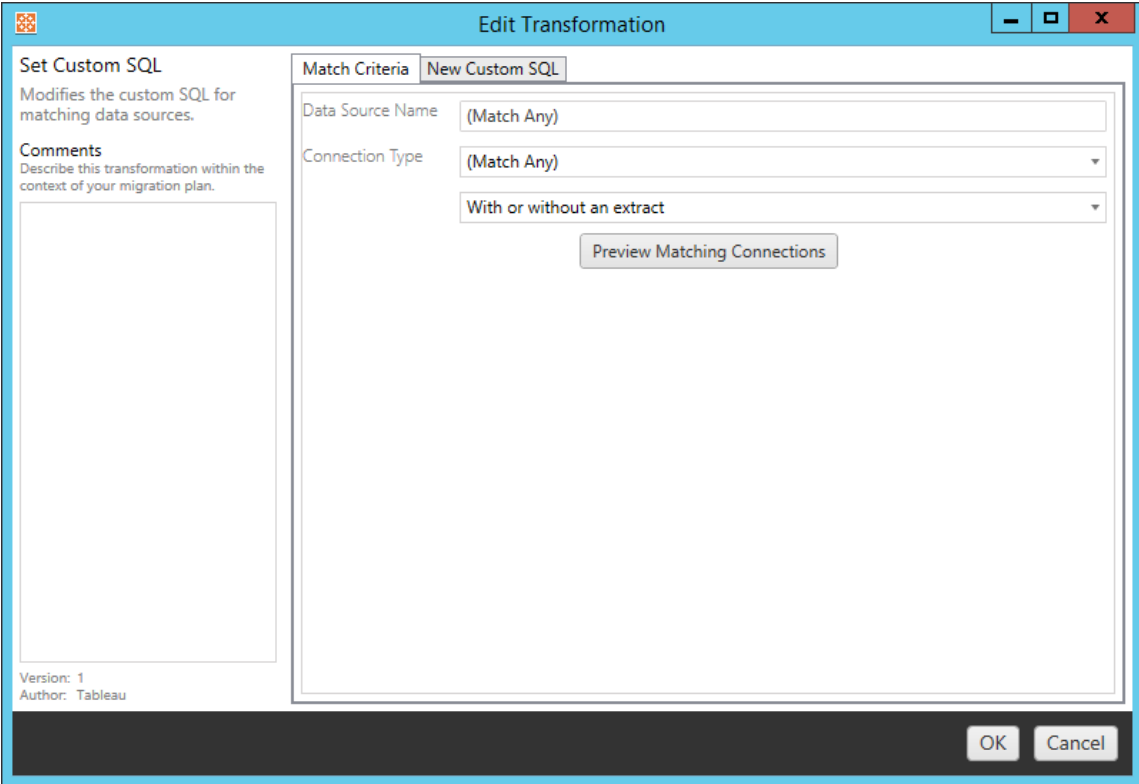
Preview Data Source Transformation

Workbook	Data Source	Project	Match	
Internet Usage	Sheet1 (Internet-Penetration.xlsx)	Default	True	
Shark Week	Shark Attacks (Shark Attacks.xlsx)	Default	True	
Shark Week	Fattest Countries (Shark Attacks.xls)	Default	True	
Shark Week	Sheet1 (Country-Military.xlsx)	Default	True	
Shark Week	BMI (Shark Attacks.xlsx)	Default	True	
World Cup	Sheet2 (World Cup.xlsx)	Default	True	
World Cup	Sheet1 (World Cup - England.xlsx)	Default	True	

☐ Show All Data Sources

Close

The second step is to use the options tab to enter the specific selections for whichever transformation you select.



Each of the data source transformations has different values to be entered on the options tab:

### Set Calculation Formula

On the options tab, you can replace the calculation for a column.

Column Name	
Formula	

### Set Connection Info

On the **New Connection Values** tab, enter the authentication method and connection details for the new data source. Depending on which connection type you select, more fields will

appear.

### Change published data sources with CMT

As of version 2022.1, select the **Tableau Server (Published Data Source)** connection type to change the published data source for a workbook. This can reduce the manual steps required when migrating workbooks between Tableau environments, for example, promoting content from development to production.

To change the published data source, select a data source from the drop-down menu and enter the **Tableau Username** for authentication. The user must exist on the destination site and have the Connect capability for the published data source.

- For file-based data sources, users will access the workbook and see data based on the permissions of the specified Tableau user.
- For all other data sources, users are prompted for their own database credentials when the view or workbook loads.

If Tableau Username isn't specified, only users with the Connect capability can see data in the workbook.

Published Data Source	(No Change) ▼
Tableau Username	<input type="text"/>

### Set Custom SQL

On the **New Custom SQL** tab, enter the name of the custom SQL query you want to modify for **Match Query Name**. The query name must match the custom SQL query name from the physical layer of the data source. If these names don't match, the transformation will fail. For more information about data modelling and the physical layer, see [The Tableau Data Model](#).

After entering the query name, enter the desired **Custom SQL** in the text field. Be aware that custom SQL can negatively impact the performance of your workbooks if improperly used.

Match Query Name	<input type="text"/>
Custom SQL	<div>1</div> <div><input type="text"/></div>

## Remove Extract

There is no options tab for this transformation, simply enter in the **Match Criteria** information and the extract will be removed during migration.

In addition, on each of the transformations you can enter notes in the **Comments** section on the left-hand side of the **Edit Transformation** window.

## Apply Saved Credentials

Deprecated in version 2022.3. Use the Set Connection Info data source transformation instead.

On the options tab, enter the **Tableau Username** and corresponding **Saved Credentials Username** for the data connection. You can only apply saved credentials for existing data connections on the Account Settings page of your Tableau site. For more information, see [Manage Saved Credentials for Data Connections](#).

Tableau Username 	<input type="text"/>
Saved Credentials Username	<input type="text"/>

### Step 5: Publish options

The final step in the Workbooks phase is to select publish options and create transformations for tags, extract refresh schedules and permissions.

## Workbook Publish Options

- ☐ Reset Dashboard Selections [?](#)
- ☐ Overwrite Newer Workbooks [?](#)
- ☐ Copy Workbook Permissions [?](#)
- ☐ Copy Extract Refresh Schedules [?](#)

### Content Owner Settings

- ☐ Copy Workbook Owner [?](#)
- ☒ Apply User Mappings [?](#)

Add Option ▼

No additional publish options.

## Reset Dashboard Selections

This option deselects all objects on dashboards.

## Overwrite Newer Workbooks

If ticked, a workbook will be migrated even if it will overwrite a workbook that has been created at the same time or more recently than the moved workbook

## Copy Workbook Permissions

When selected, the migration tool will attempt to match source workbook permissions as closely as possible.

## Copy Extract Refresh Schedules

When selected, the migration tool will attempt to set the destination workbook extract refresh schedule(s) to schedules matching the source's name.

**Note:** Extract refresh schedules cannot be created in Tableau Cloud. This option is not available if the destination is a Tableau Cloud site. For more information, see [Migration Limitations](#).

## Copy Embedded Credentials for Workbooks

Copy the embedded credentials for data sources embedded in workbooks. Only available when migrating from Tableau Server to Tableau Cloud sites. For more information, see [Migrate Workbooks and Data Sources with Embedded Credentials](#).

**Note:** CMT does not support embedded credential migration for OAuth connections. To migrate OAuth credentials to the destination site, use the [Set Connection Info](#) data source transformation.

## Copy Workbook Owner

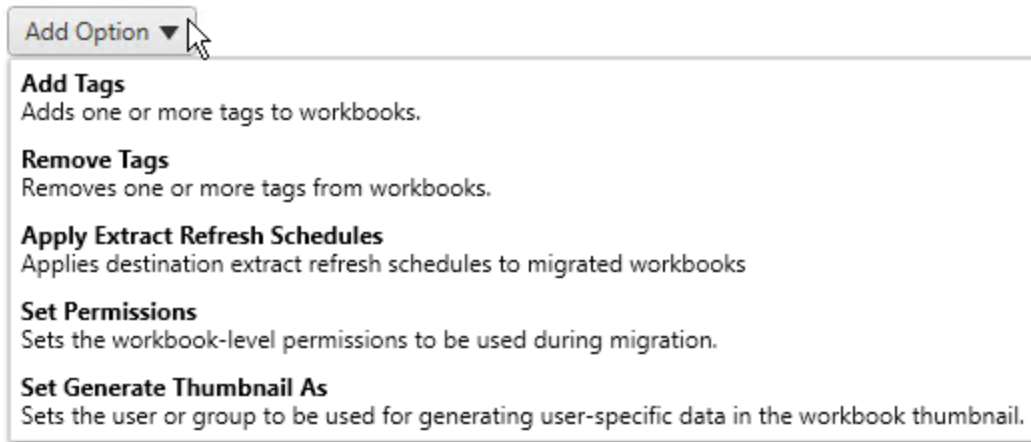
Copy workbook owner settings from the source location to assign the workbook owner. If unselected, the Content Migration Tool user is given ownership of the workbook in the destination location.

## Apply User Mappings

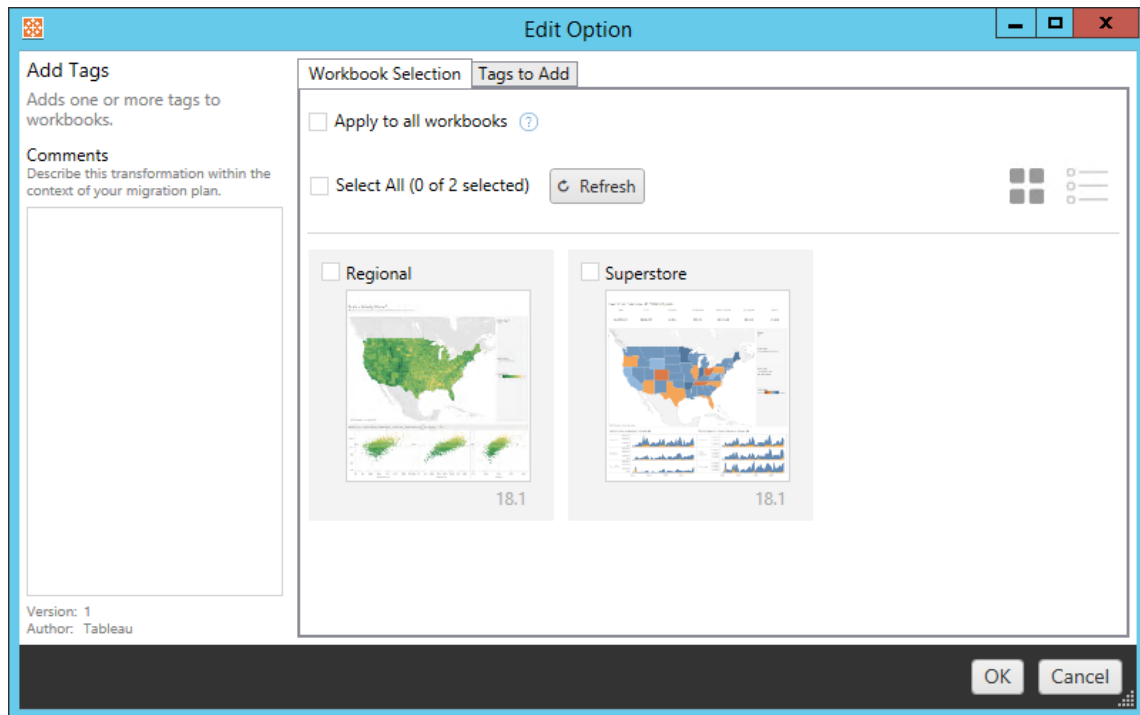
Apply user mappings to assign content ownership. Select this option if there are differences in username syntax in the destination location. For more information, see [Migration Plans: Permissions and Ownership](#).

## Add Option

Click on the **Add Option** drop-down menu for the different types of transformations you can add:



For all of the different types of transformations, there are two basic steps. The first step is to make your selection for the transformation. In this case, select the workbook(s) you want to transform. The selection area is similar to the Workbook Selection section of the Planning phase with all of the features of the Basic selection radio button: **Select/Unselect All**, **Refresh**, **Thumbnail Display** and **List Display**. At the top of the list, you can select **Select All** workbooks, which is an option to automatically select all workbooks for future transformations. You can also **Refresh** the workbook display window to reflect any changes or updates to the source site.

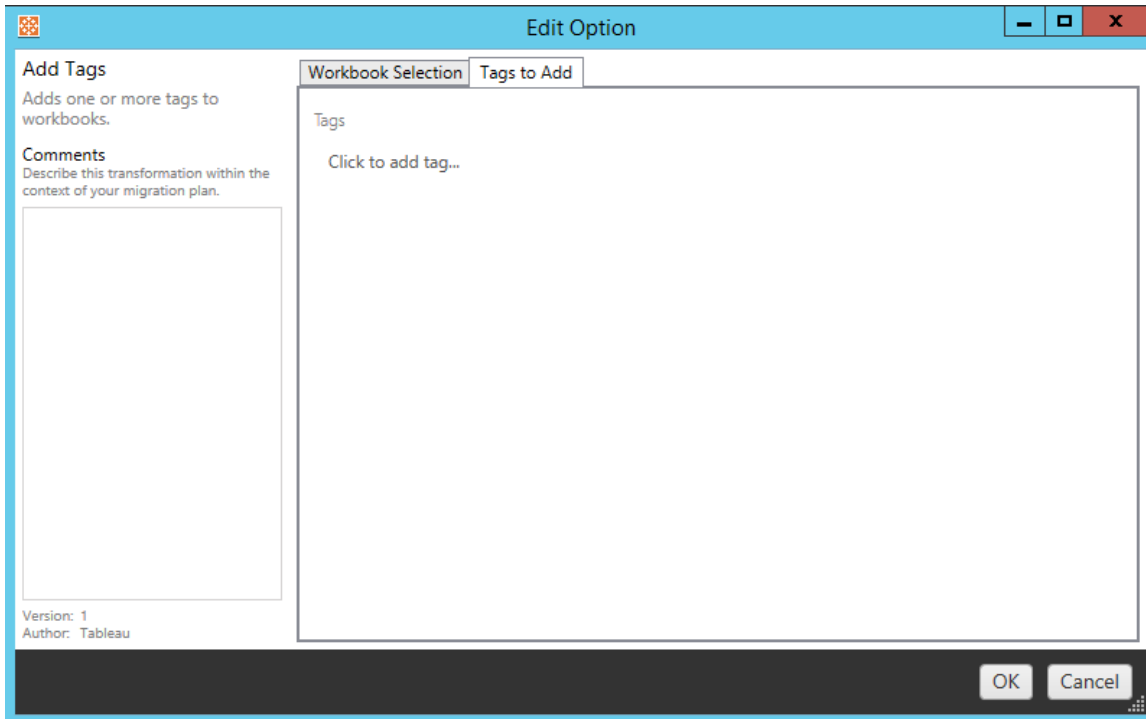


The second step is to use the options tab to enter the specific selections for whichever transformation you select. **Note:** The options tab will have different names, depending on which transformation you are editing.

## Add Tags

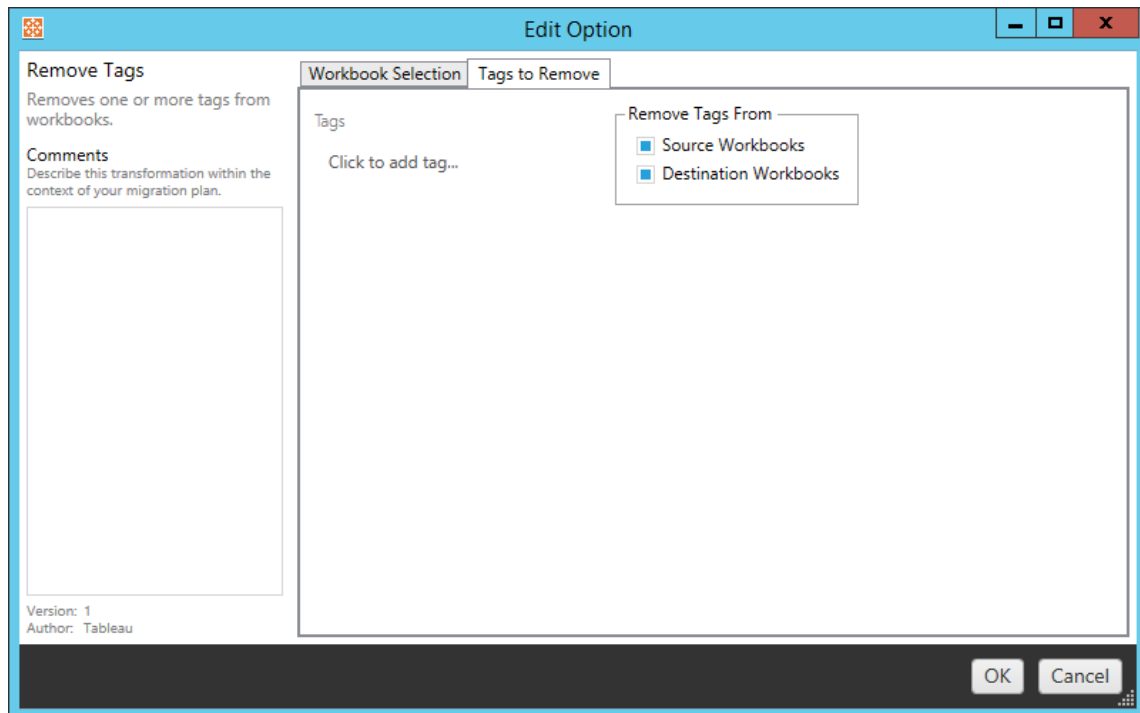
This allows you to add one or more tags to the workbook. If you hover your mouse over a previously entered tag, a blue “X” will appear to allow deletion.





## Remove Tags

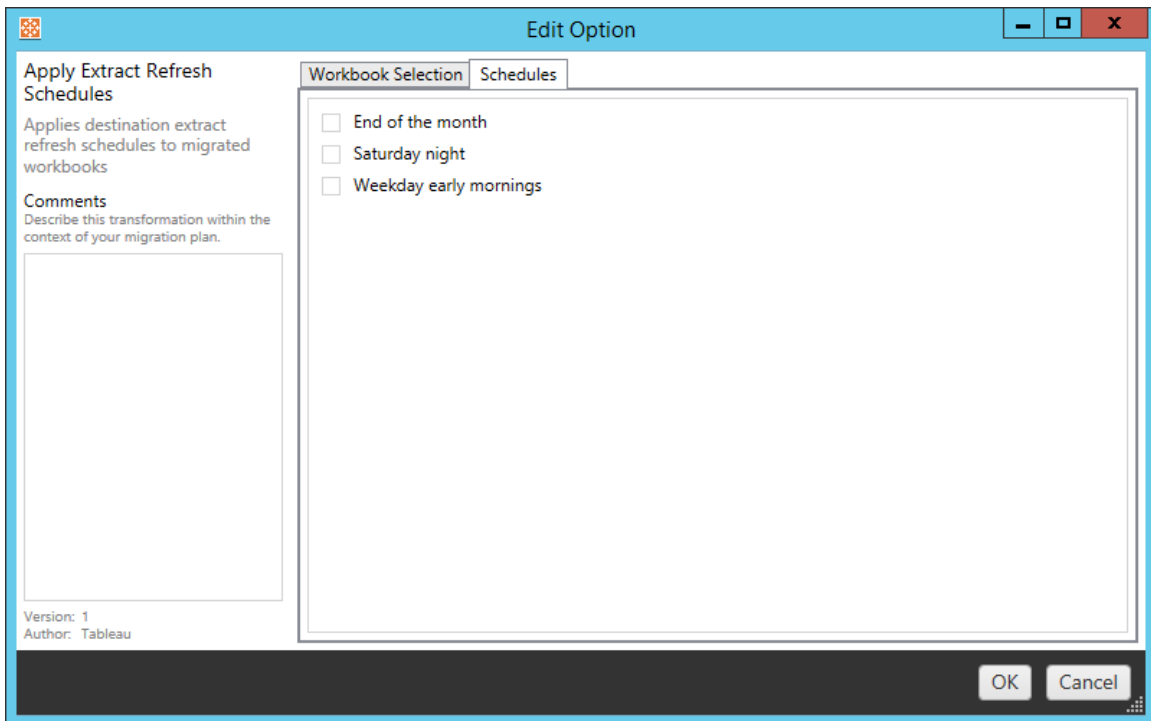
This allows you to add one or more tags to the workbook. If you hover your mouse over a previously entered tag, a blue “X” will appear to allow deletion. You can also choose to remove the tag from the source or destination workbooks.



## Apply Extract Refresh Schedules

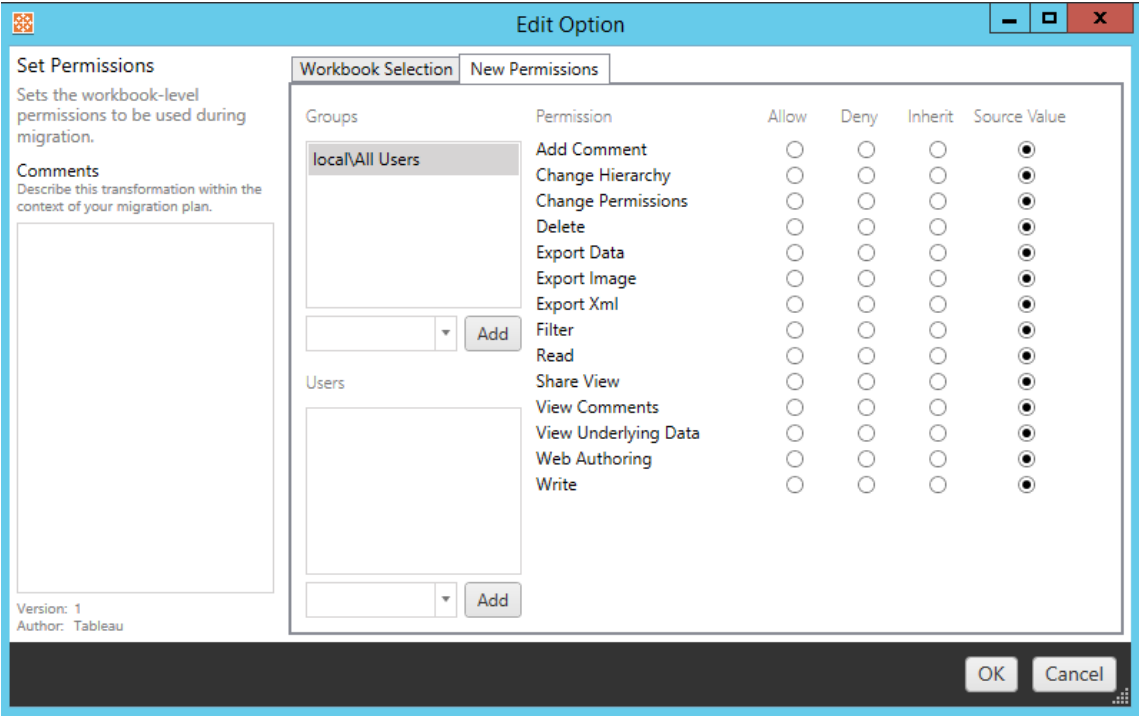
Here you can apply destination extract refresh schedules to migrated workbooks. The list of schedules generated are from the destination.

**Note:** Extract refresh schedules cannot be created in Tableau Cloud. This option is not available if the destination is a Tableau Cloud site. For more information, see [Migration Limitations](#).



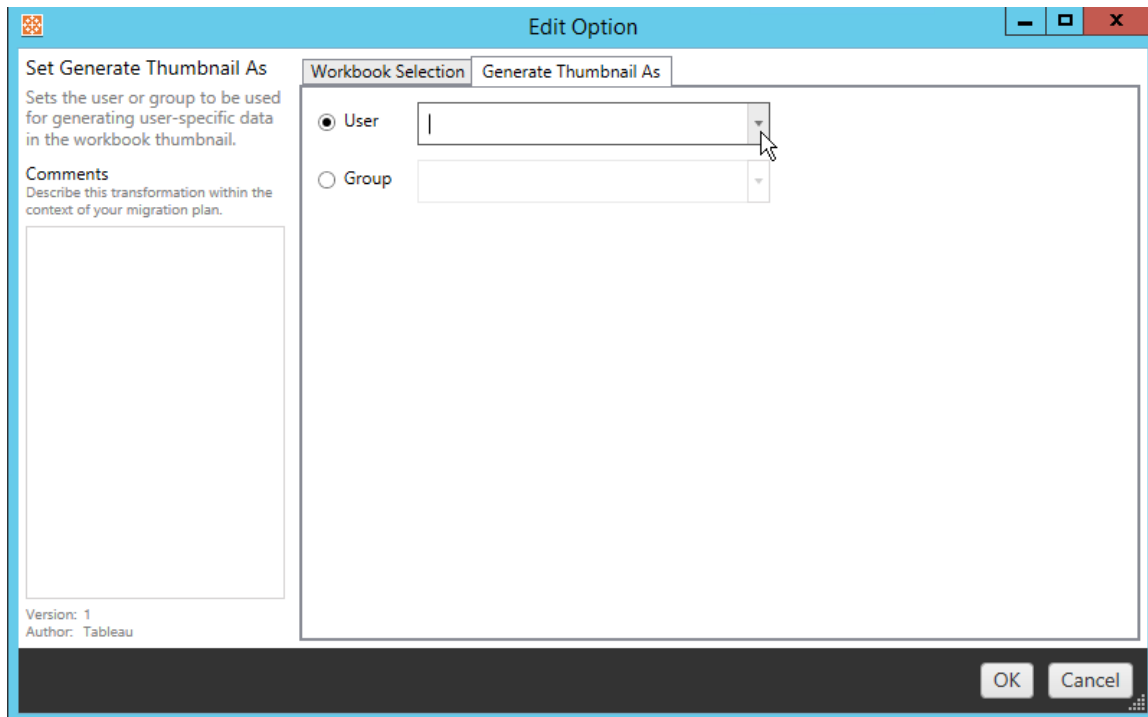
## Set Permissions

This transformation is to edit the permissions for the selected workbooks. Enter in a Group or User and then click **Add**. Adjust the permissions as desired. The four different options are to **Allow** the permission, **Deny** the permission, **Inherit** or to keep the **Source Value**.



### Set Generate Thumbnail As

This allows you to set the **User** or **Group** to be used for generating user-specific data in the workbook thumbnail after being migrated. Each option has a drop down to select the desired user or group.



Step 6: Continue to the next step

After selecting your workbooks and preferences, click **Next** to continue to the Migration Plans: Published Data Sources section of the planning phase.

Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see Permissions.

Migration Plans: Published Data Sources

The next step of creating a migration plan in the Tableau Content Migration Tool is to select, map and add any transformations to your published data sources. The process is very similar to the Workbooks step of the planning phase, particularly the data source mapping step.

**Note:** If your workbooks or data sources include extracts, be sure you read and understand the information in *Migrate Workbooks and Data Sources with Extracts*.

Step 1: Selection

Starting the Published Data Sources phase of the migration plan, you'll select any data sources you want to include in the migration plan:

**Data Source Selection**

Need help? ?

☒ Specific Data Sources ☐ Rule Based ☐ All Data Sources

Refresh

☐ Unselect All (1 of 1 selected)

	Name	Project
<input checked="" type="checkbox"/>	Sheet1 (state_plates)	Mkt-Q3

The data sources will only be selected at the moment of migration. You have two methods of selection. Use **Specific Data Sources** to choose one or more published data sources. Click **Refresh** to reload the list of published data sources available.

The second option is **All Data Sources**, which selects every data source in the source site.

Step 2: Mapping

The next step is to map your source data sources to the new destination. This is similar in functionality to mapping workbooks.

**Data Source Mapping**

Need help? ?

Add Mapping ▼

No changes to data source names or projects.

If you make no changes here, then the selected data sources will simply be deployed with the

same name and project as the source. To add data source mapping click **Add Mapping**. The following options will appear in the mapping area.

	Name	Project	Destination Name	Destination Project
<a href="#">Delete</a>	(All Selected Data S <span>▼</span>	<span>▼</span>	(Same As Source)	<span>▼</span>

The entry has the following options:

## Delete

Clicking the **Delete** link will delete this mapping entry.

## Name

Use the **Name** menu to select the data source you wish to map. You can select **(All Selected Data Sources)** to choose all of the data sources.

## Project

The **Project** is the project of the associated data source names.

## Destination Name

By default, the Content Migration Tool will use the same **Destination Name(Same As Source)**, keeping the original name in the Source file, but you can type in a new name here for the destination folder.

## Destination Project

If your destination projects have already been created on your site, you can choose which project to place your migrated workbooks in or click **Add New** to create a new project. You can create different project destinations for individual data sources.

	Name	Project	Destination Name	Destination Project
<a href="#">Delete</a>	<input type="text" value="Add Data Sources"/> ▼	<input type="text" value="Default"/> ▼	<input type="text" value="(Same As Source)"/>	<input type="text" value="Default"/> ▼
				<div><a href="#">Add New</a> Accounting Default Sales</div>

In most situations, if multiple mapping entries exist for a single data source, a validation error will be displayed and must be fixed to continue. There is one important exception to this – a data source may match both a specific selection and a project-wide mapping entry. In this instance, the more specific entry will be used.

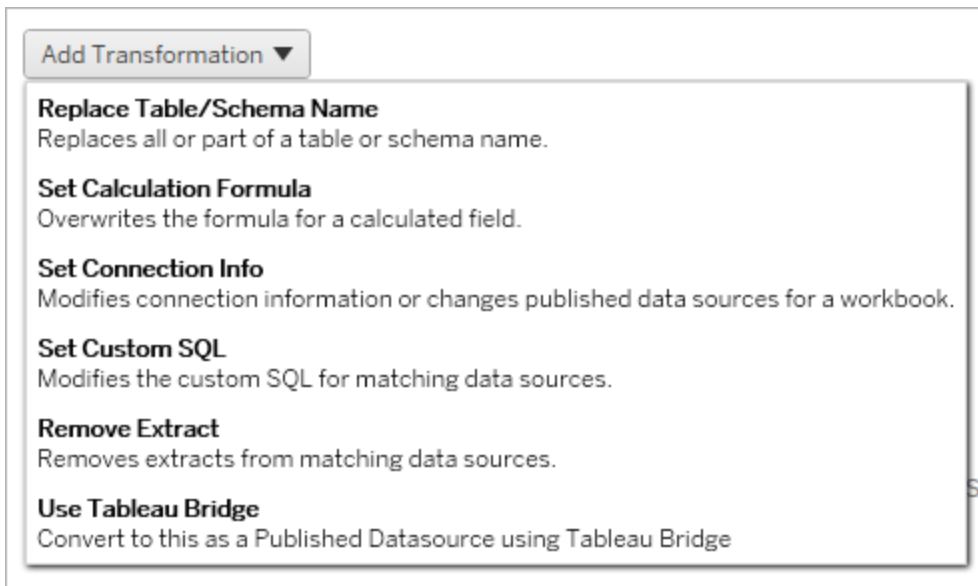
When you have completed all of the data source mapping necessary, click **Next** to continue.



Step 3: Data source transformations

You can modify your data sources by using the transformation option. Click **Add Transformation** to see the list of transformations available.





Selecting any of the data source transformations opens the **Edit Transformation** window.

Use this to customise your selected data sources. Transformations are executed in the order they are listed, from top to bottom.

For most data source transformations, there are two basic steps. The first step is to enter in the **Match Criteria** for the desired data source. Depending on which connection type you select, more fields will appear on the **Match Criteria** tab.

**Edit Transformation**

**Set Connection Info**  
Modifies connection information for matching data sources.

**Comments**  
Describe this transformation within the context of your migration plan.

**Match Criteria** | **New Connection Values**

Data Source Name: (Match Any)

Project: (Match Any)

Connection Type: (Match Any)

With or without an extract: With or without an extract

Preview Matching Data Sources

Version: 3  
Author: Tableau

OK Cancel

The second step depends on which transformation type you are adding. Each of the data source transformations have different values to be entered on the second tab.

You can add notes in the **Comments** section on the left side of the **Edit Transformation** window for each of the transformations you add.

## Replace Table/Schema Name

On the **Options** tab, you can replace all or part of a table or schema name.

## Set Calculation Formula

On the **New Calculation Formula** tab, you can replace the calculation for a column.

Column Name	<input type="text"/>
Formula	<input type="text"/>

## Set Connection Info

On the **New Connection Values** tab, enter the authentication method and connection details for the new data source. Depending on which connection type you select, more fields will appear.

File Path	<input type="text"/>
-----------	----------------------

## Set Custom SQL

On the **New Custom SQL** tab, enter the name of the custom SQL query you want to modify for **Match Query Name**. The query name must match the custom SQL query name from the physical layer of the data source. If these names don't match, the transformation will fail. For more information about data modelling and the physical layer, see [The Tableau Data Model](#).

After entering the query name, enter the desired **Custom SQL** in the text field. Be aware that custom SQL can negatively impact the performance of your workbooks if improperly used.

Match Query Name	<input type="text"/>
Custom SQL	<div>1</div> <div><input type="text"/></div>

## Remove Extract

There is no **Options** tab for this transformation. Type the **Match Criteria** information and the extract will be removed during migration.

## Use Tableau Bridge

There is no **Options** tab for this transformation. Type the **Match Criteria** information and data sources that are within a private network (inaccessible to the public internet) will be allowed to refresh using Tableau Bridge.

The destination Tableau Cloud site must have Tableau Bridge configured before migrating data sources. For information about Tableau Bridge, see [Use Tableau Bridge](#) in Tableau Cloud help. After the migration, data sources will need to be assigned a refresh schedule through Tableau Cloud.

## Apply Saved Credentials

Deprecated in version 2022.3. Use the Set Connection Info data source transformation instead.

On the options tab, enter the **Tableau Username** and corresponding **Saved Credentials Username** for the data connection. You can only apply saved credentials for existing data connections on the Account Settings page of your Tableau site. For more information, see [Manage Saved Credentials for Data Connections](#).

Tableau Username 	<input type="text"/>
Saved Credentials Username	<input type="text"/>

### Step 4: Publish options

The final step in the Published Data Source phase is to create transformations for permissions and tags and finalise the publish options specific to the data sources.

## Data Source Publish Options

- ☐ Overwrite Newer Data Sources [?](#)
- ☐ Copy Data Source Permissions [?](#)
- ☐ Copy Extract Refresh Schedules [?](#)

### Content Owner Settings

- ☐ Copy Data Source Owner [?](#)
- ☒ Apply User Mappings [?](#)

Add Option ▼

No additional publish options.

## Overwrite Newer Data Sources

If selected, a data source will be published, even if it will overwrite a data source that has been updated more recently.

## Copy Data Source Permissions

When selected, the migration tool will attempt to match published data source permissions as closely as possible.

## Copy Extract Refresh Schedules

When selected, the migration tool will attempt to set the destination data source extract refresh schedule to schedules matching the source's name.

**Note:** Extract refresh schedules cannot be created in Tableau Cloud. This option is not available if the destination is a Tableau Cloud site. For more information, see Migration Limitations.

## Copy Embedded Credentials for Data Sources

Copy the embedded credentials for published data sources. Only available when migrating from Tableau Server to Tableau Cloud sites. For more information, see [Migrate Workbooks and Data Sources with Embedded Credentials](#).

**Note:** CMT does not support embedded credential migration for OAuth connections. To migrate OAuth credentials to the destination site, use the [Set Connection Info](#) data source transformation.

## Copy Data Source Owner

Copy data source owner settings from the source location to assign the data source owner. If unselected, the Content Migration Tool user is given ownership of the data source in the destination location.

## Apply User Mappings

Apply user mappings to assign content ownership. Select this option if there are differences in username syntax in the destination location. For more information, see [Migration Plans: Permissions and Ownership](#).

## Add Options

Click on the **Add Option** drop-down menu for the different types of transformations you can add:

**Add Option ▼**

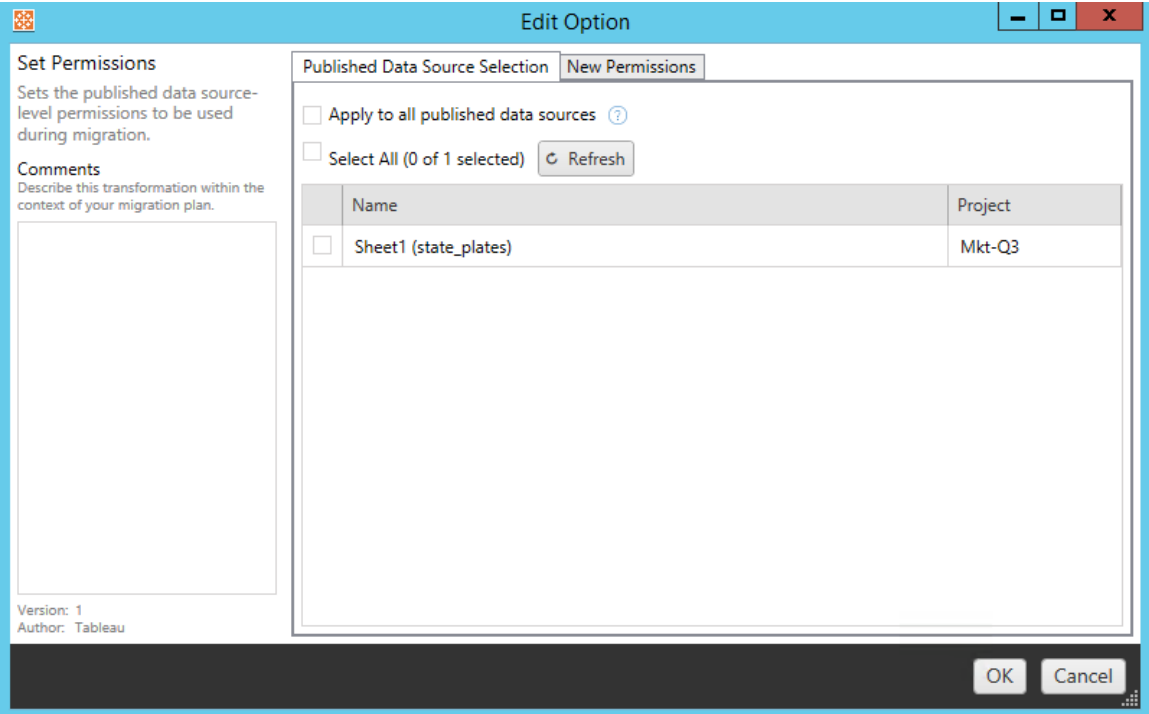
**Remove Tags**  
Removes one or more tags from published data sources.

**Add Tags**  
Adds one or more tags to published data sources.

**Apply Extract Refresh Schedules**  
Applies destination extract refresh schedules to migrated data sources

**Set Permissions**  
Sets the published data source-level permissions to be used during migration.

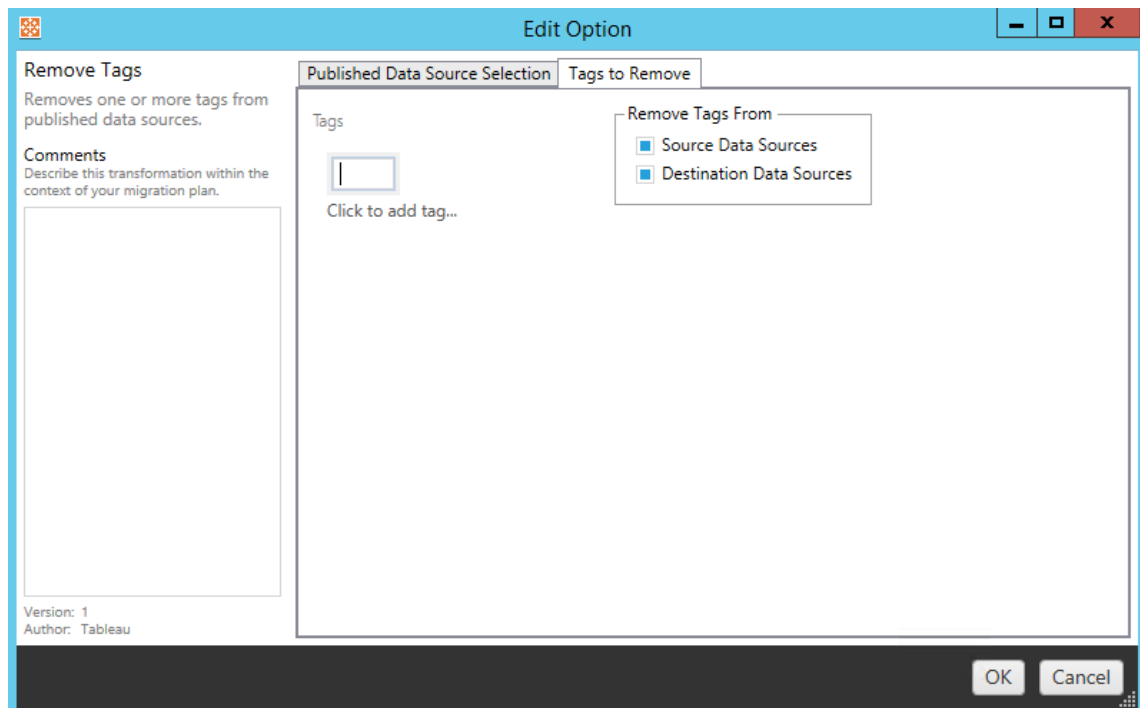
For all of the different types of transformations, there are two basic steps. The first step is to make your selection for the transformation. In this case, select the data source(s) you want to transform. At the top of the list, you can select **Apply to all published data sources**, which is an option to automatically select all data sources for future transformations. You can also **Refresh** the data source display window to reflect any changes or updates to the source site.



The second step is to enter the specific selections for the transformation you select.

## Remove Tags

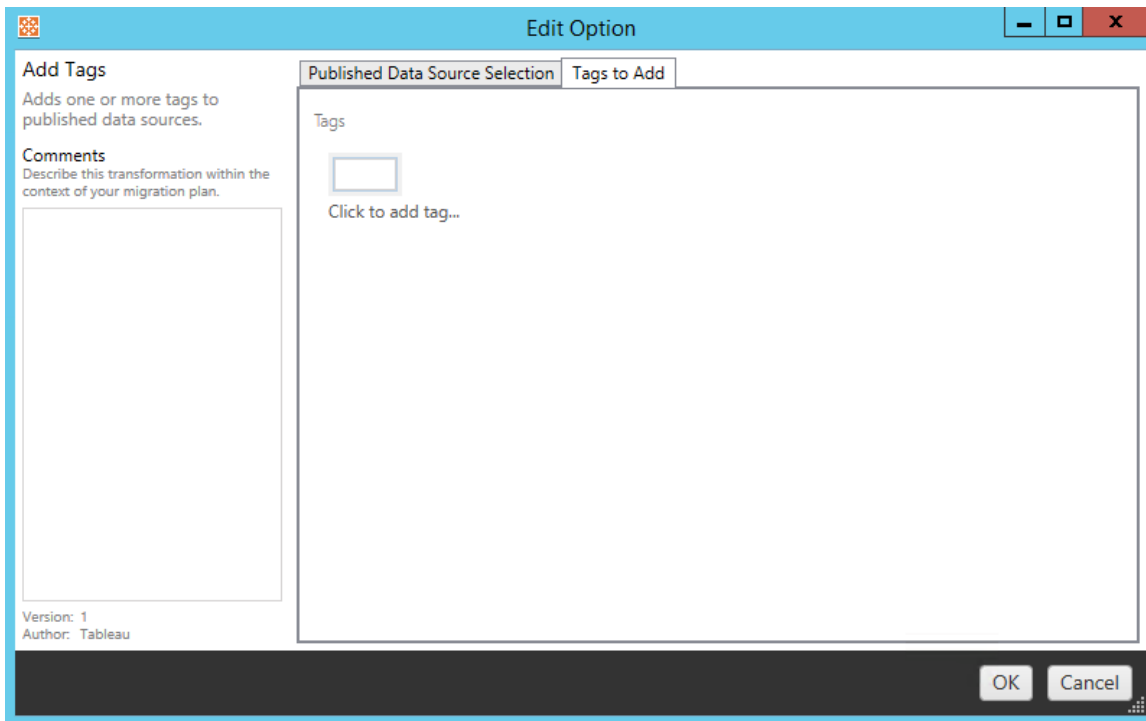
Once the data sources you would like to remove tags from are selected, enter any tags you want to remove by entering them into the field at the bottom and click **Add**. From this screen, you can also select to remove from the source or destination data sources. If you want to remove a previously entered tag, click on it and press the delete key.



## Add Tags

After selecting the data sources desired, enter any tags you want to assign by entering them into the field at the bottom and click **Add**. If you want to remove a tag, click on it and press the delete key.



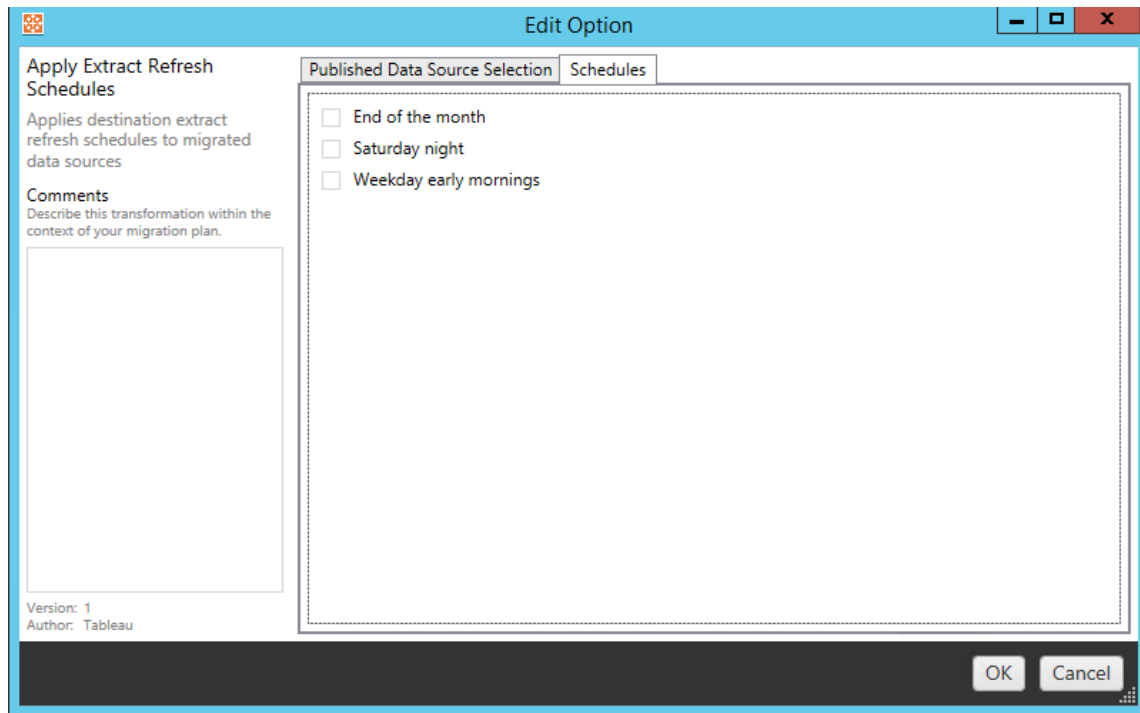


In addition, on each of the transformations you can enter notes in the **Comments** section on the left-hand side of the Edit Transformation window.

## Apply Extract Refresh Schedules

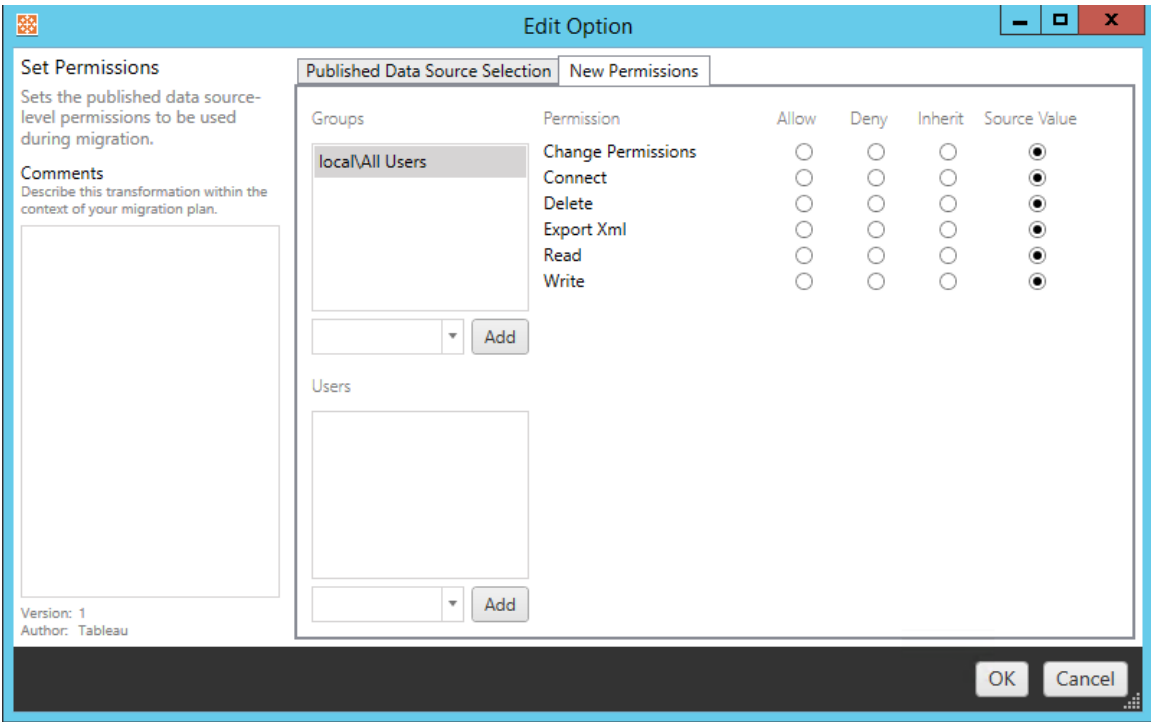
This transformation applies destination extract refresh schedules to migrated data sources. The list of schedules generated are from the destination.

**Note:** Extract refresh schedules cannot be created in Tableau Cloud. This option is not available if the destination is a Tableau Cloud site. For more information, see Migration Limitations.



## Set Permissions

The last type of transformation is to edit the permissions for the selected data sources. Enter in a Group or User and click **Add**. Adjust the permissions as desired. The four different options are to **Allow** the permission, **Deny** the permission, **Inherit** or to keep the **Source Value**.



Step 5: Continue to the next step

When you are ready, click **Next** to continue to the Migration Plans: Permissions and Ownership section of the planning phase.

Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see Permissions.

Migration Plans: Permissions and Ownership

The Content Migration Tool allows you to replicate workbook and data source permissions to Tableau environments in different network domains or have differences in username or group syntax. You can create user permissions mappings to customise and secure content after it has been published to the destination location. Mappings are applied if **Copy Project Permissions**, **Copy Workbook Permissions**, or **Copy Data Source Permissions** have been selected earlier in the planning phase, along with **Apply User Mappings**.

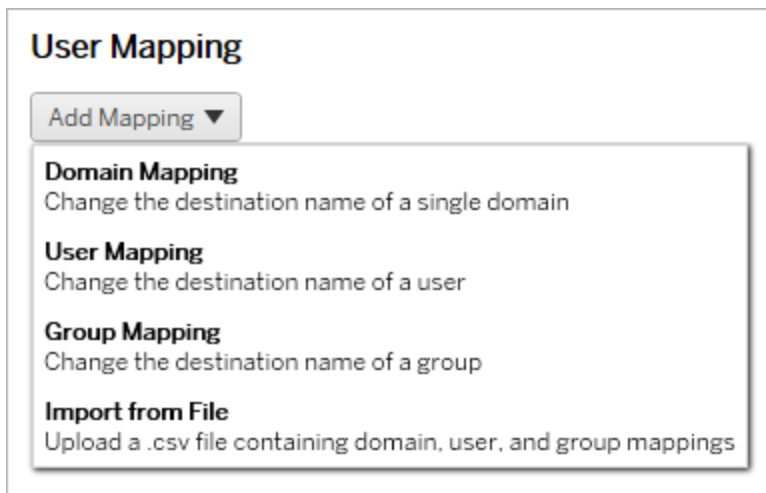
For more information, see [Migration Plans: Source Projects](#), [Migration Plans: Workbooks](#) and [Migration Plans: Published Data Sources](#).

### Mapping limitations

- Content Migration Tool will stop the migration process if it fails to find the mapped user or group in the destination location. Subsequent user or group permissions mappings are not checked after the first failure, and the plan must be run again.
- Content Migration Tool cannot replicate permissions if the source content has permissions for multiple users and groups with identical names. This only occurs when there are duplicate user or group names sourced from separate domains.

### Step 1: Add mapping

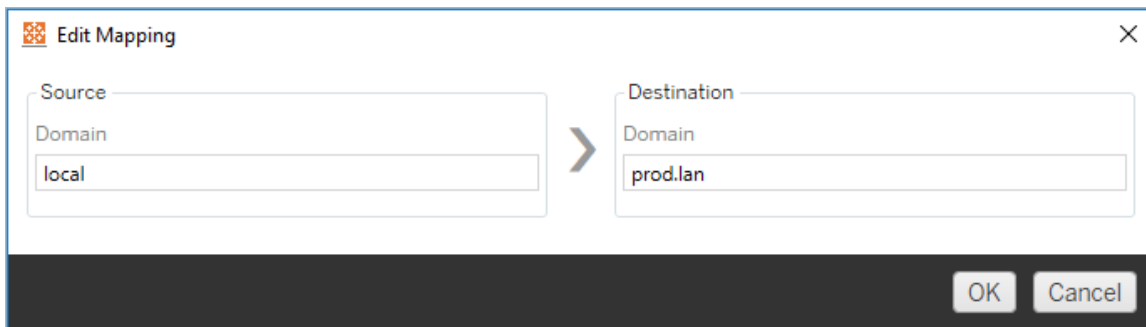
To add user permissions mapping, click **Add Mapping** and select whether to change the name of a domain, user or group, or to import mappings from a comma-separated values (CSV) file. If Content Migration Tool is unable to match a permission in the destination location, the source content will not be migrated.



## Domain Mapping

Domain permissions mapping applies to all users and groups in the destination location. If you are unsure about the source or destination domain, you can check the user and group

pages on your Tableau site. If local user provisioning has been selected, the domain must be specified as `local`.

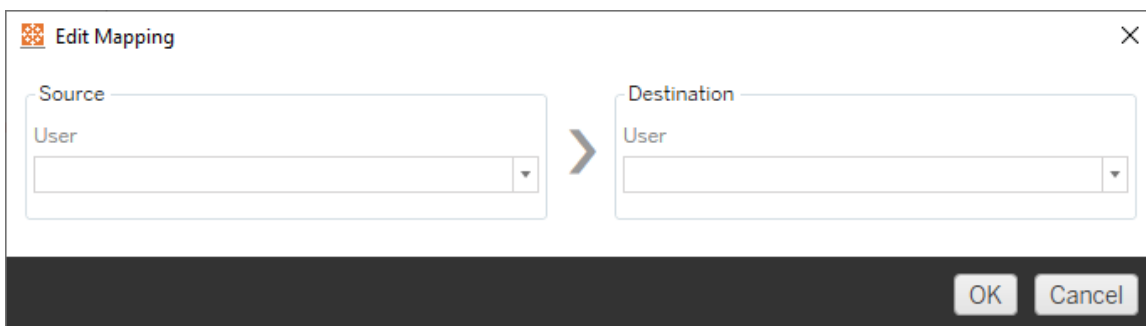


The 'Edit Mapping' dialog box is shown with a blue border and a close button (X) in the top right corner. It contains two main sections: 'Source' and 'Destination', separated by a right-pointing arrow. The 'Source' section has a 'Domain' label and a text input field containing the text 'local'. The 'Destination' section has a 'Domain' label and a text input field containing the text 'prod.lan'. At the bottom right, there are two buttons: 'OK' and 'Cancel'.

## User Mapping

User permissions mapping automatically populates a list of users from the source and destination locations using the syntax `domain\user`. You cannot enter and save the names of users that don't exist.

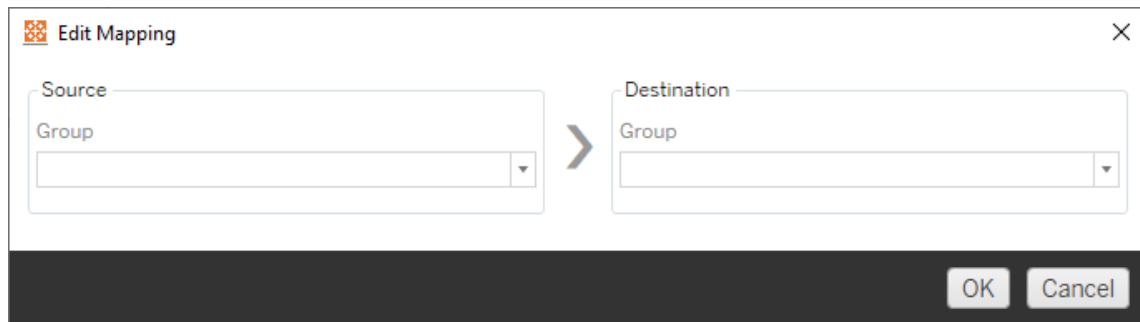
**Note:** When migrating between projects on the same site, the destination location and list of users will be the same. You can use mappings to update content ownership from `User_A` to `User_B` on the site.



The 'Edit Mapping' dialog box is shown with a blue border and a close button (X) in the top right corner. It contains two main sections: 'Source' and 'Destination', separated by a right-pointing arrow. The 'Source' section has a 'User' label and a dropdown menu. The 'Destination' section has a 'User' label and a dropdown menu. At the bottom right, there are two buttons: 'OK' and 'Cancel'.

## Group Mapping

Group permissions mapping automatically populates a list of users from the source and destination locations using the syntax `domain\group`. You cannot enter and save the names of groups that don't exist.



### Import mappings from a CSV file

Starting in version 2021.4, you can import a CSV file containing domain, user and group mappings to quickly prepare your data for migration. Importing mappings can reduce the manual steps required to run a migration plan by allowing you to create and edit your mappings in bulk outside of Content Migration Tool. To import mappings, select **Import from File** from the Add Mapping menu.

## CSV file format requirements

When you create a CSV file to import mappings, make sure that the file meets the following requirements:

- The file does not include column headings. Tableau assumes that every line represents a mapping.
- The file contains three comma-separated values per row: mapping type, source domain/user/group and destination domain/user/group.
- Include the domain for usernames and groups if the server uses Active Directory authentication or "local" if a local identity store is used.

You must specify "domain", "user" or "group" for mapping type, as shown in the following table. The source and destination columns provide example syntax for Active Directory and a local identity store. Actual values in the CSV file will vary depending on your organisation.

Mapping Type	Source	Destination
domain	<domain>	<domain>
user	<domain>\<user name> local\<user name>	<domain>\<user name> local\<user name>
group	<domain>\<group name> local\<group name>	<domain>\<group name> local\<group name>

## Import user permissions mappings

To import user permissions mappings in the Content Migration Tool:

1. Click **Add Mapping** and select **Import from File**.
2. In the dialog window, click **Export CSV** to export a .csv file containing all users and groups from the source site. Edit the resulting file in a text editor to add mappings for the destination site.

If you already have a mapping file, skip to step 3.

**Note:** The exported CSV file doesn't include domains from the source site. Domains must be added manually to the CSV to create domain mappings.

3. Click **Import Mappings** and select the mapping file you want to import.

Content Migration Tool will validate the mappings for errors when importing the file. If errors are detected, you must fix each error in the CSV file and then import it again.

## CSV import example

The following example shows a CSV file that contains multiple mapping types.

```
user,local\hwilson,companyx.lan\henry.wilson
user,local\jjohnson,companyx.lan\janna.johnson
user,local\mkim,companyx.lan\michele.kim
user,local\fsuzuki,companyx.lan\fred.suzuki
user,local\awang,companyx.lan\alan.wang
user,local\snguyen,companyx.lan\susan.nguyen
user,local\lrodriguez,companyx.lan\laura.rodriguez
user,local\agarcia,companyx.lan\ashley.garcia
group,local\All Users,companyx.lan\All Users
group,local\Finance Team,companyx.lan\Finance Group
domain,dev.mycompany,prod.mycompany
```

A preview window is displayed while importing the CSV that shows mappings removed, added or updated, unchanged and ignored. Review that the mapping changes are correct and click **Accept**.



Import from File

Review the table to make sure mapping changes are correct before continuing.

Removed: 5

Mapping	Description
User Mapping	Match "local\User_5" to "local\Company_User_5"
User Mapping	Match "local\User_6" to "local\Company_User_6"
User Mapping	Match "local\User_7" to "local\Company_User_7"
User Mapping	Match "local\User_8" to "local\Company_User_8"
User Mapping	Match "local\User_9" to "local\Company_User_9"

Added or updated: 9

Mapping	Description
User Mapping	Match "local\User_15" to "local\Company_User_15"
User Mapping	Match "local\User_18" to "local\Company_User_18"
User Mapping	Match "local\User_20" to "local\Company_User_20"
User Mapping	Match "local\User_23" to "local\Company_User_23"
User Mapping	Match "local\User_3" to "local\Company_User_3"
User Mapping	Match "local\User_26" to "local\Company_User_26"

Unchanged: 18

Mapping	Description
User Mapping	Match "local\User_1" to "local\Company_User_1"
User Mapping	Match "local\User_10" to "local\Company_User_10"
User Mapping	Match "local\User_11" to "local\Company_User_11"
User Mapping	Match "local\User_12" to "local\Company_User_12"
User Mapping	Match "local\User_13" to "local\Company_User_13"
User Mapping	Match "local\User_14" to "local\Company_User_14"

Ignored: 6

Mapping	Description
User Mapping	Match "local\Service_User_1" to "local\Company_Service_User_1"
Group Mapping	Match "sales_group" to "sales_west_group"
User Mapping	Match "local\User_40" to "local\Company_User_40"
User Mapping	Match "local\User_41" to "local\Company_User_41"
User Mapping	Match "local\User_42" to "local\Company_User_42"
User Mapping	Match "local\User_43" to "local\Company_User_43"

Accept

Cancel

Once the mappings are imported successfully, you can edit, delete or change the mapping order as described in Step 2.

### Step 2: Change mapping order

After a permissions mapping is created, you can change the order using the **Up** or **Down** options to determine when it will be handled during the migration. When a domain, user, or group is handled in a permissions mapping, any subsequent permissions mappings for the source domain, user or group will be ignored.

In the example below, permissions for `User_A` are mapped to `User_B`. Content Migration Tool will ignore the second permissions mapping because `User_A` has already been handled.

	Mapping	Description
<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Up</a> <a href="#">Down</a>	User Mapping	Match "local\User_A" to "local\User_B"
<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Up</a> <a href="#">Down</a>	User Mapping	Match "local\User_A" to "local\User_C"

In the example below, the first permissions mapping associates the domain for all users to `prod`. Content Migration Tool will ignore the second permissions mapping because the domain for `User_A` has already been handled.

	Mapping	Description
<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Up</a> <a href="#">Down</a>	Domain Mapping	Match "local" to "prod"
<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Up</a> <a href="#">Down</a>	User Mapping	Match "User_A" to "dev\User_B"

### Step 3: Continue to next step

When you are ready, click **Next** to continue to the Migration Plans: Migration Scripts section of the planning phase.

Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see Permissions.

### Migration Plans: Migration Scripts

The next step of creating a migration plan in the Tableau Content Migration Tool is to create any scripts you want to run with your plan before or after migration.

#### Step 1: Pre-Migration

The **Run Pre Migration** section of the screen is dedicated to scripts that will run before the migration.

**Run Pre Migration**

☐ Enable ?

Working Directory ?    ?

Run ?

Command Executable ?

Command Parameters ?

Each field has a help icon you can get information from by moving your cursor over it. To start with your pre-migration scripts, select **Enable**, which will then activate the fields below.

### Working Directory

This is the working directory for the script. The default directory is the same folder as the migration plan. Click on the browse button to select a different folder. The **Reset** button will restore the current migration plan folder as the working directory.

## Run

This drop down allows you to choose either to run a custom script or an executable with parameters.

### Command Executable

If you selected **Executable with Parameters** from the **Run** menu, this field will appear. This is the file path to the command executable to run before migration. Type it in directly or use the browse button to find the executable. This is a required field.

### Command Parameters

If you selected **Executable with Parameters** from the Run drop-down menu, this field will appear. Enter in command line parameters here to use with the command executable.

### Script

If you selected **Custom script** from the **Run** menu, enter in your pre-migration script here. It will be executed as a \*.cmd file. This is a required field.

### Step 2: Post-Migration

The **Run Post Migration** half of the screen is dedicated to scripts that will run after migration.

**Run Post Migration**

☐ **Enable** ?

Working Directory ?    ?

Run ?  ▼

Command Executable ?

Command Parameters ?

Each field has a help icon you can get information from by moving your cursor over it. To start with your post-migration scripts, select **Enable**, which will then activate the fields below.

## Working Directory

This is the working directory for the script. The default directory is the same folder as the migration plan. Click on the browse button to select a different folder. The **Reset** button will restore the current migration plan folder as the working directory.

## Run

This drop down allows you to choose either to run a custom script or an executable with parameters.

## Command Executable

If you selected **Executable with Parameters** from the **Run** menu, this field will appear. This is the file path to the command executable to run before migration. Type it in directly or use the browse button to find the executable. This is a required field.

## Command Parameters

If you selected **Executable with Parameters** from the **Run** menu, this field displays. Enter in command line parameters here to use with the command executable.

## Script

If you selected **Custom script** from the **Run** menu, enter in your post-migration script here. It will be executed as a \*.cmd file. This is a required field.

Step 3: Continue to Next Step

When you are ready, click **Next**.



Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).

## Migration Plans: Plan Options

The last step of creating a migration plan in the Tableau Content Migration Tool is configuring the plan options.

### Step 1: Configure options

The **Plan Name** is the name of the plan as it will appear in Content Migration Tool. We recommend using a user-friendly name for your plan name.

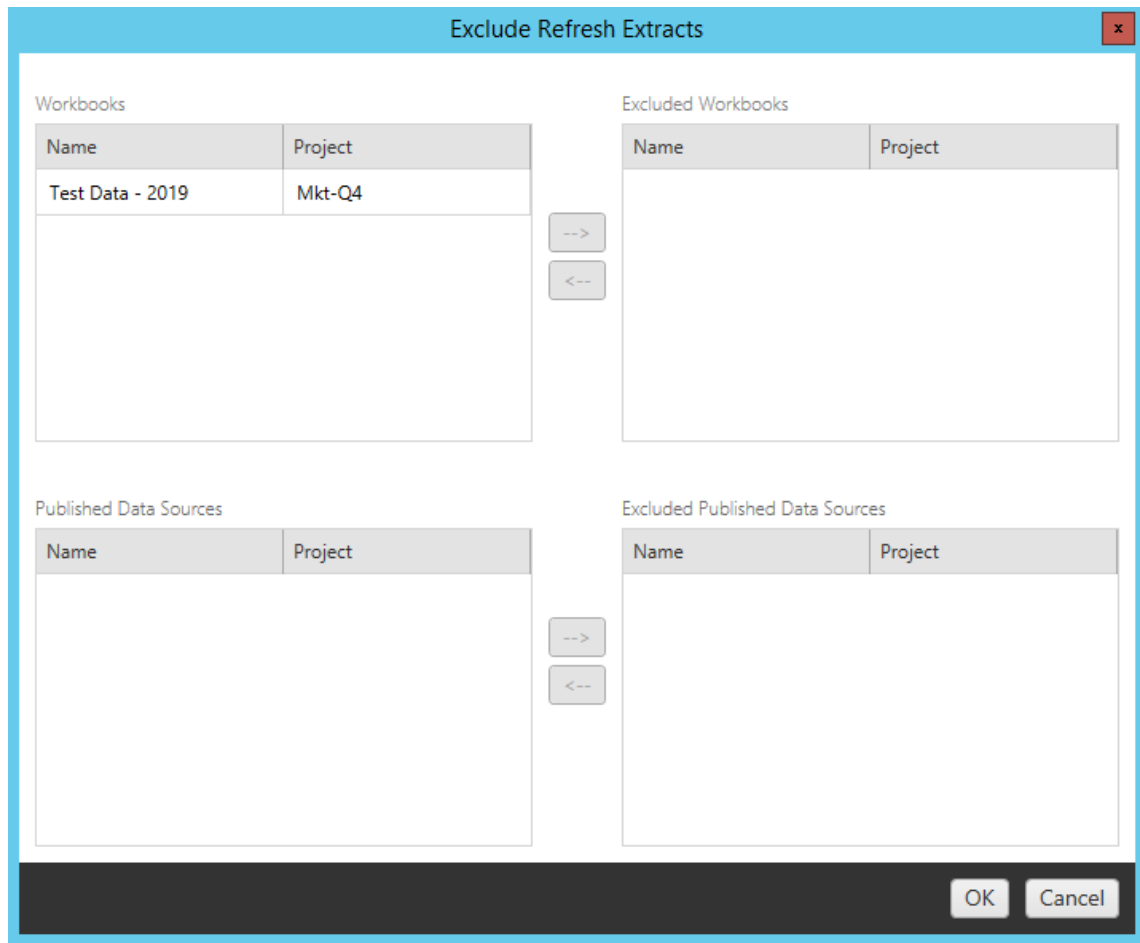
The following are available options:

- **Refresh Extracts After Migration:** If selected, data extracts will be refreshed immediately after migration if Content Migration Tool detects they have been modified during migration. Click the **Filter** link to exclude specific extracts. For more information, see [Exclude extract refreshes](#) below.
- **Automatically create Extract Refresh Schedules that do not Exist:** Automatically creates destination extract schedules that do not exist. If not ticked, source schedules that do not exist on the destination server will not be copied.

- **Continue Migration if Workbook or Data Source Fails:** If checked, errors migrating a workbook or data source will not cause the migration to stop. The errors will be logged and the migration will continue. Errors during version control will always stop the migration.
- **Continue Migration if Permission or Ownership Mapping Fails:** If ticked, errors copying permissions or ownership will not cause the migration to stop. The errors will be logged and the migration will continue.

## Exclude extract refreshes

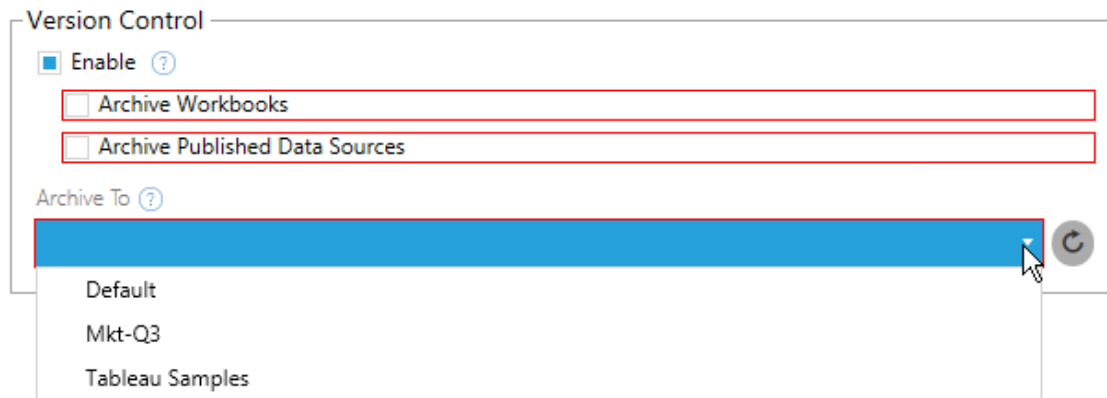
By clicking **Filter** next to **Refresh Extracts After Migration**, you can choose the workbooks or published data sources that will not be refreshed automatically. Use the arrow buttons to select the items you want to exclude, and click **OK**.



### Step 2: Version control

These options allow you to avoid losing the existing workbooks in the destination site that might be replaced by the migrated workbooks.





**Version Control**

☒ **Enable** ?

☐ **Archive Workbooks**

☐ **Archive Published Data Sources**

**Archive To** ?

Default

Mkt-Q3

Tableau Samples

Refresh button (circular arrow icon)

Select **Enable** to save previous versions of your content. You can choose to archive workbooks and/or published data sources. Once version control is enabled, you must select a project from the **Archive To** menu, which lists all the projects in your destination site. We recommend creating a separate archive project to store your versioned content. Click the refresh button to display any projects that have been added or modified on the site.

#### Step 3: Save plan

Once you have selected your plan options, click **Save Plan** to save your plan for future use. The plan will be saved to the `Documents\Tableau Content Migration Tool Plans` folder on your local machine.

#### Step 4: Continue to next step

When you are ready, click **Verify & Run** to end the Planning phase and prepare to run your plan.

#### Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).

## Migrate Workbooks and Data Sources with Extracts

Tableau Server users can publish extracts, which are copies or subsets of the original data. These extracts may be embedded in a workbook or a data source. By default, when you use the Tableau Content Migration Tool to migrate a workbook or data source that contains an extract, that extract is migrated along with the workbook or data source that contains it. The Content Migration Tool gives you a couple of options for controlling this behaviour:

- **Switching to a Live Connection**

You can add the **Remove Extract** transformation to your migration plan to remove the extract from your workbook or data source during migration. As always, the source workbook or data source will not be modified. The copy of the workbook or data source migrated to the destination site will have the extract removed from it. This effectively switches the data connection back to a live connection.

- **Refreshing Extracts after Migration**

You can enable the **Refresh Extracts After Migration** option in your migration plan to have an immediate extract refresh task scheduled after the workbook or data source is migrated.

We don't recommend using the **Refresh Extracts After Migration** option if your migration plan also uses the **Set Connection Info** transformation to change the data connection to point to a different set of data (for example, a different database server or database). When you change the connection information to point to different data and use the **Refresh Extracts After Migration** option, this can unintentionally expose data in a way that is a potential security issue.

For more information, see [Option 3: Refresh Extracts After Migration](#).

## Changing data connections that use extracts

Tableau data connections are either live connections that directly query a data source, or they are extracts of a data source. Extracts are copies or subsets of the original data and can be

embedded in a workbook or data source. When present, the views will query data from the extract instead of the underlying data source.

Commonly, you'll want to modify the data source connection during the migration so that it points to a different database on the destination site than it did on the source site.

For example, if you are migrating a workbook from your staging site to your production site, you will likely want to update the data connections inside the workbook to connect to your production database. You can implement this by using the **Set Connection Info** transformation in your migration plan. Now you have a migration plan which copies a workbook from staging to production and updates the data connections to point to the production database.

If your workbook uses an extract, additional work is required. In this scenario, the workbook will be migrated and the live data connection updated. However, the views will still show data from the staging database because it still contains the staging database extract – copied from the source (staging) site. There are a few ways to address this.

## Option 1: Use Published Data Sources

You can change your workbooks so that they use published data sources instead. This way, the extract will be managed as part of the published data source, and migrating updates to the workbooks that use that data source can be simplified by not having to worry about the connection to the live database or the data extract.

## Option 2: Remove the Extract During Migration

You can add a **Remove Extract** transformation to your migration plan. This will remove the extract from your workbook, effectively switching the data source to a live connection.

## Option 3: Refresh the Extract After Migration

You can use the **Refresh Extracts After Migration** option in your migration plan. This will migrate the extract along with the workbook but will schedule an immediate extract refresh task for that workbook after the migration is complete.

This option is usually not recommended when used in combination with a **Set Connection Info** transformation because of potential security issues that it can introduce.

The issue is that the migrated workbook on your destination site will still show the old (source) extract data for the period between the completion of migration and the completion of the extract refresh task. If the extract refresh task fails, then the old/source extract data will remain until the extract is refreshed.

In a scenario like we've outlined above, migrating from a staging to production environment, this may be acceptable, but you should be aware that the users of your workbooks may not be aware that the workbook is showing old/staging data due it being recently migrated and the extract not being refreshed yet.

In other scenarios where you may be using **Set Connection Info** to change data connections to point to a different set of customer or client data, this could introduce serious security issues where the workbook's extract contains data from a different client or customer until the extract has been refreshed post-migration.

One way to mitigate this issue is to implement a 2-stage migration. This approach requires you to create two migration plans, one for each step described below, and ensures the workbooks and data sources have an up-to-date extract before they are accessible.

- **Stage 1:** Migrate your content to a project on your destination site that only administrators have access to. This migration allows you to use the **Refresh the Extract After Migration** option along with the **Set Connection Info** transformation to update the data connection, because no unauthorised users will have an opportunity to see the old data, even if the extract refresh fails.
- **Stage 2:** After stage 1 is complete and you confirm there is a successful extract refresh, run a second migration plan to migrate the content from the stage 1 destination to the final destination where it is visible to end-users.

### Who can do this

Tableau site user with an Explorer role or higher. To migrate content, you must have **View** and **Download/Save a Copy** capabilities for workbooks on the source site and **View** and **Publish** capabilities for target projects on the destination site. For more information, see [Permissions](#).

### Migrate Workbooks and Data Sources with Embedded Credentials

Starting in version 2023.1, authorised users can migrate workbooks and published data sources with embedded credentials from Tableau Server to Tableau Cloud. Additional configuration is required before migrating with Content Migration Tool.

**Note:** Content Migration Tool does not support embedded credential migration for OAuth connections. For more information, see [Migration Limitations](#).

### Overview

Migrating embedded credentials using Content Migration Tool (CMT) is available when connecting to Tableau Server as the source site and Tableau Cloud as the destination site. Both sites must have an [Advanced Management](#) licence.

Now that we've covered the requirements, let's discuss how migration works. You'll need to work closely with the Tableau Cloud site administrator and TSM administrator (sometimes the same person) to allow the feature and authorise a site user. After the feature is activated, the authorised site user builds a migration plan and selects the publish options *Migrate Embedded Credentials for Workbooks* and *Migrate Embedded Credentials for Data Sources*.

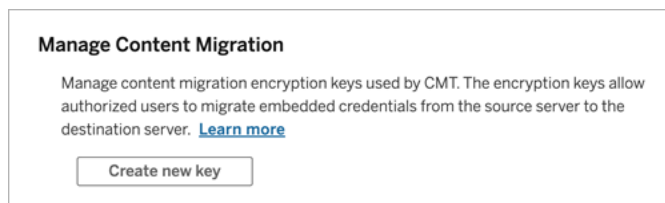
When running the migration plan, all required content credentials are transmitted in an encrypted content manifest from Tableau Server to Tableau Cloud. As CMT publishes content, the destination Tableau Cloud site embeds matched credentials securely from the manifest into the content (workbooks or published data sources). Any problems that occur during migration will appear in the Errors and Warnings tab in CMT. For more information, see [Migration Plan Overview](#).

## Allow embedded credential migration

Use the following steps to allow embedded credential migration from Tableau Server to Tableau Cloud.

### Tableau Cloud

1. Open a browser window and sign in to Tableau Cloud as a site administrator.
2. Select **Settings > General**, and scroll down to **Manage Content Migration**.



3. Click **Create new key** to generate an encryption key pair.

**Note:** The public key is only displayed once. If you lose the key before completing the configuration, you'll need to generate a new key.

4. In the resulting window, click **Copy to clipboard** and then close the window.
5. Paste the public key to a file and store it in a safe location. The TSM administrator will use the public key to allow migration. You can view the public key expiration date on the Settings page.

### TSM Command Line Interface

1. Open Windows Command Prompt with an account that is a member of the Administrators group on a node in the cluster.

2. Use `tsm security authorize-credential-migration` to allow embedded credential migration to the Tableau Cloud site. For more information, see `tsm security`.

```
tsm security authorize-credential-migration --source-site-url-  
namespace <Tableau Server site ID> --destination-site-url-  
namespace <Tableau Cloud site ID> --destination-server-url  
<Tableau Cloud site url> --authorized-migration-runner <user-  
name> --destination-public-encryption-key <public key>
```

**Note:** When running TSM commands from a remote node, use `tsm login` to authenticate a session with the Tableau Server Administration Controller service before running `tsm security authorize-credential-migration`.

3. (Optional) Use `tsm security cancel-credential-migrations` to cancel granted authorisations. By default, migration authorisation will expire in 7 days or the number of days specified with the `--expiration-time-in-days` option.

## Content Migration Tool

1. Open Content Migration Tool and select **Create New Plan** or **Browse for a Plan**.
2. On the Sites page, click **Sign in to Tableau**, and connect to Tableau Server as the source and Tableau Cloud as the destination. Embedded credential migration is only available when migrating from Tableau Server to Tableau Cloud.
3. Build your migration plan and select the following Publish Options:
  - On the Workbook Publish Options page, select **Migrate Embedded Credentials for Workbooks**. For more information, see Migration Plans: Workbooks.
  - On the Data Source Publish Options page, select **Migrate Embedded Credentials for Data Sources**. For more information, see Migration Plans: Published Data Sources.
4. When you are ready, click **Verify & Run** to start the migration.

The workbooks and published data sources you selected are migrated to your Tableau Cloud site and should not prompt for authentication. If you experience issues while migrating embedded credentials, see [Troubleshooting](#).

## Troubleshooting

This section includes some common migration issues you might encounter and suggestions to resolve them.

## There is no option to migrate embedded credentials

You can only migrate embedded credentials from a Tableau Server to a Tableau Cloud site. Tableau Server and Content Migration Tool must be running versions 2023.1 or later. For more information, see [Install Tableau Content Migration Tool](#).

## Migrating embedded credentials failed

In the [Errors and Warnings](#) tab of CMT, you may receive an error indicating that migrating the embedded credentials failed. This can occur when the public key used to authorise migration has expired.

As a Tableau Cloud site administrator, go to the Settings page and verify that the public key is valid. You'll have to create a new encryption pair to authorise the migration if the public key expires. For more information, see [Allow embedded credential migration](#).

Who can do this?

- Tableau Cloud site administrator and TSM administrator are required to allow embedded credential migration.
- The authorised site user must have an Explorer role or higher. They must also have View and Download/Save a Copy capabilities for workbooks on the source site and View and Publish capabilities for target projects on the destination site.

For more information, see [Permissions](#).



## Using the Tableau Content Migration Tool Console Runner

The Tableau Content Migration Tool includes a command-line utility for running migrations, `tabcmt-runner.exe`, located in the installation folder. The default installation folder is `%PROGRAMFILES%\Tableau\Tableau Content Migration Tool`.

**Note:** The `tabcmt-runner.exe` utility is not the same as the `tabcmt.cmd` command line utility which is used to configure the Content Migration Tool graphical application. For more information about `tabcmt.cmd`, see [Using the Tableau Content Migration Tool Command Line Interface](#).

### Usage:

- `tabcmt-runner [options] <plan_file.tcmx>`
- `tabcmt-runner licence --remove`
- `tabcmt-runner licence <new licence key>`
- `tabcmt-runner licence <licence file path> [--passphrase=<licence file passphrase>]`
- `tabcmt-runner encryption --reset`
- `tabcmt-runner encryption <new_key>`
- `tabcmt-runner improvement [on|off]`
- `tabcmt-runner --help`
- `tabcmt-runner --version`
- `tabcmt-runner script-warning [on|off]`

### Options:

- `--version`
- `--help`
- `--quiet`
- `--info`
- `--logfile=VALUE`
- `--src-user=VALUE`
- `--src-password=VALUE`
- `--dest-user=VALUE`
- `--dest-password=VALUE`

- `--https=VALUE`
- `--allow-scripts`

## Run Plan

Executes a migration plan immediately.

```
tabcmt-runner [options] <plan file>
```

Available options:

- `--logfile=<file name>` sets the file name to log output to
- `--https=<secure|legacy>` sets the HTTPS mode
- `--quiet` disables logging to stdout
- `--src-user=<username>` sets the username of the source connection
- `--src-password=<password>` sets the password of the source connection
- `--dest-user=<username>` sets the username of the destination connection
- `--dest-password=<password>` sets the password of the destination connection

Exit codes:

- 0 indicates that the migration was successful.
- 1 indicates that the migration was successful but warning messages were logged.
- 2 indicates that the migration failed. Specific errors will be included in the log output.

## Show Plan Summary

Shows a summary of the migration plan and then exits.

```
tabcmt-runner --info <plan file>
```

## help

Shows usage information for the command line utility.

```
tabcmt-runner --help
```

## version

Shows the current application version information.

```
tabcmt-runner --version
```

## encryption

Reset the encryption key, or specify a new one. You must specify the encryption key before using the `tabcmt-runner` utility, even if you already done so from the Content Migration Tool UI.

```
tabcmt-runner encryption <new_key> | --reset
```

## improvement

Default value: `on`

Enables or disables collection of anonymous usage information by the application. This information is completely anonymous and is sent periodically to Tableau to help us improve Content Migration Tool.

## Examples

Show whether the improvement program is enabled or disabled:

```
tabcmt-runner improvement
```

Enable or disable the improvement program:

```
tabcmt-runner improvement <on|off>
```

## licence

Deprecated in July 2022.

This command is only applicable for legacy licences. Manages a legacy application licence for the current user. When using a legacy key, to use the `tabcmt-runner` utility you must activate the licence using this command, even if you already activated it from the Content Migration Tool UI.

## Examples

Show the current licence information:

```
tabcmt-runner license
```

Set/activate a serial key or offline licence key:

```
tabcmt-runner license <key>
```

Remove/deactivate the current licence:

```
tabcmt-runner license --remove
```

Set/activate using a licence file:

```
tabcmt-runner license <file path> [--passphrase=<password>]
```

script-warning

Default value: on

Shows a warning message when running a migration plan that includes migration scripts.

**Note:** This command updates your selection on the Settings page. For more information, see Tableau Content Migration Tool Settings.

## Examples

Show if script warning is turned on or off.

```
tabcmd-runner script-warning
```

Turn script warning on or off

```
tabcmd-runner script-warning <on|off>
```

If turned on, you must include the option `--allow-scripts` to execute migration plans.

```
tabcmd-runner --allow-scripts <plan file>
```

Who can do this

To use the console runner, you must have all the following:

- Administrator permissions on the Content Migration Tool machine.
- Tableau site user account with an Explorer role or higher.

- View and Download Workbook/Save a Copy permissions on the source site.
- Publishing rights for the destination site.

### Example: Scripting Migration Plans

**Note:** This topic includes a sample script you can use as the basis for scripting a multi-plan migration that satisfies your needs and environment. This script is intended to be used as a sample only, and not to be run as-is. For detailed instructions on using the console runner, see [Using the Tableau Content Migration Tool Console Runner](#).

Tableau Content Migration Tool command line utility for running migrations can be used to automate the running of a migration plan from an external scheduler (such as Windows Task Scheduler) or from a custom script. The console runner only runs one migration plan (stored in a .edt file) at a time. If you have a group of migration plans you want to run as a group, then you can use a custom script in combination with the Content Migration Tool console runner.

The example below is written in PowerShell and uses the console runner to execute a list of migration plans as a group.

The following example code demonstrates:

- Running multiple migration plans as a group using the console runner.
- Optionally halting deployment of the group of plans immediately when any single migration in the group fails.
- Using the console runner's exit code to determine whether the migration failed or logged warnings.

```
# List of migration plans to execute as a group.
$planFiles = @(
    'customer 1.tcmx',
    'customer 2.tcmx'
)

# True or false whether to continue with the next plan if a
```

```

migration fails.
$continueOnFailure = $false

# Path to the CMT console runner executable
$runnerExe = 'C:\Program Files (x86)\Tableau\Tableau Content Migration Tool\tabcmt-runner.exe'

# Store the exit code from the previously run migration plan.
$lastResult = -1

# Loop through and run each migration plan one at a time.
$planFiles | % {
    $file = $_

    if ($lastResult -ge 2 -and -not($continueOnFailure)) {
        Write-Warning "Skipping plan because previous migration failed.
`nSkipped plan: $file"
        return
    }

    Write-Verbose "Running migration plan: $file"
    & $runnerExe $file
    $lastResult = $LASTEXITCODE

    if ($lastResult -ge 2) {
        Write-Error "Migration failed. See output or log file for error
details.`nPlan: $file" -ErrorAction 'Continue'
    }
    elseif ($lastResult -eq 1) {
        Write-Warning "Migration completed with warnings. See output or
log file for warning details.`nPlan: $file"
    }
}

```

### Who can do this

To script migration plans, you must have all the following:

- Administrator permissions on the Content Migration Tool machine.
- Tableau site user account with an Explorer role or higher.
- View and Download Workbook/Save a Copy permissions on the source site.
- Publishing rights for the destination site.

## Using the Tableau Content Migration Tool Command Line Interface

The Tableau Content Migration Tool includes a command line interface, `tabcmt.cmd`, located in the installation folder. The default installation folder is `%PROGRAMFILES%\Tableau\Tableau Content Migration Tool (32-bit Windows)` or `%PROGRAMFILES(x86)%\Tableau\Tableau Content Migration Tool (64-bit Windows)`.

**Note:** The `tabcmt.cmd` utility is not the same as the Content Migration Tool console runner, `tabcmt-runner.exe`. The console runner is a separate command line utility used for running migrations from the command line. For information on using the Content Migration Tool console runner, see [Using the Tableau Content Migration Tool Console Runner](#).

Here are the commands that can be used with the `tabcmt` command line:

- `migrate`
- `help`
- `update`
- `version`

### `migrate`

Opens a migration plan file to the migrate step in the GUI:

```
tabcmt migrate <plan file>
```

### `help`

Shows general help about the command line interface and the available commands.

### Examples

Show all commands available:

```
tabcmt help
```

Show help and usage information for a specific command:

```
tabcmt help <command>
```

## licence

Deprecated in July 2022.

This command is only applicable for legacy licences. Manages the application licence for the current user.

### Examples

Show the current licence information:

```
tabcmt license
```

Remove/deactivate the current licence:

```
edt license remove
```

Set/activate a serial key or offline licence key:

```
tabcmt license <key>
```

Set/activate using a licence file:

```
tabcmt license <file path> [--passphrase=<password>]
```

## update

Manages the options for application updates.

### Examples

Show the current update settings:

```
tabcmt update
```

Enable or disable the automatic update notifications:

```
tabcmt update --disabled=<true|false>
```



## Tableau Server on Windows Help

Set the URL to detect/download updates from:

```
tabcmt update --url=<url>
```

Enable or disable showing beta updates. Set to false to only show stable release updates.

```
tabcmt update --beta=<true|false>
```

version

Shows the current application version information.

```
tabcmt version
```

Who can do this

To use the command line interface, you must have all the following:

- Administrator permissions on the Content Migration Tool machine.
- Tableau site user account with an Explorer role or higher.
- View and Download Workbook/Save a Copy permissions on the source site.
- Publishing rights for the destination site.

## Tableau Content Migration Tool Settings

The Tableau Content Migration Tool default settings work in most cases, but you can change these if you need to, or if you are working with Tableau Support and they ask you to make changes.

To view or update the Content Migration Tool settings:

1. Open Content Migration Tool.
2. Click **Help** > **Settings**. The Settings dialog opens:

The screenshot shows the 'Settings' dialog box with the 'Legacy License Key' tab selected. The dialog is divided into several sections: 'Diagnostics', 'Security', 'Migration Scripts', 'Tuning', 'Temporary Files', and 'Networking'. The 'Diagnostics' section has an 'Open Log Folder' button and an unchecked checkbox for 'Enable Network Tracing (This Session Only)'. The 'Security' section has an empty 'Encryption Key' text field and a warning message. The 'Migration Scripts' section has a checked checkbox for 'Warn me when migration plans contain scripts'. The 'Tuning' section has four numeric input fields: 'Maximum Download Concurrency' (8), 'Maximum Upload Concurrency' (8), 'Download / Upload Timeout In Minutes' (60), and 'Maximum Processing Concurrency' (40). The 'Temporary Files' section has a 'Temporary File Path' text field containing 'C:\TEMP' and a browse button. The 'Networking' section has an unchecked checkbox for 'Allow Legacy HTTPS Connections (Not Recommended)'. At the bottom right are 'OK' and 'Cancel' buttons.

Settings

Advanced Legacy License Key

Diagnostics

Open Log Folder

☐ Enable Network Tracing (This Session Only)

Security

Encryption Key

Warning: Overriding the encryption key may cause previously saved plan files to stop functioning. After overriding the encryption key you are responsible for making sure it is secure!

Migration Scripts

☒ Warn me when migration plans contain scripts

Tuning

Maximum Download Concurrency 8

Maximum Upload Concurrency 8

Download / Upload Timeout In Minutes 60

Maximum Processing Concurrency 40

Temporary Files

Temporary File Path C:\TEMP

Networking

☐ Allow Legacy HTTPS Connections (Not Recommended)

OK Cancel

**Diagnostics**—Click **Open Log Folder** to open the logs location. Here you can view the logs, and zip them up if you need to send them to Tableau. For more information, see [Tableau Content Migration Tool Log Files](#).

Select **Enable Network Tracing** if you are working with Support and they ask you to include a network trace in the logs. This applies until you clear the option or restart the Content Migration Tool.

**Security**—The encryption key is automatically generated on installation. If you change the encryption key, any migration plans with embedded passwords that were created with the previous key cannot be opened. If you have multiple installations of Tableau Content Migration Tool and want to share migration plans, you need to make sure the encryption key used by each instance of the tool is the same.

**Migration Scripts** – By default, a warning is displayed when running a migration plan that includes migration scripts or executables. Other users can edit these files, so verify that they're safe before running the migration. Toggling this setting on and off will also update your warning preference for the console runner. For more information, see Using the Tableau Content Migration Tool Console Runner.

**Tuning**—In almost all cases, you can leave these set to the defaults. If you are working with Support, they may ask you to change these settings.

**Temporary Files**—Select a location for temporary files if you want to change the default. This is the location where content is copied during a migration. You may want to change this if the default location does not have enough space to temporarily hold migrated content.

**Networking**—Selecting **Allow Legacy HTTPS Connections** gives you the ability to connect to Tableau Server installations running with older HTTPS configurations (for example, SSL v3). This is not recommended.

Who can do this

Typically, the tasks listed above can only be done by a user with Administrator access on the machine where Content Migration Tool is installed.

## Tableau Content Migration Tool Log Files

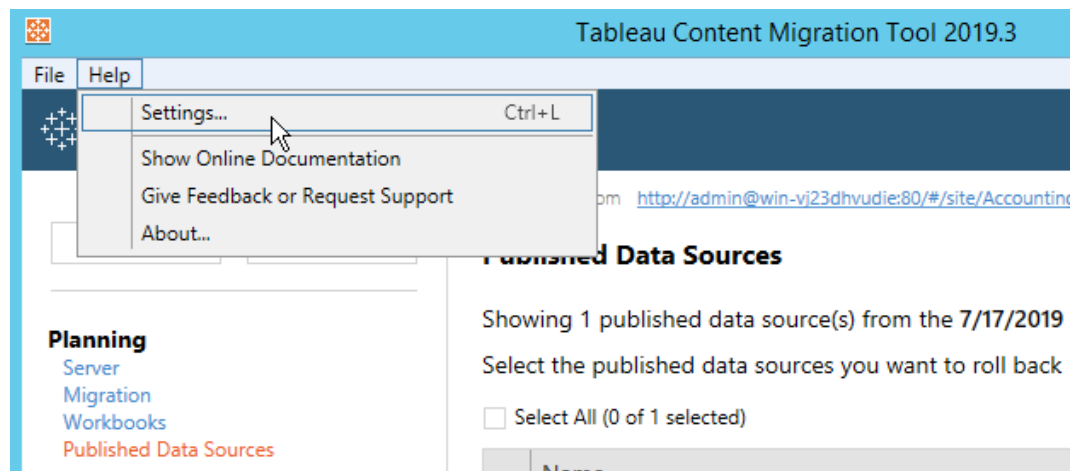
Tableau Content Migration Tool generates log files when you run migrations. These can be helpful for troubleshooting problems.

**Note:** For information on all the Content Migration Tool settings, see Tableau Content Migration Tool Settings.

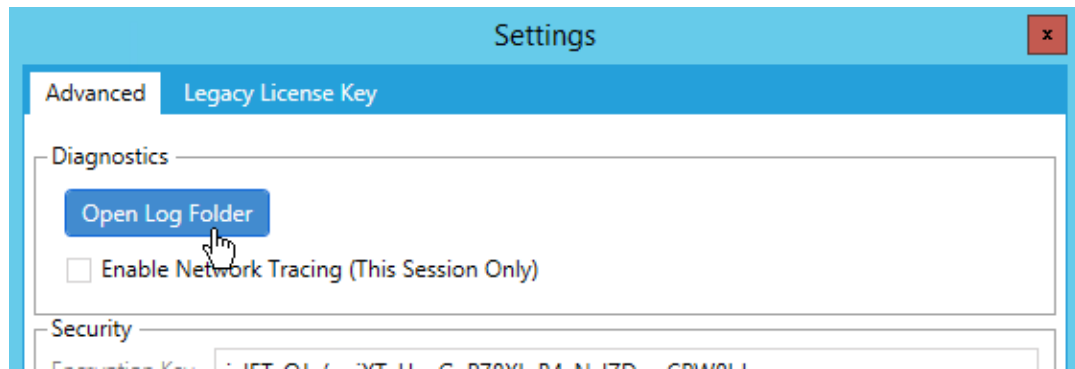
### Content Migration Tool Log File Location

To find the Content Migration Tool log files from within the Content Migration Tool:

1. Start Content Migration Tool.
2. Click **Help** and **Settings**:



3. In the **Settings** dialog, click **Open Log Folder**:



A window opens with the log files.

If you are working with Tableau Support and they ask you to send log files, zip the files up before you send them. For more information on sending log files to Tableau, see the [Tableau Knowledge Base](#).

Who can do this

Typically, the tasks listed above can only be done by a user with Administrator access on the machine.

## Activity Log

If you have Tableau Server with Advanced Management, activity log files are automatically recorded for detailed analysis and auditing. These logs are stored in the `backgrounder`, `dataserver`, `vizportal` and `vizqlserver` folders on the local hard drive, using the default path `%PROGRAMDATA%\Tableau\Tableau Server\data\tabsvc\logs\`. Within each directory, find files named `cepp-canonical-events_*.log` that record events and operations.

With the Activity Log, you can:

- View detailed event data for Tableau Server.
- Capture compliance information and keep track of who is doing what on your Tableau sites.

- Audit permissions changes including:
  - Adding or removing users from a group.
  - Moving a piece of content from one project to another.
  - Explicitly changing the permissions on a piece of content.

You can track permissions change events that are essential for implementing a robust book of controls on your Tableau environment. These controls are useful for compliance use cases.

Supplement the information provided by Admin Insights and Admin Views to track site activity and usage metrics.

All events include a timestamp and the ID of the actor that performed the event. If relevant, the ID of the piece of affected content is included with the event.

You can use tools like Splunk or Amazon Cloudwatch to examine the Activity Log. You can use these tools to query log fields and answer questions like:

- What were the 10 actions last taken by a particular user.
- Who last performed an event on a piece of content.
- What was the last action taken on a piece of content.

## Audit Permissions Using the Activity Log

Permission auditing allows system administrators to monitor which users have modified access controls to Tableau content. There are two ways to modify access control: *explicit* changes (by changing permission capabilities on a project or content item) and *effective* changes (by changing user site roles, group membership, moving content and so on). All of these changes are recorded, so administrators can certify that security and access controls are maintained.

For more information about how permission rules are evaluated, see [Effective permissions](#).

### Log format

Every action that modifies user or group access to content will get a log entry. Each log entry is structured in a JSON format, with specific keys representing different pieces of information. A log entry contains two parts:

- **Metadata:** Contains information about when and where an action occurred and what user performed the action.
- **Action:** Contains information about what piece of content had its permissions changed, what capabilities were changed and to what values the capabilities were changed.

**Note:** Activity Log records changes made through the Permissions Dialog UI and REST API. For more information about API methods, see [Permissions Methods](#).

The Activity Log entries are not formatted, and the keys are not sorted in any particular order in the logs. When auditing permissions, you can combine Activity Log data with other data sources to link IDs to names and make the events easier to interpret.

### Example

The following is an example log entry showing a group was allowed to connect to a data source.

```
{
  event: {
    actorUserId: 39872
    actorUserLuid: "4e6b42bf-9040-4e60-b326-1c56a4fb96f8"
    authorizableType: "DATASOURCE"
    capabilityId: 32
    capabilityValue: "connect"
    contentId: 2099835
    contentName: "Superstore ExtractNeal3"
    eventTime: "2023-01-31T22:44:23.650058Z"
    granteeId: 22
    granteeLuid: "dae0717a-d524-436d-b469-fadeaa22a5dd"
```

```

granteeType: "Group"
granteeValue: "GROUP_ALLOW"
initiatingUserId: 39872
initiatingUserLuid: "4e6b42bf-9040-4e60-b326-1c56a4fb96f8"
isError: false
metadata: {
    applicableToOnline: true
    applicableToServer: true
    comment: "Update Permissions"
    customerAccessible: true
    eventCategory: "security"
    eventType: "update_permissions"
    eventVersion: "1.0"
    internalAccessible: false
}
permissionType: explicit"
siteLuid: "b45e272d-10c7-49d5-9037-e53ce47dbf4e"
}
traceUuid: "3a108a2f-c0ac-4ac7-a5f8-29zf7e064ae1"
}

```

The log entry captures essential information regarding the event, including:

- `eventType` shows an update permissions event occurred
- `permissionType` shows an explicit change to permissions
- `contentId` shows the ID of the content that was modified
- `authorizableType` shows the content type, in this case, a data source
- `capabilityValue` shows the capability that was changed
- `granteeId` shows the grantee that was affected
- `actorUserId` shows the ID of the user who performed the change
- `eventTime` shows the date and time of the change



## Events

Log entries contain various event types for permission changes, such as `content_owner_change` when the content owner changes or `delete_permissions` when an explicit permission rule is deleted on content. For more information about event types, attributes and when they're recorded, see Activity Log Event Type Reference.

## Activity Log Event Type Reference

The following tables describe the Activity Log event types and attributes.

### Event type details

The following content describes each event type in Activity Log. Use the alphabetically sorted list of event types on the right, or **ctrl/cmd-f** to go directly to keywords you have in mind.

### Common attributes

The following table contains common attributes for all Activity Log events. For event-specific attributes, review the individual event tables.

Attribute Name	Type	Description
actorUserId	integer	ID of the user who performed the action that initiated the event
actorUserLuid	string	LUID of the user who performed the action that initiated the event
eventTime	string	Timestamp when the event occurred
initiatingUserId	integer	ID of the initiating user. For impersonation, it's the ID of the administrative user who initiated impersonation. For standard login, the value is the same as <code>userId</code> .
initiatingUserLuid	string	LUID of the initiating user. For impersonation, it's the LUID of the administrative user who initiated impersonation. For standard login, the value is the same as <code>userLuid</code> .

licensingRoleName	string	Name of the user's licensing role when the event occurred
serviceName	string	Name of service that initiated the event, such as viz-portal, vizqlserver or sitesaml.
siteLuid	string	LUID of the Tableau site where the event occurred
siteRoleId	integer	The user's site role ID. The value 0 = SiteAdministratorExplorer, 1 = SupportUser, 2 = Explorer-CanPublish, 3 = Explorer, 7 = Guest, 8 = Unlicensed, 9 = Viewer, 10 = Creator, and 11 = SiteAdministratorCreator.
systemAdminLevel	integer	Indicates if the user is a system administrator. The value 10 = System Admin and 0 = Not a system admin.

#### add\_delete\_user\_to\_group

The `add_delete_user_to_group` event is logged when a user is added or removed from a group.

Attribute Name	Type	Description
groupID	integer	The ID of the group
groupLuid	string	The LUID of the group
groupOperation	string	Group operation, either add or delete user to a group
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
userId	integer	The ID of the user
userLuid	string	The LUID of the user

`background_job`

The `background_job` event logs information about jobs run as background tasks. For each job, an event is created to record its various states, including initiation time, queueing, start time and success or failure.

Attribute Name	Type	Description
<code>args</code>	string	Arguments of the job
<code>duration</code>	long	Duration of the job
<code>eventInitiatedTime</code>	string	Start time of the job
<code>eventState</code>	string	State of the job
<code>isRunNow</code>	bool	Indicates whether the job was initiated manually, by clicking the 'Run Now' option on the site or using REST API, or if it was triggered by a schedule.  <b>Note:</b> Starting in April 2024, jobs triggered by a schedule ( <code>False</code> ) include data for all attributes listed in the table. Attributes for jobs initiated manually ( <code>True</code> ) are under active development and tentatively scheduled for inclusion in a future release.
<code>jobId</code>	integer	ID of the job
<code>jobLuid</code>	string	LUID of the job
<code>jobType</code>	string	Identifies the background job type associated with the event  <b>Note:</b> Starting in April 2024, only the <code>IncrementExtracts</code> , <code>RefreshExtracts</code> and <code>RefreshExtractsViaBridge</code> jobs include data for all attributes listed in the table. Attributes for other job

		types are under active development and tentatively scheduled for inclusion in a future release.
notes	string	Notes of the job
objLuid	string	Some tasks are specific to a particular workbook or data source. In such cases, the object_luid is the primary key of the relevant item, in either the workbooks or data sources tables, as indicated by obj_type.
objName	string	Name of the associated object. Used in conjunction with obj_luid, as described there.
objOwnerLuid	string	A foreign key reference to the user who owns the job target object
objOwnerName	string	Name of the user who owns the job target object
objRepositoryUrl	string	Uniquely identifies a workbook or data source and is used when referencing the object in a URL. The value is derived from the ASCII characters in the workbook or data source name.
objRevision	string	The revision number. Starts with 1.0 and increments by 0.1 with each republication.
objSize	integer	The number of bytes used in storing the job target object information
objType	string	Either a workbook or data source. Used in conjunction with obj_luid.
podName	string	Name of the Tableau pod that handled the job
projectLuid	string	A foreign key reference to the project in which the job target object exists
projectName	string	Name of the project that contains the job target object

projectOwnerEmail	string	Email address of the user who owns the project containing the job target object
projectOwnerLuid	string	A foreign key reference to the user who owns the project containing the job target object
scheduleLuid	string	Schedule LUID of the task; may be null if the job was manually started
scheduleName	string	Schedule name of the task; may be null if the job was manually started
siteId	integer	ID of the site
siteName	string	Name of the Tableau site
taskId	integer	ID of the task; may be null if the job was manually started.
taskLuid	string	LUID of the task; may be null if the job was manually started.
timeZone	integer	Time zone of the job

**content\_owner\_change**

The `content_owner_change` event is logged when the content owner changes.

Attribute Name	Type	Description
contentId	integer	The ID of the content that had the owner changed
contentLuid	string	LUID of the content that had the owner changed
contentName	string	Name of the content that had the owner changed
contentType	string	The type of content, such as data source, workbook or view
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

newOwnerId	integer	The ID of the new content owner
newOwnerLuid	string	The LUID of the new content owner
oldOwnerId	integer	The ID of the old content owner
oldOwnerLuid	string	The LUID of the old content owner

**create\_delete\_group**

The `create_delete_group` event is logged when a group is created or deleted.

Attribute Name	Type	Description
groupDomain	string	The domain of the group, such as local
groupID	integer	The ID of the group
groupLuid	string	The LUID of the group
groupName	string	The name of the group that had its permissions changed
groupOperation	string	Group operation, either create or delete
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

**create\_permissions**

The `create_permissions` event is logged when a new explicit permission rule is created.

Attribute Name	Type	Description
authorisableType	string	The type of content that had its permissions changed, such as a project or workbook
capabilityId	integer	The ID of the capability. A capability is the ability to perform actions on content, such as view, filter, download or delete

capabilityValue	string	Description of the capability
contentId	integer	The ID of the content that had the permissions updated
contentLuid	string	The LUID of the content item
contentName	string	The name of the content that had the permissions updated
granteeId	integer	The ID of the grantee
granteeLuid	string	The LUID of the grantee
granteeType	string	The type of grantee, either user or group
granteeValue	string	The updated permissions value, such as 'user allow' or 'group allow'
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

**delete\_all\_permissions**

The `delete_all_permissions` event is logged when all explicit permission rules for content are deleted, typically when content is deleted.

Attribute Name	Type	Description
authorisableType	string	The type of content that had its permissions changed, such as a project or workbook
contentId	integer	The ID of the content that had the permissions updated
contentLuid	string	The LUID of the content
contentName	string	The name of the content that had the permissions updated
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

**delete\_permissions**

The `delete_permissions` event is logged when an explicit permission rule is deleted on content.

Attribute Name	Type	Description
authorisableType	string	The type of content that had its permissions changed, such as a project or workbook
capabilityId	integer	The ID of the capability. A capability is the ability to perform actions on content, such as view, filter, download or delete
capabilityValue	string	Description of the capability
contentId	integer	The ID of the content that had the permissions updated
contentLuid	string	The LUID of the content
contentName	string	The name of the content that had the permissions updated
granteeId	integer	The ID of the grantee
granteeLuid	string	The LUID of the grantee
granteeType	string	The type of grantee, either user or group
granteeValue	string	The updated permissions value, such as 'user allow' or 'group allow'
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

**delete\_permissions\_grantee**

The `delete_permissions_grantee` event is logged when all explicit permission rules for a user are deleted, typically when the user is deleted.

Attribute Name	Type	Description
----------------	------	-------------



granteeld	integer	The ID of the grantee
granteeLuid	string	The LUID of the grantee
granteeType	string	The type of grantee, either user or group
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error

**display\_sheet\_tabs**

The `display_sheet_tabs` event is logged when the "Tabbed Views" value is updated on a workbook.

Attribute Name	Type	Description
displayTabs	boolean	Indicates whether sheets of the workbook are displayed as tabs or not
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
workbookId	integer	The ID of the workbook

**move\_content**

The `move_content` event is logged when content is moved, for example, moving a workbook between projects.

Attribute Name	Type	Description
contentId	integer	The ID of the content that had the owner changed
contentLuid	string	LUID of the content that had the owner changed
contentName	string	Name of the content that had the owner changed
contentType	string	The type of content, such as data source, workbook or view

isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
newContainerLuid	string	LUID of the new container
newContainerType	string	The new container type, such as a project
oldContainerLuid	string	LUID of the previous container
oldContainerType	string	The previous container type, such as a project

### project\_lock\_unlock

The `project_lock_unlock` event is logged when project permissions are locked or unlocked.

Attribute Name	Type	Description
controllingProjectLuid	string	LUID of the project that controls permissions for the nested project
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
projectLuid	string	LUID of the project
projectOperation	string	Project operation, either lock or unlock

### site\_storage\_usage

The `site_storage_usage` event logs the total storage capacity of the site in bytes, the amount of storage used and the percentage of the total consumed. Administrators can use this data to proactively monitor storage consumption and take action before reaching the site's storage limit.

Attribute Name	Type	Description
actorUsername	string	Username of the user who performed the action that initiated the

		event
initiatingUsername	string	Username of the initiating user
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
totalPercentageStorageQuotaUsed	float	Total percentage of storage usage
totalStorageQuotaLimit	long	Total storage capacity in bytes
totalStorageQuotaUsed	long	Total storage used in bytes

#### update\_permissions

The `update_permissions` event is logged when an explicit permission rule is updated for a content item.

Attribute Name	Type	Description
authorisableType	string	The type of content that had its permissions changed, such as a project or workbook
capabilityId	integer	The ID of the capability. A capability is the ability to perform actions on content, such as view, filter, download or delete
capabilityValue	string	Description of the capability
contentId	integer	The ID of the content that had the permissions updated
contentLuid	string	The LUID of the content
contentName	string	The name of the content that had the permissions updated
granteeId	integer	The ID of the grantee
granteeLuid	string	The LUID of the grantee

granteeType	string	The type of grantee, either user or group
granteeValue	string	The updated permissions value, such as 'user allow' or 'group allow'
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
permissionType	string	The permission type, either explicit or unspecified

### update\_permissions\_template

The `update_permissions_template` event is logged when a permission template for a project is updated.

Attribute Name	Type	Description
authorisableType	string	The type of content that had its permissions changed, such as a project or workbook
capabilityId	integer	The ID of the capability. A capability is the ability to perform actions on content, such as view, filter, download or delete
capabilityValue	string	Description of the capability
contentId	integer	The ID of the content that had the permissions updated
contentLuid	string	The LUID of the content
contentName	string	The name of the content that had the permissions updated
granteeId	integer	The ID of the grantee
granteeLuid	string	The LUID of the grantee
granteeType	string	The type of grantee, either user or group
granteeValue	string	The updated permissions value, such as 'user allow' or

		'group allow'
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
permissionType	string	The permission type, either explicit or unspecified
templateType	string	The type of permission template used to change permissions, such as workbook or data source

`user_create_delete`

The `user_create_delete` event is logged when a user is created or deleted.

Attribute Name	Type	Description
forUserName	string	The name of the user whose account was either created, updated or deleted
isError	boolean	Indicates if the audit scenario was completed successfully or failed with an error
siteRole	string	Site role of the user. Determines the maximum level of access a user can have on the site
targetUserId	integer	The ID of the user whose account was either created, updated or deleted
targetUserLuid	string	The LUID of the user whose account was either created, updated or deleted
userOperation	string	The action performed on a user, either create, delete or site role change

## Tableau Server Key Management System

Tableau Server has three Key Management System (KMS) options that allow you to enable encryption at rest. One is a local option that is available with all installations of Tableau Server.

Two additional options require Advanced Management (formerly Server Management add-on), but allow you to use a different KMS.

Beginning in version 2019.3, Tableau Server added these KMS options:

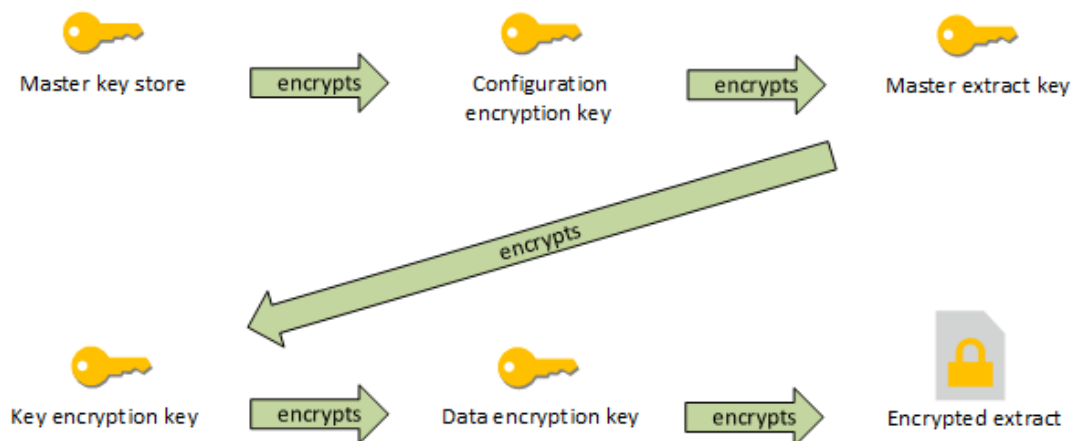
- A local KMS that is available with all installations. This is described below.
- An AWS-based KMS that comes as part of Advanced Management. For details, see [AWS Key Management System](#).

Beginning in version 2021.1, Tableau Server added another KMS option:

- An Azure-based KMS that comes as part of Advanced Management. For details, see [Azure Key Vault](#).

## Tableau Server local KMS

The Tableau Server local KMS uses the secret storage capability described in [Manage Server Secrets](#) to encrypt and store the master extract key. In this scenario, the Java keystore serves as the root of the key hierarchy. The Java keystore is installed with Tableau Server. Access to the master key is managed by native file system authorisation mechanisms by the operating system. In the default configuration, the Tableau Server local KMS is used for encrypted extracts. The key hierarchy for local KMS and encrypted extracts is illustrated here:



## Troubleshoot configuration

### Multi-node misconfiguration

In a multi-node setup for AWS KMS, the `tsm security kms status` command may report healthy (OK) status, even if another node in the cluster is misconfigured. The KMS status check only reports on the node where the Tableau Server Administration Controller process is running and does not report on the other nodes in the cluster. By default the Tableau Server Administration Controller process runs on the initial node in the cluster.

Therefore, if another node is misconfigured such that Tableau Server is unable to access the AWS CMK, those nodes may report Error states for various services, which will fail to start.

If some services fail to start after you have set KMS to the AWS mode, then run the following command to revert to local mode: `tsm security kms set-mode local`.

## Regenerate RMK and MEK on Tableau Server

To regenerate the root master key and the master encryption keys on Tableau Server, run the `tsm security regenerate-internal-tokens` command.

## AWS Key Management System

Tableau Server has three Key Management System (KMS) options that allow you to enable encryption at rest. Two of these require Advanced Management (formerly Server Management add-on), while a local one is available with all installations of Tableau Server.

Beginning in version 2019.3, Tableau Server added these KMS options:

- A local KMS that is available with all installations. For details, see Tableau Server Key Management System.
- An AWS-based KMS that comes as part of Advanced Management. This is described below.

Beginning in version 2021.1, Tableau Server added another KMS option:

- An Azure-based KMS that comes as part of Advanced Management. For details, see Azure Key Vault.

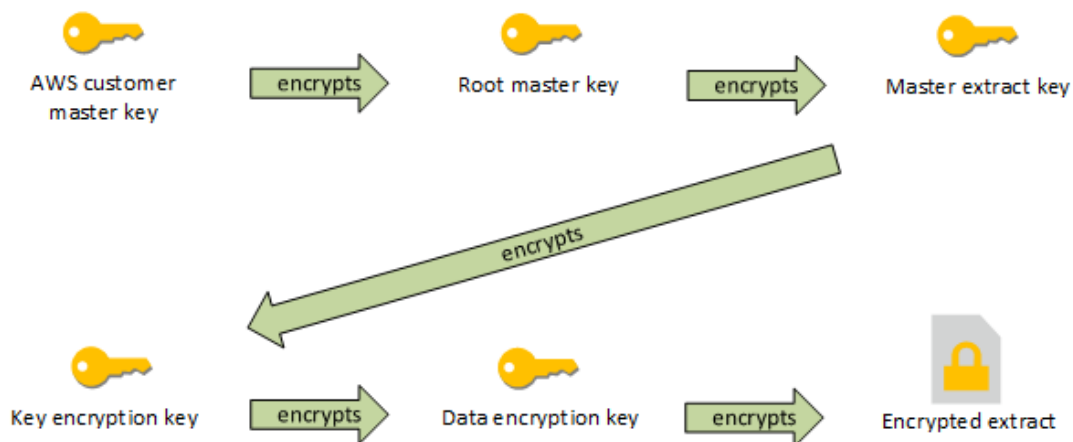
With the release of version 2019.3, Tableau Server supports the AWS key management system (KMS) as part of Advanced Management.

### AWS KMS for encryption at rest

AWS KMS is available as part of Advanced Management in Tableau Server. For more information see [About Tableau Advanced Management on Tableau Server](#).

If your organisation is deploying Data Extract Encryption at Rest, then you may optionally configure Tableau Server to use AWS as the KMS for extract encryption. To enable AWS KMS, you must deploy Tableau Server in AWS EC2. In the AWS scenario, Tableau Server uses the AWS KMS customer master key (CMK) to generate an **AWS data key**. Tableau Server uses the AWS data key as the root master key for all encrypted extracts. However, even when configured for AWS KMS, the native Java keystore and local KMS are still used for secure storage of secrets on Tableau Server. The AWS KMS is only used to encrypt the root master key for encrypted extracts.

Using AWS to encrypt the master root key provides better security properties by not storing the master key under the same permissions as the extracts.



The key hierarchy when Tableau Server is configured with AWS KMS



### Configure AWS KMS for Tableau Server encrypted extracts

To use the AWS customer master key (CMK) to encrypt the root key in the Tableau Server KMS hierarchy, you must configure Tableau Server as described in this section.

Before you begin, verify that you meet the following requirements:

- Tableau Server must be deployed in AWS EC2
- Tableau Server must be configured with a Advanced Management licence. See [About Tableau Advanced Management on Tableau Server](#).
- You must have administrative control of a customer master key (CMK) created in AWS Key Management Service

#### Step 1: Create CMK and set key policy for Tableau Server in AWS

The following procedures are performed in the AWS KMS service. References are included to AWS documentation.

1. Create the CMK that you will use for Tableau Server. See the AWS topic, [Creating Keys](#).
2. Update the server instance's IAM role.

Tableau Server needs to be able to authenticate with AWS KMS using the instance's IAM role. The role needs to have a policy attached to it. The policy should be giving the instance permissions to call the "GenerateDataKey" and "Decrypt" actions on the CMK. See [IAM Roles for Amazon EC2](#).

In a multinode deployment of Tableau Server, all nodes of the server must be running under roles that have this policy (or equivalent) attached. You can assign the same role to all nodes in the cluster.

3. At a minimum, the CMK must have a key policy where the `Effect` is set to `Allow` the `Principal` (the IAM role that is attached to the server instances) the `Action: GenerateDataKey` and `Decrypt`. See [Using Key Policies in AWS KMS](#).

#### Step 2: Collect AWS configuration parameters

You will need the full ARN string from AWS KMS. This string is in the "General configuration" section of the AWS KMS management pages. The ARN is presented in this format:

arn:aws:kms:<region>:<account>:key/<CMK\_ID>, for example, `arn:aws:kms:us-west-2:867530990073:key/1abc23de-fg45-6hij-7k89-110mn1234567`.

You will also need to specify the AWS region, which is also included in the ARN string. In the example above, the region is `us-west-2`. The region is where your KMS instance resides. In the next step, you will need to specify a region as shown in the Region column in the [Amazon API Gateway table](#).

### Step 3: Configure Tableau Server for AWS KMS

Run the following command on Tableau Server. This command will restart the server:

- `tsm security kms set-mode aws --aws-region "<region>" --key-arn "arn:aws:kms:<region>:<account_number>:key/<CMK_ID>"`

The `--key-arn` option takes a direct string copy from the ARN in the "General configuration" section of the AWS KMS management pages.

For example, if your AWS KMS instance is running in `us-west-2` region, your account number is `867530990073`, and your CMK key is `1abc23de-fg45-6hij-7k89-110mn1234567`, then the command would be as follows:

```
tsm security kms set-mode aws --aws-region "us-west-2" --key-arn "arn:aws:kms:us-west-2:867530990073:key/1abc23de-fg45-6hij-7k89-110mn1234567"
```

### Step 4: Enable encryption at rest

See Extract Encryption at Rest.

### Step 5: Validate installation

1. Run the following command:

```
tsm security kms status
```

The following information may be returned:

- The ARN (ID) of the customer master key (CMK)
- The region the CMK is in
- The ID of the root master key (RMK) in use. The RMK is a key that is encrypted by the CMK. Tableau Server decrypts the CMK by making calls to AWS KMS. The RMK is then used to encrypt/decrypt the master extract key (MEK). The RMK can change, but there will be only one at a time.
- KMS stores a collection of master extract keys (MEKs). Each MEK has:
  - An ID, for example, 8ddd70df-be67-4dbf-9c35-1f0aa2421521
  - Either a “encrypt or decrypt key” or “decrypt-only key” status. If a key is “encrypt or decrypt”, Tableau Server will encrypt new data with it. Otherwise, the key will only be used for decryption
  - A creation timestamp, for example, "Created at: 2019-05-29T23:46:54Z."
  - First transition to encrypt and decrypt: a timestamp indicating when the key became an encrypt or decrypt key.
  - Transition to decrypt-only: a timestamp indicating when the key transitioned to decrypt-only.

2. View logs after you encrypt and decrypt extracts:

- Publish extracts to your site and then encrypt them. See [Extract Encryption at Rest](#).
- Access the extracts with Tableau Desktop or with Web Authoring on a browser (this will decrypt the extracts for use).
- Search the vizqlserver\_node log files for the `AwsKmsEncryptionEnvelopeAccessor` and `AwsKmsEncryptionEnvelope` strings. The default location of the logs are at `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs`

Log entry examples that indicate successful configuration include the following:

- Decrypted the RMK with ID 1abc23de-fg45-6hij-7k89-1l0mn1234567 using the CMK with ARN `arn:aws:kms:us-west-2:867530990073:key/1234567d-a6ba-451b-adf6-3179911b760f`

- Using RMK with ID 1abc23de-fg45-6hij-7k89-1l0mn1234567 to decrypt KMS store

For publishing and extract refreshes related to KMS, search the backgrounder logs. For more information about logs, see [Tableau Server Logs and Log File Locations](#).

## Troubleshoot configuration

### Multi-node misconfiguration

In a multi-node setup for AWS KMS, the `tsm security kms status` command may report healthy (OK) status, even if another node in the cluster is misconfigured. The KMS status check only reports on the node where the Tableau Server Administration Controller process is running and does not report on the other nodes in the cluster. By default the Tableau Server Administration Controller process runs on the initial node in the cluster.

Therefore, if another node is misconfigured such that Tableau Server is unable to access the AWS CMK, those nodes may report Error states for various services, which will fail to start.

If some services fail to start after you have set KMS to the AWS mode, then run the following command to revert to local mode: `tsm security kms set-mode local`.

### Refresh AWS CMK

Refreshing the AWS CMK is a task that you perform with AWS. By default, the AWS CMK will refresh once a year. See the AWS topic, [How Automatic Key Rotation Works](#). Since the ARN and region do not change, you do not need to update the KMS configuration on Tableau Server for normal CMK refresh scenarios.

After AWS CMK refreshes, you must regenerate the internal RMK and MEKs on Tableau Server. You should also re-encrypt all extracts with the new CMK:

1. Run the `tsm security regenerate-internal-tokens` command to regenerate all internal keys on Tableau Server, including the RMK and MEKs used for extract encryption.

2. Run `tabcmd reencryptextracts <site-name>` to re-encrypt extracts on a given site. Run this command on every site where you are storing encrypted extracts. Depending on the number of encrypted extracts on the site, this operation could consume significant server processing load. Consider running this operation outside of business hours. See [Extract Encryption at Rest](#).

## Regenerate RMK and MEK on Tableau Server

To regenerate the root master key and the master encryption keys on Tableau Server, run the `tsm security regenerate-internal-tokens` command.

## Back up and restore with AWS KMS

A server backup can be taken in AWS mode with no additional configurations or procedures. The backup contains encrypted copies of the RMK and MEKs. Decrypting the keys requires access and control of the AWS CMK.

For the restore scenario, the server being restored to can be in either KMS mode, including Local. The only requirement is that the server the backup is being restored to has decrypt access to the CMK the backup itself used.

Upon restore, the MEKs from the backup are imported as decrypt-only keys. The RMK is not migrated over. A new RMK is generated as part of the installation/restore process.

## Azure Key Vault

Tableau Server has three Key Management System (KMS) options that allow you to enable encryption at rest. Two of these require Advanced Management (formerly Server Management add-on), while a local one is available with all installations of Tableau Server.

Beginning in version 2019.3, Tableau Server added these KMS options:

- A local KMS that is available with all installations. For details, see [Tableau Server Key Management System](#).
- An AWS-based KMS that comes as part of Advanced Management. For details, see [AWS Key Management System](#).

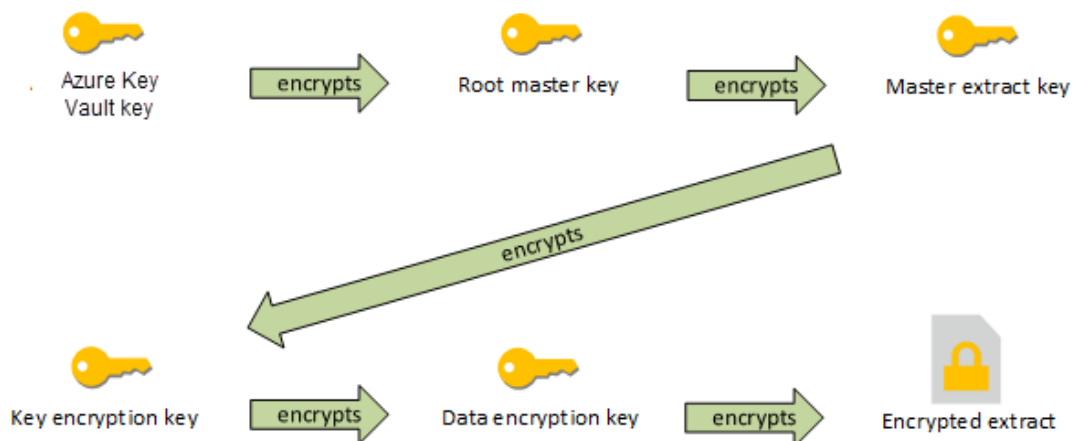
Beginning in version 2021.1, Tableau Server added another KMS option:

- An Azure-based KMS that comes as part of Advanced Management. This is described below.

### Azure Key Vault for encryption at rest

Azure Key Vault is available as part of Advanced Management to Tableau Server beginning in version 2021.1.0. For more information see [About Tableau Advanced Management on Tableau Server](#).

If your organisation is deploying Data Extract Encryption at Rest, then you may optionally configure Tableau Server to use Azure Key Vault as the KMS for extract encryption. To enable Azure Key Vault, you must deploy Tableau Server in Azure. In the Azure scenario, Tableau Server uses the Azure Key Vault to encrypt the root master key (RMK) for all encrypted extracts. However, even when configured for Azure Key Vault, the Tableau Server native Java keystore and local KMS are still used for secure storage of secrets on Tableau Server. The Azure Key Vault is only used to encrypt the root master key for encrypted extracts.



The key hierarchy when Tableau Server is configured with Azure Key Vault

### Configure Azure Key Vault for Tableau Server encrypted extracts

To use the Azure Key Vault to encrypt the root key in the Tableau Server KMS hierarchy, you must configure Tableau Server as described in this section.

Before you begin, verify that you meet the following requirements:

- Tableau Server must be deployed in Azure.
- Tableau Server must be configured with a Advanced Management licence. See [About Tableau Advanced Management on Tableau Server](#).
- You must have administrative control over the key vault in Azure where the key resides.

#### Step 1: Create a key vault and key for Tableau Server in Azure

The following procedures are performed in the Azure Key Vault service. References are included to Azure documentation.

1. Create the key vault that you will use for Tableau Server. See the Azure topic, [Create a key vault](#).
2. Create a key in the vault. See the Azure topic, [Manage keys and secrets](#).

The key must be an asymmetric, RSA type, but can be any size (Tableau Server does not care about the key size). We recommend you use the Principle of Least Privilege to have maximum security.

Tableau requires permissions to perform the GET, UNWRAP KEY and WRAP KEY commands operations and we recommend you allow access for only these operations for least privilege. Assign the access policy to the VM you are running Tableau Server on.

In a multi-node deployment of Tableau Server, the access policy must be assigned to all nodes of the server cluster.

#### Step 2: Collect Azure configuration parameters

You will need the key vault name and the key name from Azure.

#### Step 3: Configure Tableau Server for Azure Key Vault

Run the following command on Tableau Server. This command will restart the server:

- `tsm security kms set-mode azure --vault-name "<vault name>" --key-name "<key name>"`

The `--vault-name` and `--key-name` options are direct string copies from your Azure key vault.

For example, if your Azure key vault is named `tabsrv-keyvault` and your key is `tabsrv-sandbox-key01`, then the command would be as follows:

```
tsm security kms set-mode azure --vault-name "tabsrv-keyvault"
--key-name "tabsrv-sandbox-key01"
```

#### Step 4: Enable encryption at rest

See [Extract Encryption at Rest](#).

#### Step 5: Validate installation

1. Run the following command:

```
tsm security kms status
```

The following information may be returned:

- Status: OK (indicates the Key Vault is accessible by the controller node):
  - Mode: Azure Key Vault
  - Vault name: <key\_vault\_name>
  - Azure Key Vault key name: <key\_name>
  - List of available UUIDs for MEKs indicating which key is active
  - Error information if the KMS data is not accessible
2. View logs after you encrypt and decrypt extracts:
    - Publish extracts to your site and then encrypt them. See [Extract Encryption at Rest](#).
    - Access the extracts with Tableau Desktop or with Web Authoring on a browser (this will decrypt the extracts for use).



## Tableau Server on Windows Help

- Search the `vizqlserver_node` log files for the `AzureKeyVaultEnvelopeAccessor` and `AzureKeyVaultEnvelope` strings. The default location of the logs are at `C:\ProgramData\Tableau\Tableau Server\data\tabsvc\logs`

For publishing and extract refreshes related to the Azure Key Vault, search the backgrounders logs. For more information about logs, see [Tableau Server Logs and Log File Locations](#).

### Troubleshoot configuration

#### Multi-node misconfiguration

In a multi-node setup for Azure Key Vault, the `tsm security kms status` command may report healthy (OK) status, even if another node in the cluster is misconfigured. The KMS status check only reports on the node where the Tableau Server Administration Controller process is running. It does not report on the other nodes in the cluster. By default the Tableau Server Administration Controller process runs on the initial node in the cluster.

Therefore, if another node is misconfigured so that Tableau Server is unable to access the Azure key, those nodes may report Error states for various services, which will fail to start.

If some services fail to start after you have set KMS to the "azure" mode, then run the following command to revert to local mode: `tsm security kms set-mode local`.

#### Refresh Azure Key

You refresh the Azure key in Azure. There is no required or scheduled key refresh period. You can refresh your key by creating a new key version in Azure. Because the Key Vault name and Key Name do not change, you do not need to update the KMS configuration on Tableau Server for normal Azure Key refresh scenarios.

#### Back up and restore with Azure Key Vault

A server backup can be taken in Azure Key Vault mode with no additional configurations or procedures. The backup contains encrypted copies of the RMK and MEKs. Decrypting the keys requires access and control of the Azure Key Vault.

For the restore scenario, the server being restored to can be in either Azure Key Vault or Local KMS mode. The only requirement is that the server to which the backup is being restored has access to the Azure Key Vault the backup itself used.

## Tableau Server External File Store

This topic provides an overview of Tableau Server External File Store.

Tableau Server File Store stores extracts and workbook revisions. Typically, Tableau Server File Store is a built-in Tableau Server process that is installed locally on Tableau Server. Starting in Tableau Server 2020.1, you can configure Tableau Server to use an external storage to store the File Store data. The external storage must be a network share, a dedicated file storage that enables multiple users and heterogeneous client devices to retrieve data from a centralized disk capacity. This can be a Server Message Block (SMB) for Windows or a Network File System (NFS) for Linux installations. Users on a local area network (LAN) access the shared storage via a standard Ethernet connection.

With this new feature, Tableau Server can now be configured in two ways:

- Install File Store locally, meaning File Store is installed on the Tableau Server nodes.
- Use External File Store (Beginning in 2020.1).

### Why use External File Store?

Using external storage has the following key benefits over installing File Store locally:

- **Centralised location:** When File Store is installed locally, the data needs to be replicated across multiple File Store nodes, which will consume network bandwidth. Moving data to a centralised location will eliminate the need for running File Store on multiple nodes in a Tableau cluster and replication between the nodes. This reduces the disk space requirements on an individual node and also reduces the network bandwidth usage since the data will not be replicated on multiple nodes.
- **Improving backup time:** Snapshot backup technologies are efficient, and by using snapshot backup of the Tableau Data, you can expect to significantly reduce the amount of time it takes to do a Tableau backup.

## Managing External File Store

### Licence Management

To configure External File Store, you must first enable this feature using Advanced Management product keys. For more information, see [About Tableau Advanced Management on Tableau Server](#). If you don't have an Advanced Management key activated or if the licence has expired, you will see the following behaviour:

- If you try to configure Tableau Server with External File Store during installation, you will see an error message, but you will be able to continue the installation and Tableau Server File Store will be installed locally.
- If you are already using External File Store and the Advanced Management licence expires, you will see the following behaviour:
  - The server will fail on restart.
  - Backups will fail.
  - If you no longer have a valid Advanced Management licence but have a valid Tableau Server licence, you can migrate the External File Store to local File Store, to get your server up and running again. For more information on how to migrate from external repository to local repository, see [Reconfigure File Store](#).

### Supported Migration Scenarios

- Moving File Store installed locally on Tableau Server to an external managed storage (network attached storage).
- Move File Store from external managed storage to Tableau Server.

### Backup and Restore

Backup on Tableau Server with External File Store is different than how you would create backup when File Store is installed locally. For more information on how to do backup and restore on Tableau Server with External File Store, see [Backup and Restore with External File Store](#).

### Upgrade Considerations

There are no special steps necessary when upgrading Tableau Server configured with an External File Store. You can follow the normal upgrade process.

## High Availability Considerations

Tableau Server does not manage or set up high availability for the External File Store. Your managed storage may have solutions to support redundancy and high availability.

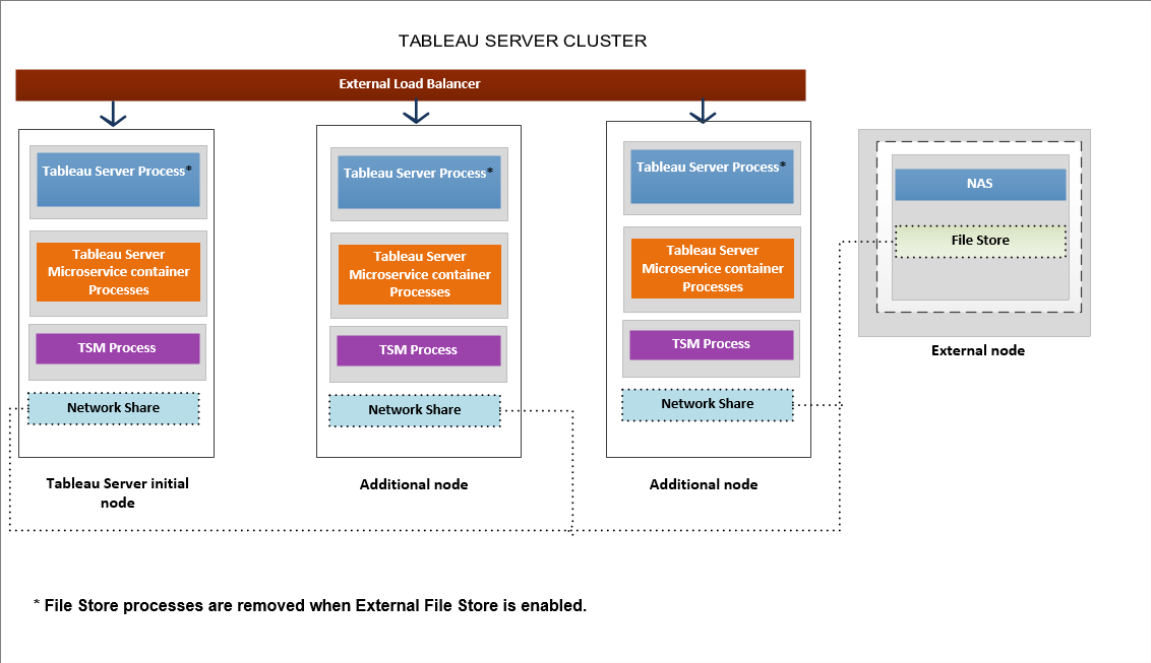
## Topology

When you configure Tableau Server with External File Store, you will no longer run File Store locally. The Server status page will indicate that the File Store process is on an external node.

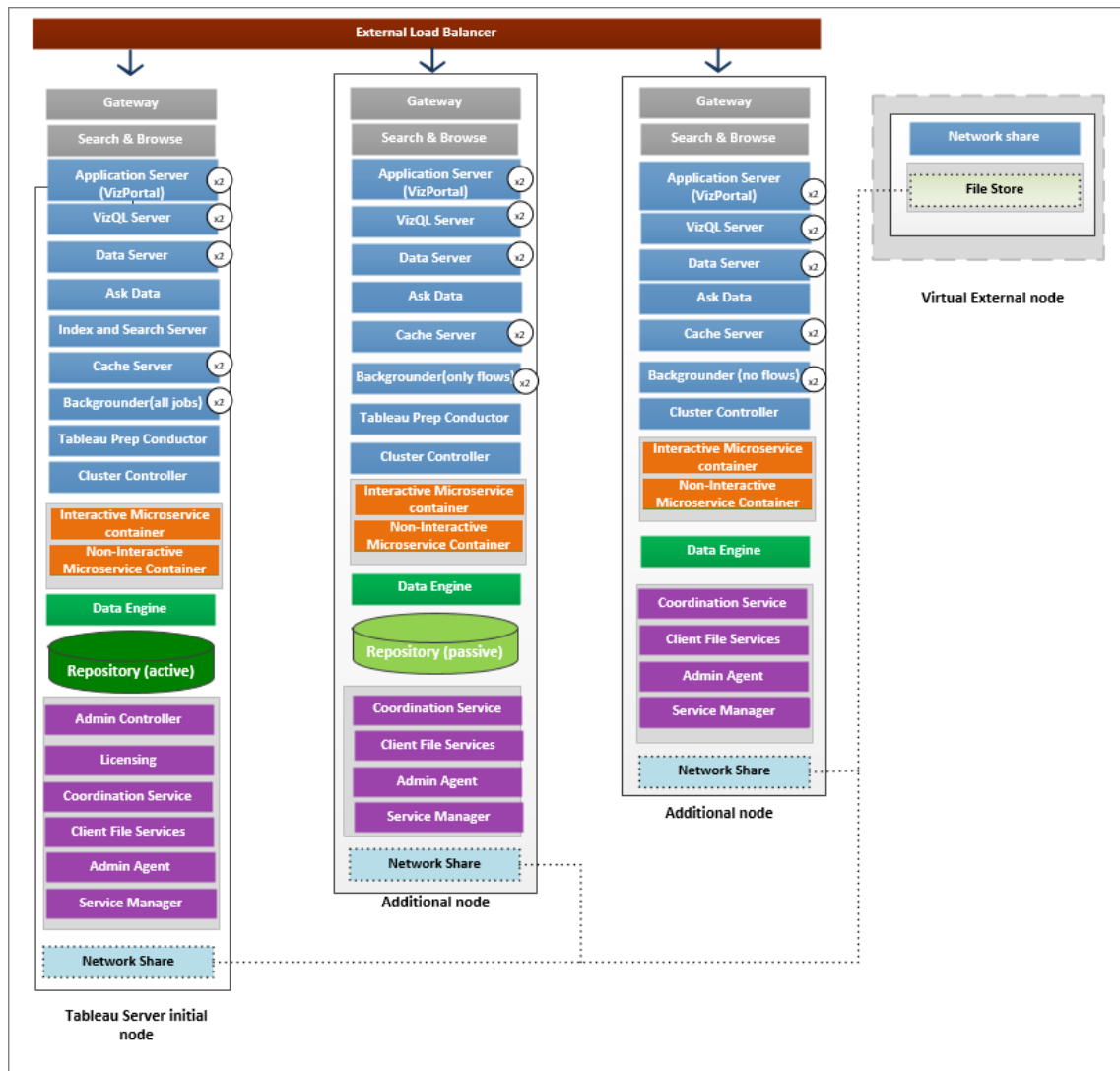
When File Store is configured external to Tableau Server, Data Engine and File Store are no longer co-located. During setup, Data Engine will continue to be automatically installed with other processes as described in Tableau Server Data Engine, except for File Store. However, when you have Tableau Server configured with External File Store, you will be able to install Data Engine on a separate node without any other processes.

When File Store is configured externally, Data Engine will access the File Store data (extracts) on the storage system across the network. To make sure that your overall system performs to your requirements, there are a few things you must consider for your network and storage system. For more information, see Performance Considerations for External File Store.

**The diagram below is a summarised version of the Tableau Server topology with External File Store.**



The diagram below is a detailed version of the Tableau Server topology with External File Store and shows all the processes installed on each node.



## Next

Install Tableau Server with External File Store

## Install Tableau Server with External File Store

This topic walks you through the process of configuring network share as your Tableau Server File Store for a new installation. If you are trying to do this on an existing installation of Tableau Server that has File Store running locally, see [Reconfigure File Store](#).

### Prerequisites

- You must use Tableau Server 2020.1 or later.
- You must have network share that you can use as your storage option. For recommendations on the storage solution, see Performance Considerations for External File Store.

Use **SMB share** for Windows installations.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the Option 2: Back up repository separately topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.
  - Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- You must have a valid Advanced Management licence activated on your server. To learn more about Advanced Management, see About Tableau Advanced Management on Tableau Server.

## Install Tableau Server with External File Store

You can install Tableau Server with File Store using a network share to store Tableau Server data. This solution replaces the need for running the File Store process locally. To learn more about this solution and its benefits, see [Tableau Server External File Store](#).

Use the following steps to install your Tableau Server with External File Store during install:

### Step 1: Configure a network share

On your file server:

1. Create and share a directory to use as the Tableau Server External File Store.
2. Make sure the network share is accessible as a directory in the same location on all the Tableau Server nodes.
3. Create the tableau directory in your network share and give full access to the **Network Service** and the domain user account that are you planning to use for the **Run As** user

We recommend calling the directory '**tableau**'.

```
\\hostname\<network share>\tableau\
```

#### Note:

- The Network Service account can be used to access resources on remote computers within the same Active Directory domain, but we recommend that you configure a domain account for **Run As** service account to use in this scenario. For more information, see [Run As Service Account](#).

- Services that run as the Network Service account access network resources by using the credentials of the computer account in the format `<domain_name>\<-computer_name>$`.

If you are using Active Directory to manage permissions and access to users, here is a recommended way to manage the permissions to your network share:

- Create an Active Directory security group.



- Add the computer accounts for the Tableau cluster along with the **Run-As user** to this group.
- Grant access to the security group on the network share. This way if you need to add or remove a computer from the cluster, you can just make the change to the security group.

4. **Validate that the network share is configured properly:** From Tableau Server run a command to write to a network share and confirm that you are able to write to it.

## Step 2: Download and install TSM

1. Download the Tableau Server installer.
2. Open a command prompt as a user with administrator access to the computer where you want to install Tableau Server.
3. Run the Setup program from the command line using the /SILENT and /ACCEPTTEULA options:

```
tableau-setup-tsm-<branch>.<build>-x64.exe/SILENT/ACCEPTTEULA
```

**Note:** There are a number of different installation options you can specify during CLI installation, for example, to change installation and logging paths, or to specify the TSM controller port. For a complete list of switches that you can specify during CLI installation, see [Install Switches and Properties for Tableau Server](#).

## Step 3: Activate and register Tableau Server

Provide the Tableau Server Key and the Advanced Management key in the activate step. You will need to run the following command twice, first with the Tableau Server product key and then with the Advanced Management product key:

```
tsm licenses activate -k <product key>
```

#### Step 4. Enable External File Store

Configuring Tableau Server with external repository can only be done using TSM CLI.

1. Enable the network storage feature using the following tsm commands:

```
tsm topology external-services storage enable --network-share  
\\hostname\<network share>\tableau\
```

The setup program automatically creates the following directory structure in the share:

#### PostgreSQL data backups:

```
tableau_data\tabsvc\pg_backups
```

**Note:** This directory will be created the first time you create a backup.

#### Extracts and workbook revisions:

```
tableau_data\tabsvc\dataengine\extracts
```

```
tableau_data\tabsvc\dataengine\revisions
```

#### Step 5: Configure the initial node settings

Follow the instructions provided in the Configure Initial Node Settings topic.

#### Step 6: Complete the install

You must create the initial administrative account for Tableau Server.

- If you configured a local identity store during setup, then specify a name and password that you want to use.
- If you configured a LDAP or Active Directory identity store during setup, then you must specify a user account that is a member of the directory.

To create the initial user, run the following tabcmd command:

## Tableau Server on Windows Help

```
tabcmd initialuser --server localhost:80 --username '<new-admin-user-name>'
```

After you run the command, the shell will prompt for an administrative password.

### Step 7: Post-installation tasks

After you have created the Tableau Server administrator account, continue your deployment by working through the configuration steps described in the Post Installation Tasks topics.

#### Who can do this

Tableau Server Administrators can install and configure Tableau Server and External File Store. In addition, you must have permissions and access to configure the network share to use with Tableau Server.

#### Next

### Backup and Restore with External File Store

## Reconfigure File Store

Your Tableau Server may be configured with a locally running File Store or an External File Store. This topic describes the steps needed to reconfigure your existing Tableau Server:

- [Reconfigure your Tableau Server to use External File Store](#). This will move your File Store to a network share.
- [Reconfigure your Tableau Server to run File Store locally](#). This will move your File Store from the external storage to your Tableau Server.
- [Configure your Tableau Server to use a different storage](#). An example of this might be when your current network share is at the end of life and you need to use a new network share with new hardware.

## Reconfigure Tableau Server with External File Store

### Prerequisites

- Tableau Server should be version 2020.1 or later.
- You must have a network share to use as the external storage.

Use **SMB shares** for Windows installations.

Storage and network considerations: See Performance Considerations for External File Store.

Estimating the storage size: You must take into account the amount of storage needed for publishing and refreshing extracts. In addition, you must also take into account the repository backup size unless you specifically choose the option to do your repository backup separately as described in the Option 2: Back up repository separately topic.

- Extracts:
  - Consider the number of extracts that will be published to Tableau Server and the size of each extract. Test your needs by publishing several extracts to Tableau Server and then checking the disk space used. You can use this amount of disk space to help you figure out how many extracts will be published to Tableau Server over time as well as how each existing extract will increase in size.
  - Consider the space needed by the temp directory during an extract refresh. The temp directory, which is where an extract is stored to during a refresh, may require up to three times the final file size of the extract.
- Repository Backup:
  - To obtain an estimate of the repository data, check the size of `<data directory>/pgsql/data/base` directory.
  - To obtain the exact size of the repository data, open the backup file and use the size of the `workgroup.pg_dump` file.
- Tableau Server should have a valid and activated Advanced Management licence.

## Tableau Server on Windows Help

### Step 1: Upgrade Tableau Server

Upgrade your Tableau Server to 2020.1 or later: Upgrading from 2018.2 and Later (Windows) .

If your Tableau Server is already on version 2020.1 or later, you can skip this step.

### Step 2: Activate the Advanced Management licence

1. View Server Licences to make sure you have a Advanced Management licence activated on your Tableau Server.
2. If you don't have a Advanced Management on your Tableau Server, use the following tsm command to activate the licence. Provide the Advanced Management key as your product key:

```
tsm licenses activate -k <product key>
```

### Step 3: Configure File Store to use an external storage

After completing the upgrade and verifying the licences, configure Tableau Server with External File Store. This will move any existing data from your local File Store to the external storage of your choice.

1. Configure a network share. On the File Server:
  - Create and share a directory to host the files
  - On all the Tableau Server nodes, map the network share or use a UNC path.
2. Create a tableau directory in your network share and give full access to **Network Service** account. We recommend calling the directory **tableau**.

#### Note:

- The Network Service account can be used to access resources on remote computers within the same Active Directory domain, but we recommend that you configure a domain account for **Run As** service account to use in this scenario. For more information, see Run As Service Account.
- Services that run as the Network Service account access network resources by

using the credentials of the computer account in the format `<domain_name>\<computer_name>$`.

If you are using Active Directory to manage permissions and access to users, here is a recommended way to manage the permissions to your network share:

- Create an Active Directory security group.
- Add the computer accounts for the Tableau cluster along with the **Run-As user** to this group.
- Grant access to the security group on the network share. This way if you need to add or remove a computer from the cluster, you can just make the change to the security group.

3. Enable the network share feature using the following tsm commands:

```
tsm topology external-services storage enable --network-share
\\hostname\<network share>\tableau\
```

The setup program automatically creates the following directory structure and will move the data from the local File Store to the external storage. The local File Stores will be automatically decommissioned during this process.

#### **Extracts and workbook revisions:**

*tableau\_data tabsvc/dataengine/extracts*

*tableau\_data/tabsvc/dataengine/revisions*

#### **PostgreSQL data backups:**

*tableau\_data/tabsvc/pg\_backups*

**Note:** This directory will be created the first time you create a backup.

## Reconfigure Tableau Server to use local File Store

1. Stop Tableau Server by running the following command:

```
tsm stop
```

2. Run the following command to move the File Store data from the external storage to Tableau Server:

```
tsm topology external-services storage disable -fsn <node1,  
node2>
```

3. Start Tableau Server by running the following command:

```
tsm start
```

For a Tableau Server cluster, specify the nodes where File Store should be installed. The data is copied to the first node specified in the command and then replicated to the other nodes.

**Note:** When moving File Store from external to local, make sure Data Engine process is not installed by itself on a separate node and is installed along with one of the core services which include File Store, Application Server (VizPortal), VizQL Server, Data Server and Backgrounder.

Typically, when you install Tableau Server Data Engine installation happens automatically and is installed on the nodes that have one or more of the core services. However, when you configure Tableau Server to use external storage, you will have the ability to manually install Data Engine on a node on its own without co-locating with the core processes.

If you currently have a Data Engine process installed on a separate node, you can either choose to install File Store on that node or remove Data Engine from that node, before running the disable command. If you install File Store on a node that currently does not have Data Engine installed, Data Engine will be added automatically.

If you have a Data Engine only node when you run the disable command, it will result in an error.

### Configure Tableau Server to use a different external storage

1. Configure the new network share. On the File Server:
  1. Create and share a directory to host the files.
  2. On all the Tableau Server nodes, map the network share or use a UNC path.
2. Create a tableau directory in your network share and give full access to **Network Service** account. We recommend calling the directory **tableau**.
3. Stop Tableau Server by running the following command:

```
tsm stop
```

4. Run the following command to configure Tableau Server to use the new network share:

```
tsm topology external-services storage switch-share --network-share \\<newshare>\tableau
```

5. Start Tableau Server by running the following command:

```
tsm start
```

### Who can do this

Tableau Server Administrators can move File Store locations. In addition, you will need access to the external storage that is used for the External File Store.



## Backup and Restore with External File Store

When you have External File Store enabled on your Tableau Server, you cannot use the `tsm maintenance backup` command to do a backup of the Tableau Server repository and File Store Data. Instead, use a "snapshot" backup process to create a point-in-time snapshot of your network share.

- Tableau Server configured with External File Store
- Tableau Server configured with External File Store and External Repository

Backup strategies:

The backup strategy you use depends on your recovery plan. The snapshot backup process may not be sufficient by itself as it only creates a backup of the File Store (and repository data if requested), and there are other configurations and settings that you may need in order to do a full recovery.

**Important:** We strongly recommend disabling scheduled tasks before you perform an upgrade. This includes all updates to data content and should be done before you create your pre-upgrade backup. This may involve disabling jobs that are triggered outside of Tableau Server, such as those initiated through REST API-based extract refreshes or using `tabcmd`.

Here are some scenarios that illustrate when the snapshot backup process may or may not be enough:

- **Standby Tableau Server** – If you maintain a standby Tableau Server to use if your production Server is down, creating a snapshot backup and restoring it to your standby server on a regular schedule may be sufficient. Your backup schedule should be based on your recovery point objective.
- **New Tableau Server, existing configuration not needed** – If you plan to use a new Tableau Server installation in case of a disaster but don't necessarily need to use the configurations and settings from your existing Tableau Server installation, you can install a fresh instance of Tableau Server and use the snapshot to restore your data.

- **New Tableau Server, existing configuration needed** – If you plan to use a new Tableau Server installation that includes your existing configurations and settings as well as your backed-up data, you need additional files along with the snapshot backup. To do a full backup including all the configurations and settings, follow these instructions:
  1. Export topology and configuration data. This exports most of the Tableau Server configuration and topology. For more information, see [Perform a Full Backup and Restore of Tableau Server](#).
  2. Create a network share snapshot of the File Store (and repository data, if desired) as described in the [Backup and Restore with External File Store](#) section of this topic.
  3. Document the settings that are not included in the export. These include values for system user accounts, coordination service deployment configuration and customised settings. For more information, see [Perform a Full Backup and Restore of Tableau Server](#).

#### Tableau Server configured with External File Store

When you have Tableau Server configured with an External File Store, your backup process needs to include creating a point-in-time snapshot backup of the network share with the External File Store. The following procedure describes how to do this.

**Note:** If you have both an External File Store and an external repository, see [Tableau Server configured with External File Store and External Repository](#).

#### Creating a snapshot backup

Use the following steps to create a snapshot backup:

1. Prepare for the snapshot backup.

Run the following command to create a repository backup file and temporarily copy it to the network share. Tableau Server continues to operate normally during the snapshot prepare process. To ensure a consistent snapshot, the internal process that deletes

unused extracts will be paused. This process will resume once you complete the backup process described in a later step.

```
tsm maintenance snapshot-backup prepare
```

You should see the following message when the prepare step is complete: **Preparation for snapshot backup succeeded.**

Confirm that the repository backup file was created on the network share.

**Note:** The prepare step creates a backup file of the repository and KMS and Asset keys. If you are using a cloud solution for your encryption key solution, you will need access to the CMK used to decrypt the keys which is necessary for restore. For more information on encryption key solution with AWS, see [AWS Key Management System](#). For more information on encryption key solution with Azure, see [Azure Key Vault](#).

2. Create a snapshot of your network share.

Use the appropriate process to create a snapshot of your network share. The snapshot is a read-only version of the share, taken at a particular point in time. This will include your File Store data, along with the repository backup file that was temporarily copied to the share in the previous step. The steps you take to create this network share snapshot depend on your network. See your networking documentation for details.

3. Complete the snapshot backup process.

Run the following command to complete the backup process and restart the paused internal processes. This removes the temporary repository backup file that was copied to your network share.

```
tsm maintenance snapshot-backup complete
```

Confirm that the temporary repository backup file was removed from the network share.

## Restoring a snapshot backup

These steps apply to both single-node and multi-node Tableau Server installations.

1. Stop Tableau Server.

At the command prompt, run the following command:

```
tsm stop
```

2. Restore your File Store data by restoring your network share snapshot to your network.  
Your specific steps will depend on your network.
3. Restore the repository data.

Use the following command to restore the repository data:

```
tsm maintenance snapshot-backup restore
```

**Note:** If you are using a cloud solution for your encryption key solution, make sure the server where the backup is being restored has decrypt access to the cloud instance where the CMK is deployed.

4. Restart Tableau Server.

At a command prompt, run the following command:

```
tsm start
```

## Tableau Server configured with External File Store and External Repository

When you have Tableau Server configured with both an External File Store and an external repository, there are special steps you need to take to create a backup. These include creating a point-in-time snapshot backup of the network share with the External File Store and may include separately backing up your external repository. The following procedure describes how to do this.

**Note:** If you have an External File Store but are using the default repository, see Tableau Server configured with External File Store.

## Backing up the repository

When you have both an External File Store and an external repository, you have two options for backing up the repository data. There are reasons why you might choose each of these:

- Include the repository backup with the network share snapshot:

Ease of management. You do not have to do a separate backup of the repository, and the backup is in sync with the File Store data.

- Back up the repository independently:

Doing a backup of an External Repository separately can be faster, especially if you are using a cloud solution that allows for snapshot backups of the instance. The size of the backup file can significantly impact the time it takes to prepare for a network share snapshot.

### Option 1: Include repository backup with network share snapshot

## Create a snapshot backup

1. Prepare for the snapshot backup.

Run the following command to create a repository backup file and temporarily copy it to the network share. Tableau Server continues to operate normally during the snapshot prepare process. To ensure a consistent snapshot, the internal process that deletes unused extracts will be paused. This process will resume once you complete the backup process described in a later step.

```
tsm maintenance snapshot-backup prepare --include-pg-backup
```

**Note:** Starting in 2021.1, if you have both External File Store and External Repository enabled, you *must* use the `--include-pg-backup` option to create the repository backup. If you are upgrading from a version earlier than 2021.1 and you have scripts to run or schedule your backups and want to continue to include the repository backup, add the `--include-pg-backup` option in the prepare command as shown above. For versions prior to 2021.1, you do not need the option; the repository backup is automatically included.

You should see the following message when the prepare step is complete: **Preparation for snapshot backup succeeded.**

Confirm that the repository backup file was created on the network share.

**Note:** The prepare step creates a backup of the repository and KMS and Asset keys. If you are using a cloud solution for your encryption key solution, you will need access to the CMK used to decrypt the keys which is necessary for restore. For more information on encryption key solution with AWS, see [AWS Key Management System](#). For more information on encryption key solution with Azure, see [Azure Key Vault](#).

2. Create a snapshot of your network share.

Use the appropriate process to create a snapshot of your network share. The snapshot is a read-only version of the share, taken at a particular point in time. This will include your File Store data, along with the repository backup file that was temporarily copied to the share in the previous step. The steps you take to create this network share snapshot depend on your network. See your networking documentation for details.

3. Complete the snapshot backup process.

Run the following command to complete the backup process and restart the paused internal processes. This also removes the temporary repository backup file that was copied to your network share.

```
tsm maintenance snapshot-backup complete
```

### Restoring a snapshot backup

These steps apply to both single-node and multi-node Tableau Server installations.

**Important:** If you perform Blue/Green upgrades or manually upgrade Tableau Server 2021.4 (or earlier) using the **tsm maintenance (backup and restore)** method, you must enable `legacy-identity-mode` before you can restore to Tableau Server 2022.1 (or later). For more information, see [Troubleshoot Issues with the Identity Migration](#).

1. Stop Tableau Server.

At the command prompt, run the following command:

```
tsm stop
```

2. Restore your File Store data by restoring your network share snapshot to your network. Your specific steps will depend on your network.
3. Restore the repository data.

Use the following command to restore the repository data:

```
tsm maintenance snapshot-backup restore
```

**Note:** If you are using a cloud solution for your encryption key solution, make sure the server where the backup is being restored has decrypt access to the cloud instance where the CMK is deployed.

4. Restart Tableau Server.

At a command prompt, run the following command:

```
tsm start
```

#### Option 2: Back up repository separately

This option is recommended only when the host platform for the External Repository allows you to do snapshot backup. If you are using Azure as your host platform, we recommend using Option 1.

### Create snapshot backups

1. Prepare for the snapshot backup.

Run the following command to create a repository backup file and temporarily copy it to the network share. Tableau Server continues to operate normally during the snapshot prepare process. To ensure a consistent snapshot, the internal process that deletes unused extracts will be paused. This process will resume once you complete the backup process described in a later step.

```
tsm maintenance snapshot-backup prepare
```

You should see the following message when the prepare step is complete: **Preparation for snapshot backup succeeded.**

**Note:** The prepare step creates a backup of the KMS and Asset keys. If you are using a cloud solution for your encryption key solution, you will need access to the CMK used to decrypt the keys which is necessary for restore. For more information on encryption key solution with AWS, see [AWS Key Management System](#). For more information on encryption key solution with Azure, see [Azure Key Vault](#).

2. Create a snapshot of your network share.



Use the appropriate process to create a snapshot of your network share. The snapshot is a read-only version of the share, taken at a particular point in time. This will include your File Store data. The steps you take to create this network share snapshot depend on your network. See your networking documentation for details.

3. Create a backup of the repository: Use the backup technology of platform where you are hosting your external repository to create a backup.

**Important:** The snapshot of the network share and the Repository backup must be completed within 3 hours and 30 minutes after completing the Prepare step (step 1). This is to make sure that the File Store and the Repository backups are in sync and to allow the restore to work properly.

For more information on creating a snapshot of AWS DB instance, see [Creating a DB snapshot](#).

For more information on creating a backup of Azure DB instance, see [Backup and Restore on Flexible Server](#) (PostgreSQL 12 and later) or [Backup and Restore on Single Server](#) (PostgreSQL 11 or earlier).

**Note:** If you are using a cloud solution for your encryption key solution, make sure the server where the backup is being restored has decrypt access to cloud instance where CMK is deployed.

4. Complete the snapshot backup process.

Run the following command to complete the backup process and restart the paused internal processes.

```
tsm maintenance snapshot-backup complete
```

## Restoring a snapshot backup

These steps apply to both single-node and multi-node Tableau Server installations.

1. Use the database backup of your External Repository. If you are using a cloud platform to host your Repository, this generally requires that you create a new database instance into which you restore the backup.

For detailed instructions on creating a new instance, see the option for your hosting solution in [Install External Repository](#).

2. Use the instructions in Step 1 of the Install Tableau Server with External PostgreSQL Repository topic to create a configuration file for the new instance.
3. Stop Tableau Server.

At the command prompt, run the following command:

```
tsm stop
```

4. If the restoration of the external repository requires a new database instance, use the following command to point Tableau Server to the new database instance:

```
tsm topology external-services repository replace-host -f <file-name>.json -c <ssl certificate file>.pem
```

The `.json` file is the configuration file you created in Step 2. The certificate file is the SSL certificate you downloaded from the new database instance.

5. Restore your File Store data by restoring your network share snapshot to your network. Your specific steps will depend on your network.

**Note:** Some technologies require you to create a new network share when doing a restore. If this applies to your network attached storage, you can do your restore **before** stopping the Tableau Server. If you are restoring the File Store data to a new network share, you must configure Tableau Server to use the new network share. For more information, see [Configure Tableau Server to use a different external storage](#).

6. Run the following command to restore the KMS and Asset keys:

```
tsm maintenance snapshot-backup restore
```

**Note:** If you are using a cloud solution for your encryption key solution, make sure the server where the backup is being restored has decrypt access to cloud instance where CMK is deployed.

7. Run the following command to restart Tableau Server:

```
tsm start
```

#### Who can do this

Tableau Server Administrators can backup and restore Tableau Server. In addition you must have permission to access and perform snapshot backups on the external storage.

## Performance Considerations for External File Store

This topic lists the factors you must consider when you have External File Store to make sure you have optimal performance.

In this scenario where File Store is configured external to Tableau Server, you are storing the extracts on a network share. This means that Tableau Server will be accessing this data across the network. To ensure optimal performance, we recommend the following:

- Use Enterprise grade storage system to ensure reliability and high data access performance.
- The storage system supports enough read IOPS:
  - Use Solid State Drives. If using spinning disks is the only option, use the fastest and as many as possible.
- The network infrastructure supports the following:
  - At least 10 GB Ethernet to support high speed data transfers between Tableau Server and the storage system.

- No more than 10 millisecond storage latency between Tableau Server and the storage system.

The above recommendations are based on testing done by the Tableau team. Your requirements and performance may vary. We highly recommend that you create your own benchmarks to assess the performance and determine resource requirements.

When creating benchmarks, consider overall performance of Tableau Server with workbook load times as one of the key metrics. This is especially relevant to this configuration since External File Store mostly impacts extract based workbooks.

You can use [Tabjolt](#) to do your benchmarks.

Who can do this

Tableau Server Administrators monitor Tableau Server performance. However, there are network, hardware and storage considerations that might either need access to make configuration changes to these resources. You may also choose to work with your network administrator to make any changes if you don't have access to these resources.

## Tableau Server External Repository

The Tableau Server Repository is a PostgreSQL database that stores data about all user interactions, extract refreshes and more.

The repository can be installed locally on the same nodes as the Tableau Server or installed externally:

**Local repository:** The PostgreSQL Database is installed and deployed locally, meaning it is deployed along with Tableau Server.

**External repository:** The PostgreSQL Database is deployed externally. The external repository can be installed on Amazon RDS, Azure Database, Google Cloud or as a stand-alone installation.

For more information about what Tableau Server Repository is in general, see:

- [Workgroups Database](#)
- Collect Data with the Tableau Server Repository

The supported hosts for the external repository are:

- Amazon RDS - Beginning in version 2019.3
- Azure Database - Beginning in version 2020.4
- Stand-alone PostgreSQL Instance - Beginning in version 2021.2
- Google Cloud SQL for PostgreSQL Instance - Beginning in version 2021.4

This topic is an overview of the Tableau Server external repository.

## External Repository Considerations

Both Amazon RDS and Azure Database offer better scalability, reliability, high availability and security built-in for PostgreSQL. By integrating more closely with these cloud offerings, you will be able to take advantage of these additional benefits.

If you are setting up a stand-alone PostgreSQL instance, you must set up and manage high availability and scale as needed.

### Cloud Platform

When using a cloud platform to host your external repository, you have the option of running PostgreSQL instances on hosted infrastructure and managing them yourself or choosing the fully managed service option.

- **Self-managed:** Setting up and managing PostgreSQL instances on hosted infrastructure yourself. For example, if you are using AWS as your cloud platform, you can use EC2 instances to run, manage and maintain PostgreSQL instances.
- **Fully managed:** Select a fully managed service. For example, if you are using AWS as your cloud platform, you can use the RDS option to host your external repository.

One of the key considerations when making a choice between self-managed and fully managed is that in a self-managed option you have the most control but with it comes the responsibility of maintaining the VMs and many database administrative tasks. A fully managed option offers ease of setup, configuration management and maintenance.

Here is a more comprehensive list of things to consider when choosing between the two:

- Setup and maintenance requirements.
- High availability and disaster recovery options
- Performance, Scalability and Monitoring capabilities
- Security maintenance
- Operational costs, service costs, personnel costs.

Here is an example of how the two options can be compared for Azure on the Microsoft site:

[Choose the right PostgreSQL server option in Azure](#),

## Requirements

- Your Tableau Server must be using the following versions:

- 2019.3 or later to use with AWS
- 2020.4 or later to use with Azure.

For the right version of PostgreSQL to use, see [Azure Database for PostgreSQL Flexible Server](#).

- 2021.2 or later to use with stand-alone PostgreSQL instance. (Can be used for on-premises, Azure VM or AWS EC2 installations).
- 2021.4 or later to use with Google Cloud for both PostgreSQL instance or a stand-alone PostgreSQL on Google Cloud VM.
- Your Tableau Server must have the Advanced Management keys activated.
- Depending on where you are planning to host the External Repository, you will need to be familiar with one of the following:
  - Amazon RDS Database setup and management.
  - Azure Database setup and management.
  - PostgreSQL database setup and management as a stand-alone installation.
  - Google Cloud PostgreSQL instance setup and management

## Versioning

You must be running the correct version of PostgreSQL for standalone Tableau Server repository. The following table shows Tableau Server version compatibility.

**Note:** The maximum compatibility version for any Tableau Server version is the minimum major version or any minor update to that. For example, if the PostgreSQL minimum compatible version is 13.4, the maximum compatible version is 13.x where <x> is equal or higher than 4.

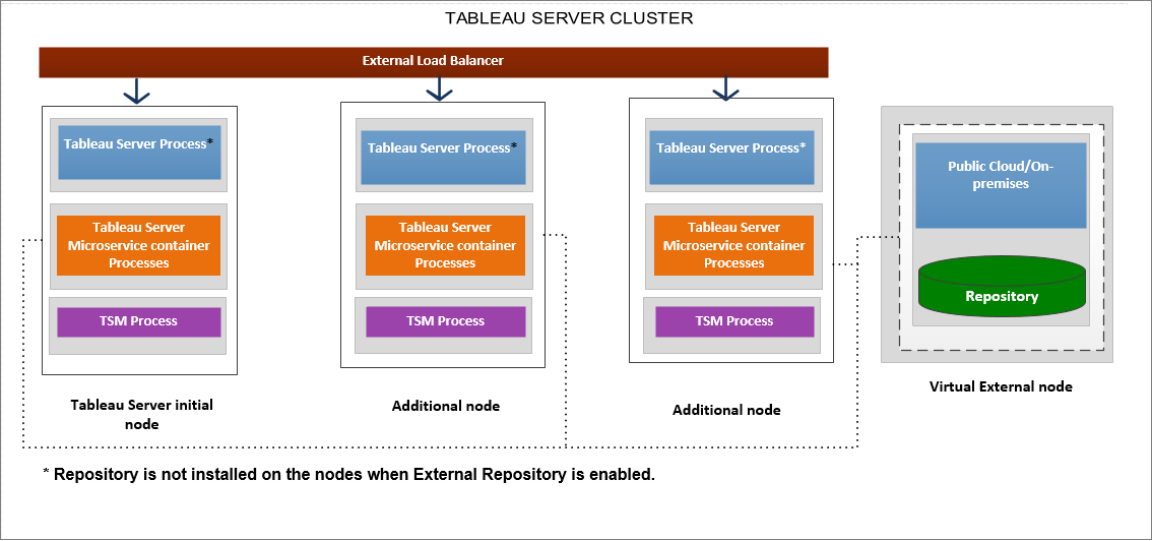
Tableau Server versions	PostgreSQL minimum compatible versions
2021.2.3 - 2021.2.8	12.6
2021.3.0 - 2021.3.7	
2021.4.0 - 2021.4.3	
2021.2.10 - 2021.2.14	12.8
2021.3.8 - 2021.3.13	
2021.4.4 - 2021.4.8	
2021.2.15 - 2021.2.16	12.10
2021.3.14 - 2021.3.15	
2021.4.9 - 2021.4.10	
2021.2.17 - 2021.2.18	12.11
2021.3.16 - 2021.3.17	
2021.4.11 - 2021.4.12	
2021.3.26	12.15

2021.4.23	
2022.1.0	13.3
2022.1.1 - 2022.1.3	13.4
2022.1.4 - 2022.1.6	13.6
2022.1.7 - 2022.1.16	13.7
2022.3.0 - 2022.3.7	
2023.1.0 - 2023.1.4	
2022.1.17 - 2022.1.19	13.11
2022.3.8 - 2022.3.11	
2023.1.5 - 2023.1.7	
2023.3.0 - 2023.3.3	

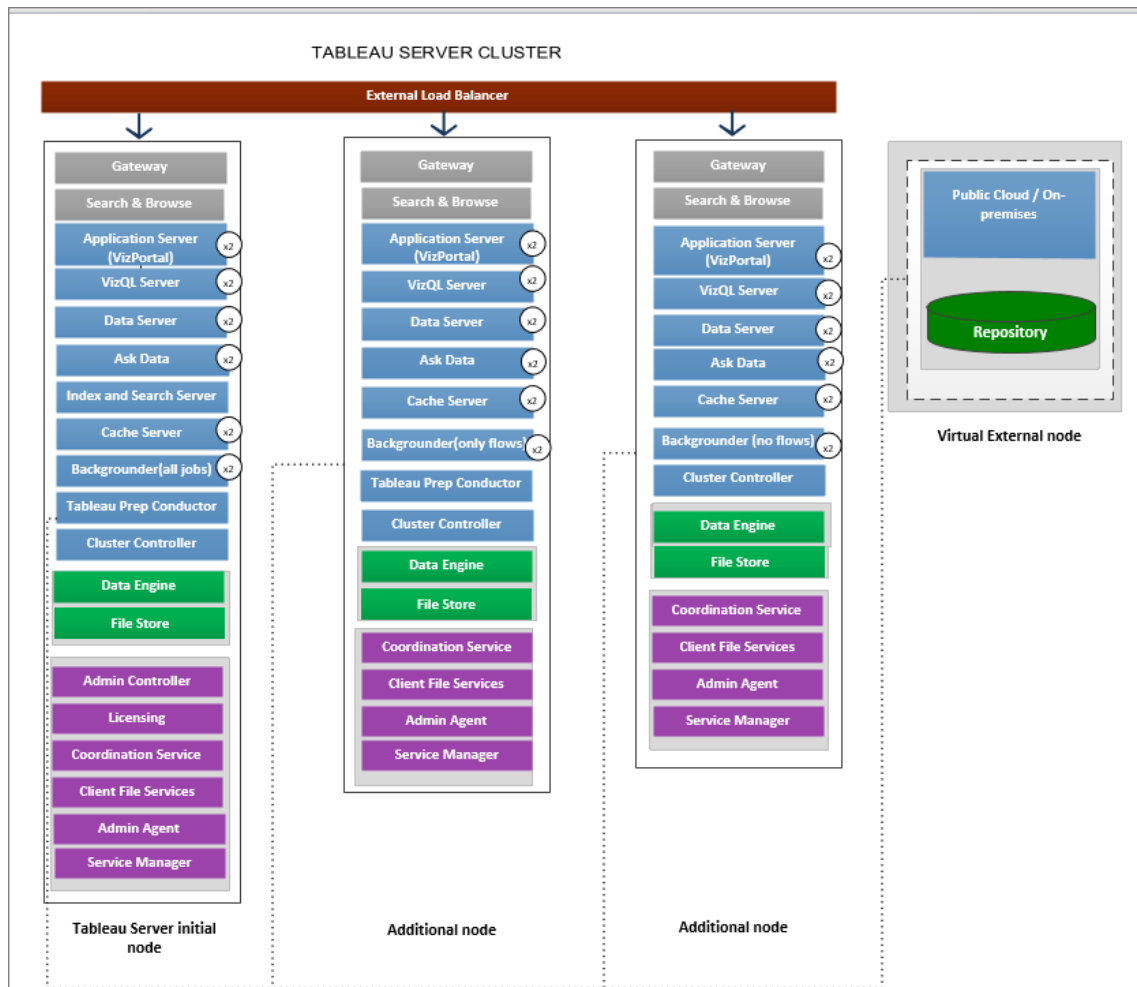
## Topology

The diagram below is a summarised version of the Tableau Server topology with External Repository.





The diagram below is a detailed version of the Tableau Server topology with External Repository and shows all the processes installed on each node.



## Managing the External Repository

### Licence Management

To enable this feature, you must first activate the Advanced Management product keys on Tableau Server. For more information, see [About Tableau Advanced Management on Tableau Server](#). If you don't have the Advanced Management keys activated or if the licences is expired, you will see the following behaviour:

- If you try to configure Tableau Server to use external repository during installation, you will see an error message, but you will be able to continue the installation and Tableau

Server Repository will be installed locally. For single server installations, the repository is installed on the same machine as Tableau Server. For multi-node installations, the repository is installed on one of the nodes of your Tableau Server cluster.

- If you are already using an external Tableau Server Repository on your Tableau Server installation, and the Advanced Management licence expires, the server will fail on restart. If you no longer have a valid Advanced Management licence, but have a valid Tableau Server licence, you will still be able to create a backup. You can also migrate the external repository to local repository which does not require the Advanced Management licence, to get your server up and running again. For more information on how to migrate from external repository to local repository, see Re-Configure Tableau Server Repository.

### Supported Migration Scenarios

- Moving your repository from local to external.
- Moving your repository from external to local.

### Backup and Restore

#### **If you have only External Repository configured:**

The backup and restore process remains is the same for both local and external repository and as described in the Back up Tableau Server Data topic.

- The backup and restore commands work in the same manner for both local and external repository. Backup in the case where Tableau Server uses external repository requires more disk space for backup, so you should keep that in mind when configuring your disk space.
- The default and other supported locations for storing the backup file are the same whether it the repository is local or external.

The following exceptions apply to Tableau Servers using external repository:

- Any custom user accounts that are created in the external Tableau Server repository will be included in the restore, but the passwords for the custom user accounts will not be. The passwords will have to be reconfigured after restore is complete. Custom user accounts are PostgreSQL database user accounts, used by SQL or other database client software to connect to the PostgreSQL database.

**Note:** These custom accounts will be disabled as a security measure, but this can be reconfigured.

- Configuration and topology should not be included in the backup. For more information on how to export configuration and topology settings, see [Perform a Full Backup and Restore of Tableau Server](#).

#### **If you have both External Repository and External File Store configured:**

You have a couple of options if you have both External Repository and External File Store configured for your Tableau Server. These options allow you to take advantage of the snapshot backup capabilities of the cloud platforms you might be using to host the External Repository and File Store. For more information, and detailed step by step instructions, see [Backup and Restore with External File Store](#).

#### SSL Connections

You have the option to require or not require TLS/SSL connections from Tableau Server to the External Repository.

If you do not need to use encrypted connections, you must configure the External Repository to allow unencrypted connections, and use the `--no-ssl` option when you configure the External Repository for Tableau Server. For more information, see `tsm topology external-services repository enable`.

If you want to enable or disable SSL at a later time, post installation, use the [tsm security repository-ssl enable](#) or [tsm security repository-ssl disable](#). This option is available starting in 2021.4.

### Updating the SSL Certificate

If as part of a planned expiry of the SSL certificate of the RDS or Azure Database, Google Cloud PostgreSQL instance or a stand-alone PostgreSQL instance you need to update the instance with the new certificate file, you will also need to update Tableau Server settings to use the new certificate file. You can do this by downloading the latest file and running the *tsm topology external-services repository replace-host* command and providing the new certificate file.

### High Availability Considerations

Tableau Server does not manage or set up high availability for the external repository.

- **AWS:** Amazon RDS offers features that can be used to provide high availability and manage failover. For more information, see [Amazon RDS High Availability](#).
- **Azure:** Azure offers features that can be used to provide high availability and manage failover. For more information, see [Azure Database High Availability](#).
- **Google Cloud:** Google Cloud offers features that can be used to provide high availability and manage failover. For more information, see [Google Cloud High Availability](#).
- **Stand-alone PostgreSQL instance:** PostgreSQL offers several features that can be used to provide high availability and manage failover. For more information, see [PostgreSQL High Availability](#).

### Upgrade considerations

This applies only if you are using the External Repository configuration with Tableau Server.

If you are using an External Repository, you may need to take additional steps when upgrading:

- **No version change** – If there is no version change in PostgreSQL, there are no special actions required.
- **Minor version change** – If there is a minor version change in PostgreSQL, you need to upgrade your external repository before upgrading Tableau Server. In most cases, there

are in-place methods for doing so. The method you use depends on the location of your repository and is beyond the scope of this documentation.

- **Major version change** – If there is a major version change in PostgreSQL, you need to follow the steps described in [Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL](#).

Steps include:

1. Creating a new instance of PostgreSQL DB. For more information, see:
  - [Create a PostgreSQL DB Instance on AWS Relational Database Service \(RDS\)](#)
  - [Create an Azure Database PostgreSQL Instance on Azure](#)
  - [Create a Cloud SQL for PostgreSQL instance on Google Cloud](#)
  - [Create a PostgreSQL Database as a Stand-Alone Installation](#)
2. Creating a configuration file and downloading the SSL certificate file for the new instance that you created in Step 1.

During upgrade, you will need to point Tableau Server to the new instance using the configuration file. The upgrade process will migrate the content from your current external repository to your new instance. For more details, see [Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL](#).

## Monitoring the Status of the Repository

TSM status page will show the Tableau Server external service as an additional node for your Tableau Server installation.

Tableau Server on Windows Help

+ tableau		
STATUS MAINTENANCE CONFIGURATION		
Process	node1	external
Gateway	<input checked="" type="checkbox"/>	
Application Server	<input checked="" type="checkbox"/>	
Interactive Microservice Container	<input checked="" type="checkbox"/>	
VizQL Server	<input checked="" type="checkbox"/>	
Cache Server	<input checked="" type="checkbox"/>	
Cluster Controller	<input checked="" type="checkbox"/>	
Search & Browse	<input checked="" type="checkbox"/>	
Backgrounder	<input checked="" type="checkbox"/>	
Non-interactive Microservice Container	<input checked="" type="checkbox"/>	
Data Server	<input checked="" type="checkbox"/>	
Data Engine	<input checked="" type="checkbox"/>	
File Store	<input checked="" type="checkbox"/>	
Repository		<input checked="" type="checkbox"/>
Tableau Prep Conductor		
Ask Data	<input checked="" type="checkbox"/>	
Elastic Server	<input checked="" type="checkbox"/>	
TSM Controller	<input checked="" type="checkbox"/>	
License Server	<input checked="" type="checkbox"/>	
Refresh Status		

The topology tab indicates whether there are Tableau Server external services configured:

Topology

Security

User Identity & Access

Notifications

Data Access

Email

Licensing

All Settings

Topology

Configure and improve Tableau Server performance by adding or removing nodes and changing process configurations and other settings. [Learn more](#)

External Services

The following services are set to external and will not be present in the nodes. [Learn more](#)

Repository

node1

process2

Gateway☒

Application Server1

Interactive Microservic...1

VizQL Server1

Cache Server1

Cluster Controller☒

Search & Browse☒

Backgrounder1

Non-interactive Micros...1

Data Server1

Data Engine☒

File Store☒

Repository

Tableau Prep Conductor☐

Ask Data☒

Elastic Server☒

TSM Controller☒

License Server☒

Remove Node

Add a Node

Step 1

Download the node bootstrap configuration file and locate your Tableau Server installer. The same installer can be used to install multiple nodes. Having trouble finding the installer?

Download Bootstrap File

Step 2

Run the node installer on the new node, and when prompted, provide the configuration file.

Tableau Services Manager will detect the new node and display it on the Topology page.

Learn more about adding, removing, and managing nodes in Tableau Services Manager

## Getting Logs

Tableau Server logs will not include logs from the external repository. Use the following ways to get the logs specific to your instance:

- **AWS:** For information on setting up logging for your Amazon RDS PostgreSQL instance, see [PostgreSQL Database Log Files](#).
- **Azure:** For information on setting up logging for your Azure Database for PostgreSQL instance, see [Logs in Azure Database for PostgreSQL](#).
- **Google Cloud:** For information on how to view and query logs for your PostgreSQL instance, see [Cloud SQL logging](#).
- **Stand alone PostgreSQL Instance:** For information on setting up logging for your stand-alone PostgreSQL instance, see [Error Reporting and Logging](#).

## Next Steps

- You can use one of the following to create a PostgreSQL database instance:
  - Create a PostgreSQL DB Instance on AWS Relational Database Service (RDS)
  - Create an Azure Database PostgreSQL Instance on Azure
  - Create a PostgreSQL Instance on Google Cloud
  - Create a PostgreSQL Database as a Stand-Alone Installation
- Install Tableau Server with External PostgreSQL Repository
- Re-Configure Tableau Server Repository
  - Migrate from local to external
  - Migrate from external to local

## Create a PostgreSQL DB Instance on AWS Relational Database Service (RDS)

Beginning in version 2019.3, you can host your External Repository on the AWS Cloud Platform. This topic describes how to create a AWS RDS PostgreSQL DB instance to use as your Tableau Server external repository.



To see a full list of hosts that you can use for the your external repository, see [Tableau Server External Repository](#).

### Requirements and Recommendations

- At a minimum, use an instance with 8vCPUs and 32 GB RAM. This is the minimum recommended AWS RDS instance size to use for Tableau Server external repository, but the exact requirements will vary with your requirements and usage. We recommend using 16 vCPUs and 128 GB RAM Amazon RDS memory optimised instance types for good performance.

You can start with a smaller instance type and if you find later that you need a larger instance type, you can upgrade your existing RDS instance. For more information, see [Upgrading your RDS Instance](#).

Secure communication between Tableau Server and the external PostgreSQL DB instance using SSL connections is **not** required but recommended.

- The PostgreSQL DB instance must be reachable by all nodes in the Tableau Server cluster. One of the ways you can do this is by making the PostgreSQL DB instance a member of a security group that has the necessary permissions to be accessed by all the nodes in the Tableau Server cluster.
- The version of PostgreSQL should match the version used by Tableau Server when installed locally. Tableau Server 2020.4 uses PostgreSQL version 12.
- Tableau auto-generates passwords for internal use by internal database users. These passwords are 32 characters long and consist of lower-case letters and numbers. They cannot be accessed or configured by an admin. Your external PostgreSQL instance may allow you to set a password policy (this will depend on the platform you are using). If you specify a policy that includes character types other than numbers and lower-case letters, this can cause errors while configuring Tableau Server to use the external repository.

## Create a PostgreSQL DB instance on Amazon RDS

### Step 1: Create a parameter group

PostgreSQL parameters that you set for a local PostgreSQL instance in the *postgresql.conf* file are maintained in the DB parameter group for your DB instance. When you create a DB instance, the parameters in the associated DB parameter group are loaded.

From the Tableau Server perspective, most of the parameters can be set to defaults. You can modify the parameter values if you have specific performance or logging requirements, but we strongly recommend that the following parameters be left to default values and not be changed:

- `standard_conforming_strings`
- `escape_string_warning`

We also recommend the value for the `work_mem` be set to at least 16384 to help avoid performance issues.

For more information and a full list of PostgreSQL Parameters, see [Working with PostgreSQL Parameters](#) on the AWS site.

### Step 2: Create a PostgreSQL DB instance on Amazon RDS

To create a new PostgreSQL DB instance, follow the instructions provided on the [Amazon documentation site](#).

Following are configuration options and the recommended values for the new PostgreSQL DB instance:

- **Instance Specifications**
  - Use the parameter group created in **Step 1**.
  - Use the compatible version of PostgreSQL for the version of Tableau Server you are using. For a full list of PostgreSQL versions compatible with Tableau Server versions, see Product Compatibility.
  - Use DB instance class that is db.m4.2xlarge or larger.
  - Allocate at least 100 GB of storage.

- Storage type and Provisioned IOPS: leave default (recommendations may change depending on load testing).

- **Settings**

- You **must** use **rails** as the master username.

**This is a requirement for the external repository to work properly with Tableau Server.**

- Pick a password that meets AWS's requirements.

- **Network and Security**

- Make sure that the RDS instance can be reached by all the Tableau Server nodes. This most often involves creating a security group that allows access from the nodes.

- **Database Options**

- Don't create an initial database. The Database name should be left blank, as Tableau Server will create the needed databases in the RDS instance.
- The port can be anything, but we recommend leaving it as the default 5432.
- Set the DB Parameter Group to the one created in **Step 1**.
- Leave the IAM DB authentication as disabled.

- **Encryption**

- You can choose whether or not you want encryption.

- **Backup**

- This is for AWS's automated backups, not Tableau Server's backups. You can specify the settings that meets the requirements.

- **Monitoring**

- You can specify the settings based on your requirements.
- **Log Exports**
  - You can specify the settings based on your requirements.
- **Maintenance**
  - Disable auto minor version upgrade. Tableau Server is built to use a specific version of PostgreSQL, and you will be prompted to upgrade the PostgreSQL version if needed, during Tableau Server Upgrade.
- **Delete Protection**
  - You can specify the settings based on your requirements.

### Step 3: Get the PostgreSQL DB Instance Endpoint

After creating the PostgreSQL database instance, you can't use it until it's completed initialisation by AWS and this can take several minutes. Once the instance is ready, get the endpoint information that you will use to configure Tableau Server to use this instance for the Tableau Server Repository.

### Step 4: Download the SSL certificate file (.pem file)

Secure connections between Tableau Server and the External Repository using SSL is **not** required, but recommended.

If you want to set up secure connections between Tableau Server and the External Repository, you will need the .pem file when you configure Tableau Server to use the external DB instance for your Tableau Server Repository. For more information, see [Using SSL to Encrypt the Connection to a DB Instance](#).

If you do not need to use secure connections between Tableau Server and External Repository, you need to configure the RDS instance to allow unencrypted connections.

**Important:** If as part of a planned expiration of the SSL certificate of the RDS instance, you need to update your RDS instance with the new certificate file, you also need to update

## Tableau Server on Windows Help

Tableau Server settings to use the new certificate file. You can do this by downloading the latest file and running the `tsm topology external-services repository replace-host` command and providing the new certificate file.

### Configuring High Availability for your PostgreSQL DB

Tableau Server does not manage or set up high availability for the external repository. Amazon RDS offers high availability features that can be used to provide high availability, manage fail-over, etc. For more information, see [Amazon RDS High Availability](#).

### Disaster Recovery for your PostgreSQL DB

In the event of a disaster, you may need to setup a new RDS instance. There are other scenarios where you may need to recover from an issue with the RDS instance. For example, when you upgrade your Tableau Server, you might also need to upgrade the PostgreSQL version on your RDS instance. In the event that your PostgreSQL upgrade is not successful you might have to use a new RDS instance. In such scenarios, to configure your Tableau Server to use the new RDS instance, use the following steps:

1. **Restore the snapshot to a new RDS instance.** AWS does not support restoring a snapshot to an existing RDS instance. For more on RDS snapshot backup and restore, see [Amazon RDS Backup and Restore](#).
2. **Create a new JSON settings file** containing connection information for the new RDS instance. For more information on creating a JSON settings file, see **Step 1** in [Install Tableau Server with External PostgreSQL Repository](#).
3. **Use the `tsm topology external-services repository replace-host` command** to point your Tableau Server to the new RDS instance.

For more information on the `tsm topology external-services repository replace-host` command, see [tsm topology](#).

### Who can do this

Only Tableau Server Administrators can configure Tableau Server to use the external repository. You will also need an AWS account to create a RDS instance.

## Next Steps

For new installations: Install Tableau Server with External PostgreSQL Repository

If you want to configure your existing Tableau Server to use an external repository, see [Re-Configure Tableau Server Repository](#).

## Create an Azure Database PostgreSQL Instance on Azure

Beginning in version 2020.4, you can host your External Repository on the Azure Cloud Platform. This topic describes how to create a Azure Database for PostgreSQL instance to use as your Tableau Server external repository.

### Requirements and Recommendations

- We recommend that you use 8 vCore memory optimised server with 50 GB of storage for Tableau Server external repository, but the exact requirements will vary with your requirements and usage. If you already have a Tableau Server, review the usage of your existing repository to determine your storage needs.

You can also scale your resources if you find that you need more. For more information, see [Scaling your PostgreSQL Azure Database resources](#).

- Secure communications between Tableau Server and the external PostgreSQL DB instance using SSL is recommended, but not a requirement.

If you do not want to use secure connections between Tableau Server and External Repository, you should configure the Azure Database to allow unencrypted connections.

- The PostgreSQL DB instance must be reachable by all nodes in the Tableau Server cluster. The database instance must be set up to allow connections from all the Tableau Server nodes. There are two ways to set this up:
  - This is most secure way: Configure Azure Database for PostgreSQL instance to only allow private access via the Virtual Network service endpoint. For more

information, see [Use Virtual Network service endpoints and rules for Azure Database for PostgreSQL](#) and [Create and Manage VNet service endpoints](#).

You may also want to review the [overview topic](#) on Azure virtual networks.

- Alternatively, Azure Database for PostgreSQL can be configured to allow connections from a range of public IP addresses. This method exposes the Azure Database endpoint to public access on the Internet.
- When setting up the Azure Database instance, we recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg** or **azure**. The username also cannot be **rails**, **tbladmin**, **tableau**, **readonly** or **tbladminviews**.
- The version of PostgreSQL should match the version used by Tableau Server when installed locally. Tableau Server 2020.4 uses PostgreSQL version 12.
- Tableau auto-generates passwords for internal use by internal database users. These passwords are 32 characters long and consist of lower-case letters and numbers. They cannot be accessed or configured by an admin. Your external PostgreSQL instance may allow you to set a password policy (this will depend on the platform you are using). If you specify a policy that includes character types other than numbers and lower-case letters, this can cause errors while configuring Tableau Server to use the external repository.

### Create a Database PostgreSQL instance on Azure

#### Step 1: Create a delegated subnet for the Azure Database for PostgreSQL instance

This step is a prerequisite for setting up private access for your networking option when you create the instance. Setting up private access to the database is a must for secure communications. This lets the virtual machines created anywhere in that Virtual Network connect to the database instance, but none outside of the Virtual Network are able to do so.

On the same virtual network where you are currently hosting your Tableau Server, create a new delegated subnet for the Azure Database instance. For more information on setting up

private access see [Networking Options for Azure Database for PostgreSQL - Flexible Server](#) on the Azure website.

## Step 2: Create an Azure Database for PostgreSQL instance

To create a new Azure Database for PostgreSQL, follow the instructions provided on the [Azure documentation site](#).

Following are configuration options and the recommended values for the new PostgreSQL DB instance:

- **Server Details**

- Specify None as the Data source to create a new server.
- For Admin username, we recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg** or **azure**. The username also cannot be **rails**, **tbl-wgadmin**, **tableau**, **readonly** or **tbladminviews**.
- Pick a password that meets Azure's requirements.
- Use the compatible version of PostgreSQL for the version of Tableau Server you are using. For a full list of PostgreSQL versions compatible with Tableau Server versions, see Product Compatibility.
- Allocate at least 512GB of storage.

- **Compute and Storage**

- At a minimum, use Flexible Server with General Purpose computer tier, and Standard\_D8s\_v3 (8 vCores, 32 GB RAM) compute size.

- **Network Options**

- Select Private Access (Virtual Network). This ensures private and secure communications for the database.

- **High availability**

- Enable the high availability option per your requirements.

- **Backup**



## Tableau Server on Windows Help

- Set the retention period as per your requirements. This is for Azure automated backups, not Tableau Server's backups. You can specify the settings that meets the requirements.

### Step 3: Configure a server-level firewall rule

Once the database is created, configure a server-level firewall rule to allow access to the Tableau Server nodes.

Make sure that the Database instance can be reached by all the Tableau Server nodes using the dedicated subnet described in Step 1.

### Step 4: Configure the Azure Database for PostgreSQL Instance.

From the Tableau Server perspective, most of the parameter values for the instance can be set to defaults. You can modify the parameter values if you have specific performance or logging requirements, but we strongly recommend that the following parameters be left to default values and not be changed:

- `standard_conforming_strings`
- `escape_string_warning`

We also recommend the value for the `work_mem` be set to at least 16384 to help avoid performance issues.

For information on how to configure server parameters, see this [Azure documentation](#).

### Step 5: Get the PostgreSQL DB Instance Endpoint

Once the instance is ready, get the endpoint information that you will use to configure Tableau Server to use this instance for the Tableau Server Repository.

### Step 6: Download the SSL certificate file

Secure communications between Tableau Server and the External Repository using SSL is **not** required but recommended.

If you want to set up secure connections between Tableau Server and the External Repository, download the certificate file. You will need this certificate file when you configure Tableau Server to use this external repository. For more information, see [Configure TLS connectivity for Azure Database for PostgreSQL](#).

If you do not need to use secure connections between Tableau Server and External Repository, configure the Azure Database instance to allow unencrypted connections.

### Configuring High Availability for your PostgreSQL DB

Tableau Server does not manage or set up high availability for the external repository. Azure offers high availability features that can be used to provide high availability. For more information, see [Azure Database High Availability](#).

### Disaster Recovery for your PostgreSQL DB

In the event of a disaster, you may need to set up a new Azure Database for PostgreSQL instance. There are other scenarios where you may need to recover from an issue with the database instance. In such scenarios, to configure your Tableau Server to use the new Azure Database instance, use the following steps:

1. **Restore the backup to a new Azure Database instance.** In Azure Database for PostgreSQL, performing a restore creates a new server from the original server's backups. For more on Azure Database for PostgreSQL backup and restore, see [Azure Database for PostgreSQL Backup and Restore](#).
2. **Create a new JSON settings file** containing connection information for the new Azure Database for PostgreSQL instance. For more information on creating a JSON settings file, see **Step 1** in [Install Tableau Server with External PostgreSQL Repository](#).
3. **Use the `tsm topology external-services repository replace-host command`** to point your Tableau Server to the new Azure Database for PostgreSQL instance.

For more information on the `tsm topology external-services repository replace-host` command, see [tsm topology](#).

Who can do this

Only Tableau Server Administrators can configure Tableau Server to use the external repository. You will also need an Azure account to create the Azure Database.

Next Steps

For new installations: [Install Tableau Server with External PostgreSQL Repository](#)

If you want to configure your existing Tableau Server to use an external repository, see [Re-Configure Tableau Server Repository](#).

## Create a PostgreSQL Instance on Google Cloud

Beginning in version 2021.4, you can host Tableau Server External Repository on the Google Cloud Platform. This topic describes how to create a PostgreSQL instance on Google Cloud to use as your Tableau Server external repository.

To see a full list of hosts that you can use for your external repository, see [Tableau Server External Repository](#).

Requirements and Recommendations

- At a minimum, use high-memory machine type with 8vCPUs and 32 GB RAM. This is the minimum recommended PostgreSQL instance size to use for Tableau Server external repository, but the exact requirements will vary with your requirements and usage. We recommend high-memory instance type with 16 vCPUs and 128 GB RAM for good performance in most scenarios.
- Secure communication between Tableau Server and the external PostgreSQL DB instance using SSL connections is not required but is recommended.

- The PostgreSQL instance must be reachable by all nodes in the Tableau Server cluster. One of the ways you can do this is by making the PostgreSQL instance a member of a security group that has the necessary permissions to be accessed by all the nodes in the Tableau Server cluster.
- The version of PostgreSQL must be a supported version. For more information, see Product Compatibility for supported version information.
- Tableau auto-generates passwords for internal use by internal database users. These passwords are 32 characters long and consist of lower-case letters and numbers. They cannot be accessed or configured by an admin. Your external PostgreSQL instance may allow you to set a password policy (this will depend on the platform you are using). If you specify a policy that includes character types other than numbers and lower-case letters, this can cause errors while configuring Tableau Server to use the external repository.

### Create a Database PostgreSQL instance on Google Cloud

#### Step 1: Create a new PostgreSQL instance

Create a PostgreSQL instance using the directions provided on the Google website, [here](#).

We recommend using a high-memory machine type, with 16 vCPUs, and 128 GB RAM.

#### Step 2: Configure database flags for your PostgreSQL instance

From the Tableau Server perspective, most of the parameter values for the instance can be set to defaults. You can modify the parameter values if you have specific performance or logging requirements, but we strongly recommend that the following parameters be left to default values and not be changed:

- `standard_conforming_strings`
- `escape_string_warning`

We also recommend the value for the `work_mem` be set to at least 16384 to help avoid performance issues.

For more information on database flags, see [this topic](#) on the Google website.

### Step 3: Get the PostgreSQL DB Instance Endpoint

Once the instance is ready, get the endpoint information that you will use to configure Tableau Server to use this instance for the Tableau Server Repository.

### Step 4: Download the SSL certificate file

Secure communications between Tableau Server and the External Repository using SSL is not required but is recommended.

To set up secure connections between Tableau Server and the External Repository, you must use the certificate file when you configure Tableau Server to use this external repository. For more information, see [Configuring SSL/TLS certificates](#) on the Google website.

### Configuring High Availability for your PostgreSQL DB

Tableau Server does not manage or set up high availability for the external repository. Google Cloud offers high availability features that can be used to provide high availability. For more information, see [Enable High Availability on an Instance](#) on the Google website.

### Disaster Recovery for your PostgreSQL DB

In the event of a disaster, you may need to set up a new PostgreSQL Database for the PostgreSQL instance. There are other scenarios where you may need to recover from an issue with the database instance. In such scenarios, to configure your Tableau Server to use the new PostgreSQL instance, use the following steps:

1. **Restore the backup to a new PostgreSQL instance.** In the Google Cloud platform, you can choose to either restore to the same instance or create a new instance. For more information, see [Restoring an instance](#) on the Google website.

We recommend you create a new instance and do the following steps to recover.

2. If this is a new instance, **Create a new JSON settings file** containing connection information for the new Azure Database for PostgreSQL instance. For more information

on creating a JSON settings file, see **Step 1** in [Install Tableau Server with External PostgreSQL Repository](#).

3. **Use the `tsm topology external-services repository replace-host` command** to point your Tableau Server to the new Azure Database for PostgreSQL instance.

For more information on the `tsm topology external-services repository replace-host` command, see [tsm topology](#).

#### Who can do this

Only Tableau Server Administrators can configure Tableau Server to use the external repository. You will also need a Google Cloud account to create the PostgreSQL database instance.

#### Next Steps

For new installations: [Install Tableau Server with External PostgreSQL Repository](#)

If you want to configure your existing Tableau Server to use an external repository, see [Re-Configure Tableau Server Repository](#).

## Create a PostgreSQL Database as a Stand-Alone Installation

Beginning in version 2021.2, you can host the Tableau Server repository separately as a stand-alone installation. This is different to using a managed cloud service such as AWS RDS, or Azure Database. This configuration can be done on-premises, on AWS EC2 or on an Azure VM. Such an installation of the Tableau Server Repository will be referred to as stand-alone External Repository.

To see a full list of hosts that you can use for the your external repository, see [Tableau Server External Repository](#).

This topic provides guidance on the requirements and configurations that are necessary for Tableau Server to connect to a PostgreSQL installation and use it as the Tableau Server External Repository. This topic does not provide you with the detailed instructions on how to

install PostgreSQL. We recommend that you follow the [documentation on the PostgreSQL site](#) for this information.

### Requirements and Recommendations

- **Hardware Recommendations:** CPU and storage depend on your requirements. For smaller installations, you should have at least 50 GB of disk storage and a quad processor (or 4 virtual cores) system with 32 gig of RAM. Review the guidance in [this topic](#) to calculate the disk space requirements for backup and restore. The general recommendation is to start with more hardware resources and scale back after monitoring.
- **Networking:** The PostgreSQL database instance must be reachable from all nodes in the Tableau Server cluster. One of the ways you can do this is by making the PostgreSQL database instance a member of a security group that has the necessary permissions to be accessed by all the nodes in the Tableau Server cluster.
- **Version Compatibility:** The version of PostgreSQL should match the version of the Tableau Server Repository when installed locally. For more information about compatibility, see Product Compatibility.
- **Security:** Secure connections between Tableau Server and the External Repository using SSL are **not** required, but recommended.

But if you do not want to set up secure connections between Tableau Server and External Repository, you should configure the stand-alone PostgreSQL Database to allow unencrypted connections.

### Create a stand-alone PostgreSQL Database Instance

#### Step 1: Install and initialise PostgreSQL

1. Use the [PostgreSQL documentation](#) to install PostgreSQL database instance to serve as the External Repository for Tableau Server. You may want to set up a PostgreSQL database cluster to meet any high availability requirements you may have.
2. Install the contrib package that includes the uuid-oss extension. This module is used to

generate the UUIDS that Tableau Server uses for keys in the database.

### 3. Initialise the PostgreSQL instance.

#### Step 1: Configure your PostgreSQL Instance

You will be using two configuration files to configure your PostgreSQL instance:

- `pg_hba`: This is the configuration file for host-based authentication.
- `postgresql.conf`: This is the general server configuration file.

By default these files are located here:

```
C:\Program Files\PostgreSQL\<version>\Data
```

## Super User Settings

Choose a username that meets your requirements. We recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg**. The username also cannot be **rails**, **tblwgadmin**, **tableau**, **readonly** or **tbladminviews**.

**This is a requirement for the external repository to work properly with Tableau Server.**

## Network and Security

Make sure that the database instance can be reached by all the Tableau Server nodes. This most often involves creating a security group that allows access from the nodes.

## Database Options

The port can be anything, but we recommend leaving it as the default 5432.

## Update Parameters

From the Tableau Server perspective, most of the parameter values for the instance can be set to defaults. You can modify the parameter values if you have specific performance or log-



ging requirements, but we strongly recommend that the following parameters be set to default values and not be changed:

- `standard_conforming_strings`
- `escape_string_warning`

We also recommend the value for the `work_mem` be set to at least 16384 to help avoid performance issues.

## Configure remote connections

Use the following steps to make updates to the configuration files:

1. By default, the configuration in the `postgresql.conf` is configured to only listen to local connections. Enable remote connections by making the following changes in the connections and authentication section of the `postgresql.conf` file:

Add this line to allow remote connections:

```
listen_addresses = '*'
```

2. Restart the PostgreSQL instance.

## Configure SSL

Secure connections between Tableau Server and the External Repository are **not** required, but recommended.

To configure encrypted connections between Tableau Server and the External Repository, follow the guidance and the detailed steps described below:

When configuring Tableau Server to use the stand-alone PostgreSQL database instance, you will need to provide a trusted root certificate authority (CA), which is used to verify the connection to the server. Ideally, the stand-alone PostgreSQL instance's server certificate should specify a resolvable hostname so Tableau Server can use `sslmode, verify-full`. This mode verifies that the PostgreSQL server's certificate was signed by a trusted CA and that the hostname in the PostgreSQL Server's certificate matches the hostname used to connect to the

PostgreSQL instance. However, if that is not possible, `sslmode, verify-ca` will just verify that the PostgreSQL server's certificate was signed by a trusted CA.

The following procedure provides the general steps to generating a root CA certificate on the PostgreSQL Server. For more detailed information, read the [SSL documentation](#) on the PostgreSQL website (the link points to version 12):

1. Generate signing root certificate authority (CA) key.
2. Create the root CA certificate.
3. Create the certificate and related key (for example, `server.csr` and `server.key`) for the PostgreSQL Server. The subject name for the certificate must match the DNS name of the PostgreSQL Server. The subject name is set with the `-subj` option with the format `"/CN=<private DNS name>".`
4. Sign the new certificate with the CA certificate that you created in step 2.
5. Copy the crt and key files to the data directory (`/pgsql/<version>/data`).
6. The `pg_hba.conf` file controls the connections to the database. Add the following line to allow remote connections. For example:

```
host all all 10.0.0.0/8 md5
```

7. To enable SSL, add or update the `postgresql.conf` file with:

```
ssl = on
```

To restrict connections to SSL only, use `hostssl` instead of `host`.

## High Availability and Disaster Recovery

Tableau Server does not manage or set up high availability for the external repository. PostgreSQL database supports several solutions for these purposes including replication and log-shipping. For more information, see the [high availability documentation](#) on the PostgreSQL website.

In the event of a disaster, if you need to set up a new PostgreSQL instance, make sure you follow these steps to configure Tableau Server to use the new instance.

1. **Create a new JSON settings file** containing connection information for the new RDS instance. For more information on creating a JSON settings file, see **Step 1** in [Install Tableau Server with External PostgreSQL Repository](#).
2. **Use the `tsm topology external-services repository replace-host` command** to point your Tableau Server to the new PostgreSQL instance.

For more information on the `tsm topology external-services repository replace-host` command, see [tsm topology](#).

Who can do this

Only Tableau Server Administrators can configure Tableau Server to use the external repository. If you are using AWS EC2 or Azure VM to set up a stand-alone External Repository, you need to have accounts to access these platforms.

## Install Tableau Server with External PostgreSQL Repository

This topic describes how to install and configure Tableau Server to use an external service for Tableau Server Repository.

Before you install

- You must have the Advanced Management licence activated on your Tableau Server to make sure your environment has the appropriate licence to use external repository. For more information about Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).
- Your Tableau Server environment must be one of the following:
  - Public Cloud Services:
    - AWS cloud services.
    - Azure cloud services. For more information on Tableau Server installation on Azure, see [Install Tableau Server on Microsoft Azure](#).

- Google Cloud services. For more information on Tableau Server installation on Google Cloud, see [Install Tableau Server for Healthcare on the Google Cloud Platform](#).
- On-premises: This is Tableau Server running on the hardware located in your organisation or company and not on a public cloud.
- You must have an instance of PostgreSQL database install and ready. You will also need the endpoint of your PostgreSQL DB instance.
  - Tableau Server on **AWS**
    - For a fully managed Server option, using Amazon RDS, follow the guidance detailed in [Create a PostgreSQL DB Instance on AWS Relational Database Service \(RDS\)](#).
    - For a self-managed Server option: Use AWS EC2, and [Create a PostgreSQL Database as a Stand-Alone Installation](#)
  - Tableau Server on **Azure**:
    - For a fully managed Server option using Azure DB, see [Create an Azure Database PostgreSQL Instance on Azure](#).
    - For a self-managed Server option, use Azure VM, and [Create a PostgreSQL Database as a Stand-Alone Installation](#).
  - Tableau Server on **Google Cloud**:
    - For a fully managed Server option using Google Cloud PostgreSQL instance, follow the guidance in [Create a PostgreSQL Instance on Google Cloud](#)
    - For a self-managed Server option, use Google Cloud VM, and [Create a PostgreSQL Database as a Stand-Alone Installation](#)
  - If you are installing this on-premises, see [Create a PostgreSQL Database as a Stand-Alone Installation](#)
- Download the SSL certificate:

Secure connections between Tableau Server and the External Repository are **not** required, but recommended.

If you want to set up SSL connections for communications between Tableau Server and the External Repository, do the following:

## Tableau Server on Windows Help

- Amazon RDS: See [Using SSL to Encrypt the Connection to a DB Instance](#).
- Azure Database for PostgreSQL: See [Configure TLS connectivity for Azure Database for PostgreSQL](#).
- Google Cloud database: See [Configure SSL/TLS certificates](#).
- Stand-alone PostgreSQL database: The CA certificate that you used to configure SSL for the database should be copied to the Tableau Server initial node. For more information on configuring SSL for your PostgreSQL database, see [Configure SSL](#).

### Install and Configure Tableau Server

#### Step 1: Create a configuration file

Create a json file with the following configuration settings:

```
{  
  "flavor": "<flavor name>",  
  "masterUsername": "<admin user name>",  
  "masterPassword": "<password>",  
  "host": "<instance host name>",  
  "port": 5432  
}
```

- **flavour:** This is the type of external service you are going to use for Tableau Server repository.
  - Amazon RDS: use "rds"
  - Azure Database: use "azure"
  - Google Cloud Database: use "gcp"
  - Stand-alone PostgreSQL database: use "generic"
- **masterUsername:**
  - Amazon RDS: Use "rails" for the username. This is the user that you specified when creating the RDS instance.  
  
You must use "rails" as the masterUsername. This is required for the external repository to work with Tableau Server properly.

- Azure Database, Google Cloud PostgreSQL instance or Stand-alone PostgreSQL Database: Choose a username that meets your requirements. We recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg** or **azure**. The username also cannot be **rails**, **tblwgadmin**, **tableau**, **readonly** or **tbladminviews**.
- **masterPassword**: This is the same password you specified when creating the PostgreSQL database instance.
- **host**: This is the endpoint of your PostgreSQL database instance.
- **port**: The database port you specified when creating the PostgreSQL DB instance.

## Step 2: Install Tableau Server and Configure the External Repository

### Using TSM CLI:

1. Install TSM: Follow the instructions provided in this topic and complete steps 1-5 which runs the setup program and installs TSM.
2. Activate and Register Tableau Server: Provide the Tableau Server Key and the Advanced Management key in the activate step. You will need to run the following command twice, first with the Tableau Server product key and then with the Advanced Management product key:

```
tsm licenses activate -k <product key>
```

3. Configure Initial Node Settings: Follow the instructions provided in the topic to configure the initial node settings.

Important! Do not run the **Initialise and Start Tableau Server** step when you configure the initial node. After completing the other steps in the Configure Initial Node Settings topic, return to this page and follow the rest of the instructions.

4. Configure Tableau Server to use the external repository by using the following commands:

## Tableau Server on Windows Help

- Specify the external repository settings using the json file that you created in the previous step:

```
tsm topology external-services repository enable -f <file-name>.json -c <ssl certificate file>
```

The json file is the file that you created in the first step with the configuration settings.

**Note:** The SSL certificate is needed only if you are using encrypted connections between Tableau Server and the External Repository. If this is not a must for you, you must specify the --no-ssl option. In this case, the tsm command would look like this:

```
tsm topology external-services repository enable -f <file-name>.json --no-ssl
```

- Apply the changes:

```
tsm pending-changes apply
```

### Step 3: Complete tsm Initialise

To initialise and start Tableau Server:

```
tsm initialize --start-server --request-timeout 1800
```

### Step 4: Complete the install

Add an Administrator Account and complete the installation.

Who can do this

Tableau Server Administrators can install and configure Tableau Server.

## Re-Configure Tableau Server Repository

Your Tableau Server may be configured to use either a local or an external repository. This topic describes the steps needed to reconfigure your existing Tableau Server with one of the

following options:

- Move a local Tableau Server Repository to an external repository and configure your Tableau Server to use an external repository.
- Move the external Tableau Server Repository to your local Tableau Server installation, and configure your Tableau Server to use the local repository. This means that the Tableau Server repository will be installed on the same machine or machines as your Tableau Server.

To learn more about these options and external repositories, see [Tableau Server External Repository](#).

#### Move local repository to external

Tableau Server must be stopped to migrate from a local repository to an external repository.

Use the following steps to move Tableau Server Repository from local to external:

1. Activate the Advanced Management product key on your Tableau Server if it is not already activated. Advanced Management licence is required to configure your Tableau Server with an external repository.
2. Configure Amazon PostgreSQL DB instance to use as the external repository.
  1. Amazon: Create a PostgreSQL DB Instance on AWS Relational Database Service (RDS).
  2. Azure Database: Create an Azure Database PostgreSQL Instance on Azure.
  3. Google Cloud Database: Create a PostgreSQL Instance on Google Cloud
  4. Stand-Alone PostgreSQL Instance: Create a PostgreSQL Database as a Stand-Alone Installation.
3. Create a json file with the following configuration settings:

```
{
  "flavor": "<flavor name>",
  "masterUsername": "<admin user name>",
  "masterPassword": "<password>",
  "host": "<instance host name>",
```



```
"port":5432
}
```

- **flavour:** This is the type of external service you are going to use for Tableau Server repository.

- Amazon RDS: use "rds"
- Azure Database: use "azure"
- Google Cloud Database: use "gcp"
- Stand-alone PostgreSQL database: use "generic"

- **masterUsername:**

- **Amazon RDS:** Use "rails" for the username. This is the user that you specified when creating the RDS instance.

You must use "rails" as the masterUsername. This is required for the external repository to work with Tableau Server properly.

- **Azure Database, Google Cloud instance and Stand-alone PostgreSQL instance:** Choose a username that meets your requirements. We recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg** or **azure**. The username also cannot be **rails**, **tblwgadmin**, **tableau**, **readonly** or **tbladminviews**.

- **masterPassword:** This is the same password you specified when creating the PostgreSQL database instance.
- **host:** This is the endpoint of your PostgreSQL database instance.
- **port:** The database port you specified when creating the PostgreSQL DB instance.

4. Run the following TSM CLI command to configure Tableau Server to use external repository:

```
tsm topology external-services repository enable -f file.json -  
c <ssl certificate file>.pem
```

**Note:** The SSL certificate is needed only if you are using encrypted connections between Tableau Server and the External Repository. If this is not a requirement for you, you must specify the `--no-ssl` option. In this case, the tsm command would look like this:

```
tsm topology external-services repository enable -f <file-  
name>.json --no-ssl
```

The json file is the file that you created in the first step with the configuration settings.

The SSL certificate file can be downloaded as described in [this topic](#).

Running the above command will migrate the local repository to your new external PostgreSQL DB instance.

#### Move external repository to local

Use the following steps to move Tableau Server Repository from external location to the local installation:

1. Run the following TSM CLI command to move the repository to a specific node:

```
tsm topology external-services repository disable -n nodeN
```

2. If you are setting up HA for your repository, install the repository on a second node. For more information, see [Example: Install and Configure a Three-Node HA Cluster](#).

**Note:** To install the repository on a second node, you must run the command described in the previous step first. The first step migrates your external repository to the local repository. You can then install the repository on a second node on your Tableau Server.

Who can do this

Tableau Server Administrators can reconfigure external repository. You will also need to have access to create PostgreSQL database instance on Amazon or Azure.

## Upgrade Tableau Server with External Repository for a New Major Version of PostgreSQL

When there is a change in the PostgreSQL major version requirement for Tableau Server, there are some specific instructions you must follow to ensure that your Tableau Server upgrade is successful. For example, Tableau Server 2020.4 requires the repository to use PostgreSQL version 12. This is a major version change from PostgreSQL version 9.x used in Tableau Server versions earlier than 2020.4. So if you are upgrading from an earlier version of Tableau Server to version 2020.4 or later, you will need to take the steps described in the following sections to complete the upgrade.

This topic also includes the product compatibility between PostgreSQL and Tableau Server.

Before you upgrade

You cannot do an in-place upgrade to update the PostgreSQL version on your existing PostgreSQL DB instance on Amazon RDS or Azure Database for PostgreSQL DB. Instead, you must create a new instance and point the Tableau Server to the new instance during upgrade. Use the following information to create a new instance and prepare for the upgrade:

1. Create a new instance of PostgreSQL Database instance:
  1. Create a PostgreSQL DB Instance on AWS Relational Database Service (RDS)
  2. Create an Azure Database PostgreSQL Instance on Azure
  3. Create a PostgreSQL Instance on Google Cloud
  4. Create a PostgreSQL Database as a Stand-Alone Installation
2. SSL connections are **not** required but recommended. If you want to set up SSL connections for communications between Tableau Server and the External Repository, do the following:
  - **Amazon RDS:** See [Using SSL to Encrypt the Connection to a DB Instance](#).
  - **Azure Database:** See [Configure TLS connectivity for Azure Database for PostgreSQL](#).

- **Google Cloud Instance:** See [Configuring SSL/TLS certificates](#)
- **Stand-alone PostgreSQL Instance:** See [Configure SSL](#).

3. Create a configuration file for the new instance you created in step 1.

Create a json file with the following configuration settings:

```
{
  "flavor": "<flavor name>",
  "masterUsername": "<admin user name>",
  "masterPassword": "<password>",
  "host": "<instance host name>",
  "port": 5432
}
```

- **flavour:** This is the type of external service you are going to use for Tableau Server repository.

- Amazon RDS: use "rds"
- Azure Database: use "azure"
- Google Cloud Database: use "gcp"
- Stand-alone PostgreSQL database: use "generic"

- **masterUsername:**

- **Amazon RDS:** Use "rails" for the username. This is the user that you specified when creating the RDS instance.

You must use "rails" as the masterUsername. This is required for the external repository to work with Tableau Server properly.

- **Azure Database, Google Cloud Instance or Stand-alone PostgreSQL Instance:** Choose a username that meets your requirements. We recommend using **postgres** as the Administrator username. If you choose to use a different username, make sure that the username does not start with **pg** or **azure**. The username also cannot be **rails**, **tblwgadmin**, **tableau**, **readonly** or **tbladminviews**.

## Tableau Server on Windows Help

- **masterPassword:** This is the same password you specified when creating the PostgreSQL database instance.
- **host:** This is the endpoint of your PostgreSQL database instance.
- **port:** The database port you specified when creating the PostgreSQL DB instance. Default port for PostgreSQL is 5432.

## Tableau Server Upgrade

**Note:** If you are using Tableau Server External Repository, you must upgrade Tableau server using the command line option.

The following are the high level steps of how to specify the external repository parameters when running the upgrade script.

For a full walk-through of the Tableau Server upgrade process, see [Upgrading from earlier versions](#).

1. On the Tableau Server, open a command prompt as administrator.

**Note:** You must open a new command window because the Setup program updates the path for the new installation.

2. Navigate to the scripts folder for your new installation.

By default:

```
C:\Program Files\Tableau\Tableau Server-  
\packages\scripts.<version_code>\
```

3. Run the upgrade script and specify the configuration file and the SSL certificate:

```
upgrade-tsm.cmd --external-repository-config-file=<json config
file> --external-repository-cert-file=<SSL certificate file>
```

## Product Compatibility

The table below lists the version of PostgreSQL that is supported with Tableau Server. Use this table to determine the version of PostgreSQL to install for your External Repository.

**Amazon RDS support:** External Repository using Amazon RDS is supported on Tableau Server versions 2019.3 and later.

**Azure Database support:** External Repository using Azure Database instance is supported on Tableau Server versions 2020.4 and later.

**Google Cloud support:** External Repository using Google Cloud SQL instance is supported on Tableau Server versions 2021.4 and later.

**Stand-alone PostgreSQL instance support:** External Repository using a stand-alone installation of PostgreSQL database is supported on Tableau Server versions 2021.2 and later.

Google Cloud Platform support: External Repository using a PostgreSQL instance on Google Cloud Platform is supported on Tableau Server versions 2021.4 and later.

Tableau Server versions	PostgreSQL minimum compatible versions
2021.2.3 - 2021.2.8	12.6
2021.3.0 - 2021.3.7	
2021.4.0 - 2021.4.3	
2021.2.10 - 2021.2.14	12.8
2021.3.8 - 2021.3.13	
2021.4.4 - 2021.4.8	
2021.2.15 - 2021.2.16	12.10

2021.3.14 - 2021.3.15	
2021.4.9 - 2021.4.10	
2021.2.17 - 2021.2.18	12.11
2021.3.16 - 2021.3.17	
2021.4.11 - 2021.4.12	
2021.3.26	12.15
2021.4.23	
2022.1.0	13.3
2022.1.1 - 2022.1.3	13.4
2022.1.4 - 2022.1.6	13.6
2022.1.7 - 2022.1.16	13.7
2022.3.0 - 2022.3.7	
2023.1.0 - 2023.1.4	
2022.1.17 - 2022.1.19	13.11
2022.3.8 - 2022.3.11	
2023.1.5 - 2023.1.7	
2023.3.0 - 2023.3.3	

## Legacy compatibility

The table below includes two columns:

1. PostgreSQL version shipped with Tableau Server, which is the version that is installed with Tableau Server for local Repositories.

## 2. All PostgreSQL versions supported for External Repository.

**Notes:**

- For PostgreSQL versions earlier than version 10, the first two digits indicate the major version, and the minor version is represented by the last digit. For example, in the version 9.4.1, 9.4 indicates the major version and the .1 indicates the minor version.
- For PostgreSQL versions 10 or later, the first digit indicates the major version, and the minor version is the represented by the last digit. For example, in the version 11.1, 11 is the major version and .1 is the minor version.
- A PostgreSQL version with a major version equal to, and a minor version greater than, the Postgres version shipped with Tableau server is always acceptable for use with the external repository, along with any explicitly allowed older versions.

Tableau Server Version	PostgreSQL Version (Shipped with Tableau Server)	Alternative PostgreSQL Versions supported for External Repository
2019.3 - 2019.3.3	9.6.11	9.6.x, where x is greater than 11
2019.3.4 - 2019.3.10	9.6.15	9.6.x, where x is greater than 15
2019.3.11 - 2019.3.14	9.6.17	9.6.15, or 9.6.x, where x greater than 17
2019.4 - 2019.4.1	9.6.14	9.6.x, where x is greater than 14
2019.4.2 - 2019.4.6	9.6.15	9.6.x, where x is greater than 15
2019.4.7 - 2019.4.13	9.6.17	9.6.15, or 9.6.x, where x is greater than 17
2020.1 -	9.6.15	9.6.x, where x is greater than 15



2020.1.6		
2020.1.7 - 2020.3.2	9.6.17	9.6.15, or 9.6.x, where x is greater than 17
2020.4 – 2021.4	12.8	12.8, or 12.x, where x is greater than 8
2022.1 and later	13.3	13.3 or 13.x, where x is greater than 3

Who can do this

Tableau Server Administrators can upgrade and configure Tableau Server.

## Upgrading your RDS Instance

If you find that the current RDS instance you are using to host Tableau repository is a performance bottleneck, you can upgrade your RDS instance to a larger size. This topic describes the steps that you can use to upgrade your RDS instance.

1. Back up Tableau Server Data.
2. Stop Tableau Server:
 

```
tsm stop
```
3. After confirming that the server has shutdown, sign in to the AWS Management Console and open the Amazon RDS console at

<https://console.aws.amazon.com/rds/>.

4. In the navigation pane, choose **Databases** and then choose the DB instance that you want to modify.
5. Choose **Modify**. The Modify DB Instance page appears.
6. Modify your RDS instance by setting the DB instance class to the one you want.
7. Choose **Apply immediately** to make sure that the changes are applied straight away.

For more detailed information, see [Modifying a DB Instance Running the PostgreSQL Database Engine](#) on AWS documentation site.

8. Monitor the status of the RDS instance in the AWS console. It may take a while, but when the status shows as Available, you can start Tableau Server and resume normal operations:

```
tsm start
```

Who can do this

Tableau Server Administrator who has have access to the Amazon RDS account can perform all the steps required to upgrade the Amazon RDS instance.

## Workload Management through Node Roles

Using node roles, you can configure where certain types of workloads are processed on your Tableau Server installation. The node roles features allows you to dedicate and scale resources to specific workloads. You can configure node roles for Backgrounder and File Store.

The Backgrounder node role specifies the type of background tasks that should run on a node, whereas the File Store node role specifies the type extract workload that should run on a node. Both node roles are specified at a node level. Although these node roles can work independently to optimise selected workload, the two node roles in combination can be used to specialise server nodes to preferentially execute selected workloads to optimise performance extract heavy workloads. This combination is discussed in more detail later in the File Store node roles section.

### Backgrounder node roles

The Backgrounder process runs Tableau Server tasks, including extract refreshes, subscriptions, flow tasks, 'Run Now' tasks and tasks initiated from *tabcmd*. Running all these tasks can use a lot of machine resources. If you have more than one Backgrounder node in your cluster, you can manage your Backgrounder workload by specifying the type of tasks a Backgrounder can run on a node using the Backgrounder node role feature.

This configuration option is currently available only through TSM CLI commands and is only useful on multi-node clusters. If you have only one node, the Backgrounder is set to run all tasks by default and that cannot be changed.

Using Backgrounder node roles

The Backgrounder node role feature is intended to give you more control and governance over where certain type of Backgrounder workloads are processed in your Tableau Server installation and allows you to dedicate and scale resources to specific workloads.

For example, if your deployment is heavy on extract and users are running a lot of extract refreshes or encryption jobs, it could be beneficial to dedicate a node to extract refreshes. Similarly, in the case of subscriptions, if your Tableau Server installation processes a lot of subscriptions and you want to ensure that other jobs do not take resources from subscriptions, then you can dedicate a node to subscriptions. In these cases, you would also want to dedicate other backgrounder nodes to workloads other than extract refreshes or subscriptions.

To support high availability, Tableau recommends having multiple nodes that are dedicated towards a specific workload. For example, if you dedicate a node to extract refreshes, you should also configure a second node to process extract refresh workload. This way if a node dedicated to extract refreshes becomes unavailable, extract refreshes can still be processed by the other node.

Configuration options

Configuration	Jobs
all-jobs (default)	All Tableau Server jobs
flows	Flow run jobs.
no-flows	All jobs except flows.
extract-refreshes	Jobs that are created for:  Incremental refreshes, full refreshes, encryption and decryption of all extracts including extracts that flow outputs create.

subscriptions	Subscription jobs
system	System maintenance jobs that interact with other Tableau Server processes. For example, cleaning crashed jobs, reaping database events and syncing Active Directory.
extract-refreshes-and-subscriptions	Extract-refreshes, encryption and decryption of all extracts including extracts that flow outputs generate, and subscription jobs.
no-extract-refreshes	All jobs except extract-refreshes, extract encryption and decryption of all extracts including extracts created from flow outputs.
no-subscriptions	All jobs except subscriptions.
no-extract-refreshes-and-subscriptions	All jobs except extract-refreshes, encryption and decryption of all extracts including extracts created from flow outputs, and subscriptions.
no-system	All jobs except system maintenance jobs.

For more information on how to use the tsm commands to set the node role, see [tsm topology](#).

**Note:** Making configurations to node roles require a restart of the server and will require some downtime. For more information, see [tsm pending-changes](#).

### Licence requirements

Configuring a node to do only a specific type of tasks, like, flows, extract refreshes and subscriptions, you must have one of the following licences activated on your Tableau Server:

- To configure a node to run flows, you must have a valid Data Management licence activated on your server and have Tableau Prep Conductor running on that node. To learn more about Tableau Prep Conductor, see [Tableau Prep Conductor](#).

- To configure a node to run extract refreshes, subscriptions and any combination related to extract refreshes and subscriptions you must have a valid Advanced Management licence activated on your Tableau Server. If the licence expires or is deactivated, you will see an error any time you make a change to the Server configuration. For more information on Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

### Important!

While flows, extract refreshes and subscriptions can be expensive and resource heavy, they are not the only jobs that may require dedicated resources. In the **all jobs** group, there are a variety of System jobs that the Backgrounder executes, such as thumbnail generation for workbooks. Make sure that the nodes that run jobs other than extract refreshes, subscriptions or flows have enough machine resources.

For more information on configuring node roles using TSM commands, see [tsm topology set-node-role](#).

### Considerations

There are some rules you must consider when configuring Backgrounder node roles, which are listed below:

- Only one node role configuration can be set for a node at a time. You cannot configure multiple node roles on a node.
- To configure a node role, there must be at least one Backgrounder process on that node.
- If you have only one Backgrounder node, you must configure this node to run all jobs. This is the default configuration and does not require additional licensing.
- If you have more than one Backgrounder node, combined, they must be configured to handle all jobs. This can be achieved in the following ways:

- Configure one of the nodes to run all jobs using the all jobs option. This is the easiest and most straightforward way.
- Using one of the exception configurations on one of the nodes:
  - no-flows
  - no-subscriptions
  - no-extract-refreshes
  - no-extract-refreshes-and-subscriptions

For example, in a cluster where there are three backgrounders, you could have one node configured to run flows, one to run subscriptions and extract refreshes and one to run all jobs except flows, subscription and extract refreshes.

**Note:** The ability to specify node roles to run flows, or run all jobs except flows, or run all jobs was introduced in 2019.1.

## File Store node roles

The Tableau Server File Store controls the storage of extracts. There are three broad categories of workloads that are extract dependent.

Extract Workload	Execution Service
Refresh	Backgrounder
Query	Data Engine
Backup/Restore	Backup/Restore

File Store node role management in combination with Backgrounder node role management gives server admins the ability to specialise server nodes to preferentially execute selected workloads to optimise performance of all categories of extract heavy workloads.

It is possible to specialise a node to execute extract query workloads through a topology that has only stand-alone Data Engine nodes. For more information, see [Optimise for Extract Query-Heavy Environments](#). However, this is at the expense of extract refresh workloads, which are executed by Backgrounder nodes. With the topology-based isolation approach, extract refresh heavy Backgrounder workloads can get slower as none of the Backgrounder nodes have a File Store and thus all extract refresh traffic goes over the network.

With the File Store Node Role configuration option, it is possible to designate certain server nodes that process extract queries to be preferentially selected from the list of server nodes that can do so. This helps speed up workloads such as backup and extract refreshes by allowing server admins to enable File Store on Backgrounder server nodes, which prevents extract queries from running on these nodes. This feature is useful if you have an extract-heavy query workload and an extract-heavy refresh workload and want to achieve optimal extract query and refresh performance.

Guidelines to optimise for extract refresh and backup or restore workloads.

Start from a topology with specialised Data Engine nodes (see [Optimise for Extract Query-Heavy Environments](#)).

**Note:** In the below diagram and procedure, node 1 is Initial Node, node 2 is Additional Node 1, node 3 is Additional Node 2 and node 4 is Additional Node 3.

Process	Initial Node	Additional Node 1	Additional Node 2	Additional Node 3
Cluster Controller	✓	✓	✓	✓
Gateway	✓	✓		
Application Server	✓	✓		
VizQL Server	✓ ✓	✓ ✓		
Cache Server	✓ ✓	✓ ✓		
Search & Browse	✓	✓		
Backgrounder	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		
Data Server	✓ ✓	✓ ✓		
Data Engine	✓	✓	✓	✓
File Store			✓	✓
Repository	✓	✓		

### Topology 1 – Dedicated Data Engine Nodes

1. Add File Store to Node 1.

```
tsm topology set-process -n node1 -pr filestore -c 1
```

2. Designate Node 3 and Node 4 to preferentially execute extract-query workloads

```
tsm topology set-node-role -n node3, node4 -r extract-queries
```

3. Designate Node 1 to preferentially execute extract-refresh workloads.

```
tsm topology set-node-role -n node1 -r extract-refreshes
```

4. Designate Node 2 to preferentially execute non-extract-refresh workloads.

```
tsm topology set-node-role -n node2 -r no-extract-refreshes
```

5. Apply pending changes.

```
tsm pending-changes apply
```



Process	Initial Node	Additional Node 1	Additional Node 2	Additional Node 3
Cluster Controller	✓	✓	✓	✓
Gateway	✓	✓		
Application Server	✓	✓		
VizQL Server	✓ ✓	✓ ✓		
Cache Server	✓ ✓	✓ ✓		
Search & Browse	✓	✓		
Backgrounder	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		
Data Server	✓ ✓	✓ ✓		
Data Engine	✓	✓	✓	✓
File Store	✓		✓	✓
Repository	✓	✗		

Topology 2 - Extra File Store Node

**Note:** In your Tableau Server deployment, adding File Store roles to existing nodes will temporarily increase network I/O between all File Store nodes while the new File Store is being synchronised. The duration of this operation is dependent on the volume of data on the File Store and the network bandwidth capacity. The status of synchronisation can be monitored using the TSM Web GUI. If you are adding more than one File Store to your deployment, it is recommended to add them consecutively and wait for the initial synchronisation to complete in between each File Store addition.

Fine tune extract query workload management

When extract queries for email subscriptions and metric alerts are running at the same time that users are interactively viewing extract-based visualisations, users may experience slower than normal viz load times. Use the following node roles to fine tune how these workloads are prioritised.

Node role to use	Type of extract query workload	Example
extract-queries	scheduled	email subscriptions and metric alerts

<code>extract-queries-interactive</code>	<code>interactive</code>	users viewing an extract-based visualisation
------------------------------------------	--------------------------	----------------------------------------------

If your server deployment is seeing growth in email subscriptions and metric alerts, you can add nodes and assign the `extract-queries` node role, which makes them more available to handle subscriptions and alerts.

If your server deployment is seeing growth in users viewing extract-based visualisations, you can add nodes and assign the `extract-queries-interactive` node role, which makes them prioritise interactive extract queries to reduce extract-based viz load times. The `extract-queries-interactive` node role is a preference and not strict isolation. This means that queries will be routed to nodes that have the `extract-queries-interactive` node role assigned. If you have multiple nodes with the `extract-queries-interactive` role, queries will be routed based on node health.

For example, add a node and designate it to preferentially execute `extract-queries-interactive` workloads.

- `tsm topology set-node-role -n node4 -r extract-queries-interactive`

### Configuration options

Configuration	Jobs
all-jobs (default)	All Tableau Server jobs
extract-queries	Jobs that are created for extract queries. The nodes selected will run as all-jobs and will prioritise the processing of extract queries.
extract-queries-interactive	Jobs that are created for extract queries. The nodes selected will run as all-jobs and will prioritise the processing of interactive extract queries, such as those that run when a user is looking at their screen and waiting for an extract-based dashboard to load. This is an advanced setting and it should only be used if the cluster has a heavy subscription and alert job workload that causes users to experience

	degraded performance on viz load times that run around the same time as scheduled loads.
--	------------------------------------------------------------------------------------------

For more information on configuring node roles using TSM commands, see `tsm topology set-node-role`.

### Licence requirements

To configure a node to run extract queries you must have a valid Advanced Management licence activated on your Tableau Server.

## How to see node roles

Use the following command to see what node roles are currently configured on Tableau Server:

```
tsm topology list-nodes -v
```

## Who can do this

Tableau Server Administrators can configure node roles and activate any required product keys.

## Tableau Server Independent Gateway

This topic provides an overview of Tableau Server Independent Gateway.

Independent Gateway is a reverse proxy server and load balancer based on Apache HTTPD. It uses the same Apache HTTPD version as the Tableau Server Gateway process internal to Tableau Server cluster, but it is suitable for deployment in a network DMZ. Because Independent Gateway is a part of Tableau Server, it is managed by TSM and does not need separate configuration.

Its configuration has full knowledge of the topology of externally accessible Tableau Server components and is updated when the cluster topology changes. After a simple Independent

Gateway installation process, configuration choices are made centrally using Tableau Services Manager (TSM) configuration items.

With this feature, Tableau Server can now be configured in two ways:

- Install Tableau Server in a self-contained installation. Any reverse proxy needs to be installed and managed separately.
- Install Tableau Server and install Independent Gateway as a reverse proxy that is managed by Tableau Server (version 2022.1 and later).

## Why use Independent Gateway?

Using Independent Gateway has the following benefits over installing a separate reverse proxy:

- **Fully supported:** The Independent Gateway is part of a Tableau Server installation and is fully supported by Tableau.
- **Tableau Server aware:** When you use a separate reverse proxy, it needs to be updated when the topology of Tableau Server changes. Independent Gateway is fully aware of all externally-callable Tableau Server components and is updated when these change.

## Managing Independent Gateway

### Licence Management

To use Independent Gateway, you must first enable this feature using Advanced Management product keys in Tableau Server. There is no licensing done on the Independent Gateway node. For more information, see [About Tableau Advanced Management on Tableau Server](#). If you don't have an Advanced Management key activated or if the licence has expired, you will see the following behaviour:

- If you try to configure Tableau Server with Independent Gateway, it will fail.
- If you are already using Independent Gateway and the Advanced Management licence expires, the server will fail on restart.

### Backup and Restore

There is no impact to backup or restore with Independent Gateway. A backup or restore of Tableau Server will not include any information or configuration for Independent Gateway. If you use the backup to create a new installation of Tableau, you will need to separately install, configure and enable Independent Gateway for the new Tableau Server installation.

### High Availability Considerations

You can install multiple instances of Independent Gateway to provide robust high availability in your reverse proxy. You might also want to increase the number of Independent Gateway nodes if you have large numbers of client sessions accessing Tableau.

## Topology

When you configure Tableau Server with Independent Gateway, you no longer need to set up and configure a separate reverse proxy. Independent Gateway will appear on the TSM status page as an external service.

**Note:** The status page and the status output on the CLI will only show a single instance of Independent Gateway, even if you have installed multiple Independent Gateway nodes.

## Next

Install Tableau Server with Independent Gateway

## Install Tableau Server with Independent Gateway

This topic walks you through the process of installing Tableau Server Independent Gateway.

Following this process will result in an Independent Gateway configuration with a direct connection to the backend Tableau Server deployment. You can learn more about *direct* vs *relay* connection modes in the topic, [Configure Tableau Server with Independent Gateway](#).

## Prerequisites

- You must have a dedicated server with at least 2 cores (4 vCPUs), 8 GB of RAM and 100 GB of free disk space.
- You must use Tableau Server 2022.1 or later.
- You must use an installer for Tableau Server Independent Gateway with a major version (**2022.1**, for example) that matches the version of Tableau Server. We recommend maintenance versions (2022.1.1 or 2022.1.5, for example) match as well, but this is not a requirement. If "static assets" change between versions and versions do not match, you may see some unexpected image impact. For example, maps may not be up to date if Independent Gateway is an earlier version than Tableau Server.
- You must have a valid Advanced Management licence activated in Tableau Server. To learn more about Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).
- By default, the Independent Gateway must be able to communicate with the backend Tableau Server deployment on ports 80 and 21319 during installation. You can change these default ports during initialisation, as described later in this topic.
- Verify that your Tableau Server deployment is complete and healthy before installing and configuring Independent Gateway.
- Verify that you are not running any other web-aware applications on the computer where you are installing Independent Gateway. For example if Apache HTTPD is installed on the computer, uninstall it or configure `httpd` so that it is not actively listening on port 80.

## Install Tableau Server and Independent Gateway

Installing Independent Gateway is done using a standalone installation program that includes "tsig" as part of the filename to distinguish it from the full Tableau Server installer. We strongly recommend you install Independent Gateway after installing Tableau Server and confirming that it is functioning as expected. To install, you must have administrator rights. You can install one or more instances of Independent Gateway, but each instance of Independent Gateway must be installed separately. If you are installing multiple instances for high availability or to distribute a heavy client load, repeat the installation steps for each instance.

During installation, a script called `initialize-tsig.bat` is run. The script prompts you for information needed to configure Independent Gateway. Once Independent Gateway is fully

installed, you need to run a TSM command on the Tableau Server initial node to configure the server with details about the instance of Independent Gateway.

The IG installation consists of these steps:

- Run the platform-specific installer.
- Run the post-install script. This is done automatically by the Setup program.
- Enable the Independent Gateway instance using TSM.

### Step 1: Download and install Tableau Server

1. **Install TSM:** Follow the instructions provided in this topic and complete steps 1-5 which runs the setup program and installs TSM.
2. **Activate and Register Tableau Server:** Provide the Tableau Server Key and the Advanced Management key in the activate step. You will need to run the following command twice, first with the Tableau Server product key and then with the Advanced Management product key:

```
tsm licenses activate -k <product key>
```

3. **Configure Initial Node Settings:** Follow the instructions provided in the topic to configure the initial node settings.

### Step 2: Download and install Independent Gateway

After you download the Tableau Server Independent Gateway installation file, follow the instructions below to install Independent Gateway.

1. On the computer where you are installing Independent Gateway, sign in as a user with administrator access and double-click on the downloaded installation file.
2. On the first screen, you must accept the licensing agreement before continuing on.
3. After accepting the licensing agreement, you can take one of two actions:

- Install Independent Gateway by clicking **Install** or
- Change the install location by clicking **Customise** and then install Independent Gateway:

By default Independent Gateway is installed to `C:\Program Files\Tableau\Tableau Server\independentgateway`. You can choose a non-default location, including a different drive, either by browsing to or typing in a new path.

Once you have specified the install location, click **Install** to install the Independent Gateway to this location.

4. The Setup program installs Independent Gateway and automatically runs the `initialize-tsig.bat` script.

In a command window opened by the installer, you are prompted for values that are used for configuring Independent Gateway:

- `TSIG_TS_CLUSTER`—Required. There is no default value. You must enter a value when prompted.

This should be the internet address or addresses of every node in the Tableau Server cluster. Wild cards can be used and subnet masks can be used to specify multiple nodes. To specify multiple addresses, separate addresses by spaces. Values must be provided in one of the forms acceptable to Apache HTTPD `mod_authz_host` "Require" directive. For more information, see [https://httpd.apache.org/docs/2.4/mod/mod\\_authz\\_host.html](https://httpd.apache.org/docs/2.4/mod/mod_authz_host.html).

- `TSIG_HK_PORT` – Default is 21319. This is the port used for incoming housekeeping requests from Tableau Server.
- `TSIG_HK_PROTOCOL` – Default is `http`. Valid values are `http` and `https`. This is the protocol used for housekeeping requests from Tableau Server.
- `TSIG_PORT` – Default is 80. The port used for external requests.



- **TSIG\_PROTOCOL** – Default is `http`. Valid values are `http` and `https`. This is the protocol used for external requests.
- **TSIG\_INSTANCE\_ID** – Default is the machine name. A unique identifier for the instance of the Independent Gateway.

5. Setup finishes when the script is done running and Independent Gateway is initialised.

### Step 3: Enable Independent Gateway in Tableau Server

The last step of installing and configuring Independent Gateway is to enable Independent Gateway in Tableau Server. To do this, use the TSM command `tsm topology external-services gateway enable -c <file>` with a JSON file that identifies the Independent Gateway instance or instances and provides Tableau Server with the details necessary for communication between the server and the Independent Gateway.

Tableau Server must be in a stopped state to enable Independent Gateway.

## The Independent Gateway JSON file contents

The JSON file that you use to enable the instances of Independent Gateway on Tableau Server needs to contain the following:

- **ID** – The ID value must match the `TSIG_INSTANCE_ID` for the particular instance. If you did not provide this during initialisation, the default is the machine name (`%COMPUTERNAME%`) of the Independent Gateway computer. The value in the JSON file must match the output of the `hostname` command.
- **Host** – The host must be a DNS-resolvable name of the Independent Gateway computer.
- **Port** – The port must match the `TSIG_HK_PORT` value specified on the Independent Gateway instance. If you did not provide this during initialisation, the default is "21319".
- **Protocol** – The protocol must match the `TSIG_HK_PROTOCOL` specified on the Independent Gateway instance. If you did not provide this during initialisation, the default is "HTTP".
- **Authsecret** – The authsecret must match the secret created by the initialisation script on the Independent Gateway instance.

## The Independent Gateway authsecret

The initialisation script creates a unique, shared secret on each Independent Gateway computer. You need this secret to enable Independent Gateway in Tableau Server. Copy the secret and include it in your JSON file as the "authsecret".

The shared secret is located in the `tsighk-auth.conf` file here:

```
C:\ProgramData\Tableau\Tableau Server-
\independentgateway\config\tsighk-auth.conf
```

## Independent Gateway JSON file example

The JSON file should be in the format below. This example JSON file shows default values where there are defaults. Your file should have use the actual values that match your installation of Independent Gateway and your organisation.

```
{
  "independentGateways": [
    {
      "id": "<IGCOMPUTER>",
      "host": "<DNS name of Independent Gateway computer>",
      "port": "21319",
      "protocol": "http",
      "authsecret": "<shared-secret01>"
    },
    {
      "id": "<IGCOMPUTER2>",
      "host": "<DNS name of second Independent Gateway computer>",
      "port": "21319",
      "protocol": "http",
      "authsecret": "<shared-secret02>"
    }
  ]
}
```

### Enabling Independent Gateway in Tableau Server

To complete the installation of Independent Gateway, you need to enable it using TSM.

1. Copy the JSON configuration file to the initial node of Tableau Server.
2. On the initial node, open a command prompt as an administrator.
3. Run the following commands to stop Tableau Server, enable Independent Gateway using the JSON configuration file, and restart the server:

```
tsm stop  
tsm topology external-services gateway enable -c tsig.json  
tsm start
```

#### Step 4: Verify Independent Gateway in Tableau Server

You should be able to navigate to the Tableau Server sign-in page by entering the address of the Independent Gateway in a browser.

If there is a firewall between the Independent Gateway and the backend Tableau Server deployment, then you will need to open the ports for the Tableau Server processes for direct connection. See [Direct connection](#) for more information.

Alternatively, you may choose to minimise port requirements by configuring Independent Gateway for a relay connection. See [Relay connection](#) for more information.

## Configure Tableau Server with Independent Gateway

This topic describes how to configure Tableau Server with Independent Gateway for different connection scenarios and for a custom authentication module.

For installation procedure, see [Install Tableau Server with Independent Gateway](#).

For an end-to-end deployment example running on Tableau Server for Linux in AWS, see [Configuring Web Tier](#) in the Enterprise Deployment Guide.

## Direct vs relay connection

The Independent Gateway can communicate directly with the backend Tableau Server processes over multiple ports. We refer to this communication as *direct* connection.

Alternatively, you can configure Independent Gateway to relay client communication over a single port to the gateway process on Tableau Server. We refer to this as a *relay* connection.

The TSM configuration key that sets the connection type is `gateway.tsig.proxy_tls_optional`.

The following sections describe how these connections differ and how to set them.

### Direct connection

In this configuration, the Independent Gateway communicates directly with the backend processes on Tableau Server over multiple ports. This requires that you open the ports between the firewall that separates Independent Gateway from the Tableau Server backend deployment.

The current implementation of Independent Gateway does not support TLS connections on these processes.

A direct connection allows Independent Gateway to communicate with the backend Tableau Server processes without proxying through the Gateway process. Direct connection provides better performance than the alternative relay connection.

## Configuration

Direct connection is the default configuration. As such, you do not need to run a command to set it. However, should you need to reset to the default direct connection, run the following commands:

```
tsm configuration set -k gateway.tsig.proxy_tls_optional -v all --  
force-keys  
tsm pending-changes apply
```

## Manage port ingress

After installation, Independent Gateway must be able to communicate with Tableau Server over multiple ports. These ports are dynamically assigned during setup and are in the range, TCP 8000-9000. The specific ports and corresponding processes used to communicate to Tableau Server are written to a CSV file on the computer running Independent Gateway at `TSIG_DATA/config/httpd/proxy_targets.csv`.

**Note:** Independent Gateway is an implementation built on Apache HTTPD. All TSM commands that reference file locations use forward slashes, even on Windows. This is an Apache HTTPD convention.

Use `proxy_targets.csv` to set or automate port ingress configuration through your network to Tableau Server. We recommend automating port ingress configuration since the ports may change if the topology Tableau Server deployment changes. Adding nodes or reconfiguring processes on the Tableau Server deployment will trigger changes to the port access required by Independent Gateway.

### Relay connection

In a relay connection configuration, the Independent Gateway does not connect directly to the backend processes. Instead, the Independent Gateway relays communication to the Gateway process on the backend Tableau Server deployment over HTTP. This relay process results in an extra hop and therefore degrades performance as compared to the direct connection configuration.

One benefit of configuring Independent Gateway as a relay connection is to secure traffic with TLS. See [Configure TLS on Independent Gateway](#).

## Configuration

To configure Independent Gateway for relay connection to Tableau Server, run the following commands:

```
tsm configuration set -k gateway.tsig.proxy_tls_optional -v none --
force-keys
tsm pending-changes apply
```

### Housekeeping protocol

Both direct and relay connections require communication with the Tableau Server house-keeping (HK) protocol. The HK process maintains configuration state between the backend Tableau Server deployment and the Independent Gateway. During installation, the Tableau Server must be able to communicate with Independent Gateway over port 21319.

Housekeeping protocol communication details:

- The HK requests check Independent Gateway status and update configuration as needed. There is no customer data in these requests. The configurations do not include passwords or other secrets.
- The configuration files do contain details about the Tableau Server cluster topology so that Independent Gateway can perform reverse proxy functions. Cluster topology configuration can be considered sensitive because the configuration could provide targeting information to an attacker. Note that such configuration data would only be useful to attackers who could then access the Tableau Server cluster.
- The configuration update files include a check of the hashed contents. This provides an extra layer of security to validate the integrity of the configuration files that are used to update Independent Gateway.

By default, the HK process uses TCP 21319.

Beginning with Tableau Server 2022.1.2, TLS is supported on HK connection. See [Configure TLS on Independent Gateway](#).

### Change the HK port

You can change the port used by the HK protocol as part of the Independent Gateway initialisation. See [Install Switches and Properties for Tableau Server Independent Gateway](#).

To change the port after installation, you can re-run the post-install script to provide a different value for `TSIG_HK_PORT`. By default, the script is at `C:\Program Files\T-`

## Tableau Server on Windows Help

`ableau\Tableau Server\independentgateway\scripts\initialize-tsig.bat.`

### Log file locations

The most useful log entries on Tableau Server are in the `tabadminagent` log file directory. However, if you are running Tableau Server in a cluster, you must look on each instance to locate the latest `tabadminagent` logs.

On the Independent Gateway, the following log files are written to the `TSIG_DATA/logs/` directory.

- `access.log`: Independent Gateway will write to `access.log` for logging that is generated by the `httpd.conf.stub` configuration. Timestamped log files (e.g. `access_date.log`) are generated by `httpd.conf` configuration.
- `error.log`
- `startup.log`

These logs are also relayed verbatim to the Tableau Server deployment and stored in sub-directories of the Cluster Controller logs directory. As such, the Independent Gateway logs are included in the `ziplog` file generated by the `tsm maintenance ziplogs` command.

### Troubleshooting

For troubleshooting tips, see [Troubleshooting Tableau Server Independent Gateway](#) in the Enterprise Deployment Guide (EDG). The EDG provides an example deployment of Tableau Server on Linux. The troubleshooting steps are useful for Windows or Linux versions of Tableau Server.

### Configure Authentication Module with Independent Gateway

A common security practice is to allow only authenticated requests to pass through the inner firewall of the DMZ servers. The Independent Gateway supports the traditional Tableau Server authentication methods, but it also includes configuration properties that allow integrating an Apache HTTPD loadable module for custom authentication.

For example, by configuring SAML on Tableau Server and configuring a custom authentication module, you can require all users to authenticate with your IdP at the Independent Gateway.

Only those users who are authenticated will then be able to access Tableau Server, which can then authenticate and authorise user access.

For a more detailed explanation of this authentication scheme, see [Pre-authentication with an AuthN module](#) in the Enterprise Deployment Guide.

To configure the authentication module, you must complete the following steps:

1. Generate authentication module configuration files. When setup is complete, each module and its configuration directives will be treated as Include options, making the included files logically part of the overall HTTPD configuration.
2. Copy the configuration files to each computer running Independent Gateway. All files must be copied to the same locations on each Independent Gateway computer. Each file maps to a configuration property that is managed by Tableau Server.
3. Set the configuration properties with the `tsm configuration set` command on Tableau Server.

Do not edit the HTTPD configuration file (`httpd.conf`) on the Independent Gateway, since Independent Gateway includes logic to update HTTPD configuration based on changes made with TSM commands on Tableau Server.

#### Example authentication module configuration

For an end-to-end authentication module configuration example, see [Example authentication configuration: SAML with external IdP](#) in the Enterprise Deployment Guide. The example describes how to set up and configure SAML with Okta IdP and Mellon authentication module for a Tableau Server on Linux deployment running in AWS. Although the example describes the process for Linux, the configuration example is also useful for Tableau Server on Windows.

#### Configuration properties

The following table describes the various configuration files that you may reference. Each file maps to a configuration property that is set on Tableau Server. Use forward slashes in the path, even on Windows (Apache HTTPD convention.) You only need to define the properties necessary to formulate your custom authentication configuration. Skip any configuration properties that are not needed.



Configuration property	Description
gateway.tsig.authn_module_block	Appears at the end of the set of normally loaded Apache HTTPD modules. The intent is that the file includes one or more <code>LoadModule</code> directives. The modules themselves should be identified with full paths.
gateway.tsig.authn_global_block	Appears after all of the <code>LoadModule</code> references and before most other Apache HTTPD directives. The intent is to provide a place for any configuration directives needed by the custom module.
gateway.tsig.authn_globalbottom_block	Appears at the very bottom of the configuration file, again at the global level. The intent is to provide a place for any configuration directives needed by the custom module that must specifically come after various other directives. (You are unlikely to need this.)
gateway.tsig.authn_location_block	Appears inside a <code>&lt;Location "/"&gt;</code> block, covering all URL paths.
gateway.tsig.authn_directory_block	This appears inside a <code>&lt;Directory "/"&gt;</code> block, covering all paths to files served by the Independent Gateway. (You are unlikely to need this. Most files served by Independent Gateway are non-sensitive static assets, like images and JavaScript files.)
gateway.tsig.authn_virtualhost_block	Appears inside one or two <code>&lt;VirtualHost&gt;</code> blocks: one for TLS (if enabled) and one for non-TLS. If configured, the same file is included in both places. If you need to distinguish the two cases, you can use the standard Apache httpd HTTPS environment variable.

The `<Location "/tsighk">` block

In addition to the expected `<Location "/">` block for normal request traffic, there is also a `<Location "/tsighk">` block used to service internal Independent Gateway house-keeping (HK) requests. These HK requests have their own authentication guards and will not work with typical custom SSO solutions.

You may need to explicitly exclude your custom module from attempting authentication for the HK URL path.

To determine whether you need to exclude your module, first configure the module. Then look for HK requests in the Independent Gateway access log. You should see at least a status check once or twice a minute. If those requests are receiving a 200 response code, things are probably OK. On the other hand, if those requests receive a 3xx response code (redirecting to your custom authentication provider), you need to do something about it.

Possible solutions include:

- The `<Location "/tsighk">` block contains the directive `AuthType None`, and that may be sufficient.
- The Independent Gateway `httpd.conf` has the standard Apache HTTPD directive `ProxyPreserveHost On`. If there is an unusual circumstance that requires it to be `Off` or some other value, that value can be set with the TSM configuration item `gateway.tsig.proxypreservehost`.
- You might need some module-specific directives to disable your authentication module for `<Location "/tsighk">`. You can't directly modify that block in the `httpd.conf` file. Instead, you can make another `<Location "/tsighk">` block in your `gateway.tsig.authn_global_block` file and let Apache HTTPD logically merge them. For example, some versions of `mod_auth_mellon`, a popular open source authentication module, requires `MellonEnable Off` for sections where it doesn't apply, even if `AuthType None` is set in those sections.
- When creating an additional `<Location "/tsighk">` section, as described in the previous bullet, you may find that the order of appearance of the various sections in the `httpd.conf` file makes a difference in how they affect each other. The standard `<Location "/tsighk">` section appears before the standard `<Location "/">` section. If your experimentation shows that some different order is needed, you might have to define another `<Location "/">` section in your `gateway.tsig.authn_`

## Tableau Server on Windows Help

`global_block` block in addition to another `<Location "/tsighk">` section, in which case, you might not need anything in a `gateway.tsig.authn_location_block` block.

### Troubleshoot custom authentication module configuration

A handy way to understand how the Independent Gateway will compose the `httpd.conf` file is to set the TSM configuration items with values that point to empty files on your Independent Gateway computers. (The files must exist, but they can be empty.) You can then look at the Independent Gateway's `httpd.conf` file to get a concrete understanding of where the `Include` directives for the various configuration files will actually appear.

Configuration problems in the Independent Gateway `httpd.conf` can result in the `tsig-httpd` service being unable to start. Other configuration problems may interfere with receiving configuration updates from the Independent Gateway companion service on the Tableau Server cluster. One way to recover, after you've fixed whatever caused the problem, is to copy `TSIG_DATA/config/httpd.conf.stub` to `TSIG_DATA/config/httpd.conf`, and then restart the `tsig-httpd` service.

For more troubleshooting tips, see [Troubleshooting Tableau Server Independent Gateway](#) in the Enterprise Deployment Guide (EDG). The EDG provides an example deployment of Tableau Server on Linux. The troubleshooting steps are useful for Windows or Linux versions of Tableau Server.

### Configure TLS on Independent Gateway

TLS support for Independent Gateway is in Tableau Server 2022.1.2 and later.

Both Tableau Server and Tableau Server Independent Gateway use the SSL module (`mod_ssl`) built with OpenSSL to implement Transport Layer Security (TLS) features.

Because of its complexity and security-sensitive nature, we recommend that TLS configuration is planned and implemented by an IT professional who is familiar TLS on Apache `httpd`.

In many cases, we use "SSL" in the names of things for compatibility with existing TSM or Apache `httpd` configuration properties or concepts. "SSL" actually refers to protocol versions

now considered insecure and obsolete. However, the legacy name persists and is often used interchangeably with TLS as convention. Tableau Server and Independent Gateway do not support SSL-era protocols.

### TLS configuration example

For an end-to-end TLS configuration example, see [Configure SSL/TLS from load balancer to Tableau Server](#) in the Enterprise Deployment Guide. The topic shows a step-by-step example of configuring TLS on Tableau Server on Linux in an AWS deployment. Although the example describes the process for Linux, the configuration example is also useful for Tableau Server on Windows.

### TLS configuration overview

You can configure TLS for HTTPS on any of the following sections of the internet-to-Tableau Server path:

- From the external network (internet or front-end load balancer) to Independent Gateway
- From Independent Gateway to Tableau Server
- For housekeeping (HK) process from Tableau Server to Independent Gateway

This topic provides procedures to configure each of these hops.

You will need to make configuration changes to Independent Gateway computers and to the Tableau Server cluster.

## Certificate requirements and considerations

The certificate requirements for Independent Gateway are the same as those specified for Tableau Server "external SSL". See [SSL certificate requirements](#).

### Other considerations:

- To simplify certificate management and deployment, and as a security best practice, we recommend using certificates generated by a major trusted third-party certificate authority (CA). Alternatively, you may generate self-signed certificates or use certificates from a PKI for TLS. In this case, pay attention to the configuration options for

trusting CA certificates and validating certificates.

- If your implementation requires the use of a certificate chain file, see the Knowledge Base article [Configure TLS on Independent Gateway when using a certificate that has a certificate chain](#).
- If you are running multiple instances of Independent Gateway, then you must distribute certificates to each computer in the same location (file path).
- If you are running a Tableau Server deployment with more than one node, certificates that you upload with TSM commands are automatically distributed across the nodes. Run all TSM commands on the initial node.

### Global TLS configurations

The following configurations are global. The configuration options below refer to configuration keys that must set with the `tsm configuration set` command. The commands must include the `--force-keys` option.

It's unlikely that you will need to change these values.

Note that each pair of keys shares the same naming format, where the string, `tsig`, sets the value for the Independent Gateway. The key that does *not* include the string, `tsig`, sets the value for the gateway process on the Tableau Server cluster.

If you do not set a value for the `tsig` key, then the default Tableau Server gateway value will be used.

`gateway.tsig.httpd.socache` or `gateway.httpd.socache`

Default: `shmcb`

Alternative value: `dbm`

The storage type of the inter-process SSL Session Cache. For more information about the `shmcb` and `dbm` storage types, see [SSLSessionCache Directive](#) on the Apache web-site.

`gateway.tsig.httpd.shmcb.size` or `gateway.httpd.shmcb.size`

Default: `2048000`

Amount of memory, in bytes, to use for the circular buffer when using `shmcb` storage type.

**Note:** Another global key is `gateway.tsig.ssl.key.passphrase.dialog`. If applicable, there is only a single configuration for `gateway.tsig.ssl.key.passphrase.dialog`. By design, it collects passphrases for all encrypted private key files in the configuration. The applicable sections later in this topic describe the use of this key.

## External TLS to Independent Gateway

The process of configuring external connections to terminate TLS on the Independent Gateway servers is conceptually similar to how "external SSL" is configured for a Tableau Server cluster. The mechanics are different. TSM does not automatically distribute certificate and key material to Independent Gateway nodes. Additionally, Independent Gateway does not automatically provide a way to supply the optional TLS key passphrase on start-up.

The following steps describe how to configure TLS from external source to Independent Gateway computers.

## Step 1: Distribute files to Independent Gateway computers

1. Place certificates and related files in a location and with permissions that allow the Independent Gateway service (`tsig-httpd`) to read them. We recommend restricting access to the key files such that only the Independent Gateway service can read them.
2. Place all files, certificates and keys in exactly the same locations on all Independent Gateway computers. Place the files outside of the `TSIG_INSTALL` and `TSIG_DATA` paths so that they do not get removed if you reinstall or upgrade Independent Gateway.

## Step 2: Update environment variables on Independent Gateway computers

On each Independent Gateway computer, set the `TSIG_PORT` and `TSIG_PROTOCOL` environment variables to `443` (by convention, but any unused TCP port number is supported) and

`https` respectively.

Change these values by re-running the post-install script to provide a different value for `TSIG_PORT` and `TSIG_PROTOCOL`. By default, the script is at `C:\Program Files\Tableau\Tableau Server\independentgateway\scripts\initialize-tsig.bat`.

## Step 3: Set TLS configuration properties on Tableau Server

Most of the TSM configuration keys in the following table are derived from Apache `httpd` directives. As such, the configuration values for these TSM configuration keys map directly to the valid values for the corresponding Apache directive. Links to corresponding directives are included in the following table.

In some cases, the configuration will use fallback configurations if a particular key is not set. These are called out in the table below.

The configuration options in the following table refer to configuration keys that you must set with the `tsm configuration set` command. All commands must include the `--force-keys` option. For example:

```
tsm configuration set -k gateway.tsig.ssl.enabled -v true --force-keys
```

After you have set the configuration keys, you must run `tsm pending-changes apply`.

Configuration property	Description	Corresponding Apache directive
<code>gateway.tsig.ssl.enabled</code>	Required.  Enables TLS. Must be set to <code>true</code> .	N/A
<code>gateway.tsig.ssl.cert.file_name</code>	Required.  Path + file name of the certificate file for Independent Gate-	<a href="#">SSLCertificateFile</a>

	way. For example, <code>/etc/ssl/certs/tsig-ssl.crt.</code>	
<code>gateway.tsig.ssl.key.file_name</code>	Required.  Path + file name of the certificate key file for Independent Gateway. For example, <code>/etc/ssl/keys/tsig-ssl.key.</code>	<a href="#">SSLCertificateKeyFile</a>
<code>gateway.tsig.ssl.key.passphrase.dialog</code>	If your key requires a passphrase, then you must configure this key with the correct string expected by the Apache httpd <code>SSLPassPhraseDialog</code> directive. Do not enter the literal passphrase for this key. Refer to the Apache documentation for information about how to configure this key.  This configuration is global for Independent Gateway.	<a href="#">SSLPassPhraseDialog</a>
<code>gateway.tsig.ssl.protocols</code>  Fallback: <code>ssl.protocols</code>	Specify supported versions of SSL/TLS. See Security Hardening Checklist for more information about default configuration.	<a href="#">SSLProtocols</a>
<code>gateway.tsig.ssl.ciphersuite</code>  Fallback: <code>ssl.ciphersuite</code>	Specifies ciphers that the client is permitted to negotiate for SSL connection.	<a href="#">SSLCipherSuite</a>
<code>gateway.tsig.ssl.client_cer-</code>	Set this value to <code>true</code> to enable	N/A



<code>tificate_login.required</code>	<p>mutual TLS on this connection.</p> <p>You must also set the <code>gateway.tsig.ssl.cacert.file</code> property as specified below.</p>	
<code>gateway.tsig.ssl.cacert.file</code>	Specifies the file containing the concatenated CA certificates for client authentication process.	SSLCACertificateFile
<code>gateway.tsig.ssl.revocation.file</code>	Specifies the file containing the concatenated CA revocation lists for clients that connect to Independent Gateway.	SSLCARevocationFile
<code>gateway.tsig.ssl.redirect</code>	<p>When Independent Gateway has been configured for TLS, this option forces client requests from port 80 (default) to redirect to TLS.</p> <p>Default: <code>true</code>.</p>	N/A
<code>gateway.tsig.ssl.redirect_from_port</code>	<p>When <code>gateway.tsig.ssl.redirect</code> is set to <code>true</code>, this option allows you to specify the port from which traffic is redirected.</p> <p>Default: 80.</p>	N/A

### Independent Gateway to Tableau Server

This section describes how to encrypt the connection between the Independent Gateway and Tableau Server.

## Step 1: Configure and enable TLS on Tableau Server

See [Configure SSL for External HTTP Traffic to and from Tableau Server](#).

Note that "SSL" is actually a TLS implementation, and "external" refers to an external connection to Tableau Server. In this scenario, the Independent Gateway is the "external" connection.

We recommend enabling and verifying that clients can connect with TLS directly to Tableau Server before configuring Independent Gateway.

## Step 2: Distribute certificate files on Independent Gateway computers

You will need to distribute certificate files on the Independent Gateway computers if either of the following are true:

- You are using self-signed or PKI certificates for the TLS certificates on the Tableau Server deployment.
- You are enabling mutual TLS on the connection from Independent Gateway to Tableau Server.

As with all TLS-related files on Independent Gateway computers, you must put the files in the same paths on each computer. All file names for TLS shared files must also be the same.

## Step 3: Set TLS configuration properties on Tableau Server

Most of the TSM configuration keys in the following table are derived from Apache httpd directives. As such, the configuration values for these TSM configuration keys map directly to the valid values for the corresponding Apache directive. Links to corresponding directives are included in the following table.

In some cases, the configuration will use fallback configurations if a particular key is not set. These are called out in the table below.

## Tableau Server on Windows Help

The configuration options in the following table refer to configuration keys that you must set with the `tsm configuration set` command. All commands must include the `--force-keys` option. For example:

```
tsm configuration set -k gateway.tsig.ssl.enabled -v true --force-keys
```

After you have set the configuration keys, you must run `tsm pending-changes apply`.

Configuration property	Description	Corresponding Apache directive
gateway.tsig.ssl.proxy.cacertificatefile	If your organisation uses a self-signed or PKI-generated TLS certificate for Tableau Server, then you must specify a path to the root CA certificate file. This root CA certificate file must be stored on the Independent Gateway computers.	<a href="#">SSLProxyCACertificateFile</a>
gateway.tsig.ssl.proxy.protocols  Fallback: ssl.protocols	Specify supported versions of SSL/TLS. See Security Hardening Checklist for	<a href="#">SSLProtocols</a>

	more information about default configuration.	
gateway.tsig.ssl.proxy.ciphersuite  Fallback: ssl.ciphersuite	Specifies ciphers that the client is permitted to negotiate for SSL connection.	<a href="#">SSLCipherSuite</a>
gateway.tsig.ssl.proxy.machinecertificatefile	For mutual TLS. Specifies the file containing concatenated certificate-key pairs for authentication of the Independent Gateway to Tableau Server.	<a href="#">SSLProxyMachineCertificateFile</a>
gateway.tsig.ssl.proxy.verify	Specify whether Independent Gateway should verify the certificate presented by Tableau Server.	<a href="#">SSLProxyVerify</a>

	Defaults to require.	
gateway.tsig.ssl.proxy.checkpeername	Specify whether Independent Gateway inspects Tableau Server certificate to verify that subject name matches server name.  Defaults to off.	SSLProxyCheckPeerName
gateway.tsig.ssl.proxy.checkpeerexpire	Specify whether Independent Gateway inspects Tableau Server certificate to verify expiry:  Defaults to off.	SSLProxyCheckPeerExpire

## Step 4: Upload root CA certificate to Tableau Server

If the TLS certificate that you are using on the Independent Gateway computers is a self-signed or PKI-generated certificate, then you must perform this additional step. If the TLS certificate that you are using on the Independent Gateway computer is a certificate from a trusted third-party certificate authority, then you can skip this step.

Copy the root CA certificate used for the Independent Gateway computers to the initial node of Tableau Sever, and then run the following commands:

```
tsm security custom-cert add -c <root-certificate-file-name>.pem  
tsm pending-changes apply
```

### Housekeeping connection between Tableau Server and Independent Gateway

The housekeeping (HK) process maintains configuration state between the backend Tableau Server deployment and the Independent Gateway.

When Independent Gateway is installed, the default configuration provides an unencrypted HTTP connection. Independent Gateway listens for housekeeping requests originating in the Tableau Server cluster (as you defined it during installation).

If you are running multiple instances of Independent Gateway, then all servers must accept housekeeping requests with TLS or all without TLS. This section describes how to configure HK connection for TLS. This process requires restarting Tableau Server and will result in downtime.

As with the previous TLS scenarios described above, many of the configuration changes for HK connection are set on configuration properties managed by the Tableau Server cluster. However, HK TLS configuration requires additional steps on Independent Gateway.

## Step 1: Distribute files to Independent Gateway computers

If you have enabled TLS with external network and Independent Gateway, you may use the same certificate and key files for the HK connection.

If you are using the same assets, then the only other certificate file that you need to distribute is the root CA certificate for the certificate used by Tableau Server. If the TLS certificate presented by Tableau Server is generated by a trusted third-party CA, then you do not need to copy a root CA certificate to the Independent Gateway computers.

1. Place certificates and related files in a location and with permissions that allow the Independent Gateway service (tsig-httpd) to read them. We recommend restricting access to the key files such that only the Independent Gateway service can read them.
2. Place all files, certificates and keys in exactly the same locations on all Independent Gateway computers.

## Step 2: Import Independent Gateway root CA certificate into Tableau Server trust store

If the TLS certificate that you are using on the Independent Gateway computers is a self-signed or PKI-generated certificate, then you must perform this additional step. If the TLS certificate that you are using on the Independent Gateway computer is a certificate from a trusted third-party certificate authority, then you can skip this step.

You may only upload one root CA certificate to Tableau Server. Therefore, if you have already uploaded a root CA certificate, then the same root CA certificate must sign the certificate that you will be using for HK connection.

Copy the root CA certificate used for the Independent Gateway computers to the initial node of Tableau Server, and then run the following commands:

```
tsm security custom-cert add -c <root-certificate-file-name>.pem  
tsm pending-changes apply
```

## Step 3: Update environment variables on Independent Gateway computers

On each Independent Gateway computer, set the `TSIG_HK_PROTOCOL` environmental variable to `https`. You may specify an alternative port for HK (default is 21319) by setting the `TSIG_HK_PORT` environment variable as well.

Change these values by re-running the post-install script to provide a different value for `TSIG_HK_PROTOCOL` and `TSIG_HK_PORT`. By default, the script is at `C:\Program Files\Tableau\Tableau Server\independentgateway\scripts\initialize-tsig.bat`.

## Step 4: Update `httpd.conf.stub` on Independent Gateway

You must update the `httpd.conf.stub` file on each Independent Gateway server. The `httpd.conf.stub` file is used to seed the global `httpd` configuration.

The file is located at `TSIG_DATA/config/httpd.conf.stub`.

1. Open the `httpd.conf.stub` file in a text editor. You must update the `<VirtualHost *: ${TSIG_HK_PORT}>` block with HK configuration details. The following example shows the required changes:

```
<VirtualHost *: ${TSIG_HK_PORT}>
    SSLEngine on
    #TLS# SSLHonorCipherOrder on
    #TLS# SSLCompression off
    SSLCertificateFile /etc/ssl/certs/tsig-ssl.crt
    SSLCertificateKeyFile /etc/ssl/private/tsig-ssl.key
    SSLCACertificateFile /etc/ssl/certs/rootTS-CACert.pem
    #TLS# SSLCARevocationFile /path/to/file
</VirtualHost>
```

### Notes:

- By default, each line in the `<VirtualHost *: ${TSIG_HK_PORT}>` block is commented out by the string, `#TLS#`. To "enable" a line in the block, delete the `#TLS#` string at the beginning of the line.
- As with all `httpd` configurations, each referenced file requires an absolute path to the file.
- `SSLCACertificateFile` specifies the root CA certificate for the CA that generates the certificate presented by Tableau Server. You only need to set this if the TLS certificate used by Tableau Server is self-signed or generated by a PKI.

2. Stop the `tsig-httpd` service.



You will start receiving failed status checks at this point, indicating in TSM that your Independent Gateway component is degraded.

3. Copy `httpd.conf.stub` to `httpd.conf`.

The `httpd.conf` file is in the same directory. Overwrite the `httpd.conf` file with the `httpd.conf.stub` file.

4. Start the `tsig-httpd` service.

You will continue receiving failed status checks at this point, indicating in TSM that your Independent Gateway component is degraded. These status checks will fail until you have completed the configuration as described in the following steps.

## Step 5: Set TLS configuration properties on Tableau Server

Applying the configuration changes requires a restart of the server. To avoid long time-out times, we recommend stopping the server before applying changes that you set here. In Step 6, you will run an update command and then restart TSM. Stopping TSM at this phase of the configuration results in a shorter downtime.

1. Stop TSM. Run the following command:

```
tsm stop
```

2. Most of the TSM configuration keys in the following table are derived from Apache `httpd` directives. As such, the configuration values for these TSM configuration keys map directly to the valid values for the corresponding Apache directive. Links to corresponding directives are included in the following table.

There are TSM configuration property names that include the `hk` node in the prefix: `gateway.tsig.hk.xyz.abc`. If set, these values are used for the HK TLS configuration. If not set, many configuration properties will use the fallback to `gateway.tsig.xyz.abc`, which themselves may or may not fall back to `gateway.xyz.abc`. The fallback configuration property is listed when relevant.

The configuration options in the following table refer to configuration keys that you must set with the `tsm configuration set` command. All commands must include the `--force-keys` option. For example:

```
tsm configuration set -k gateway.tsig.hk.ssl.enabled -v true --
force-keys
```

Configuration property	Description	Corresponding Apache directive
gateway.tsig.hk.ssl.enabled  (No fallback)	Required.  Enables TLS. Must be set to <code>true</code> .	N/A
gateway.tsig.hk.ssl.cert.file_ name  Fallback:  gateway.tsig.ssl.cert.file_ name	Path + file name of the certificate file for Independent Gateway. For example, <code>/etc/ssl/certs/tsig-ssl.crt</code> .	SSLCertificateFile
gateway.tsig.hk.ssl.key.file_ name  Fallback:  gateway.tsig.ssl.key.file_ name	Path + file name of the certificate key file for Independent Gateway. For example, <code>/etc/ssl/keys/tsig-ssl.key</code> .	SSLCertificateKeyFile
gateway.tsig.ssl.key.- passphrase.dialog  (Global property)	If your key requires a passphrase, then you must configure this key with the correct string expected by the Apache <code>httpd SSLPassPhraseDialog</code> directive.	SSLPassPhraseDialog

	This configuration is global for Independent Gateway.	
gateway.tsig.hk.ssl.protocols  Fallbacks:  gateway.tsig.ssl.protocols  ssl.protocols	Specify supported versions of SSL/TLS. See Security Hardening Checklist for more information about default configuration.	SSLProtocols
gate- way.tsig.hk.ssl.ciphersuite  Fallbacks:  gateway.tsig.ssl.ciphersuite  ssl.ciphersuite	Specifies ciphers that the client is permitted to negotiate for SSL connection.	SSLCipherSuite
gateway.tsig.hk.ssl.client_certificate_login.required  (No fallback)	Set this value to <code>true</code> to enable mutual TLS on this connection.  You must also set the <code>gate- way.t- sig.hk.ssl.cacert.file</code> property as specified below.	N/A
gate- way.tsig.hk.ssl.cacert.file  Fallback:  gateway.tsig.ssl.cacert.file	Specifies the file containing the concatenated CA certificates for client authentication process.	SSLCACertificateFile
gate-	Specifies the file containing the	SSLCARe-

way.t- sig.hk.ssl.revocation.file  Fallback:  gate- way.t- sig.hk.ssl.revocation.file	concatenated CA revocation lists for clients that connect to Independent Gateway.	<a href="#">vocationFile</a>
------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	------------------------------

3. Apply changes. Run the following command:

```
tsm pending-changes apply.
```

## Step 6 Update Independent Gateway JSON configuration file

The final step is to update the Independent Gateway configuration with a JSON file reflecting the switch to `https` and, if applicable, other port numbers.

Refer to the installation topic for more information about editing this file. See Step 3: Enable Independent Gateway in Tableau Server.

After you have updated the JSON file, run the following commands:

```
tsm topology external-services gateway update -c tsig.json
tsm start
```

### Troubleshooting

For troubleshooting tips, see [Troubleshooting Tableau Server Independent Gateway](#) in the Enterprise Deployment Guide (EDG). The EDG provides an example deployment of Tableau Server on Linux. The troubleshooting steps are useful for Windows or Linux versions of Tableau Server.

## Upgrade Tableau Server Independent Gateway

This topic walks you through the process of upgrading Tableau Server Independent Gateway. The process described in this topic is the same for all version upgrades. This means you can

use this process for major version (for example, 2022.1 to 2023.1) and maintenance version (2022.1.1 to 2023.1.1) upgrades.

You must use an installer for Tableau Server Independent Gateway with a major version that matches the version of Tableau Server. We recommend maintenance versions (2022.1.1 or 2022.1.2, for example) match as well, but this is not a requirement. If "static assets" change between versions and versions do not match, you may see some unexpected image impact. For example, maps may not be up to date if Independent Gateway is an earlier version than Tableau Server.

### Overview

The upgrade process for Independent Gateway is actually a process of uninstalling then reinstalling the software. However, you can minimise configuration and overall downtime by following the process as described in this topic.

The process described in this topic assumes that you have a functional deployment of Tableau Server and Tableau Server Independent Gateway running. If you are upgrading the backend Tableau Server deployment as part of your upgrade, we recommend upgrading the Independent Gateway server(s) first, validating basic connectivity with a Tableau client and then proceeding with the Tableau Server upgrade.

The steps detailed in this topic are summarised here:

1. Copy some existing files for use during upgrade.
2. Run the obliterate script to remove Independent Gateway.
3. Install new version of Independent Gateway.
4. Optional: Overwrite tsighk-auth file with original copy.
5. Update TLS settings.
6. Optional: Update backend Tableau Server
7. Restart Independent Gateway service.

### Step 1: Copy files for reference

You may need to reference the configuration settings stored in the following files. Copy these files to a secure and accessible location (file paths are default location):

- ProgramData\Tableau\tableau\_tsig\config\tsighk-auth.conf
- ProgramData\Tableau\tableau\_tsig\config\httpd.conf.stub
- ProgramData\Tableau\tableau\_tsig\config\environment.bash

## Step 2: Obliterate Independent Gateway

To remove Independent Gateway from the server(s), run the `tableau-tsig-obliterate.cmd` script:

1. On the initial node, open a command prompt as administrator.
2. Run the `tableau-tsig-obliterate.cmd` script:

```
C:\Program Files\Tableau\tableau_tsig\packages\scripts.<version_code>\tableau-tsig-obliterate.cmd -y -y -y
```

3. Restart the computer.

## Step 3: Install Independent Gateway

Download the version of Independent Gateway that you want to upgrade to and then follow the same installation procedure as described in the topic, [Install Tableau Server with Independent Gateway](#).

As with the original installation, you will need to specify initialisation settings as part of setup. To use the same values, reference the `environment.bash` file that you copied in step 1. Do not overwrite the new bash file with the original.

## Step 4: (Optional) Overwrite tsighk-auth file with original copy

The `tsighk-auth` file is a configuration file that stores a unique string called the `authsecret`. The `authsecret` is used to verify that the backend Tableau Server is communicating with a trusted instance of Independent Gateway. When you set up the original instance of Independent Gateway, you had to update a configuration file on the backend Tableau Server with the `authsecret`.

If your security policy allows it, you can continue to use the original authsecret on Independent Gateway. Doing so avoids the process of updating and restarting the backend Tableau Server with a new authsecret.

To maintain the original authsecret, overwrite the `tsighk-auth.conf` file (located at `ProgramData\Tableau\tableau_tsig\config\tsighk-auth.conf`) with the copy that you saved in step 1.

If your security policy requires that you refresh the authsecret, then make note of the new authsecret that was generated by the installation process. You will update the backend Tableau Server with the new authsecret later in the process.

### Step 5: Update housekeeping TLS settings

If you did not configure TLS for housekeeping (HK) communication between Independent Gateway instance(s) and the backend Tableau Server deployment, then you can skip this step.

If you configured HK TLS, then you must manually copy the configuration from the original `httpd.conf.stub` file into the file located at `ProgramData\Tableau\tableau_tsig\config\httpd.conf.stub`. Do not overwrite the new file with the original file, as the newer file may include other settings.

1. Update the relevant TLS configuration settings in the following block:

```
<VirtualHost *: ${TSIG_HK_PORT}>
    SSLEngine on
    #TLS# SSLHonorCipherOrder on
    #TLS# SSLCompression off
    SSLCertificateFile /etc/ssl/certs/tsig-ssl.crt
    SSLCertificateKeyFile /etc/ssl/private/tsig-ssl.key
    SSLCACertificateFile /etc/ssl/certs/rootTS-CACert.pem
    #TLS# SSLCARevocationFile /path/to/file
</VirtualHost>
```

For more information about these settings, see [Configure TLS on Independent Gateway](#).

2. When you have finished updating `httpd.conf.stub`, save it.
3. Copy `httpd.conf.stub` and then save to overwrite `httpd.conf` in the same directory.

#### Step 6: (Optional) Update backend Tableau Server deployment

If you copied the original authsecret file (`tsighk-auth.conf`) to the new instance of Independent Gateway as described in step 4, then you may skip this step.

If you are refreshing the authsecret in the backend Tableau Server deployment, then you must update the `tsig.json` file on the initial node with the new authsecret. See [Install Tableau Server with Independent Gateway](#). When you are finished, run the following TSM commands:

```
tсм stop

tсм topology external-services gateway update -c tsig.json

tсм start
```

#### Step 7: Restart the tsig-httpd service

When you have finished with the configuration, restart the `tsig-httpd` service.

## Uninstall Tableau Server Independent Gateway

This topic walks you through the process of uninstalling Tableau Server Independent Gateway.

### Uninstalling Independent Gateway

Uninstalling Independent Gateway is a two-step process:



1. Disable the Independent Gateway instance in Tableau Server using TSM.

To disable Independent Gateway in Tableau Server, run this command at the command prompt of the initial Tableau Server node:

```
tsm topology external-services gateway disable
```

2. Uninstall the Independent Gateway instance you are upgrading from the computer it is running on.

To uninstall Independent Gateway from a Windows computer, run the Setup program and select Uninstall. When the Setup program finishes, Independent Gateway has been uninstalled.

To uninstall an instance of Independent Gateway, remove it from the server cluster using TSM, and then, after Tableau Server is fully reconfigured, uninstall Independent Gateway from the computer where it was installed. When you use TSM to remove the instance from Tableau Server, TSM no longer sends any communication to the Independent Gateway instance, so Independent Gateway is unaware of any configuration changes. However, the Independent Gateway continues to respond based on the last known configuration and Tableau Server continues to accept those responses. You also need to remove the Independent Gateway instance from the computer it is running on.

## Install Switches and Properties for Tableau Server Independent Gateway

Switch	Description	Comments
/install /repair /uninstall /layout "<directory>"	Run Setup to either install, repair or uninstall Tableau Server Independent Gateway, or with /layout, create a complete local copy of the installation	Default is to install, displaying UI and all prompts. If no directory is specified on a fresh install, C:\Program Files\Tableau\Tableau Server\independentgateway is assumed. If TSIG is already installed, Setup will assume the same location as the current

	bundle in the directory specified.	installation.
<code>/passive</code>	Run Setup with minimal UI and no prompts.	
<code>/quiet   /silent</code>	Run Setup in unattended, fully silent mode. No UI or prompts are displayed.	<p><b>Note:</b> Use either <code>/silent</code> or <code>/quiet</code>, not both.</p>
<code>/norestart</code>	Run Setup without restarting Windows, even if a restart is necessary.	<p><b>Note:</b> In certain rare cases, a restart cannot be suppressed, even when this option is used. This is most likely when an earlier system restart was skipped, for example, during installation of other software.</p>
<code>/log "&lt;drive&gt;\&lt;path&gt;\&lt;-log-file&gt;.&lt;ext&gt;"</code>	Log information to the specified file and path.	<p>Use this switch with a path and log file name to make the log available after installation is complete.</p> <p>If this switch is used with a log file name but no path, the log file is written to a temporary location and deleted at the end of the installation.</p>

		<p>If this switch is used but no log file name is specified, the switch is ignored and the file is written to %TEMP%.</p> <p>If this switch is not used, the log file is written to %TEMP%.</p>
--	--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Properties	Description	Comments
ACCEPTTEULA=1   0	Accept the End User Licence Agreement (EULA). Required for quiet, silent and passive install on both initial and additional nodes. 1 = true, accept the EULA, 0 = false, do not accept the EULA.	<p>If not included when using /passive, /silent or /quiet, Setup fails silently.</p> <p>If included but set to 0, Setup fails.</p>
DATADIR- =<path\to\data- a\directory>"	Optional. The location where the TSIG software configuration and data are stored. If you don't provide a data directory path and TSIG is being installed to the default location (INSTALLDIR is not specified), the default data directory is used: C:\ProgramData\T-	<p>Example: DATADIR- ="D:\- \TableauServerData"</p>

	ableau\Tableau Server. If you don't provide a data directory path and INSTALLDIR is specified, DATADIR is also set to the INSTALLDIR location.	
HKPORT=" <code>&lt;port&gt;</code> "	Port listening for house-keeping requests from the Tableau Server cluster.  Default is 21319.	
HKPROTOCOL=" <code>&lt;protocol&gt;</code> "	Protocol for house-keeping requests.  Options are <code>http</code> or <code>https</code> . Default is <code>http</code> .	
INSTALLDIR= <code>"&lt;path\to\i-installation\directory&gt;"</code>	Install to the specified non-default install location.	Specifies the location to install server. If not used, Tableau Server Independent Gateway is installed to <code>C:\Program Files\Tableau\Server-independentgateway</code>  <b>Example:</b> <code>&lt;Setup file&gt; /silent INSTALLDIR-</code>

		= "D:\- \Tableau\Tableau Server- \inde- pendentgateway"
INSTANCEID="<computer_iden- tifier>"	A unique identifier for this TSIG instance.  Default is "%COMPUTERNAME%".	
PORT="<port>"	Port listening for external requests.  Default is "80".	
PROTOCOL="<protocol>"	Protocol for external requests. Choices are http or https. Default is http.	
TSCLUSTER="<nodes>"	Network location(s) of the Tableau Server nodes from which TSIG housekeeping requests can be received.  These are all nodes with Cluster Controller or Administration Agent, which includes all nodes in the cluster.  This is required. There	Must be one of the forms acceptable to Apache HTTPD mod_auth_host "Require" directive ( <a href="https://httpd.apache.org/docs/2.4/mod/mod_auth_host.html">https://ht- tpd.a- pache.or- g/docs/2.4/mod/mod_ auth_host.html</a> ).  Examples: "ip 192.1.168.0/24", "host ts.ex-

	is no default for this option.	ample.org".  Use quotes if there are embedded spaces.

## Tableau Server Backgrounder Resource Limits

Tableau Server Backgrounder resource limits feature was introduced in Tableau Server 2022.1.

### Overview and Concepts

#### What it is

The Backgrounder resource limits feature gives you the ability to manage Backgrounder resources and control how they are used. Starting in 2022.1, you can set limits on the number of background jobs that can run at the same time on a site. You can also specify the number of Backgrounder hours that a site can use to run jobs per day.

Default limits can be applied to all sites, but you can also set custom limits per site. This gives you the ability to manage the Backgrounder resources based on the specific requirements for a site.

#### When to use it

Use this feature when you want to make sure the resources are used where they are most needed. More importantly, you can prevent a single site from consuming a lot of backgrounder resources, thus impacting job completion or job queue time on other sites.

If you are currently experiencing unbalanced Backgrounder resource usage or delays in background job completions, use this feature to optimise resource usage that is right for your organisational needs and content priorities.

## Requirements and recommendations

1. This feature requires that Tableau Server be enabled with a **Advanced Management** licence.
2. A new Tableau Server process called **Resource Limits Manager** is required to enforce the set resource limits. When you install or upgrade to Tableau Server 2022.1 or later, this process is automatically configured on the initial node.
  - We recommend having at least 5 Backgrounder processes in total running on Tableau Server for Backgrounder resource limits feature to run optimally. The default configuration and topology recommendations are described in detail in the Tableau Server Resource Limits Manager.
  - We do not recommend adding more Resource Limits Manager processes to your Tableau Server. The automatically installed process on the initial node is sufficient.

## Terminology and concepts

- **Site job limits:** The background jobs concurrency and runtime limits for a site.
- **Default site limits:** The default jobs concurrency and runtime limits for a site.
- **Custom site limits:** Site limits specific to that site.
- **Job type:** Same as the task type. Includes extract refreshes, subscriptions and flows.
- **Concurrent jobs limits:** The maximum number of jobs of a specific type that can run at the same time. The maximum number is equal to the total number of Backgrounder processes deployed on the Server.
- **Daily limit:** The daily limit includes runtime limits and the reset time.
- **Runtime limit:** This is the total number of Backgrounder job hours allotted for a site per day. The maximum number is equal to the total number of Backgrounder processes deployed on the Server multiplied by 24, 24 being the number of hours in a full day.
- **Reset time:** The time at which the daily limits are reset. This is automatically set to midnight UTC and cannot be changed.
- **No limit:** This is the same as if there are no resource limits configured. In this case, the jobs on a site that can run in parallel could use all the available backgrounder processes on Tableau Server.

## What you can do

**As a Tableau Server administrator,**

1. You can specify concurrency jobs limit for each task type – extract refreshes, subscriptions and flows. This limit controls the number of background jobs on a site that can be run at the same time, for a given task type. The limits are unique to each task type, meaning you can set different limits for extract refreshes, subscriptions and flows.
2. You can specify the number of Backgrounder hours a site can use to run jobs in a 24-hour period – the daily job run time limit. Unlike the concurrency jobs limit, the daily job runtime limit is cumulative across all task types.
3. You can find out how many Backgrounder hours have been used by a site in the last 24-hour time period.
4. You can see when a job is delayed due to set concurrency limits.
5. You can identify when a job is cancelled due to lack of available Backgrounder resources.

You can see the job status and details on the Managing Background Jobs in Tableau Server page.

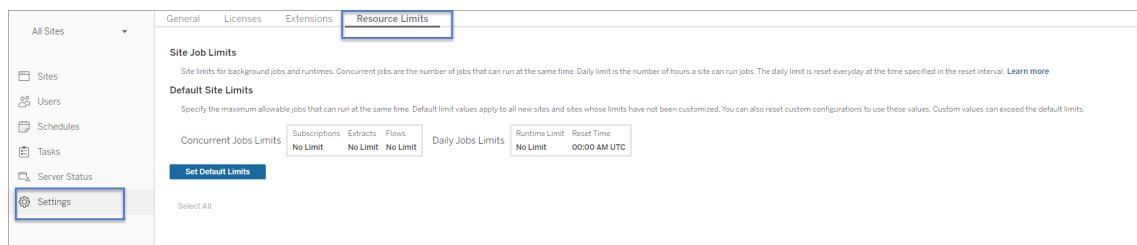
**As a task owner**, you will receive an email when your background job is cancelled because the site reached its daily runtime limit.

## How to set Backgrounder resource limits

Tableau Server does not automatically set any resource limits. Until you configure resource limits, there is no resource limitation on backgrounder resource usage.

To set resource limits for the first time or make changes thereafter, navigate to the **Settings** page, and select the **Resource Limits** tab.

**You can only configure custom limits once you have configured the default limits.**





### Default site limits

Default site limits are set at the server level so they can be applied to all sites. Changes to default site limits apply to all new sites and any existing sites that are set to use default limits. Sites that have custom limits will not be affected by this change.

- **Concurrent Jobs Limits** and the **Daily Runtime Limits** must be specified in whole numbers.
- Changes to default site limits are effective immediately and do not require a server restart.

To set default limits for the first time, on the **Resource Limits** tab, select **Set Default Limits**. If you are making updates to existing default limits, select **Edit Default Limits**.

The screenshot shows the 'Resource Limits' configuration page in Tableau Server. The 'Default Site Limits' section is active, displaying 'Concurrent Jobs Limits' for Subscriptions (10), Extracts (10), and Flows (10). The 'Daily Jobs Limits' section shows a 'Runtime Limit' of 20 hours and a 'Reset Time' of 00:00 AM UTC. An 'Edit Default Limits' dialog box is open, allowing selection of 'No Limit' or 'Default Limits' for Concurrent Jobs and Daily Limit, with input fields for values.

Concurrent Jobs Limits	No Limit	Default Limits
How many <b>subscriptions</b> can run at the same time?	<input type="checkbox"/>	10
How many <b>extract refreshes</b> can run at the same time?	<input type="checkbox"/>	10
How many <b>Prep Builder flows</b> can run at the same time?	<input type="checkbox"/>	10

Daily Limit	No Limit	Default Limits
How many <b>Backgrounder hours</b> can this site use to run jobs?	<input type="checkbox"/>	20

### Custom site limits

For certain sites, you may need more or fewer resources than the default limits. This depends on the amount of content you have on the site and their importance to your business operations. When the default values are not the right capacity for a site, you can set custom resource limits for that site. Custom site limits can exceed default limits.

- **Concurrent Jobs Limits** and the **Daily Runtime Limits** must be specified in whole numbers.
- Changes to custom site limits are effective immediately and do not require a server restart.

To configure custom limits for a site, on the **Resource limits tab**, under **Actions**, click on the ellipsis and select **Customise Site Limits**.

Site name	Actions	Configuration	Subscriptions	Extracts	Flows	Runtime limits	Actual runtime (since reset)	Jobs
Default	...	Default	10	10	10	20 hours	20.2 hours	<a href="#">Default Jobs Page</a>
Marketing		<div> Revert to Default Limits... Customize Site Limits... </div>	83	13	84	47 hours	47.0 hours	<a href="#">Marketing Jobs Page</a>
Finance	...	Custom	87	24	84	92 hours	0.0 hours	<a href="#">Finance Jobs Page</a>

## What happens after you configure resource limits

Once you set the resource limits for your sites, Tableau Server monitors and keeps track of the background resource usage, and makes sure the appropriate limits are enforced.

Jobs are placed in a queue when the site is at its maximum concurrency limit and will not run until a job that is currently running on that site is complete and Background capacity becomes available.

If, after 12 hours, there is still no concurrency resource available, jobs that are still pending will be removed from the queue. At the end of the daily runtime limit, **any pending jobs will be cancelled for the day** and the task owner will receive a notification.

This feature requires Tableau Server to be activated with a valid Server Management licence, without which, the limits are not enforced. If the licence is invalid or deactivated for any reason, previously configured limits are saved and will be enforced once the licence issue has been resolved.

## When to make adjustments to the resource limits

*Before making configuration changes, make sure that Tableau Server is running and is in a good state.*

You can use the [jobs](#) page to identify jobs that are pending or cancelled, and then determine which of those were due to resource limits.

Here are some patterns to monitor and make adjustments to the resource limits:

- If you are seeing that one or more jobs on a site are consistently getting cancelled, you may need to increase the daily runtime limits.
- If you are seeing that jobs on a site are consistently getting cancelled early in the day, it probably means that the daily job runtime is not enough for that site.
- If you are consistently seeing several jobs of a particular type stay pending over a period of time, you may want to consider increasing the concurrent jobs limits for that task type. Alternatively, consider scheduling the tasks over different time periods so that everything is not running at the same time. Also, you may want to consider creating schedules that are spread over a longer period so that tasks are not all scheduled to run too closely to one another.
- If you don't want to change the resource limits in the situations described above, you can choose to adjust the frequency of when the jobs are scheduled to run. For example, if the job is scheduled to run every hour, adjust it to run on a less frequent schedule.

Who can do this

Tableau Server Administrators can configure resource limits.

A Tableau Server user who owns extract refresh, subscription or flow run tasks will receive email notifications when their jobs are cancelled.

## About Data Management

**Important:** Beginning 15 September 2024, Data Management will no longer be sold as an independent add-on option. After 15 September 2024, features and functionality in Data Management will be offered via certain licence editions. Existing deployments with Data Management remain unaffected. More details will be announced in the coming months. For more information, contact your Sales Account team.

Data Management is a collection of features and functionalities that helps customers manage Tableau content and data assets in their Tableau Server or Tableau Cloud environment.

Starting in Tableau Server 2019.1, Tableau Prep Conductor is available for on-premise Tableau Server deployments, and in version 2019.3, Tableau Prep Conductor is available for Tableau Cloud deployments. You can use Tableau Prep Conductor to schedule and monitor flows.

Starting in Tableau 2019.3, Tableau Catalog is included in Data Management, making a variety of additional features available to you in the data management space. You can use Tableau Catalog to discover data, curate data assets, communicate data quality, perform impact analysis and trace the lineage of data used in Tableau content.

Starting in Tableau 2021.4, more governance and security features were added to Data Management: virtual connections and data policies. Using the virtual connection editor, you can create:

- Virtual connections that provide a sharable central access point to data.
- Data policies to apply row-level security at the connection level.

Tableau Catalog, Tableau Prep Conductor, virtual connections and data policies are licensed through Data Management. For more information about licensing, see [Licence Data Management](#).

To purchase Data Management, contact your account manager.

## Data Management Features

The following table lists the features for Data Management, which includes:

- Tableau Catalog
- Tableau Prep Conductor
- Virtual connections
- Data policies

### Tableau Catalog

These features require Data Management with [Tableau Catalog enabled](#).

Feature	Description	
Permissions on metadata	Tableau Catalog enables you to control who can see and manage external assets and what metadata is shown through lineage by setting permissions.	
Expanded connect experience – data discovery	Whether you author in the web or in <a href="#">Tableau Desktop</a> , you can now search for and connect to the specific databases and tables used by published data sources and workbooks on your <a href="#">Tableau Server</a> or <a href="#">Tableau Cloud</a> site.	
<a href="#">Expanded search</a>	Tableau Catalog expands search to include results based on columns, databases and tables.	
<a href="#">Tag external assets</a>	You can categorise items on Tableau Server and Tableau Cloud with tags, helping users to filter external assets (databases, files, tables and columns).	
<a href="#">Certify databases and tables</a>	Help users find trusted data that meets the standards you set by certifying databases and tables.	
<a href="#">Set data quality warnings</a>	You can set warnings to alert users to data quality issues, such as stale or deprecated data.	
<a href="#">Lineage and impact analysis</a>	The Lineage tool traces the source of your data. You can use it to analyse the impact of changes to your data, identify which users might be impacted, and <a href="#">email owners</a> of a workbook, data source or flow, or contacts for a database or table, about data-related updates.	
<a href="#">Data Details</a>	Enable users to better understand a published visualisation by seeing information about the data used.	
<a href="#">Add descriptions to assets</a>	Help users find the data they're looking for by adding descriptions to databases, tables and columns.	
Developer resources	Tableau REST API - <a href="#">metadata methods</a>	Programmatically add, update and remove external assets; and add additional metadata to Tableau content and external

Feature	Description	
		assets like descriptions.
	Tableau Metadata API	<p>Programmatically query metadata from the content published to Tableau Server or Tableau Cloud. Programmatically update certain metadata using the <a href="#">metadata methods</a> in the Tableau Server REST API.</p> <p><b>Note:</b> The Metadata API does not require Data Management.</p>
	GraphiQL	<p>Explore and test queries against the Metadata API schema using an interactive in-browser tool called GraphiQL.</p> <p><b>Note:</b> GraphiQL does not require Data Management.</p>

## Tableau Prep Conductor

These features require Data Management with Tableau Prep Conductor enabled on [Tableau Server](#) or [Tableau Cloud](#).

Feature	Description
<i>Schedule Flow Tasks</i> in the <a href="#">Tableau Cloud</a> or <a href="#">Tableau Server</a> help.	You can create scheduled flow tasks to run a flow at a specific time or on a recurring basis.
Monitor Flow Health and Performance	Set up email notifications at the site or server level when flows fail, view and resume suspended flow tasks and view errors and alerts.
Administrative Views for Flows	Use Administrative Views to monitor the activities related to flows, performance history and the disk space used at the server or site level.
Tableau REST API - <a href="#">flow</a>	Programmatically schedule flows.

Feature	Description
<a href="#">methods</a>	

## Virtual connections and data policies

These features require Data Management.

Feature	Description
Create a Virtual Connection	A Tableau content type that enables you to create a shareable reusable connection to curated data.
Create a Data Policy for Row-Level Security	Use the virtual connection editor to create data policies with policy conditions that apply row-level security to the data at the connection level.
Test Row-Level Security with Preview as User	Test the data policy with Preview as user to ensure that users can see only their data.
Schedule Extract Refreshes for a Virtual Connection	Create an extract refresh schedule for the tables in your connection, ensuring that the data is fresh for any content that uses that virtual connection.

## Licence Data Management

Data Management includes Tableau Catalog, Tableau Prep Conductor, virtual connections and data policies. Contact your account manager (or go to the Tableau [pricing](#) page) to purchase Data Management.

Data Management can only be activated on a licensed Tableau Server Deployment. A Deployment includes a licensed production Tableau Server installation and licensed non-production Tableau Server installations that support the production installation. For more information on Deployment, see the [EULA Documentation](#).

## Tableau Prep Conductor

After you purchase and license Data Management, you must enable Prep Conductor on Tableau Server. For more information, see [Enable and Configure Tableau Prep Conductor on Tableau Server](#).

- When Data Management is active and enabled, you can schedule flows in Tableau Server or Tableau Cloud and monitor flows.
- When Data Management is removed or deactivated, or if the Data Management licence expires, then the ability to schedule flows is disabled.
- If your Tableau Server or Tableau Cloud licence is still active and valid, you can download the flows using the Tableau Server REST API. For more information, see [Flow Methods](#).

## Tableau Catalog

After you purchase and license Data Management, you must enable Catalog on Tableau Server. For more information, see [Enable Tableau Catalog](#).

- When Data Management is active and enabled, you can use Tableau Catalog to discover data, curate data assets, perform impact analysis and trace the lineage of data used in Tableau content.
- When Data Management is removed or deactivated, or the licence expires, the information remains on the server. The Tableau Catalog-specific information is then only accessible using the Tableau Metadata API; it no longer appears in the product. For more information, see the [Metadata API](#).
- When Data Management is removed or deactivated, or the licence expires, the write APIs for all new Tableau Catalog information (for example, table descriptions, data quality warnings, column descriptions) are disabled. You can still read information using the Metadata API, however permissions on tables and databases can't be explicitly managed in the product.

## Virtual connections and data policies

After you purchase and license Data Management for Tableau, virtual connections and data policies are automatically enabled.



- When Data Management is active and enabled, you can use virtual connections to create sharable resources that provide a central access point to data. You can also create data policies that enable you to filter data for users using centralised row-level security.
- When Data Management is removed or deactivated, or the licence expires, the information remains on the server but is not accessible.
- When Data Management is reactivated, the information is restored on the server and becomes accessible.

## How Data Management licensing works

A Tableau Server Deployment may be user-based or core-based, depending on which licence you purchase.

### User-Based

A User-Based licence metric allows you to deploy Tableau Server on a single computer or on multiple computers in a cluster. Each user that accesses Tableau Server must be licensed. Administrators add users and license them. The first Creator or Explorer product key that you add to Tableau Server activates Tableau Server and will be used by a Server Administrator.

The Data Management product key enables the included features at the deployment level, and those features are licensed for all the users that are already licensed for Tableau Server.

### Core-Based

A Core-Based licence metric imposes no constraints on the number of user accounts in Tableau Server. Instead, the licence specifies the maximum number of computer cores on which you can run Tableau Server.

**Note:** When you purchase and use core-based licensing, you must apply both the Data Management product key and the Resource Core product key to your Tableau Deployment. The first key allows flows to be run on Tableau Server through the Tableau Prep Conductor and the second key adds the additional cores for the Tableau Prep Conductor nodes. All product keys are available through the [Customer Portal](#).

Typically, the total number of cores in all the computers should not exceed the total number that the Tableau Server licence allows. When you add the Data Management product key to your Tableau server, it includes a specific number of Tableau Prep Conductor cores. In this scenario, the total number of cores on all computers should not exceed the total number that the Tableau Server licence and the Data Management licence together allow.

In this topic, we will refer to the cores licensed through Tableau Server licence as Tableau Server cores, and the cores licensed through Data Management as Tableau Prep Conductor cores.

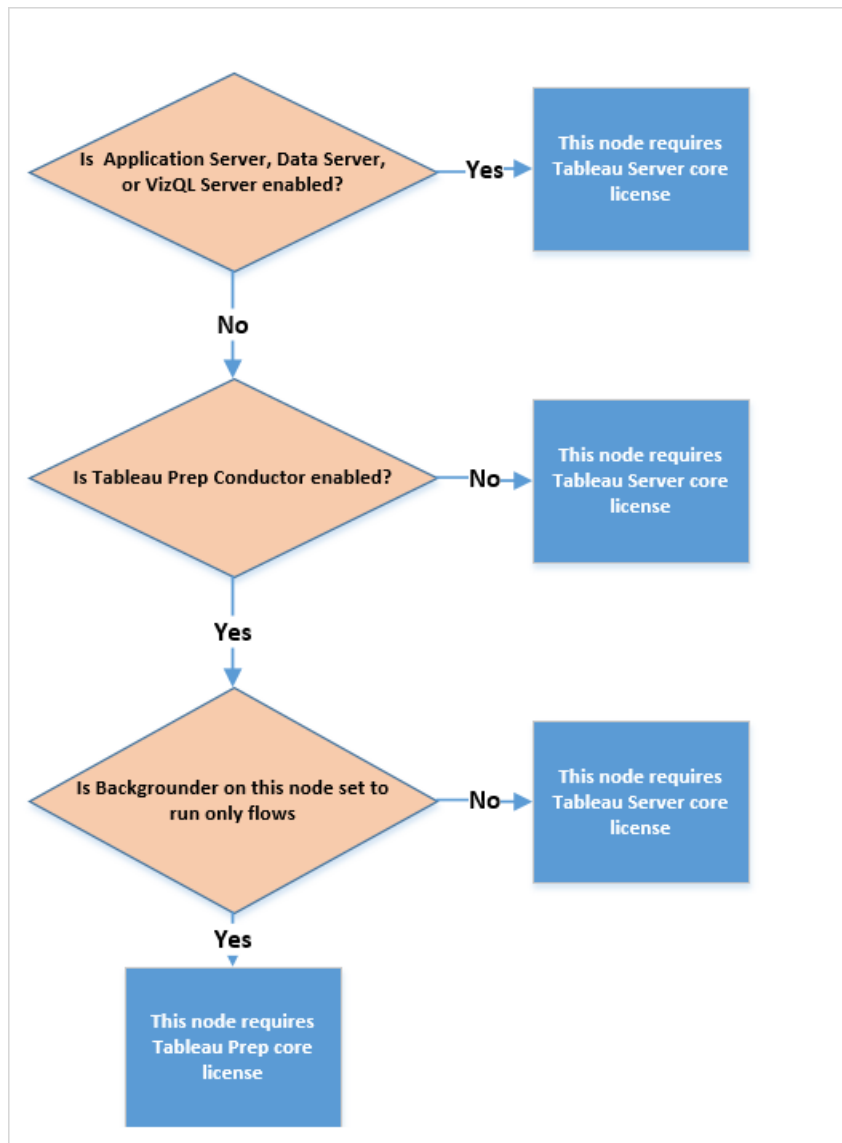
Here are some concepts that apply to how licensing is applied in a Core-Based metric:

- A node can be licensed by only one of type – Tableau Server Cores or Tableau Prep Conductor cores.
- The Tableau Prep Conductor cores are applied to any node that is dedicated to running Tableau Prep Conductor and when the Backgrounder on that node is set to run only flow background jobs. In this case, the total number of cores on this node cannot exceed the number of cores that the Data Management licence allows. If this node has any other licensed process besides Tableau Prep Conductor, Backgrounder and Data Engine enabled, then this node will require and use a Tableau Server core licence.
- As mentioned above, the Backgrounder node role also affects which licence is used by a node. For example, if the Backgrounder node role is set to run jobs of all types (this is the default), then this node will be licensed through the Tableau Server cores. For more information on node roles, see [Node Roles in Tableau Server](#).

See the following table and decision flow to understand how a node is licensed:

If a node has...	the core on the node is counted towards...	the node is licensed using...
one of the following processes enabled: <ul style="list-style-type: none"> <li>• Application Server</li> <li>• Backgrounder (node role is set</li> </ul>	Total count of Tableau Server cores.	Tableau Server cores.

<p>to run all jobs)</p> <ul style="list-style-type: none"><li>• File Store</li><li>• Data Server</li><li>• VizQL Server</li></ul>		
<p>only the following processes enabled:</p> <ul style="list-style-type: none"><li>• Tableau Prep Conductor</li><li>• Backgrounder (node role is set to run only flows)</li><li>• Data Engine</li></ul>	<p>Total number of Tableau Prep Cores purchased through Data Management.</p> <div><p><b>Note:</b> If there are no Tableau Prep Conductor cores available, but Tableau Server cores are available, then Tableau Server cores are used.</p></div>	<p>Tableau Prep Cores included in Data Management.</p> <div><p><b>Note:</b> If there are no Tableau Prep Conductor cores available, but Tableau Server cores are available, then Tableau Server cores are used.</p></div>



For more information about licensed processes, see [Tableau Server Processes](#).

To learn more about Tableau Server licensing, see [Tableau Server Licensing Overview](#).

## Tableau Prep Conductor

Tableau Prep Conductor enables you to leverage the scheduling and tracking functionality available in Tableau Server to run your flows automatically to update the flow output. Tableau

Prep Conductor is part of Tableau Data Management, introduced in Tableau Server version 2019.1, and must be enabled to schedule your flows to run.

For more information about the Tableau Prep Conductor process on Tableau Server, see [Tableau Prep Conductor](#)

**Note:** Starting in version 2020.4, the Data Management licence is required to run flows on a schedule and when using REST API to run flows.

Data Management isn't required to publish flows and manually run them on the web, and as a Creator, create and edit flows directly on your server.

Flows created in Tableau Prep Builder must be published to Tableau Server before they can be scheduled to run.

Publishing flows is similar to publishing data sources and workbooks with Tableau Desktop. You can package files with the flow or specify a direct connection to data sources to update the flow input as data changes. If your flow connects to databases, specify the authentication type and set credentials to access the data.

You can also publish a flow to share it with others or to continue editing it on the web. For example, publish an incomplete flow to Tableau Server and then open the flow on the web in Edit mode to continue working on it. You could also create a flow with only Input steps (that are properly configured) and share it with colleagues, who can then download the flow to their computers and create and publish their own flows.

For flows to run, they must include output steps and have no errors or incompatible features. For more information about publishing a flow, see [Publish a Flow to Tableau Server or Tableau Cloud](#). For more information about incompatibility, see [Version Compatibility with Tableau Prep](#).

Keeping track of the health of your flows is easy. If a flow fails to run due to errors, such as a calculation that isn't valid or a connection that's failed, you can fix the error directly in Tableau

Server. You can edit the connection or edit the flow to fix the error, then republish it to pick up where you left off.

The following table shows the flow management features that are available with and without the Data Management and Tableau Prep Conductor enabled.

Data Management with Tableau Prep Conductor enabled	No Data Management
<ul style="list-style-type: none"> <li>• View and monitor the details about your flow, including recent activity in the <b>Content</b> pages.</li> <li>• Edit your flow (starting in version 2020.4).</li> <li>• View the results of the flow runs and any errors in the <b>Run History</b> tab.</li> <li>• Use <b>Administrative Views</b> to monitor server and site activity, including a new view that tracks flow performance history.</li> <li>• Run flows using REST API.</li> <li>• View detailed alerts for failed flow runs.</li> <li>• Set up email notification alerts to send emails to flow owners notifying them when the flow failed to run and why.</li> </ul> <p>For more information about setting up alerts, <a href="#">Monitor Flow Health and Performance</a>.</p>	<ul style="list-style-type: none"> <li>• View the details about your flow, including recent activity in the <b>Content</b> pages.</li> <li>• Edit your flow (starting in version 2020.4).</li> <li>• View and edit your connections on the <b>Connections</b> tab.</li> </ul>

## Enabling Tableau Prep Conductor on Tableau Server

Before you can start publishing flows to your Tableau Server, there are server-level and site-level settings you must configure or verify to prepare your Tableau Server to allow publishing, scheduling and monitoring flows.

Review the following topics to understand Tableau Prep Conductor licensing, and learn how to enable Tableau Prep Conductor:

- **Enable and Configure Tableau Prep Conductor on Tableau Server:** This topic provides step-by-step instructions on how to enable and configure Tableau Prep Conductor, and preparing your Tableau Server to allow publishing, scheduling, managing, and maintaining flows.
- **Licence Data Management**

## About the Flow Workspace

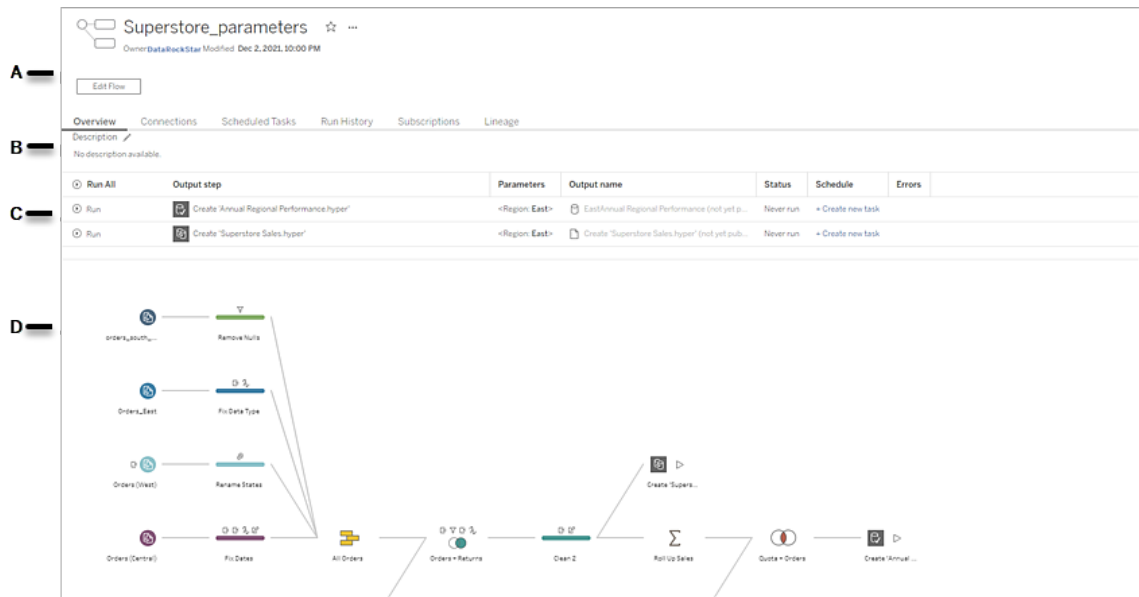
After you publish your flow, you can schedule tasks or linked tasks (version 2021.3 and later) in Tableau Server to automatically run your flows on a regular basis to keep your output data fresh. You can also run your flows manually at any time (no Data Management required).

Tableau Prep Conductor leverages much of the same functionality for managing flows that you might see when managing workbooks or data sources from Tableau Desktop in Tableau Server. For example, just like extract refreshes, scheduled flow tasks and on-demand flow runs are queued as background tasks. But when it comes to working with flows, there are a few differences.

### Flow Overview page

The flow **Overview** page is the main landing page where you can view data about your flow and schedule, monitor and maintain the flow. If you don't have the Data Management, you will have different options.

Open the flow **Overview** page by clicking on a flow in your list. You can navigate there from **Content > Explore > All Flows** or by opening the project that contains your flows.



A. The header lists the name of the flow, the flow owner and the date that the flow was last modified. Starting in version 2020.4, click **Edit** to edit existing flows.


Add a flow to your favourites or from the **More actions** ... menu, you can also edit, run, download the flow, set permissions, change the flow owner, restore previous flow versions and more.

B. View and edit the flow description and set tags to help others find the flows they are looking for.

C. View the output steps for a flow along with any parameters applied to the flow (version 2021.4 and later), the status of the last update, any schedule the output is assigned to and any errors from the last flow run. You can also click the **Run** button to run all output steps or individual output steps on-demand.

<b>Parameters</b>	If the flow includes user parameters, the parameter value last run in the flow is shown and you can see all generated outputs in the <b>Output</b> column. When the flow is run, you'll be prompted to enter the parameter values.
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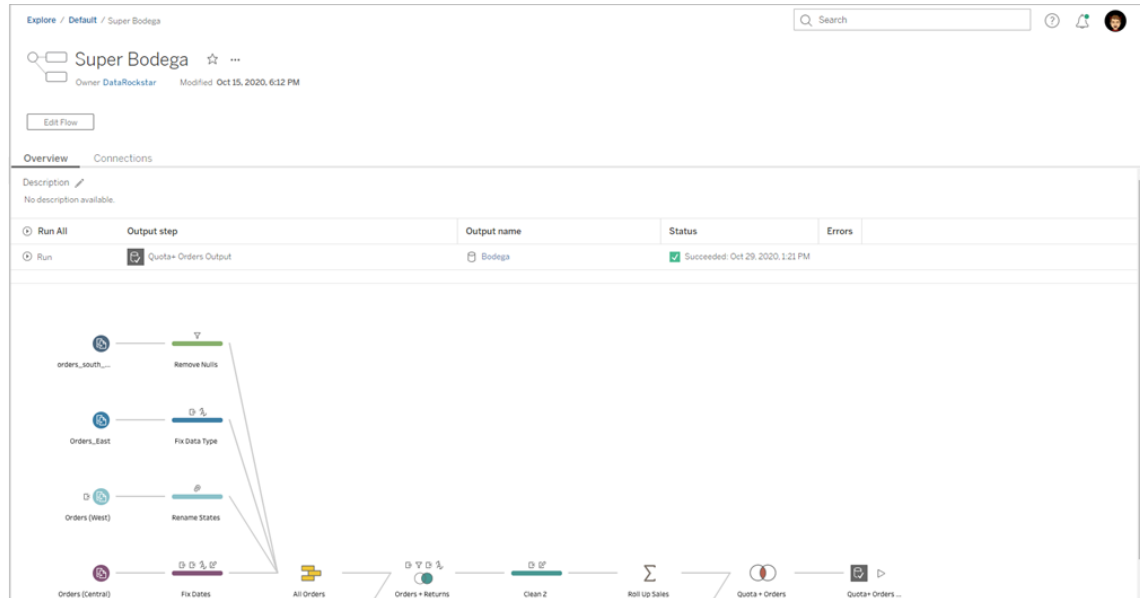


	<p>System parameters (version 2023.2 and later) are automatically generated at flow run time and the type of system parameter is shown in the <b>Parameters</b> column. To see the last system parameter value applied to the flow, edit the flow.</p> <p>For more information about using parameters in flows, see <a href="#">Create and Use Parameters in Flows</a> in the Tableau Prep help.</p>
<b>Status</b>	<p>After a flow has run successfully, outputs that are data sources become links that you can click to open the <b>Data Source</b> page to view more information about the data source or edit the flow input connection.</p>
<b>Schedule</b>	<p>In the <b>Schedule</b> field, view the scheduled tasks that the output step is assigned to. A flow output can be assigned to one or more tasks.</p> <p>If no schedule has been assigned yet, click <b>Create new task</b> to add the output step to a schedule. To immediately run the flow to update a specific output step, click the <b>Run</b>  button on the left-hand side of the row.</p>
<b>Errors</b>	<p>If the flow has errors, the flow run will fail. Connectivity errors can be resolved directly by navigating to the <b>Connections</b> tab for the flow and editing the input connections.</p> <p>To resolve any other flow errors, edit the flow then republish it and try running the flow again. If you are using an earlier version of Tableau Prep Builder, from the <b>More actions</b> ... menu, you can also download and open the flow in Tableau Prep Builder, then republish it and try running the flow again.</p>

D. View an image of the flow.

## Flow Overview page without the Data Management

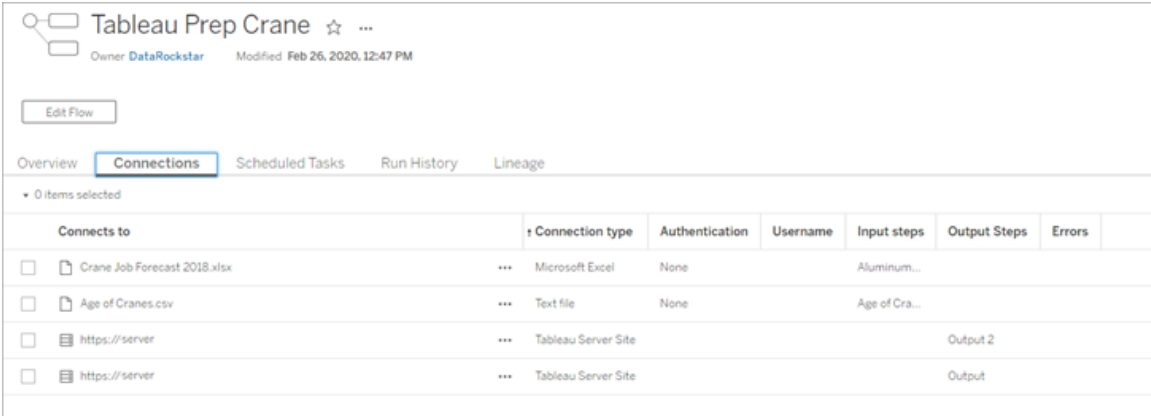
If you don't have the Data Management installed on your server, you can still publish flows to Tableau Server, but you will see fewer options to manage your flow.



## Flow Connections page

View both the input and output locations for a flow, connection types, authentication settings, input and output steps and any connectivity errors. You can set authentication settings when publishing a flow. For more information, see [Publish a Flow](#).

For database input types, click the **More actions** ... menu for an input connection to edit the connection and change the server name, port, username and password.



The screenshot shows the Tableau Prep Crane interface. At the top, it says "Tableau Prep Crane" with a star icon and "Owner DataRockstar" and "Modified Feb 26, 2020, 12:47 PM". Below this is an "Edit Flow" button. The interface has tabs: "Overview", "Connections" (which is selected), "Scheduled Tasks", "Run History", and "Lineage". Below the tabs, it says "0 items selected". The main table has columns: "Connects to", "Connection type", "Authentication", "Username", "Input steps", "Output Steps", and "Errors". There are four rows of connections:

Connects to	Connection type	Authentication	Username	Input steps	Output Steps	Errors
<input type="checkbox"/> Crane Job Forecast 2018.xlsx	Microsoft Excel	None		Aluminum...		
<input type="checkbox"/> Age of Cranes.csv	Text file	None		Age of Cra...		
<input type="checkbox"/> https://server	Tableau Server Site				Output 2	
<input type="checkbox"/> https://server	Tableau Server Site				Output	

Flow Scheduled Tasks page (Data Management required)

View any schedules that the flow is assigned to, the outputs that are included in those schedules and any parameters applied to the flow (version 2021.4 and later). As an administrator, you can click the schedule link to open the **Schedules** page and see a list of flows that are assigned to that schedule. For more information about assigning flows to a schedule, see *Schedule Flow Tasks* in the [Tableau Cloud](#) or [Tableau Server](#) help.

To view the outputs on a schedule or the tasks assigned to a linked task (version 2021.3 and later), click the links in the **Schedule type** column.

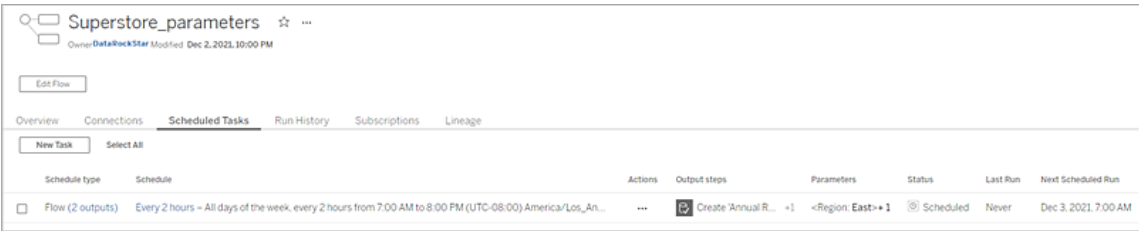
You can also add new tasks or manage existing ones from this page. To take action on an existing task, select the tick box on a task card then click the **Actions** drop-down menu to run, edit or delete the task.

If the flow fails to run after a configured number of consecutive attempts, the flow is automatically suspended.

You can see that status on the **Overview** tab as well as this tab. You can resume suspended tasks from this menu.

For information about how to set the threshold for suspended flow tasks, see [Step 5: Optional Server Configurations](#). For more information about suspended flow tasks, see [View and resolve errors](#).

**Note:** The Scheduled Tasks page for flows was redesigned in version 2021.3. Your view may look different depending on your server version.



Schedules page

On the **Schedules** page, you can view the flows assigned to a schedule and the details about the flow runs. If the schedule includes linked tasks (version 2021.3 and later) the number of flows included in the linked tasks is shown.

You can run the schedule on-demand and run all flows assigned to it. You can also select one or more flows, then use the **Actions** menu to change the flow schedule or priority, delete selected flows from the schedule or resume suspended flows.

For information about how to set up a schedule, see [Step 3: Create Schedules for Flow Tasks](#).

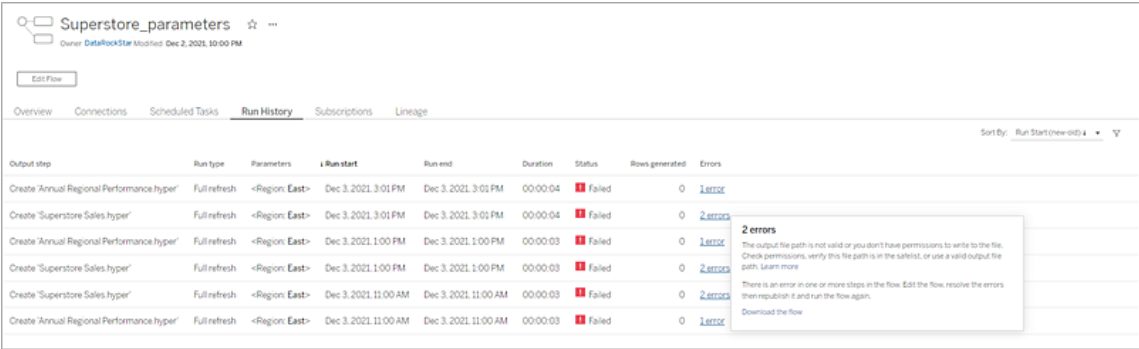
Run Flow - First of the month 1:00AM <span>ⓘ</span> <span>⌵</span>							
Schedule: Every 1 <sup>st</sup> day of the month, at 1:00 AM (UTC-08:00) America/Los_Angeles (next run at: Oct 1, 2021, 1:00 AM)							
Flows 18 Details							
Select All							
Flow	Actions	Output steps	Priority	Status	Last Run	Next Scheduled Run	Errors
<input type="checkbox"/> <a href="#">Superstore_2020.1 RC</a>	...	2 outputs	50	Suspended	Never	Disabled	
<input type="checkbox"/> <a href="#">2019.4 Itcy2 Postgres JDBC</a>	...	1 output	50	Succeeded	Sep 1, 2021, 1:01 AM	Oct 1, 2021, 1:00 AM	
<input type="checkbox"/> <a href="#">Flow1</a>	...	2 outputs	50	Failed	Sep 1, 2021, 1:00 AM	Oct 1, 2021, 1:00 AM	<a href="#">2 errors</a>
<input type="checkbox"/> <a href="#">1102203</a>	...	1 output	50	Succeeded	Sep 1, 2021, 1:04 AM	Oct 1, 2021, 1:00 AM	
<input type="checkbox"/> <a href="#">My Super Test flow</a>	...	2 outputs	50	Scheduled	Never	Oct 1, 2021, 1:00 AM	
<input type="checkbox"/> <a href="#">Linked tasks (1)</a>	...	1 output	50	Succeeded	Sep 1, 2021, 1:12 AM	Oct 1, 2021, 1:00 AM	
<input type="checkbox"/> <a href="#">Linked tasks (2)</a>	...	4 outputs	50	Failed	Sep 1, 2021, 1:00 AM	Oct 1, 2021, 1:00 AM	<a href="#">2 errors</a>
<input type="checkbox"/> <a href="#">Linked tasks (2)</a>	...	1 output	50	Failed	Sep 1, 2021, 1:04 AM	Oct 1, 2021, 1:00 AM	
<input type="checkbox"/> <a href="#">Linked tasks (1)</a>	...	2 outputs	50	Failed	Sep 1, 2021, 1:04 AM	Oct 1, 2021, 1:00 AM	<a href="#">1 error</a>
<input type="checkbox"/> <a href="#">Linked tasks (2)</a>	...	1 output	50	Succeeded	Sep 1, 2021, 1:11 AM	Oct 1, 2021, 1:00 AM	

### Flow Run History (Data Management required)

See, search and sort through a list of historical runs for a flow. This page also includes details about the flow run such as run type, parameter values applied to flows included in each flow run (version 2021.4 and later), duration and number of rows that were generated.

If the flow output has an error, hover over the error to view the messages. If applicable, click the **Go to Connections** link in the error message to navigate to the **Connections** page to fix connectivity errors. You can also edit the flow directly to fix any errors, or click **Download the flow** to download and fix flow errors in Tableau Prep Builder, then republish the flow to continue to manage it using Tableau Prep Conductor.

**Note:** The run history for a flow will persist unless the flow is deleted.

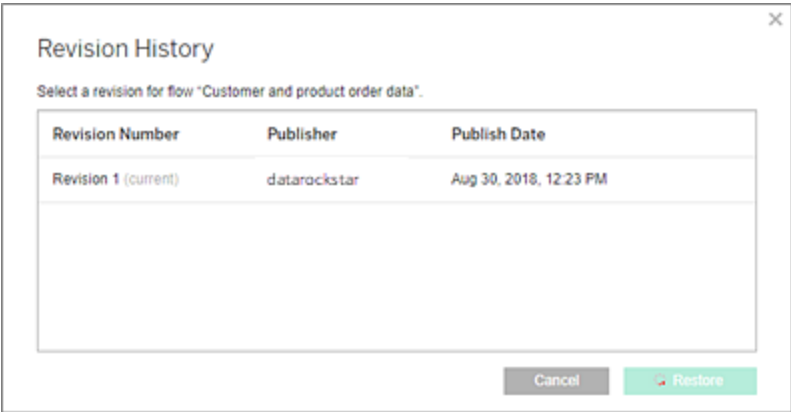


Output step	Run type	Parameters	Run start	Run end	Duration	Status	Rows generated	Errors
Create 'Annual Regional Performance hyper'	Full refresh	<Region: East>	Dec 3, 2021, 3:01 PM	Dec 3, 2021, 3:01 PM	00:00:04	Failed	0	<a href="#">1 error</a>
Create 'Superstore Sales hyper'	Full refresh	<Region: East>	Dec 3, 2021, 3:01 PM	Dec 3, 2021, 3:01 PM	00:00:04	Failed	0	<a href="#">2 errors</a>
Create 'Annual Regional Performance hyper'	Full refresh	<Region: East>	Dec 3, 2021, 1:00 PM	Dec 3, 2021, 1:00 PM	00:00:03	Failed	0	<a href="#">1 error</a>
Create 'Superstore Sales hyper'	Full refresh	<Region: East>	Dec 3, 2021, 1:00 PM	Dec 3, 2021, 1:00 PM	00:00:03	Failed	0	<a href="#">2 errors</a>
Create 'Superstore Sales hyper'	Full refresh	<Region: East>	Dec 3, 2021, 11:00 AM	Dec 3, 2021, 11:00 AM	00:00:03	Failed	0	<a href="#">2 errors</a>
Create 'Annual Regional Performance hyper'	Full refresh	<Region: East>	Dec 3, 2021, 11:00 AM	Dec 3, 2021, 11:00 AM	00:00:03	Failed	0	<a href="#">1 error</a>

**2 errors**  
The output file path is not valid or you don't have permissions to write to the file. Check permissions, verify this file path is in the subroot, or use a valid output file path. [Learn more](#)  
There is an error in one or more steps in the flow. Edit the flow, resolve the errors, then republish it and run the flow again.  
[Download the flow](#)

Flow Revision History

If you need to revert a flow to a previous version, from the **More actions** ... menu for the flow, select **Revision History**. On the **Revision History** dialog, select the flow version from the list that you want to revert to.



Select a revision for flow "Customer and product order data".		
Revision Number	Publisher	Publish Date
Revision 1 (current)	datarockstar	Aug 30, 2018, 12:23 PM

CancelRestore

Who can do this

Server Administrators can activate Data Management licence keys.

Server administrators can enable Tableau Prep Conductor.

Creators can create, edit and run flows manually. If the Data Management is installed, creators can run flows on a schedule.

Enable and Configure Tableau Prep Conductor on Tableau Server

*Supported in Tableau Server version 2019.1 and later.*

## Tableau Server on Windows Help


Tableau Prep Conductor is licensed through Data Management, on a per-Deployment basis, which is User-Based or Core-Based. A Deployment includes a licensed production Tableau Server installation and licensed non-production Tableau Server installations that support the production installation. For more information on Deployment, see the [Tableau Deployment Guide](#).

For more information on how Tableau Prep Conductor licensing works, see Licence Data Management.

### Server Topology

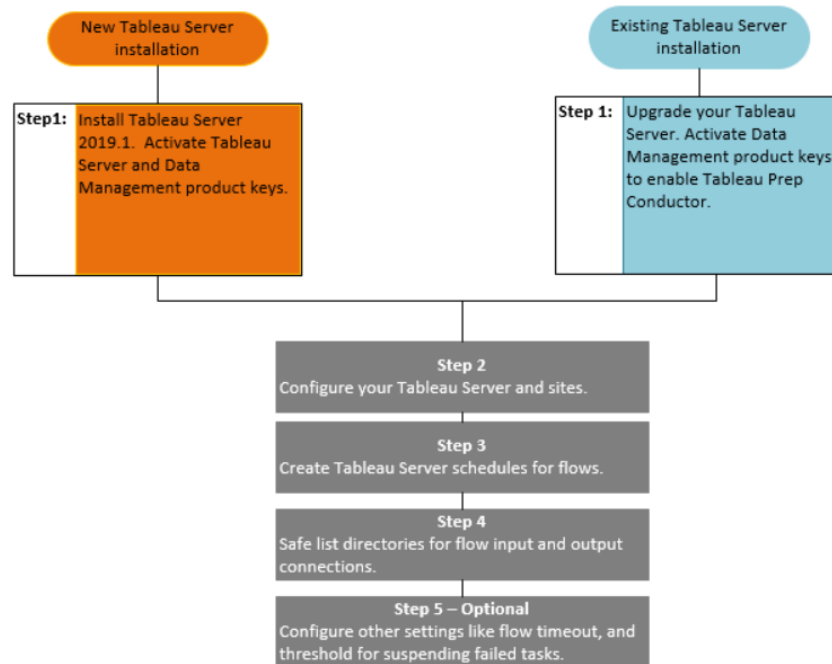
When you install Tableau Server and enable Tableau Prep Conductor using the Data Management product key, Tableau Prep Conductor is automatically enabled by default by the setup program.

For multi-node installations, by default, one instance of Tableau Prep Conductor is enabled on any node that has backgrounder installed. In the example below, Tableau Prep Conductor is enabled on node 2 and 3 where the backgrounders are also enabled, but not on node 1, 4 and 5.

<div><div> + a b   e a u</div><div>STATUS</div><div>MAINTENANCE</div><div>CONFIGURATION</div></div>					
Process	node1	node2	node3	node4	node5
Gateway	✓				
Application Server	✓				
Interactive Microservice Container	✓				
VizQL Server	✓✓✓✓				
Cache Server	✓✓				
Cluster Controller	✓	✓	✓	✓	✓
Search & Browse	✓				
Backgrounder		✓✓✓✓	✓✓✓✓		
Background Microservice Container		✓✓✓✓	✓✓✓✓		
Data Server	✓✓				
Data Engine	✓	✓	✓		
File Store	✓				
Repository	✓				
Tableau Prep Conductor		✓	✓		
Ask Data	✓				
Elastic Server	✓				

Below is a visual representation of that work-flow:





Next step:

New Tableau Server Installations: Step 1 (New Install): Install Tableau Server with Tableau Prep Conductor

Existing Tableau Server Installations: Step 1 (Existing Install): Enable Tableau Prep Conductor

Who can do this

Server administrators can install Tableau Server and enable Tableau Prep Conductor.

Server-level settings can be configured by Tableau Server administrators, and site-level settings can be configured by Tableau Server and Site administrators.

Step 1 (New Install): Install Tableau Server with Tableau Prep Conductor

This topic describes how to Tableau Prep conductor on a new installation of Tableau Server.

Tableau Prep Conductor is supported only on Tableau Server versions 2019.1 or later.

Tableau Prep Conductor is licensed through Data Management, on a per-Deployment basis. A Deployment includes a licensed production Tableau Server installation and licensed non-production Tableau Server installations that support the production installation. For more information on Deployment, see the [Tableau Deployment Guide](#).

Before you install

The recommended topology for a production Tableau Server installation is a dedicated node for running flows. If you are currently planning to have a single node Tableau Server installation, it is recommend that you add a second node and dedicate it to run flows.

- Review the hardware recommendations for Tableau Server and Tableau Prep conductor.
  - [Minimum Hardware Requirements and Recommendations for Tableau Server installation on Windows](#).
  - [Minimum Hardware Requirements and Recommendations for Tableau Server installation on Linux](#).

Install Tableau Server and enable Tableau Prep Conductor

Use the instructions provided in the following topics to install Tableau Server.

[Windows: Install Tableau Server](#)

[Linux: Install Tableau Server topic](#)

When you get to the **Activate** step, use the Tableau Server product keys to activate Tableau Server.

All product keys are available through the [Customer Portal](#).

## Configure public gateway settings

If your Tableau Server is set up with one of the following:

- Load balancer to distribute requests across gateways.
- Reverse proxy to authenticate external (internet) client requests and offloading SSL-based encryption.

You must configure the following public gateway settings:

```
tsm configuration set -k gateway.public.host -v <name> (This should be the URL that your users are using to access Tableau Server)
```

```
tsm configuration set -k gateway.public.port -v 443
```

For more information on configuring gateway settings, see [Configuring Proxies for Tableau Server](#).

## Enable Tableau Prep Conductor

Use the following steps to add the Data Management product key to your Tableau Server:

**Note:** This process requires a restart of the Tableau Server.

**Note:** If you are using core-based licensing, you must apply both the Data Management product key and the Resource Core product key to your Tableau Deployment. The first key allows flows to be run on Tableau Server through the Tableau Prep Conductor and the second key adds the additional cores for the Tableau Prep Conductor nodes. All product keys are available through the [Customer Portal](#).

1. If the computer where you are running Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. Open TSM in a browser:

`https://<tsm-computer-name>:8850`

3. Click **Licensing** on the **Configuration** tab and click **Activate Licence**.
4. Enter or paste your **Data Management product key** and click **Activate**.
5. On the Register page, enter your information into the fields and click **Register**.
6. Follow the prompts and restart Tableau Server after registration is complete.

## Verify Tableau Prep Conductor is enabled and running

When you activate the Data Management product key, a single instance of Tableau Prep Conductor is automatically enabled on any node that has Backgrounder enabled.

**Use the following steps to verify that it is enabled and running:**

1. Open a browser and enter the Tableau Server URL, and append the dedicated TSM web UI port. Here are some examples of what the URL might look like:

`https://localhost:8850/` (if you're working directly on the server computer)

`https://MarketingServer:8850/` (if you know the server's name)

`https://10.0.0.2:8850/` (if you know the server's IP address)

In the sign-in page that appears, enter your administrator user name and password.

**Note:** Tableau Server creates and configures a self-signed certificate during the installation process. This certificate is used to encrypt traffic to the TSM Web UI. Because it's a self-signed certificate, your browser will not trust it by default. Therefore, your browser will display a warning about the trustworthiness of the certificate before allowing you to connect.

2. In the Tableau Services Manager web interface, click the **Status** tab to see the status.


Tableau Server on Windows Help

- If Tableau Prep Conductor is enabled and running, you should see Tableau Prep Conductor in the list of processes as **Active** on at least on one node. If Tableau Prep Conductor is not enabled, you will see Tableau Prep Conductor in the list of processes, but with no status information for any of the nodes.

Tableau Prep Conductor not enabled:

+ a b   e a u			
STATUS MAINTENANCE CONFIGURATION			
Process	node1	node2	node3
Gateway	✓		
Application Server	✓		
Interactive Microservice Container	✓		
VizQL Server	✓ ✓ ✓ ✓		
Cache Server	✓ ✓		
Cluster Controller	✓	✓	✓
Search & Browse	✓		
Backgrounder	✓ ✓		✓ ✓
Non-interactive Microservice Container	✓		✓
Data Server	✓ ✓		
Data Engine	✓	✓	✓
File Store	✓	✓	
Repository	✓		
Tableau Prep Conductor			
Ask Data	✓		
Elastic Server	✓		
TSM Controller	✓		
License Server	✓		
Refresh Status			
✓ Active ⚙ Busy ⚠ Degraded ❌ Error ⏹ Stopped			

Tableau Prep Conductor enabled and running. In the image below Tableau Prep Conductor is enabled on node1 and node3:

<div>  <span>STATUS</span> <span>MAINTENANCE</span> <span>CONFIGURATION</span> </div>			
Process	node1	node2	node3
Gateway	✓		
Application Server	✓		
Interactive Microservice Container	✓		
VizQL Server	✓ ✓ ✓ ✓		
Cache Server	✓ ✓		
Cluster Controller	✓	✓	✓
Search & Browse	✓		
Backgrounder	✓ ✓		✓ ✓
Non-Interactive Microservice Container	✓		✓
Data Server	✓ ✓		
Data Engine	✓	✓	✓
File Store	✓	✓	
Repository	✓		
Tableau Prep Conductor	✓		✓
Ask Data	✓		
Elastic Server	✓		
TSM Controller	✓		
License Server	✓		

✓ Active
⚙ Busy
⚠ Degraded
✖ Error
⏹ Stopped

## Dedicate a node for Tableau Prep Conductor

On the node you are planning to dedicate to running flows, enable Backgrounder process if it is not already enabled. It is recommended that you do not run other processes like VizQL server on this node.

Because you are dedicating this node to running flows, you must configure Backgrounder to run only flow tasks. By default, the Backgrounder process runs tasks of all types, including flows, extract refreshes and subscriptions. For more information, see [Node Roles in Tableau Server](#).

Run the following tsm commands on that dedicated node to run only flow tasks:

1. Run the following command to allow Backgrounders on this node to run only flow tasks.

```
tsm topology set-node-role -n node1 -r flows
```

## Tableau Server on Windows Help

2. Set the node role on the initial node to no flows. The backgrounders on this node will run all jobs except flows:

```
tsm topology set-node-role -n node1 -r no-flows
```

3. Apply the changes and restart Tableau Server:

```
tsm pending-changes apply
```

## Multi-node installations

If you have more than 2 nodes in your Tableau Server installation, you can choose to configure other nodes to run all tasks other than flows:

1. Restrict a node to not allow flows. This command removes Tableau Prep Conductor from this node and Backgrounders on this node will not run flow tasks.

```
tsm topology set-node-role -n node1 -r no-flows
```

2. Apply the changes and restart Tableau Server:

```
tsm pending-changes apply
```

### Next step

Step 2: Configure Flow Settings for your Tableau Server

## Who can do this

Server administrators can install Tableau Server and enable Tableau Prep Conductor.

Step 1 (Existing Install): Enable Tableau Prep Conductor

This topic describes how to enable Tableau Prep conductor on your existing installation of Tableau Server.

Tableau Prep Conductor is supported only on Tableau Server versions 2019.1 or later. If you are using Tableau Server 2018.3 or earlier, you must first upgrade your Tableau Server to 2019.1 before enabling Tableau Prep Conductor on your Tableau Server installation.

Tableau Prep Conductor is licensed through Data Management, on a per-Deployment basis, which is User-Based or Core-Based. A Deployment includes a licensed production Tableau Server installation and licensed non-production Tableau Server installations that support the production installation. For more information on Deployment, see the [Tableau Deployment Guide](#).

This topic describes how to enable Tableau Prep conductor on your existing installation of Tableau Server.

Before you upgrade

## Prepare for upgrade:

- [Know before you upgrade](#)
- [Licensing Tableau Prep Conductor](#)
- [Tableau Server Hardware Requirements and Recommendations](#)

## Configure public gateway settings

If your Tableau Server is set up with one of the following:

- Load balancer to distribute requests across gateways.
- Reverse proxy to authenticate external (internet) client requests and offloading SSL-based encryption.

You must configure the following public gateway settings:

```
tsm configuration set -k gateway.public.host -v <name> (This should be the URL that your users are using to access Tableau Server)
```

```
tsm configuration set -k gateway.public.port -v 443
```



For more information on configuring gateway settings, see [Configuring Proxies for Tableau Server](#).

## Tableau Server Installations using User-Based licences

The recommended topology for a production Tableau Server installation is a dedicated node for running flows. For more information, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#).

## Tableau Server single-node installations

If you currently have a single node Tableau Server installation, it is recommended that you add a second node and dedicate it to running flows.

1. Run upgrade on your current Tableau Server installation using the information in the topics below:

- [Windows](#)
- [Linux](#)

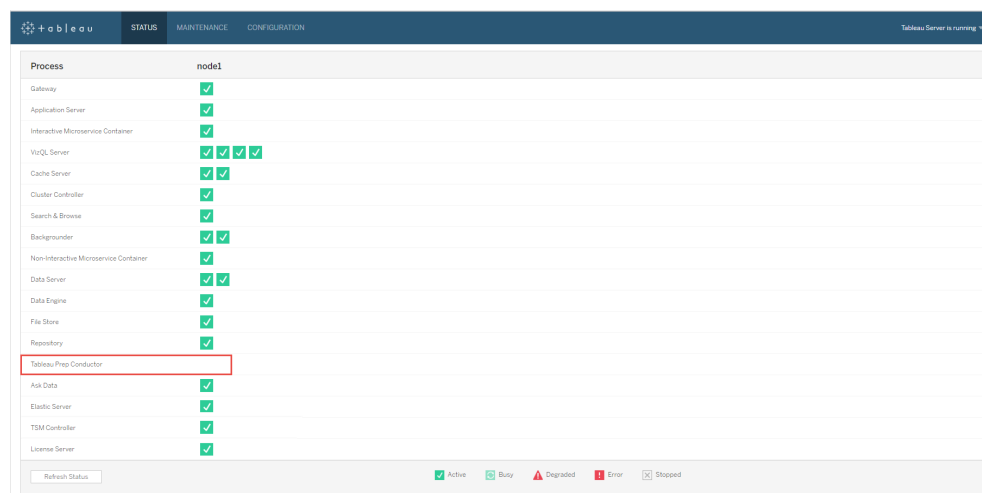
When you get to the **Activate** step, use the Tableau Server product keys to activate Tableau Server.

All product keys are available through the [Customer Portal](#).

2. After completing the installation, add the Data Management product key to enable Tableau Prep Conductor on your node. The Data Management product key, like your other server keys, are available through the [Customer Portal](#).
  - In the Tableau Services Manager web interface, click **Licensing** on the **Configuration** tab and click **Activate Licence**.
  - Enter or paste your new product key and click **Activate**.
  - On the **Register** page, enter your information into the fields and click **Register**.

3. You will be prompted to restart the server. Restart the server and verify that Tableau Prep Conductor is enabled and running.
  - In the Tableau Services Manager web interface, click the **Status** tab to see the status. If Tableau Prep Conductor is enabled and running, you should see Tableau Prep Conductor in the list of processes as **Active**. If Tableau Prep Conductor is not enabled, you will see Tableau Prep Conductor in the list of processes, but with no status information.

### Tableau Prep Conductor not enabled:



Process	node1
Gateway	✓
Application Server	✓
Interactive Microservice Container	✓
VizQL Server	✓ ✓ ✓ ✓
Cache Server	✓ ✓
Cluster Controller	✓
Search & Browse	✓
Backgrounder	✓ ✓
Non-Interactive Microservice Container	✓
Data Server	✓ ✓
Data Engine	✓
File Store	✓
Repository	✓
Tableau Prep Conductor	
Ask Data	✓
Elastic Server	✓
TSM Controller	✓
License Server	✓

Refresh Status

✓ Active
⚙ Busy
⚠ Degraded
✖ Error
⏹ Stopped

**Tableau Prep Conductor enabled and running:**

Process	node1
Gateway	✓
Application Server	✓
Interactive Microservice Container	✓
VizQL Server	✓ ✓ ✓ ✓
Cache Server	✓ ✓
Cluster Controller	✓
Search & Browse	✓
Backgrounder	✓ ✓
Non-Interactive Microservice Container	✓
Data Server	✓ ✓
Data Engine	✓
File Store	✓
Repository	✓
<b>Tableau Prep Conductor</b>	<b>✓</b>
Ask Data	✓
Elastic Server	✓
TSM Controller	✓
License Server	✓

Refresh Status

Active Busy Degraded Error Stopped

4. Add a second node to your Tableau Server installation. The installer will enable certain required processes like the Cluster Controller. Enable Backgrounder process on it as it is required to run scheduled flow tasks. When you enable the Backgrounder process, the installer automatically enables a single instance of Data Engine and Tableau Prep Conductor on the node. Do not add any other processes on this node.
5. Run the following commands to dedicate this node to do only flow tasks. For more information on node roles, see [Node Roles in Tableau Server](#).

- Get the nodeID for your dedicated node to see the list of services on each node:

```
tsm topology list-nodes -v.
```

- Set the node role for the dedicated node using the nodeID that you got from running the command described above:

```
tsm topology set-node-role -n <nodeID> -r flows.
```

- Apply the changes, and restart the server:

```
tsm pending-changes apply.
```

- Review the status to ensure that all the processes are up and running and configured correctly:

```
tsm status -v.
```

You have successfully added Tableau Prep Conductor to your Tableau Server installation.

## Tableau Server multi-node installations

1. Run upgrade on your current Tableau Server Installation using the information in the topics below:

- [Windows](#)
- [Linux](#)

When you get to the **Activate** step, use the Tableau Server product keys to activate Tableau Server.

All product keys are available through the [Customer Portal](#).

2. After completing the installation, add the Data Management product key to enable Tableau Prep Conductor. Tableau Prep Conductor is automatically enabled on the nodes where you already have the Backgrounder process enabled. The Data Management product key, like your other server keys, are available through the [Customer Portal](#).
  - In the Tableau Services Manager web interface, click **Licensing** on the **Configuration** tab and click **Activate Licence**.
  - Enter or paste your new product key and click **Activate**.
  - On the **Register** page, enter your information into the fields and click **Register**.
3. You will be prompted to restart the server. Restart the server and verify that Tableau Prep Conductor is enabled and is running.


Tableau Server on Windows Help

- In the Tableau Services Manager web interface, click the **Status** tab to see the status of all the processes. If Tableau Prep Conductor is enabled and running, you should see Tableau Prep Conductor in the list of processes as **Active**. If Tableau Prep Conductor is not enabled, you will see Tableau Prep Conductor in the list of processes, but with no status information.

Tableau Prep Conductor not enabled:

+ a b   e a u			
STATUS MAINTENANCE CONFIGURATION			
Process	node1	node2	node3
Gateway	✓		
Application Server	✓		
Interactive Microservice Container	✓		
VizQL Server	✓ ✓ ✓ ✓		
Cache Server	✓ ✓		
Cluster Controller	✓	✓	✓
Search & Browse	✓		
Backgrounder	✓ ✓		✓ ✓
Non-Interactive Microservice Container	✓		✓
Data Server	✓ ✓		
Data Engine	✓	✓	✓
File Store	✓	✓	
Repository	✓		
Tableau Prep Conductor			
Ask Data	✓		
Elastic Server	✓		
TSM Controller	✓		
License Server	✓		
Refresh Status			
✓ Active ⚙ Busy ⚠ Degraded ❌ Error ⏹ Stopped			

Tableau Prep Conductor enabled and running:

 <span>STATUS</span> <span>MAINTENANCE</span> <span>CONFIGURATION</span>			
Process	node1	node2	node3
Gateway	✓		
Application Server	✓		
Interactive Microservice Container	✓		
VizQL Server	✓✓✓✓		
Cache Server	✓✓		
Cluster Controller	✓	✓	✓
Search & Browse	✓		
Backgrounder	✓✓		✓✓
Non-Interactive Microservice Container	✓		✓
Data Server	✓✓		
Data Engine	✓	✓	✓
File Store	✓	✓	
Repository	✓		
Tableau Prep Conductor	✓		✓
Ask Data	✓		
Elastic Server	✓		
TSM Controller	✓		
License Server	✓		

Refresh Status

✓ Active
⚡ Busy
⚠ Degraded
✖ Error
⏹ Stopped

4. Add a new node to your Tableau Server installation. The installer will enable certain required processes like the Cluster Controller. Enable Backgrounder process on it as it is required to run scheduled flow tasks. When you enable the Backgrounder process, the installer automatically enables a single instance of Data Engine and Tableau Prep Conductor on the node. Do not add any other processes on this node.

**Note:** The dedicated node counts towards the total count of the Coordination Service ensemble. You may need to deploy a Coordination Service on the new node depending on the total number of nodes you have in your cluster including the new dedicated node. For more information, see [Deploy a Coordination Service Ensemble](#).

5. Run the following command to dedicate this node to only doing flow related operations. For more information on node roles, see [Node Roles in Tableau Server](#).

## Tableau Server on Windows Help

- Get the nodeID for your dedicated node to see the list of services on each node:
  - `tsm topology list-nodes -v.`
  - Set the node role for the dedicated node using the nodeID that you got from running the command described above:
  - `tsm topology set-node-role -n <nodeID> -r flows.`
  - Apply the changes and restart the server:
  - `tsm pending-changes apply.`
  - Review the status to ensure that all the processes are up and running and configured correctly:
  - `tsm status -v.`
6. At this stage, you may have Tableau Prep Conductor enabled on other nodes. By default, the Backgrounder process on a node performs all tasks of all types including flow tasks. To isolate Tableau Prep Conductor and flow tasks to only certain nodes, you can configure the Backgrounders to do one of the following:
- To run only flow tasks: `tsm topology set-node-role -n <nodeID> -r flows.`
  - To run all other tasks except flows: `tsm topology set-node-role -n <nodeID> -r no-flows.`

You have successfully added Tableau Prep Conductor to your Tableau Server installation.

## Tableau Server Installations using Core-Based licences

The recommended topology for a production Tableau Server installation is a dedicated node for running flows. For more information, see [Minimum Hardware Requirements and Recommendations for Tableau Server](#).

Data Management for Core-Based licences includes product keys that enable Tableau Prep Conductor for your Tableau Server, and Tableau Prep Conductor cores that comes in units of four. The Tableau Prep Conductor cores should be applied to the node dedicated to running the flows. These product keys, like your other server keys, are available through the [Customer Portal](#).

To learn more about Tableau Prep Conductor licensing, see [Licensing Tableau Prep Conductor for Tableau Server](#).

## Tableau Server single-node installations

If you currently have a single node Tableau Server installation, it is recommended that you add a second node and dedicate it to running flows.

1. Run upgrade on your current Tableau Server Installation using the information in the topics below:
  - [Windows](#)
  - [Linux](#)
2. Activate the product keys. This will enable Tableau Prep Conductor on the nodes where you already have the Backgrounder process enabled. When you are using core-based licensing, you must apply both the Data Management product key and the Resource Core product key to your Tableau Deployment. The first key allows flows to be run on Tableau Server through the Tableau Prep Conductor and the second key adds the additional cores for the Tableau Prep Conductor nodes. All product keys are available through the [Customer Portal](#).
  - In the Tableau Services Manager web interface, click **Licensing** on the **Configuration** tab and click **Activate Licence**.
  - Enter or paste your new product key and click **Activate**.
  - On the **Register** page, enter your information into the fields and click **Register**.
3. You will be prompted to restart the server. Restart the server and verify that Tableau Prep Conductor is enabled and is running.
  - In the Tableau Services Manager web interface, click the **Status** tab to see the status. If Tableau Prep Conductor is enabled and running, you should see Tableau Prep Conductor in the list of processes as **Active**. If Tableau Prep Conductor is not enabled, you will see Tableau Prep Conductor in the list of processes, but with no status information.



Tableau Prep Conductor not enabled:

a b l e a u

STATUS

MAINTENANCE

CONFIGURATION

Tableau Server is running

Process	node1
Gateway	<div></div>
Application Server	<div></div>
Interactive Microservice Container	<div></div>
VisQL Server	<div></div>
Cache Server	<div></div>
Cluster Controller	<div></div>
Search & Browse	<div></div>
Backgrounder	<div></div>
Non-Interactive Microservice Container	<div></div>
Data Server	<div></div>
Data Engine	<div></div>
File Store	<div></div>
Repository	<div></div>
Tableau Prep Conductor	
Ask Data	<div></div>
Elastic Server	<div></div>
TSM Controller	<div></div>
License Server	<div></div>

Refresh Status

Active

Busy

Degraded

Error

Stopped

Tableau Prep Conductor enabled and running:

a

b

l

e

a

u

STATUS

MAINTENANCE

CONFIGURATION

Tableau Server is running

Process	node1
Gateway	<div>✓</div>
Application Server	<div>✓</div>
Interactive Microservice Container	<div>✓</div>
VisQL Server	<div>✓</div> <div>✓</div> <div>✓</div> <div>✓</div>
Cache Server	<div>✓</div> <div>✓</div>
Cluster Controller	<div>✓</div>
Search & Browse	<div>✓</div>
Backgrounder	<div>✓</div> <div>✓</div>
Non-Interactive Microservice Container	<div>✓</div>
Data Server	<div>✓</div> <div>✓</div>
Data Engine	<div>✓</div>
File Store	<div>✓</div>
Repository	<div>✓</div>
Tableau Prep Conductor	<div>✓</div>
Ask Data	<div>✓</div>
Elastic Server	<div>✓</div>
TSM Controller	<div>✓</div>
License Server	<div>✓</div>

Refresh Status

✓

Active

🔄

Busy

⚠

Degraded

❌

Error

⏹

Stopped

4. Add a second node to your Tableau Server installation. The installer will enable certain required processes like the Cluster Controller. Enable Backgrounder process on it as it is required to run scheduled flow tasks. When you enable the Backgrounder process, the installer automatically enables a single instance of Data Engine and Tableau Prep Conductor on the node. Do not add any other processes on this node.

**Important:** The number of physical cores on this machine must be equal to or less than the Tableau Prep Conductor cores you purchased. For example, if you purchased four Tableau Prep Conductor cores, your node can only have up to four physical cores. To understand about how Tableau Prep Conductor licensing works, see [Licensing Tableau Prep Conductor for Tableau Server](#).

5. Run the following commands to dedicate this node to only doing flow tasks. For more information on node roles, see [Node Roles in Tableau Server](#).

- Get the nodeID for your dedicated node to see the list of services on each node:

```
tsm topology list-nodes -v.
```

- Set the node role for the dedicated node using the nodeID that you got from running the command described above:

```
tsm topology set-node-role -n <nodeID> -r flows.
```

- Apply the changes and restart the server: `tsm pending-changes apply`.
- Review the status to ensure that all the processes are up and running and configured correctly:

```
tsm status -v.
```

You have successfully added Tableau Prep Conductor to your Tableau Server installation.

## Tableau Server multi-node installations

1. Run upgrade on your current Tableau Server installation using the information in the topics below:
  - [Windows](#)
  - [Linux](#)

2. Activate the product keys. This will enable Tableau Prep Conductor on the nodes where you already have the Backgrounder process enabled. When you are using core-based licensing, you must apply both the Data Management product key and the Resource Core product key to your Tableau Deployment. The first key allows flows to be run on Tableau Server through the Tableau Prep Conductor and the second key adds the additional cores for the Tableau Prep Conductor nodes. All product keys are available through the [Customer Portal](#).
  - In the Tableau Services Manager web interface, click **Licensing** on the **Configuration** tab and click **Activate Licence**.
  - Enter or paste your new product key and click **Activate**.
  - On the **Register** page, enter your information into the fields and click **Register**.
3. You will be prompted to restart the server. Restart the server and verify that Tableau Prep Conductor is enabled and is running.
  - In the Tableau Services Manager web interface, click the **Status** tab to see the status. If Tableau Prep Conductor is enabled and running, you should see Tableau Prep Conductor in the list of processes as **Active**. If Tableau Prep Conductor is not enabled, you will see Tableau Prep Conductor in the list of processes, but with no status information.

**Tableau Prep Conductor not enabled:**

+ a b   e a u				STATUS	MAINTENANCE	CONFIGURATION
Process	node1	node2	node3			
Gateway	✓					
Application Server	✓					
Interactive Microservice Container	✓					
VizQL Server	✓✓✓✓					
Cache Server	✓✓					
Cluster Controller	✓	✓	✓			
Search & Browse	✓					
Backgrounder	✓✓		✓✓			
Non-Interactive Microservice Container	✓		✓			
Data Server	✓✓					
Data Engine	✓	✓	✓			
File Store	✓	✓				
Repository	✓					
Tableau Prep Conductor						
Ask Data	✓					
Elastic Server	✓					
TSM Controller	✓					
License Server	✓					
Refresh Status				✓ Active	⚡ Busy	⚠ Degraded
				! Error	✖ Stopped	

Tableau Prep Conductor enabled and running:

+ a b   e a u				STATUS	MAINTENANCE	CONFIGURATION
Process	node1	node2	node3			
Gateway	✓					
Application Server	✓					
Interactive Microservice Container	✓					
VizQL Server	✓✓✓✓					
Cache Server	✓✓					
Cluster Controller	✓	✓	✓			
Search & Browse	✓					
Backgrounder	✓✓		✓✓			
Non-Interactive Microservice Container	✓		✓			
Data Server	✓✓					
Data Engine	✓	✓	✓			
File Store	✓	✓				
Repository	✓					
Tableau Prep Conductor	✓		✓			
Ask Data	✓					
Elastic Server	✓					
TSM Controller	✓					
License Server	✓					
Refresh Status				✓ Active	⚡ Busy	⚠ Degraded
				! Error	✖ Stopped	

4. Add a new node to your Tableau Server installation. A dedicated node to run flow related operations is recommended for production Tableau Server installations. The installer will enable certain required processes like the Cluster Controller. Enable Backgrounder process on it as it is required to run scheduled flow tasks. When you enable the Backgrounder process, the installer automatically enables a single instance of Data Engine on the node. Do not add any other processes on this node.

**Note:** The dedicated node counts towards the total count of the Coordination Service ensemble. You may need to deploy a Coordination Service on the new node depending on the total number of nodes you have in your cluster including the new dedicated node. For more information, see [Deploy a Coordination Service Ensemble](#).

**Important:**

The number of physical cores on this machine must be equal to or less than the Tableau Prep Conductor cores you purchased. For example, if you purchased four Tableau Prep Conductor cores, your node can only have up to four physical cores. To understand about how Tableau Prep Conductor licensing works, see [Licensing Tableau Prep Conductor for Tableau Server](#).

5. Run the following commands to dedicate this node to only doing flow tasks. This will enable Tableau Prep Conductor on your new node. For more information, see [Node Roles in Tableau Server](#).
  - Get the nodeID for your dedicated node to see the list of services on each node:

```
tsm topology list-nodes -v.
```
  - Set the node role for the dedicated node using the nodeID that you got from running the command described above:

```
tsm topology set-node-role -n nodeID -r flows.
```

- Apply the changes and restart the server:

```
tsm pending-changes apply.
```

- Review the status to ensure that all the processes are up and running and configured correctly:

```
tsm status -v.
```

6. At this stage, you may have Tableau Prep Conductor enabled on other nodes that have the Backgrounder process. By default, the Backgrounder process on a node performs all tasks of all types including flow tasks. To isolate Tableau Prep Conductor and flow operations to only certain nodes, you can configure the backgrounders to do one of the following:

- To run only flow tasks:

```
tsm topology set-node-role -n <nodeID> -r flows.
```

- To run all other tasks except flows:

```
tsm topology set-node-role -n <nodeID> -r no-flows.
```

Next step

Step 2: Configure Flow Settings for your Tableau Server.

## Who can do this

Tableau Server Administrators can install or upgrade Tableau Server, and enable Tableau Prep Conductor on Tableau Server.

Step 2: Configure Flow Settings for your Tableau Server

This topic describes the various flow settings that you can configure for your Tableau Server. For more information about the different settings needed to enable web authoring for flows,

see [Create and Interact with Flows on the Web](#).

## Publishing, Scheduling, and Credential Settings

When you activate Tableau Prep Conductor using the Data Management product key, Tableau Prep Conductor is enabled for the entire Tableau Server installation. You can further modify and customise the setting for sites.

Use the following instructions to configure settings related to flows for all your sites or for individual sites:

Use the following instructions to sign in to Tableau Server Admin pages:

- Windows: [Tableau Server Admin Pages](#).
- Linux: [Tableau Server Admin Pages](#).

### Configure whether publishing and scheduling flow should be allowed for a site:

1. **Enable users to publish and schedule flows:** This setting is enabled by default when you enable Tableau Prep Conductor. If you have multiple sites, you can selectively turn off Tableau Prep for Server for individual sites. If you disable this setting for a site that once allowed flows, see [Implication of disabling Tableau Prep Conductor](#) for more information.

On the **General** page under **Settings**, scroll to the **Tableau Prep Conductor** section and clear the **Allow users to schedule and monitor flows** check box.

2. **Enable users to link flow runs together using Linked Tasks (version 2021.3 and later):** Enable users to schedule flow tasks to run one after the other. Starting in version 2022.1, this option is enabled by default. In prior versions, administrators needed to enable this feature first.

If you have multiple sites, you can selectively turn off **Linked Tasks** for individual sites, but the option must first be enabled at the **Server Settings** level.

If the setting is turned off after linked tasks are scheduled, any tasks that are running will complete and the scheduled linked tasks are hidden and no longer show on the **Scheduled Tasks** tab.

### 3. Embed Credentials

**-Allow publishers to embed credentials in a data source, flow or workbook:** This setting allows publishers to attach passwords to published flows that will automatically authenticate web users.

**-Allow publishers to schedule flow runs and data extract refreshes:** This option is only available if setting above is enabled. When this setting is enabled, publishers will see scheduling options in the Publish dialog box.

## Implication of disabling Tableau Prep Conductor

If you disable Tableau Prep Conductor after using it for a while, you will not be able to see the flows, schedules, tasks and other things related to flows. The following table gives you more information on what you can and cannot see when you disable Tableau Prep for Server completely or only for specific sites:

	Prep not enabled at Server level	Prep enabled at Server level, but disabled for a site	Prep enabled for both Server and site
Show flows	Yes	Yes	Yes
Show tasks/schedules in Server view	No	Yes	Yes
Show tasks/schedules in Site view	No	No	Yes
Show Site setting (only for Server Admins)	Yes (disabled)	Yes	Yes



<b>Show TSM status</b>	Yes (Tableau Prep Conductor is not shown)	Yes	Yes
<b>Show TSM settings</b>	Yes (disabled)	Yes	Yes

**Important:** Scheduled tasks will continue to run even when Tableau Prep Conductor is disabled for that site, but will fail.

#### Configure notifications for flow failures

You can configure Tableau Server to send email notifications for flow run failures. The notifications are sent for failures that occur when running the flows through either a scheduled task, linked task or a manual run using the **Run now** menu option. You must first enable the server-wide setting, and then configure at the site level.

## To enable the server-wide email notification

You can either use the Tableau Services Manager (TSM) web interface or TSM CLI as described below:

### Use the TSM web interface

1. Open TSM in a browser:  
  
https://<tsm-computer-name>:8850.
2. Click **Notifications** on the **Configuration** tab and click **Email Server**.
3. Enter the email server information.
4. Click the **Events** tab.

5. Under **Content Updates**, select **Send emails when flow runs, encryption jobs or scheduled refreshes fail** if not already turned on by default.
6. Click **Save Pending Changes** after you've entered your configuration information.
7. Click **Apply Changes and Restart**.

## Use the TSM CLI

The notification values can be set individually with the `tsm configuration set` command:

Windows: [tsm configuration](#).

Linux: [tsm configuration](#).

### Set notification values

Use the `tsm configuration set` command with the following syntax to

to enable flow failure notifications, run the following command:

```
tsm configuration set -k backgrounder.notifications_enabled -v true
```

**Note:** This will enable email notifications for both extract refresh failures and flow failures.

After you are done setting values, you must run the following command:

```
tsm pending-changes apply
```

The `pending-changes apply` command displays a prompt to let you know this will restart Tableau Server if the server is running. The prompt displays even if the server is stopped, but

in the case there is no restart. You can suppress the prompt using the `--ignore-prompt` option, but this does not change the restart behaviour.

## To configure notification for a site:

On the **General** page under **Settings**, scroll to the **Manage Notifications** setting and select the notification types that you want site users to receive.

You can receive notifications as an email, on the Tableau site or in your Slack workspace if your administrator has connected your site to Slack. For more information, see [Site Settings Reference](#).

	On Tableau	Email	Slack
<b>Collaboration</b>			
Comment mentions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Share	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data alerts		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Systems Status</b>			
Flow runs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Extract jobs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Webhooks		<input checked="" type="checkbox"/>	

If grayed out, the notification option is disabled for use.

**Note:** Recreate your notification settings when upgrading from 2020.4 or earlier to 2021.1 and later. Older notification settings are not automatically moved to the Manage Notifications setting.

Next step

Step 3: Create Schedules for Flow Tasks

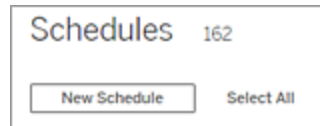
## Who can do this

Tableau Server Administrators can configure server and site level settings. Tableau Site Administrators can configure site level settings.

### Step 3: Create Schedules for Flow Tasks

Create a new schedule:

1. On the **Schedules** tab, click **New Schedule**.



2. Enter the following information in the **New Schedule** dialog box and click **Create**.
  - **Name:** Enter a descriptive name for the schedule. Typically, this includes the description of the schedule frequency.
  - **Type:** Select Flow as the task type.
  - **Priority:** You can define a default priority from 1 to 100, where 1 is the highest priority. This value will be assigned to the tasks by default. If two tasks are pending in the queue, the one with the higher priority runs first.
  - **Execution:** Choose whether a schedule will run in parallel or serially. Schedules that run in parallel run on all available backgrounder processes so that they can complete faster.
  - **Linked Tasks (version 2021.3 and later):** Select the tick box if the schedule can be used to schedule flows to run one after the other. Linked tasks require a **Parallel** execution method.

Starting in version 2022.1, this option is enabled by default. In prior versions, the Server Administrator must first enable linked tasks for the server before you can configure schedules to support linked tasks. For more information, see Step 2: Configure Flow Settings for your Tableau Server

- **Frequency:** You can define an hourly, daily, weekly or monthly schedule.

The screenshot shows the 'Create Schedule' dialog box with the following settings:

- Name:** Linked Task Schedule
- Type:** Flow
- Priority:** 50
- Execution:** Parallel
- ☒ **Linked Tasks** ⓘ
- Frequency:** 1 day a week, at 17:30
- Repeats:** Daily
- Every:** Day
- At:** 17:30
- On:** Su M T **W** Th F Sa (Wednesday is selected)

Buttons: Cancel, Create

Next step

Step 4: Safe list Input and Output locations

## Who can do this

Tableau Server Administrators can create and modify schedules. Schedules are created at the server level and apply across all the sites on a server.

Step 4: Safe list Input and Output locations

This topic describes the rules that apply to this feature and how to safe list the directories on your network.

Flow input and output connections may need to connect to databases or files in the directories on your network. You must safe list the directories you want to allow access to. Input and Output connections will only be allowed to connect to data in the safe listed locations. By default, no connections are allowed.

**Note:** You can still publish the flows and any data that is embedded in the flow file (tflx) to Tableau Server, but the flow will fail to run if the directories aren't included in your organisation's safe list.

#### How to safe list input and output locations

The following rules apply and must be considered when configuring this setting:

- The directory paths should be accessible by Tableau Server. These paths are verified during server startup and at flow run time and are **not** verified at the time of publishing the flow to Tableau Server.
- Network directory paths have to be absolute and cannot contain wildcards or other path traversing symbols. For example, `\\myhost\myShare\*` **or** `\\myhost\myShare*` are invalid paths and would result in all the paths as disallowed. The correct way to safelist any folder under *myShare* would be `\\myhost\myShare` **or** `\\myhost\myShare\.`

**Note:** The `\\myhost\myShare` configuration will not allow `\\myhost\myShare1`. In order to safe list both of these folders safe list them as `\\myhost\myShare; \\myhost\myShare1`.

- **Windows:**
  - The value can be either `*`, (for example, `tsm configuration set -k maestro.input.allowed_paths -v "*"`) to allow any network directory or a specified list of network directory paths, delimited by a semicolon (;). If you specify a list of directory paths, be sure to specify particular directories rather than the root of the file share.

- If the path contains spaces or special characters you will have to either use single or double quotes. Whether you use single or double quotes depends on the shell that you are using.
- No local directory paths are allowed even when the value is set to \*.
- To save flow output to a network share, you must first [configure a Run As user](#) service account on Tableau Server. You cannot save flows to a network share using the default system account. Then configure the target directory on the network share for Full Control permissions for the Run As user account you created.

Depending on how your organisation manages nested folder permissions, you may need to grant additional permissions in the folder hierarchy, with a minimum of Read, Write, Execute, Delete and List Folder permission, to allow the Run As user account access to the target folder.

- **Linux:**
  - The value can be either \*, (for example, `tsm configuration set -k maestro.input.allowed_paths -v "*"`) meaning that any path, including local (with the exception of some system paths configured using "native\_api.internal\_disallowed\_paths"), or a list of paths, delimited by a semicolon (;).
  - You must be using a kernel version equal to or later than 4.7. Safe listing to or from a network share is not supported on kernel versions earlier than 4.7. On earlier versions, when the output is written to a network share, hyper fails to output files, resulting in flows failing at runtime. When reading input files from a network share on earlier versions, flow executions fail. To check the kernel version, in the Linux terminal, type the command `uname -r`. This will display the full version of the kernel you are running on the Linux machine. Note that for Red Hat Enterprise Linux, kernel version 4.7 and later is only available with Red Hat Enterprise Linux version 8.

- To save flow output to a network share, the local Linux account that has access to Tableau Server resources must be given Full Control permissions to the target directory on the network share. If a path is both on the flows allowed list and internal\_disallowed list, internal\_disallowed takes precedence.

The mount points for both input and output paths used by flows must be configured using the `native_api.unc_mountpoints` configuration key. For example:

```
tsm configuration set -k native_api.unc_mountpoints -v
'mountpoints'
```

For information about configuring this, see this Tableau Knowledge Base article: [Tableau Server on Linux - How to Connect to a Windows Shared Directory](#).

Use the following commands to create a list of allowed network directory paths:

#### For input connections:

```
tsm configuration set -k maestro.input.allowed_paths -v your_networkdirectory_path_1;your_networkdirectory_path_2
```

```
tsm pending-changes apply
```

#### For output connections:

```
tsm configuration set -k maestro.output.allowed_paths -v your_networkdirectory_path_1;your_networkdirectory_path_2
```

```
tsm pending-changes apply
```

#### Important:

These commands overwrite existing information and replace it with the new information you provided. If you want to add a new location to an existing list, you must provide a list of all the existing locations and the new one you want to add. Use the following commands to see the current list of input and output locations:

```
tsm configuration get -k maestro.input.allowed_paths
tsm configuration get -k maestro.output.allowed_paths
```



Next step

Step 5: Optional Server Configurations

## Who can do this

On Windows, members of the local computer Administrators group can run *tsm* commands.

On Linux, members of the **tsmadmin** group can run *tsm* commands. The **tsmadmin** group can be configured using the *tsm.authorized.groups* setting.

Step 5: Optional Server Configurations

The options described in this topic are not required to enable flow publishing and scheduling flows on Tableau Server. They can be used to customising your environment according to your requirements.

Set the timeout period for flows

You can set time limits for how long a flow can run to make sure that subsequent tasks are not held up due to stalled tasks. The following two *tsm* command options determine how long a flow task can run before the flow background task is cancelled. These two commands together determine the total timeout value for flow tasks.

The `backgrounder.default_timeout.run_flow` sets the number of seconds before a flow run task is cancelled.

For example:

```
tsm configuration set -k backgrounder.default_timeout.run_flow -v  
<new value>
```

```
tsm pending-changes apply
```

(Default value: 14400 seconds or 4 hours)

The `backgrounder.extra_timeout_in_seconds` command sets the number of seconds beyond the setting in `backgrounder.querylimit` before a background job is cancelled.

This setting makes sure that a stalled job does not hold up subsequent jobs. The setting applies to processes listed in `backgrounder.timeout_tasks`.

For example:

```
tsm configuration set -k backgrounder.extra_timeout_in_seconds -v  
<value>
```

(Default value: 1800 seconds or 30 minutes)

Check the available resources on the server running flows. It's recommended that you have a dedicated node for Tableau Prep Conductor.

Set the threshold for suspended flow tasks

By default, a flow task is suspended after 5 consecutive flow task failures. To change the threshold number of flow task failures that can occur before they are suspended, use the following `tsm configuration set` command:

```
tsm configuration set -k backgrounder.flow_failure_threshold_for_  
run_prevention -v <number>
```

This sets the threshold for the number of consecutive failed flow tasks necessary before suspending the tasks. This is a server-wide setting.

## Who can do this

Tableau Server administrators can make changes to server configurations.

## Schedule Flow Tasks

**Note:** Flows can be scheduled to run on Tableau Cloud or Tableau Server using Tableau Prep Conductor. Prep Conductor is licensed through Data Management on a per deployment basis. After you purchase and license Data Management, you must enable Prep Conductor.

Starting in version 2020.4.1, you no longer need the Data Management licence to publish flows to the web. As a Creator, you can also create and edit flows directly on your server. For more information authoring flows on the web, see [Tableau Prep on the Web](#).

**Note:** With the 2024.1 release, changes were introduced for flow schedules on Tableau Cloud. The Schedules tab on the left navigation pane has been removed and you can now create custom schedules directly from your flow's Scheduled Tasks tab.

To schedule flows to run at a specific time or on a recurring basis you can create scheduled tasks. Scheduled tasks rely on pre-configured schedules. Schedules are created by the System Administrator. For information about how to create schedules on Tableau Server, see [Step 3: Create Schedules for Flow Tasks](#) in the Tableau Server help.

Starting in version 2021.3, you can link flow runs together when scheduling tasks to run flows one after the other. For more information, see [Schedule linked tasks](#) in this topic.

Starting in version 2022.1, you can also run linked tasks via the REST API using the new flow methods **Query Linked Tasks**, **Query Single Linked Tasks** and **Run Linked Task Now**. For more information, see [Flow Methods](#) in the Tableau REST API help.

### Running flows that include parameters

Starting in version 2021.4, you can include user parameters in your flows to make flows more dynamic. When the flow runs, you are prompted to enter your parameter values. When setting up flows on a schedule, you specify parameter values at that time.

You must specify the parameter values for any required parameters. For optional parameters, you can enter those values as well, or accept the current (default) value for the parameter. For

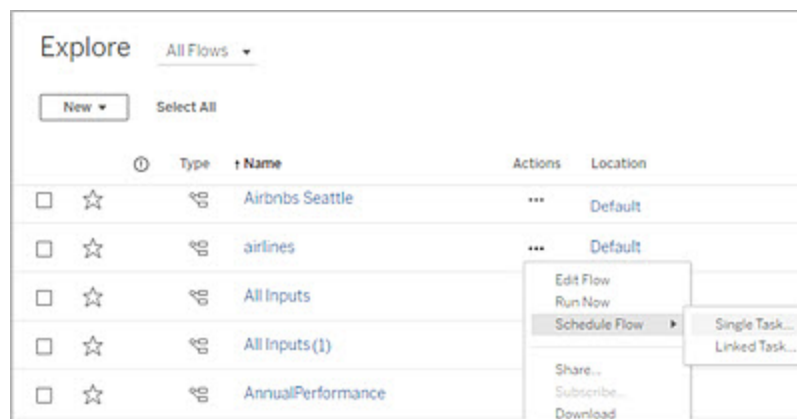
more information about running flows with parameters, see [Run flows on a schedule](#) in the Tableau Prep help.

Starting in Tableau Prep Builder and Tableau Cloud version 2023.2, you can apply date or time system parameters to flow output names for file and published data source output types. The start time is automatically added to the flow output name.

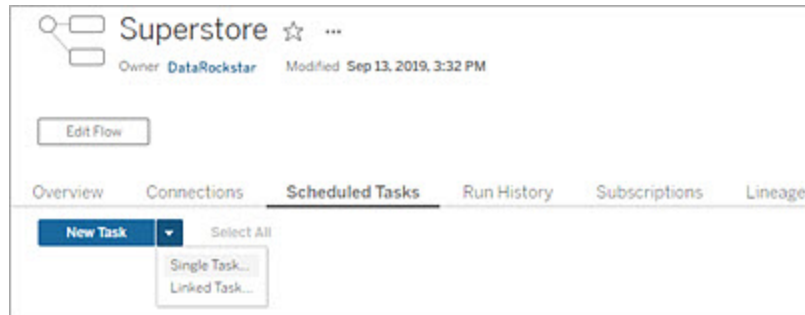
**Note:** Your administrator must enable the **Flow Parameter** server and site settings on your server before you can run flows that include parameters in Tableau Server or Tableau Cloud. For more information, see **Create and Interact with Flows on the Web** in the [Tableau Server](#) or [Tableau Cloud](#) help.

### Schedule a flow task

1. Do one of the following:
  - (version 2022.1 and later) From the **Explore** page, in **List** view, in the **Actions** menu, select **Schedule Flow > Single Task**. If you select a flow in the list, you can also use the top **Actions** menu.

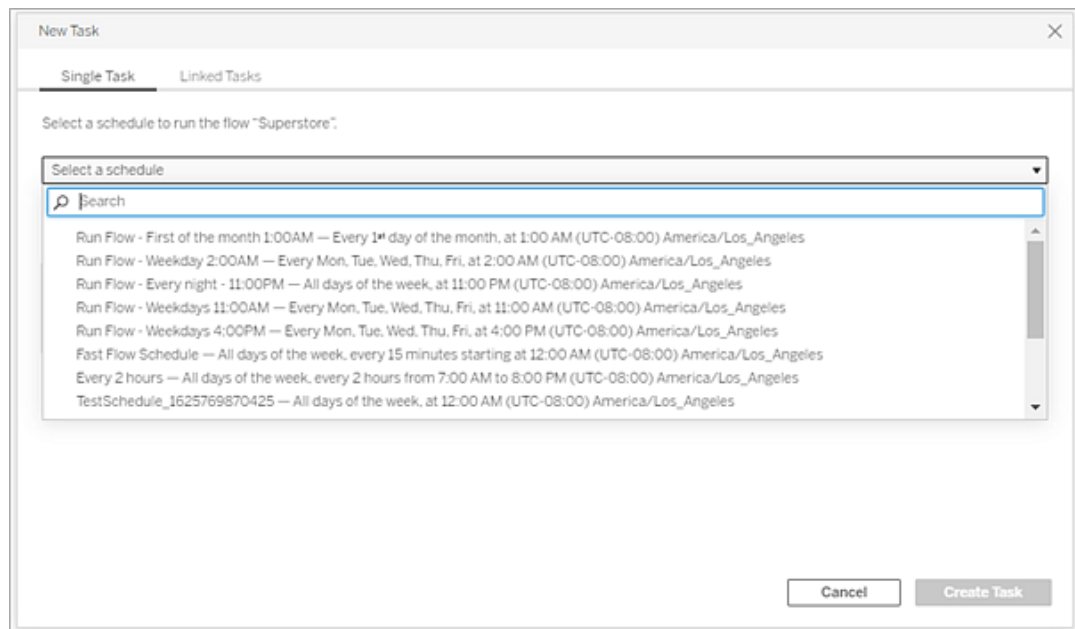


- From the **Overview** page for the flow, **Scheduled Tasks** tab, click **New Task** or click on the drop-down and select **Single Task**.



If the output step isn't assigned to a task, you can also create a new task from the **Overview** page. On that page, in the **Schedules** field, click **Create new task**.

2. In the **New Task** dialog, on the **Single Task** (**New Task** in prior releases) tab, select a schedule from the drop-down list.



3. Select one of the following options:
  - **Automatically include all output steps for this flow:**(default) Select this option to include all current and future output steps for this flow in the scheduled

task. As new output steps are added to the flow over time, they are automatically included in the schedule when it runs.

- **Select the output steps to include in this task:** Select this option and manually select the output steps to include in this scheduled task.

To include all output steps in the flow task, tick the box next to **Output Steps**.

This area can't be edited if the **Automatically include all output steps for this flow** radio button is selected. Select the other radio button to enable this section.

Output steps	Output name	Location	Refresh Type
Create 'Annual Regional Performance.hyper'	Annual perf_test	Tableau Server Site	Full refresh
Create 'Superstore Sales.hyper'	Create 'Superstore Sales.hyper'	Tableau Data Engine	

4. (version 2020.2.1 and later) Select a **Refresh Type**. For more information about these settings, see [Refresh Flow Data Using Incremental Refresh](#).

**Note:** Starting in version 2020.2.1 and later, if one input is configured to use incremental refresh and it is associated with multiple outputs, those outputs must be run together and must use the same refresh type. Otherwise the flow will fail.

- **Full refresh** (default): Refresh all data and create or append data to your table based on the flow output setting.

- **Incremental refresh:** Refresh only the new rows and create or append data to your table based on the flow output setting. The incremental refresh option is only available when the flow is configured to use this refresh type.

**Note:** Tableau Prep Conductor runs a full refresh for all outputs regardless of the run option you select if no existing output is found. Subsequent flow runs will use the incremental refresh process and retrieve and process only your new rows unless incremental refresh configuration data is missing or the existing output is removed.

The screenshot shows the 'New Task' dialog box with the 'Single Task' tab selected. It prompts the user to 'Select a schedule to run the flow "My Superstore":' and shows a dropdown menu with the selected schedule: 'Run Flow - Every night - 11:00PM — All days of the week, at 11:00 PM (UTC-08:00) America/Los\_Angeles'. Below this, there are two radio buttons: 'Automatically include all output steps for this flow.' (selected) and 'Select the output steps to include in this task.' Below the radio buttons is a table with the following columns: 'Output steps', 'Output name', 'Location', and 'Refresh Type'. The table has one row: 'Output', 'Orders>Returns\_Superstore', 'Tableau Server Site', and 'Full refresh'. Below the table is a checkbox 'Send email when done' with a pencil icon. At the bottom right are 'Cancel' and 'Create Task' buttons. A dropdown menu for 'Refresh Type' is open, showing 'Full refresh' (selected) and 'Incremental refresh'.

Output steps	Output name	Location	Refresh Type
Output	Orders>Returns_Superstore	Tableau Server Site	Full refresh

5. (optional) If you are the flow owner, select **Send email when done** to notify users when the flow is successful. For more information about how to send email notifications on flow runs, see [Notify Users of Successful Flow Runs](#).
6. (version 2021.4 and later) If your flows include parameters, enter any required or optional parameter values. You must enter required values for the flow to run.

New Task

Single Task Linked Tasks

Select a schedule to run the flow "Flow with Parameters".

Select a schedule

☒ Automatically include all output steps for this flow.  
☐ Select the output steps to include in this task.

Output steps	Output name	Location	Refresh Type
Output	Output	Tableau Data Engine	Full refresh

Set Parameters (2 required)

Required Parameters

Years ⓘ

#

2017  
2018  
2019

7. Click **Create Task** to create the scheduled task.

Schedule linked tasks

*Supported in Tableau Server and Tableau Cloud version 2021.3.0 and later.*

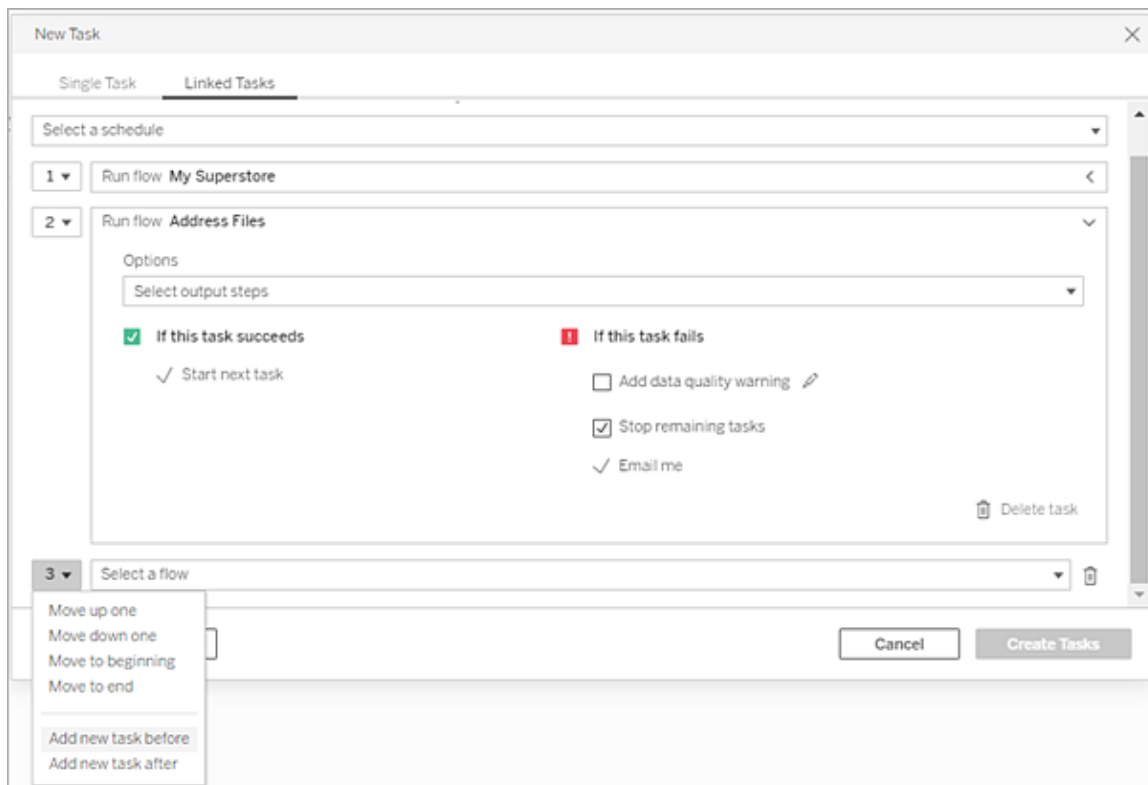
**Note:** Starting in version 2022.1, Linked tasks functionality is enabled by default. Server and Site Administrators can turn off this functionality on the **Settings** page and on flow schedules in the **Schedules** dialog. In previous versions, Server Administrators must first enable this functionality to use and manage it. For more information, see Step 2: Configure Flow Settings for your Tableau Server and Step 3: Create Schedules for Flow Tasks.

Use the **Linked Tasks** option to schedule up to 20 flows to run sequentially, one after the other. Easily set up your flow list by selecting your schedule, then select downstream flows to run in the order you choose.

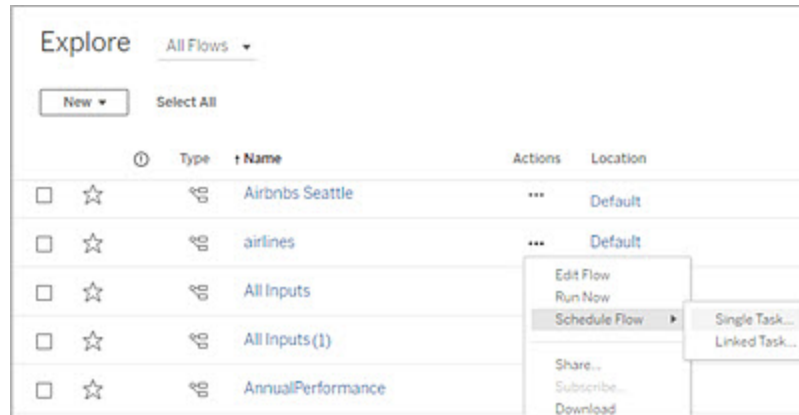


Flows run in the order specified in the list. Use the menu to move flows around in your list or add new upstream or downstream flows to the list at any time.

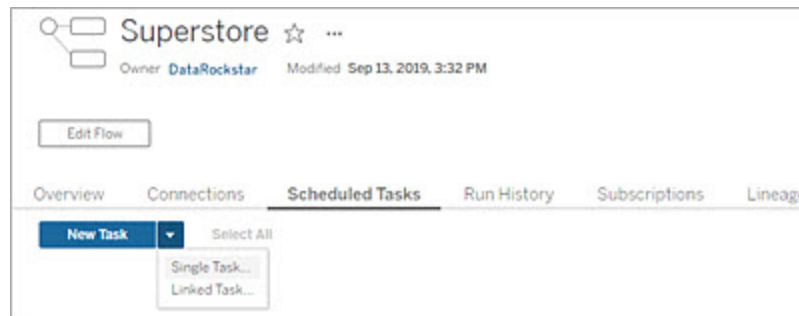
Select the outputs that you want to include in the flow run and configure the settings to tell Tableau what to do with remaining flows in the schedule when the previous flow run fails.



1. Do one of the following:
  - (version 2022.1 and later) From the **Explore** page, in **List** view in the **Actions** menu, select **Schedule Flow > Linked Task**. If you select multiple flows in the list, you can also use the top **Actions** menu.

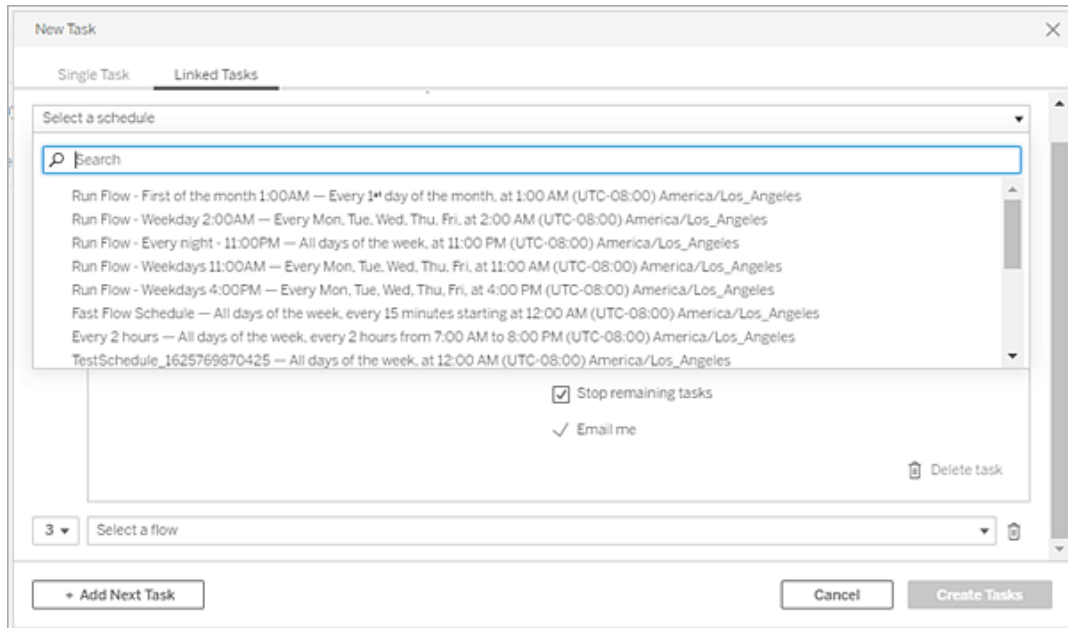


- From the **Overview** page for the flow, **Scheduled Tasks** tab, click **New Task** and select the **Linked Task** tab, or click on the drop-down and select **Linked Task**.



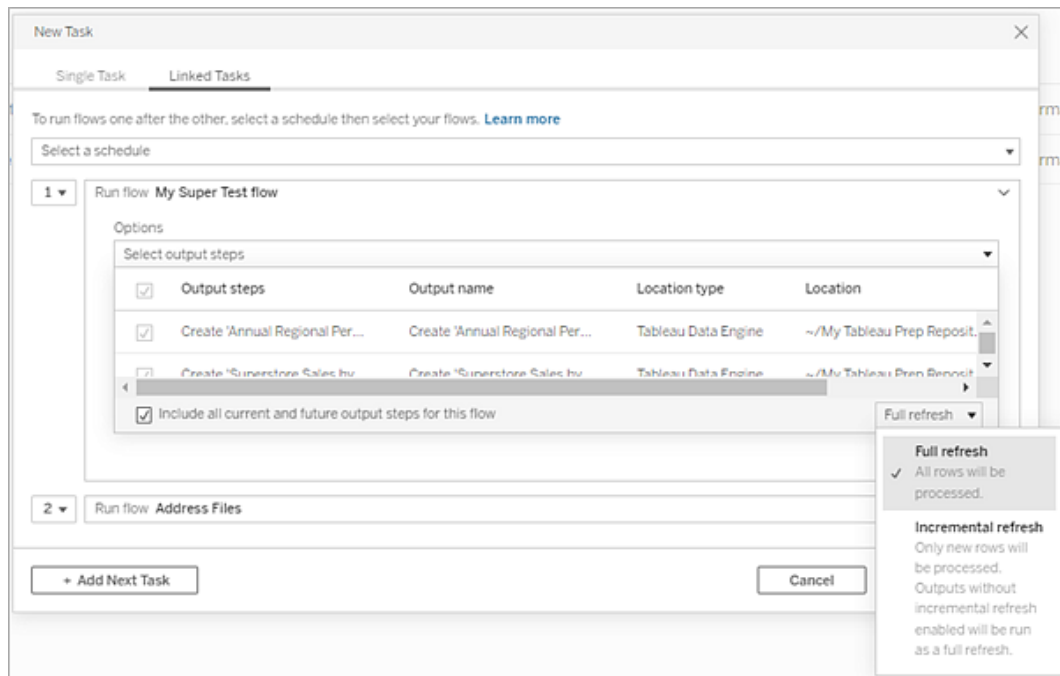
If the output step isn't assigned to a task, you can also create a new task from the **Overview** page. On that page, in the **Schedules** field, click **Create new task**.

- In the **New Task** dialog, on the **Linked Tasks** tab, select a schedule from the drop-down list. Only schedules that are enabled for linked tasks are shown.



- Click the **Select output steps** drop-down to select the flow outputs to run. By default, all flow outputs are included. To select specific outputs, clear the **Include all current and future output steps for this flow** tick box.

The flow where the task is initiated is automatically set as the first flow to run, but you can use the menu to change the run order after you add other flows to your list.




4. Select your refresh type from the following options:

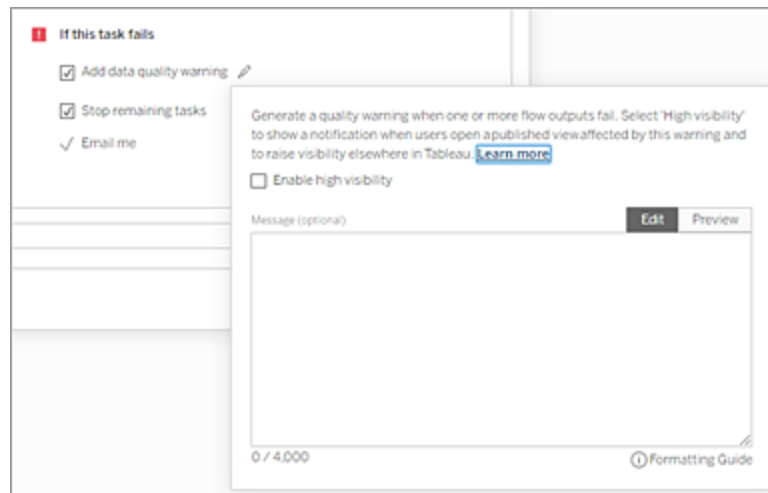
**Note:** If one input is configured to use incremental refresh and it is associated with multiple outputs, those outputs must be run together and must use the same refresh type. Otherwise, the flow will fail.

- **Full refresh** (default): Refresh all data and create or append data to your table based on the flow output setting.
- **Incremental refresh:** Refresh only the new rows and create or append data to your table based on the flow output setting. The incremental refresh option is only available when the flow is configured to use this refresh type. For more information, see [Refresh Flow Data Using Incremental Refresh](#).

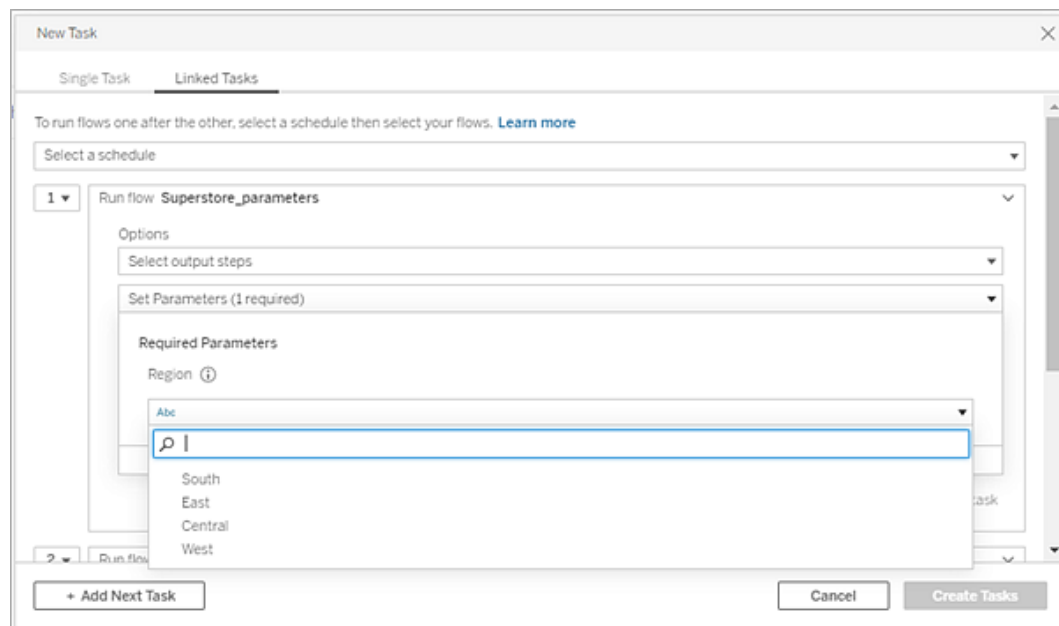
**Note:** Tableau Prep Conductor runs a full refresh for all outputs regardless of the run option you select if no existing output is found. Subsequent flow runs will use the incremental refresh process and retrieve and process only your new rows unless incremental refresh configuration data is missing or the existing output is removed.

5. (optional) If you are the flow owner, select **Send email when done** to notify users when the flow is successful. For more information about how to send email notifications on flow runs, see [Notify Users of Successful Flow Runs](#).
6. Set your flow failure options:
  - **Add data quality warning:** Select the tick box to set a warning message on the flow so that users of the data are aware of issues. The message remains until the flow runs successfully. If the flow already has a data quality warning, this option shows as selected and can't be turned off.

**Note:** In version 2021.4 and earlier, click on the **Flow run monitoring** icon  to open the **Data Quality Warning** dialog.

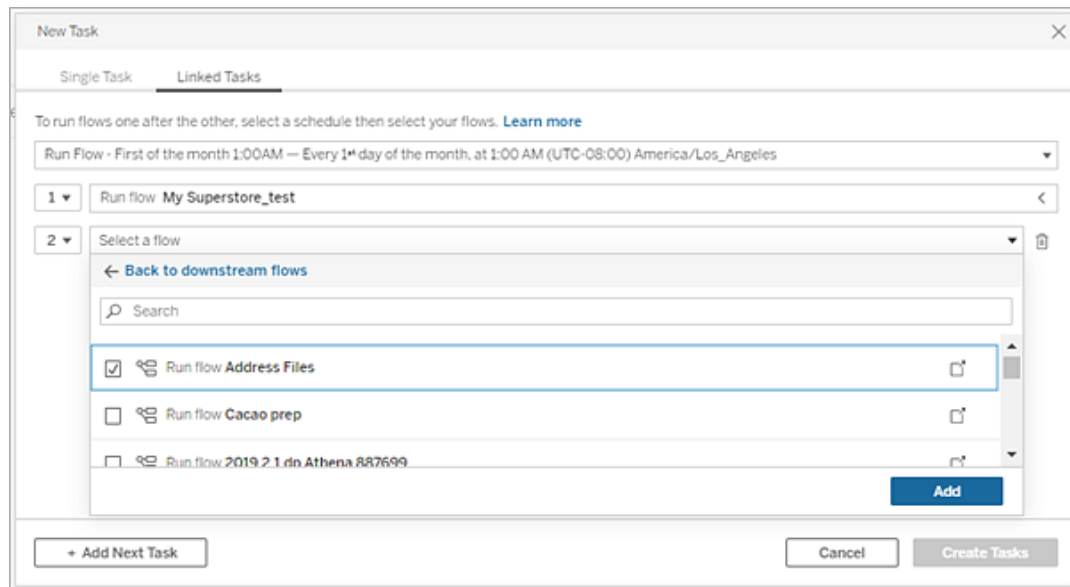


- **Stop remaining tasks:** Select this option to prevent the downstream tasks in the list from being queued to run.
  - **Email me:** Email notifications are automatically sent to the flow owner and the linked task creator when the flow fails, is suspended or is cancelled.
7. (version 2021.4 and later) If your flows include parameters, enter any required or optional parameter values. You must enter required values for the flow to run.

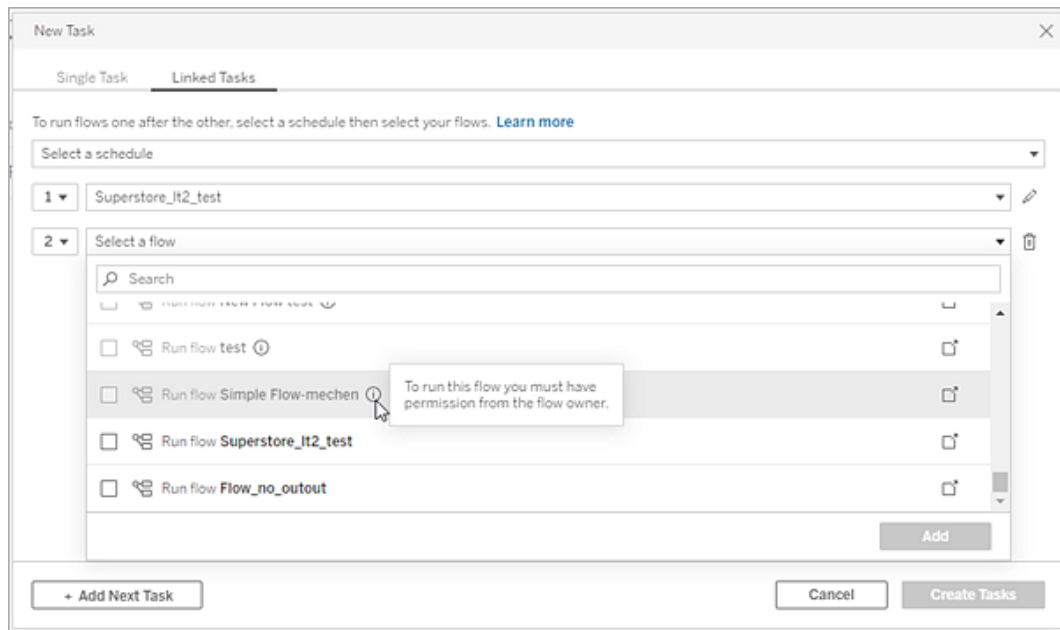


- Click on the drop-down for the 2nd task to add your next flow. Flows that use the previous flow's outputs are shown automatically, or click **View all flows** to see all available flows.


Select one or more flows and click **Add** or click **Add Next Task** to add more flow run tasks to your list.



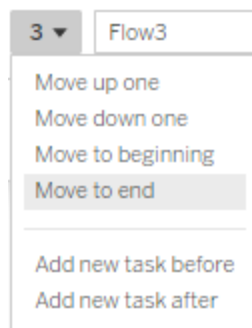
If you don't have permission to run the flow, you must contact the flow owner to grant permissions before adding the flow to your list.



9. Repeat steps 3–5 to configure your flow run options.

**Note:** In version 2021.4 and earlier, click on the **Edit** icon  next to your new flow to expand the Options pane.

10. (Optional) Click on the drop-down next to any numbered task to open the menu to change the order of your flow tasks or insert new tasks between existing tasks.



11. Click **Create Tasks** to create the scheduled linked tasks.



### Who can do this

- The Server administrator can do this on all sites on the server. The Site administrator can do this on sites they have access to if the site settings to allow users to publish and schedule tasks is enabled.
- For linked tasks, the Server administrator can do this on all sites where the server settings to allow users to schedule linked tasks is enabled. The Site administrator can do this on sites they have access to if the site settings to allow users to schedule linked tasks is enabled.
- Flow owners and project leaders can create flow tasks for flows or projects that they own respectively.

Site administrators, flow owners, project leaders, can create flow tasks for the flows and projects that they own respectively.

For more information, see [Set Users' Site Roles](#) and [Content Ownership and Permissions](#)

## Notify Users of Successful Flow Runs

*Supported in Tableau Prep Builder version 2021.4.1 and later and in Tableau Server and Tableau Cloud version 2021.4 and later. Data Management is required to use this feature.*

Flow owners can subscribe themselves, individual users and groups to email notifications for information about scheduled tasks for successful flow runs. The email includes links to data within the Tableau environment, or you can optionally include the details of the flow run in attached Excel and CSV files.

Flow subscriptions are added to scheduled tasks for flows. You can add flow subscriptions to an existing flow task or when you create a new flow task. Email notifications are sent when the scheduled task is completed successfully.

Configure the site settings for flow subscriptions

By default, the **Flow Subscriptions** site setting for sending and receiving email notifications is enabled.

## Flow Subscriptions

Flow owners can schedule and send emails with flow output data to themselves and others. [Learn more](#)

- ☒ Let users send or receive emails that include flow output data
- ☐ Attach .csv and .xlsx flow output files. This option sends data outside of Tableau and is not recommended

- The **Let users send or receive emails that include flow output data** option allows the flow owner to receive and subscribe users and groups to successful flow run notifications. From the notification email, users can access the full data source or view the flow details from within Tableau.
- (Not recommended) The **Attach .csv and .xlsx flow output files** option lets the flow owner attach files to notification emails. The email recipients must be added to the Tableau server or site, however, the files contain the data source and can be exposed outside of the Tableau system. This option is available only for on-premise environments.

### Publish the Flow

Publish the flow output as either a file, database table or data source. Consider the following when saving the flow:

- (On-premise only) When publishing you can save the output as a file or as a database table and choose to attach either a .csv or .xlsx file type to the email.
- When publishing and saving the output as a published data source, the email notification provides a link to the flow in Tableau. Files cannot be attached to the email.
- When choosing to save as a file output, you must use a network share and the output and input location must be included in a safe list. For more information, see [Step 4: Safe list Input and Output locations](#).
- Flow subscriptions are supported on Windows and Linux. The following restrictions apply to flow subscriptions on Linux:

## Tableau Server on Windows Help

- File outputs must be output to a Windows server.
  - For flows that output to a file, use the UNC format for the path: `\\server\path\file-name`. Do not use a local drive letter.
  - The mounted path must be safe-listed.
- When attaching files to an email, the file limit is approximately 25 MB for Tableau Cloud. When using an on-premise Tableau Server, you configure the size of attachment files.

### Add a flow subscription

1. As the owner of the flow, select a published flow in Tableau Server or Tableau Cloud that you want to add subscriptions to for email notifications.
2. You can add subscriptions to a new or existing task:
  - If you are adding a subscription to a new task:
    1. Click **Scheduled Tasks > New Task**.
    2. In the New Task dialog, select a schedule to run the flow from the **Select a schedule** drop-down list.
    3. Enable **Send email when done**
  - If you are adding a subscription to an existing task:
    1. Click **Subscriptions > Subscribe**.
    2. In the **Add Flow Subscriptions** dialog, select a schedule from the **Frequency** drop-down list.
3. In the **Send to** field, start typing the name of the user or group to populate the field. Select the users and groups that you want to send a notification to.

Users and groups must be added to the Tableau environment by the administrator.
4. (Optional) To be included in the notification, check the **Send to me** box.
5. (Optional) In the **Subject** field, customise the default email subject line for the flow run notification.
6. (Optional) Add information about the flow run in the **Email message** text box.

- Click **Include output data** and select the type of output that you want to include in the email.

- If you published your flow as a file or database table output, you can choose to attach .csv or .xlsx files containing the data source to the email. This is not recommended because data can be exposed outside of the Tableau system.

- If you published your flow as a data source, you can choose to include the link to the data source. Attaching files to the email is not supported.

- If you are adding a subscription to an existing task, click **Subscribe**.

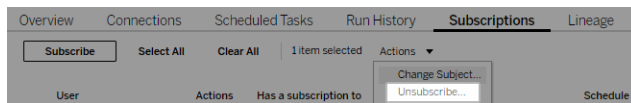
### Unsubscribe from a flow subscription

To unsubscribe from notifications from the email, follow these steps.

- Click **Unsubscribe** from the bottom of a subscription email.
- As the flow owner, Sign in to Tableau Server or Tableau Cloud. At the top of the page, click the **Notifications** icon.
- Expand the ... menu, then select **Remove notification**.

To unsubscribe and remove the subscription as the flow owner, follow these steps.

- Click **Subscriptions**.
- Open the published flow in Tableau Server or Tableau Cloud.
- From the list of flow subscriptions, click the selection box for the flow you want to unsubscribe from.

4. Select **Actions > Unsubscribe**.

## View Subscriptions

You can view your current flow subscriptions in Tableau Server or Tableau Cloud.

- From the **Subscriptions** tab on the **Overview** page of the flow, you can see the list of current subscriptions.
- From the **Subscriptions** tab on the **Tasks** page, you can see the list of subscriptions along with subscriptions to workbooks.

## Resume suspended flow subscriptions

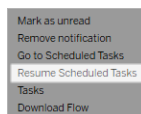
Sometimes, subscriptions fail because of an issue with the flow. If a subscription fails more than five times, you'll receive a notification email that your scheduled flow task has been suspended.

From the flow Overview page, you can see when a scheduled flow task fails.

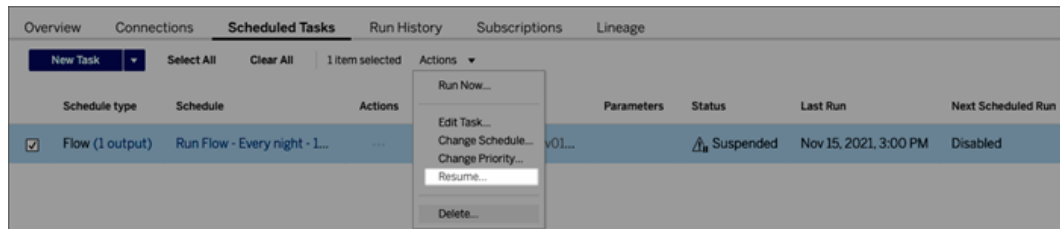
Overview	Connections	Scheduled Tasks	Run History	Subscriptions	Lineage
Description No description available.					
Run All	Output step	Output name	Status	Schedule	Errors
Run	Output	Output	Failed: Nov 15, 2021, 3:00 ...	Run Flow - Every night - 11:0	<a href="#">Error</a>

There are a few ways to resume a suspended flow task. If you're flow owner:

- From the My Content area of Tableau web pages, an icon appears in the Last update column to indicate that the subscription is suspended. Select ... > **Resume Scheduled Tasks** to resume.



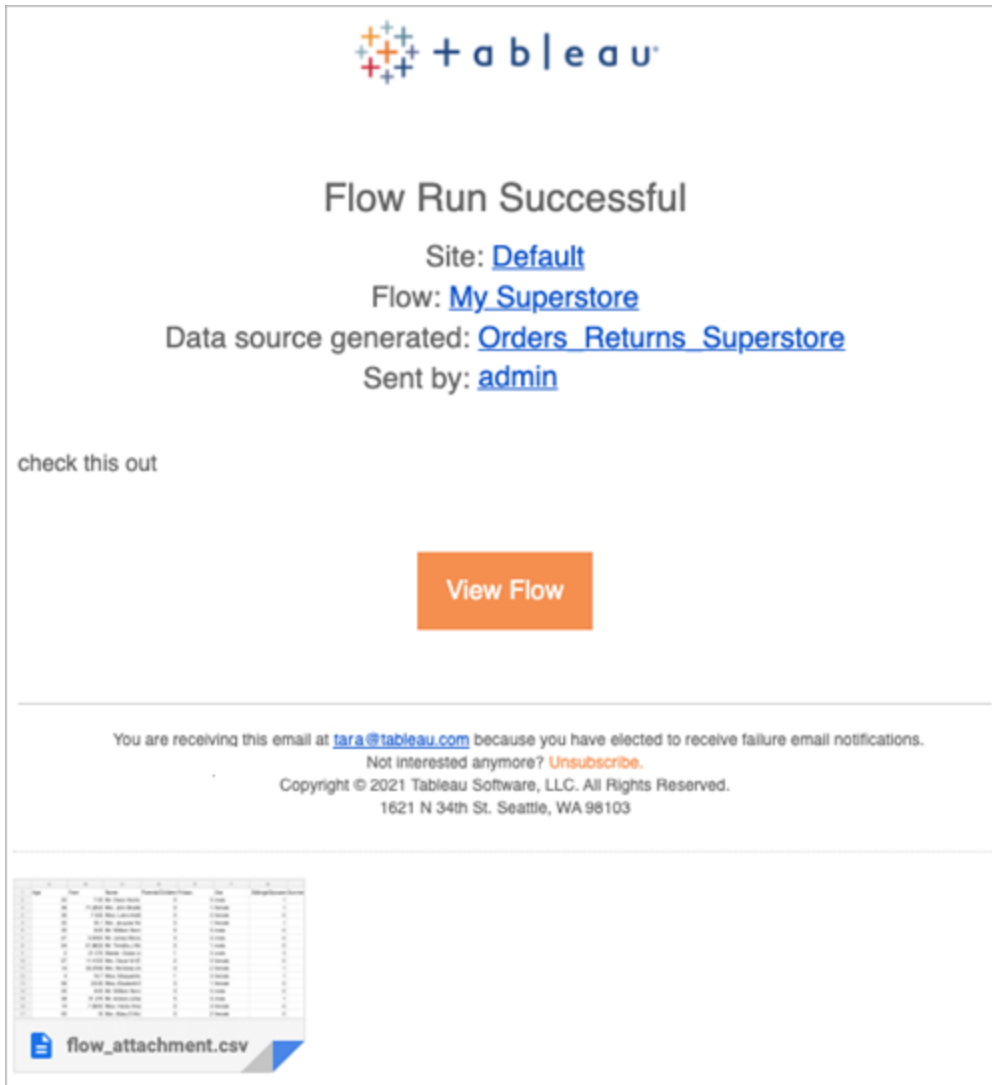
- From the Scheduled Tasks page, an icon appears in the last update column to indicate that the subscription is suspended. Select the flow, then click **Actions > Resume**.



Access the flow data from a notification email

Depending on how the flow notification was configured, you can access the data source and file attachments from the notification email.

- Click View Flow to open the flow in Tableau Server or Tableau Cloud.
- Click the attachment file to view the flow data.



Who can do this

- Flow owners can create flow notification subscriptions for flows that they own.
- To receive notifications, users and groups must be added to the Tableau environment by the administrator.

For more information, review the following articles:

- Windows: [Set Users' Site Roles](#) and [Content Permissions and Ownership](#)
- Linux: [Set Users' Site Roles](#) and [Content Permissions and Ownership](#)

## Manage a Flow

Once you publish a flow to Tableau Server or Tableau Cloud, you can manage your flows and make changes to them as necessary. This topic describes the various actions you can take to manage your flows.

**Note:** The content in this topic applies to both Tableau Server and Tableau Cloud, exceptions are called out specifically.

### Managing your flows

**Following is a list of actions you can take to manage your flows:**

- **Create flows:** Starting in version 2020.4, as a Creator you can create flows directly on the web. From the **Home** page, click **Create > Flow** or from the **Explore** page, click **New > Flow**. For more information, see [Tableau Prep on the Web](#).
- **Edit flows:** Starting in version 2020.4, as a Creator you can edit flows directly on the web. Navigate to the list of flows, select **Actions** and click **Edit Flow**, or open a flow and click the **Edit** button.

When you edit a flow, your changes are moved to a draft state. When you're finished, publish your flow to commit your changes and create a new version of the flow. For more information, see [Autosave and working with drafts](#).

- **Run flows:** You can manually run a flow in addition to creating scheduled flow tasks that run at a specific time.

**Note:** The Data Management is not required to manually run flows, but is required to schedule flows to run.

- Navigate to the list of flows, select one or more flows you want to run, select **Actions** and click **Run Now**.



- **Tag:** Tags are keywords you can create for flows to help you find, filter and categorise content. Authors can add tags to flows when they publish it. But you can also add tags to any workbook, view, or data source that you are allowed to access and you can delete any tags you have added. You can add a tag to a list of flows.

Navigate to the list of flows, select one or more items you want to tag, select **Actions** and click **Tag**. To add a tag to a specific flow you can do it from the list of flows as described above. Open the Flow, from the Overview tab, select **Actions**, and click **Tag**.

- **Change Owner:** Administrators and flow owners can change owners but only to themselves.
- **Permissions:** You can set permissions for users and specify if they can perform edit actions like save, download, move to a different project and delete. In addition, you can specify who can view and run the flow.
- **Download:** You can download a flow to view or modify it using Tableau Prep Builder. To download a flow, you need download permissions. You'll have that by default if you are the owner, but you might need to add it for other users.
- **Revision History:** When you make a change to the flow, and republish it to the same project with the same name, a new version of the flow is created. You can view the revision history by selecting revision history from the actions menu. Flow owners have permissions to restore a previous version of a flow.
- **Move:** You can move flows between projects. To move a flow, users need Move permission. You'll have that by default for flows you own, but you might need to add it for other users.
- **Rename:** You can rename a flow. To rename a flow, users need the Save permission. You'll have that by default for flows you own, but you might need to add it for other users.

- **Delete:** You can delete a flow. To delete a flow, users need the Delete permission. You'll have that by default for flows you own, but you might need to add it for other users.

Who can do this

## Tableau Server Administrator

**Can do the following tasks across all the sites:**

- Create flows
- Edit published flows
- View a list of all draft flows
- Run flows
- Delete flows
- Download flows
- Change Owner
- Change Permissions
- Change Project
- Add/Remove Tags
- Change Description
- Change Name
- Update Flow Task
- Delete Flow Task

## Tableau Server on Windows Help

- Create a Flow Task\*
- Version Management\*

\*Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:
  - Revision history must be enabled on the site.
  - User role is allowed to publish to the project.

## Tableau Site Administrator

**Can do the following tasks on flows published to the sites that they are site administrator for:**

- Create flows
- Edit published flows
- View a list of all draft flows
- Run flows
- Delete flows
- Download flows
- Change Owner
- Change Permissions

- Change Project
- Add/Remove Tags
- Change Description
- Change Name
- Update Flow Task
- Delete Flow Task
- Create a Flow Task\*
- Version Management\*

Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:
  - Revision history must be enabled on the site.
  - User role is allowed to publish to the project.

## Project Leader

**Can do the following tasks on flows published to the projects where they have project leader permissions:**

## Tableau Server on Windows Help

- Create flows
- Edit published flows
- Run Flows
- Delete
- Download
- Change Permissions
- Change Project
- Add/Remove Tags
- Change Description
- Change Name
- Update Flow Task
- Delete Flow Task
- Create a Flow Task\*
- Version Management\*

\*Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:

- Revision history must be enabled on the site.
- User role is allowed to publish to the project.

## Project Owner

**Can do the following tasks on flows published to the projects that they own:**

- Create Flows
- Edit published flows
- Run Flows
- Delete
- Download
- Change Permissions
- Change Project
- Add/Remove Tags
- Change Description
- Change Name
- Update Flow Task
- Delete Flow Task
- Create a Flow Task\*
- Version Management\*

\* Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:
  - Revision history must be enabled on the site.
  - User role is allowed to publish to the project.

## Flow Owner

### **Can do the following tasks on flows that they own:**

- Create Flows
- Edit Draft (flows they own) and Published Flows
- Run flows
- Delete flows
- Download flows
- Change Owner
- Change Permissions
- Change Project
- Add/Remove Tags
- Change Description
- Change Name

- Update Flow Task
- Delete Flow Task
- Create a Flow Task\*
- Version Management\*

\*Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:
  - Revision history must be enabled on the site.
  - User role is allowed to publish to the project.

## User with Creator Licence

### Can do the following tasks:

- Create Flows
- Edit Draft (flows they own) and Published Flows
- Run Flows (with Run flow permissions)
- Delete (with delete permissions)
- Download (with download or Save as, and read permissions)
- Change Permissions (with Change Permissions)



## Tableau Server on Windows Help

- Change Project (with move permissions, and write permissions on the destination project)
- Add/Remove Tags (with read permissions)
- Change Description (with Save permissions)
- Change Name (with Save permissions)
- Update Flow task (with Execute permissions)
- Delete Flow Task (with Execute permissions)
- Create a Flow Task\* (with Execute permissions)
- Version Management\* (with view, read, save as, download permissions)

\* Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:
  - Revision history must be enabled on the site.
  - User role is allowed to publish to the project.

## User with Explorer Licence

**Can do the following tasks:**

**Note:** Starting in version 2020.4, Explorer licence users can no longer run flows on Tableau Server.

- Explorer licence users (with Run flow permissions) can run flows on Tableau Cloud.
- Delete (with delete permissions)
- Download (with download or Save as, and read permissions)
- Change Permissions (with Change Permissions)
- Change Project (with move permissions and write permissions on the destination project)
- Add/Remove Tags (with read permissions)
- Change Description (with Save permissions)
- Change Name (with Save permissions)
- Update Flow task (with Execute permissions)
- Delete Flow Task (with Execute permissions)
- Create a Flow Task\* (with Execute permissions)
- Version Management\* (with view, read, save as, download permissions)

\*Some additional conditions apply to these actions:

- To create a flow task:
  - A flow schedule must be available. Only Server Administrators can create a schedule.
  - The flow must have at least one output step.
  - The flow version must be compatible with the Tableau Server version.
- Version management:

- Revision history must be enabled on the site.
- User role is allowed to publish to the project.

## User with Viewer Licence

Viewers cannot manage flows, they can however view the flow and the different versions of the flow.

For more information about the full capabilities you can set on flows, see [Permission capabilities](#).

## Monitor Flow Health and Performance

After you publish flows and schedule them to run periodically, you want to know that they are running as expected and resolve any issues as they occur. You will also want to monitor and understand the performance of your flows.

This topic describes the various methods that Tableau Server provide to help you monitor your flows.

Detect issues as they occur and resolve them

You can set up Tableau Server to send email notifications when flows fail, or find and review errors on Tableau Server using the Alerts menu or by reviewing the flow pages for the flows that you are interested in. This type of monitoring allows you to detect problems as they occur.

Get notifications when a flow fails:

You can configure Tableau Server to send notifications about flow failure via email or on the Tableau site or Slack. To set up notifications for your Tableau Server and sites, follow the instructions in [Step 2: Configure Flow Settings for your Tableau Server](#).

## View and resolve errors

**Note:** Starting in version 2020.4.1, you can now create and edit flows directly in Tableau Server and Tableau Cloud. The content in this section applies to all platforms, unless specifically noted. For more information about authoring flows on the web, see [Tableau Prep on the Web](#).

The following errors can happen when running a flow:

- **Connection errors:** Connection errors generally happen when Tableau Server is unable to connect to one or more data inputs or is unable to make a connection in one or more output steps.
  - For Input connection errors, use the **Edit connections** option on the **Connections** tab to make changes to connection details, then run the flow again.
  - For output connection errors, check the output location for the flow output steps. If the flow output is going to a network share, make sure the output steps are pointing to a safe listed location. After you make any changes, republish the flow and try running it again.

**Note:** To fix output connection errors for flows that output to a file or network share, download the flow to Tableau Prep Builder, then republish the flow to your server. Flows that output to a published data source or database can be edited directly on the web.

- **Errors in the flow:** If there are errors in one or more steps in the flow, you will see an error message. You can edit the flow directly on the web and republish it. You can also download the flow to Tableau Prep Builder, resolve the errors, republish the flow to the server and then run the flow again.

- **Suspended flow tasks:** When a scheduled flow task fails to run after a configured number of attempts, the flow task is suspended. By default, a flow task is suspended after 5 consecutive flow task failures.

A flow can have multiple scheduled tasks assigned to it, but only the failed tasks are suspended. All other flow tasks will continue to run unless they have errors. To resolve a suspended task, review and resolve the errors then run the flow on-demand or let the flow run automatically based on the assigned schedule.

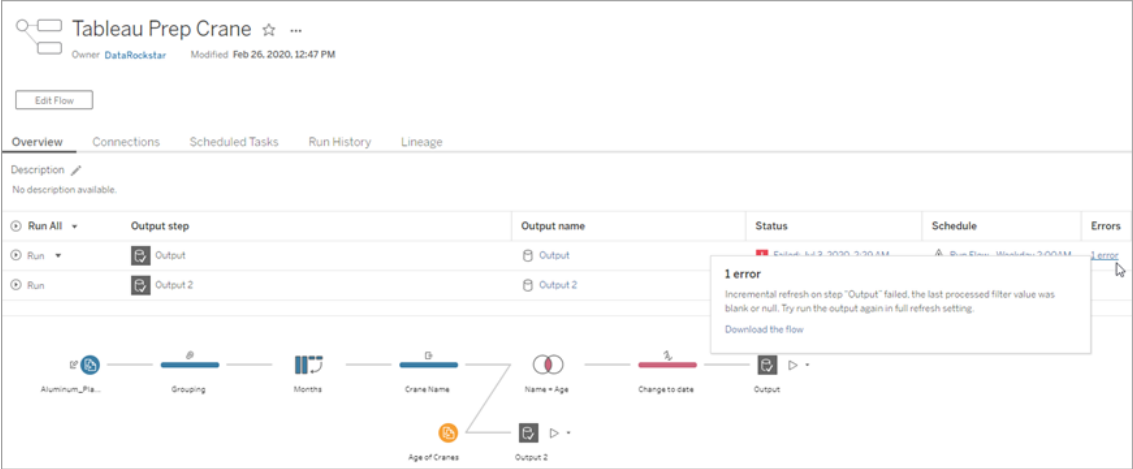
**Note:** Server administrators can configure the number of attempts before a flow run is suspended using the tsm configuration set option. For more details, see Step 5: Optional Server Configurations.

You can view errors on the following pages:

## Flow Overview page

On this page you can see the status of the most recent flow run and any errors. Hover on the error text to review the error details. If a scheduled task is suspended, a warning icon shows next to the schedule. Hover on the icon to view the status.

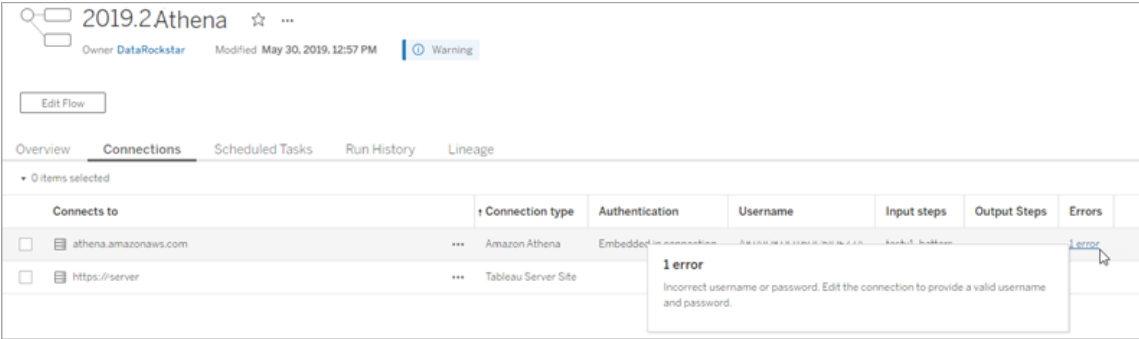
After you resolve the error that caused the flow to fail or the task to be suspended, you can run the flow manually or let the flow run based on the assigned schedule. For suspended flow tasks, click the **Go to Scheduled Task** link on the tooltip for the suspended task to navigate to the **Scheduled Tasks** page and click the **Resume Scheduled Tasks** button to resume the suspended tasks.



### Connections page

The **Connections** page shows the most recent status and any related connectivity errors. To correct input errors, click the **More actions** ... menu for an input connection to edit the connection and change the server name, port, username and password.

To fix output connection errors, edit the flow directly or download the flow in Tableau Prep Builder, correct the file path, then republish the flow to continue running it.



### Scheduled Tasks page

**Note:** The Data Management is required to see this tab.

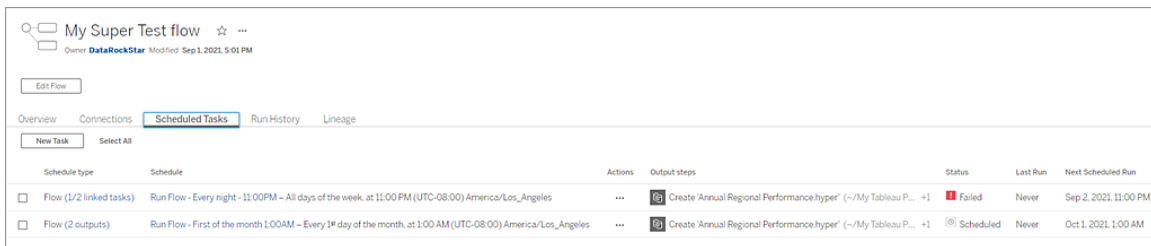
## Tableau Server on Windows Help

View the scheduled tasks assigned to a flow. If a scheduled task is suspended, you can see the status of that tasks here and you can manually resume the flow tasks from this page. Before resuming a suspended task, resolve any errors in the flow.

Error details are not shown on this page, but you can review them on the **Overview** or **Run History** pages. You can also click the links in the **Schedule type** column to view the details of what was scheduled and to edit the tasks.

A suspended scheduled task will automatically resume when the flow is republished, if you edit a connection for the flow or manually run the flow tasks. To manually resume a suspended tasks, on the **Scheduled Tasks** page, click **Resume Scheduled Tasks**. This resumes all suspended tasks for the flow.

To resume individual tasks, click the **More actions** ... menu for a scheduled task and select **Resume**. You can also click **Run Now** to run all tasks for the flow immediately.



Schedule type	Schedule	Actions	Output steps	Status	Last Run	Next Scheduled Run
<input type="checkbox"/> Flow (1/2 linked tasks)	Run Flow - Every night - 11:00PM - All days of the week, at 11:00 PM (UTC-08:00) America/Los_Angeles	...	Create 'Annual Regional Performance hyper' (~\My Tableau P... +1	Failed	Never	Sep 2, 2021 11:00 PM
<input type="checkbox"/> Flow (2 outputs)	Run Flow - First of the month 1:00AM - Every 1st day of the month, at 1:00 AM (UTC-08:00) America/Los_Angeles	...	Create 'Annual Regional Performance hyper' (~\My Tableau P... +1	Scheduled	Never	Oct 1, 2021 1:00 AM

## Run History page

**Note:** The Data Management is required to see this tab.

The **Run History** page shows the details of all the flow runs that have either completed or are in progress for each output. View any error details by hovering over the errors in the **Errors** column. The duration column shows you the run time of the flow.

**Note:** Starting in version 2020.2.1, the **Run Type** field shows the refresh type for the output. In prior releases this field showed whether the output was run on a schedule or on-

demand. For more information about setting up output refresh types, see [Refresh Flow Data Using Incremental Refresh](#).

Tableau Prep Crane ☆ ...  
Owner: DataRockstar Modified: Feb 26, 2020, 12:47 PM

Edit Flow

Overview Connections Scheduled Tasks **Run History** Lineage

Sort By: Run Start (new-old) ▾

Output step	Run type	Run start	Run end	Duration	Status	Rows generated	Errors
Output 2	Full refresh	Jul 3, 2020, 2:29 AM	Jul 3, 2020, 2:29 AM	00:00:06	✓ Succeeded	7	
Output	Incremental refresh	Jul 3, 2020, 2:29 AM	Jul 3, 2020, 2:29 AM	00:00:04	✗ Failed	0	<a href="#">1 error</a>
Output	Incremental refresh	Jul 2, 2020, 2:28 AM	Jul 2, 2020, 2:28 AM	00:00:04	✗ Failed	0	<a href="#">1 error</a>
Output 2	Full refresh	Jul 2, 2020, 2:28 AM	Jul 2, 2020, 2:28 AM	00:00:06	✓ Succeeded	7	
Output 2	Full refresh	Jul 1, 2020, 2:29 AM	Jul 1, 2020, 2:29 AM	00:00:06	✓ Succeeded	7	
Output	Incremental refresh	Jul 1, 2020, 2:29 AM	Jul 1, 2020, 2:29 AM	00:00:04	✗ Failed	0	<a href="#">1 error</a>
Output 2	Full refresh	Jun 30, 2020, 2:30 AM	Jun 30, 2020, 2:30 AM	00:00:06	✓ Succeeded	7	
Output	Incremental refresh	Jun 30, 2020, 2:30 AM	Jun 30, 2020, 2:30 AM	00:00:04	✗ Failed	0	<a href="#">1 error</a>
Output	Incremental refresh	Jun 29, 2020, 2:29 AM	Jun 29, 2020, 2:29 AM	00:00:04	✗ Failed	0	<a href="#">1 error</a>
Output 2	Full refresh	Jun 29, 2020, 2:29 AM	Jun 29, 2020, 2:29 AM	00:00:06	✓ Succeeded	7	

**1 error**  
Incremental refresh on step "Output" failed: the last processed filter value was blank or null. Try run the output again in full refresh setting.  
[Download the flow](#)

## Alerts

When a flow fails, the alerts menu is populated with the error details with the option to re-run the flow, or download the flow to troubleshoot.

**Note:** Flow owners, Server or Site Administrators can see this menu.



Tableau Server on Windows Help

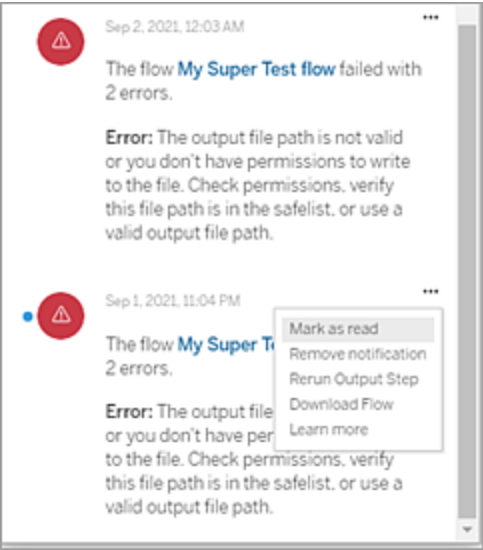


Tableau Prep Conductor process status

- The Tableau Services Manager (TSM) status page is accessible in TSM and can be viewed by TSM administrators. You must be able to log into TSM to see this page.
- The Tableau Server status page appears in the Tableau Server web UI and is accessible by Tableau Server administrators. If you hover your mouse pointer over the status indicator for a process, a tooltip shows the node name and the port the process is running on. The Tableau Server status page does not show TSM processes.

+ a b   e a u		STATUS	MAINTENANCE	CONFIGURATION	Tableau Server is running <span>Sign out</span>	
Process	node1					
Gateway	✓					
Application Server	✓					
Interactive Microservice Container	✓					
VisQL Server	✓✓✓✓					
Cache Server	✓✓					
Cluster Controller	✓					
Search & Browse	✓					
Backgrounder	✓✓✓✓					
Background Microservice Container	✓✓✓✓					
Data Server	✓✓					
Data Engine	✓					
File Store	✓					
Repository	✓					
Tableau Prep Conductor	✓					
Ask Data	✓					
Elastic Server	✓					
TSM Controller	✓					
License Server	✓					
Refresh Status		✓ Active	⚡ Busy	⚠ Degraded	✖ Error	⏹ Stopped

When Tableau Server is functioning properly, Tableau Prep Conductor will show as Active or Busy:

- **Active** – The process is functioning as intended.
- **Busy** – The process is completing some task.
- **Down** – The process is down. The implications of this differ depending on the process.
- **Status unavailable** – Tableau Server is unable to determine the status of the process.

Who can do this

- **Tableau Server Administrators:**
  - Setup email notifications at the server level
  - Set up email notifications for a site
  - View errors
  - Resume suspended tasks
  - View alerts
  - view process status
- **Tableau Site Administrators:**
  - Set up email notifications at the site level
  - View errors
  - Resume suspended tasks
  - View alerts
- **Flow owners, project leaders and any user who is granted permissions to view the flow:**
  - View errors
  - Resume suspended tasks
  - View alerts (Flow owners)

### Administrative Views for Flows

Administrative views can be used to monitor the activities related to flows, performance history and the disk space used. The **Status** page contains an embedded Tableau workbook

## Tableau Server on Windows Help

with various administrative views that can be used to monitor different types of server or site activity.

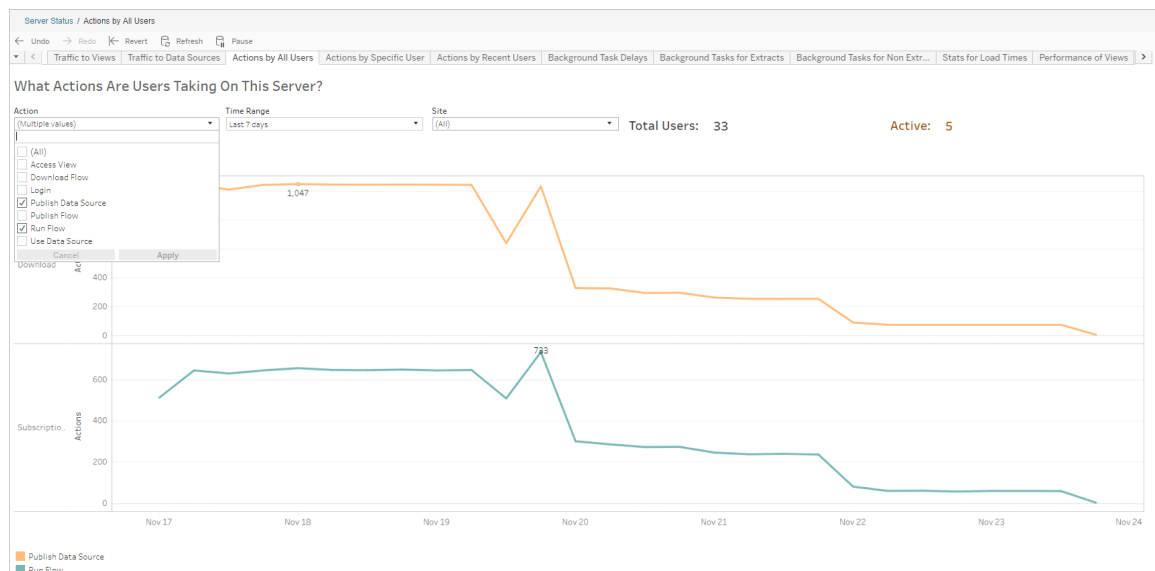
For **Tableau Server** installations, you must install PostgreSQL drivers before you can see Administrative views. For more information, see [Database Drivers \(Linux\)](#), [Database Drivers \(Windows\)](#). Server administrators can use these views to see activity both at the server level (aggregated for all sites) or for a specific site. Only server administrators can filter by site.

Who can do this?

Tableau Server administrators and Tableau Site administrators can both view and work with Administrative Views. Only Server administrators can filter by site.

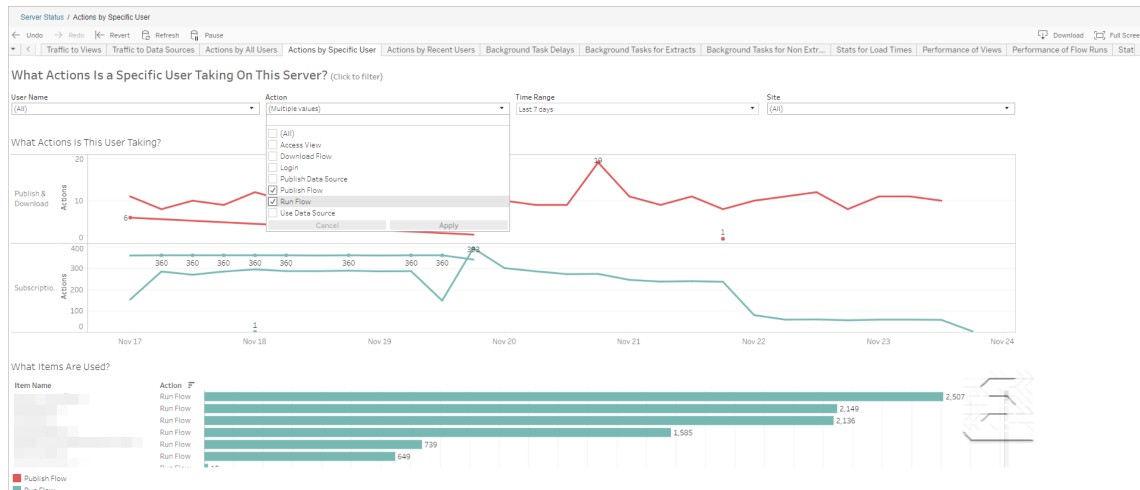
### Action by all users

Use this view to gather insight into how flows are being used. This includes actions like publish, download and flow runs. You can filter the view by actions, by site and by time range. The Total Users count shows the number of users who have performed an action. This value is not affected by any filtering. The Active user count shows the number of users who have been active during the selected time period and performed one of the selected actions.



## Action by Specific User

Use this view to gather insights about how an individual user is working with flows. You can filter the view by username, the type of action, time range and by site.



## Action by Recent Users

This view shows you which users have been active on Tableau Server over the past 24 hours.

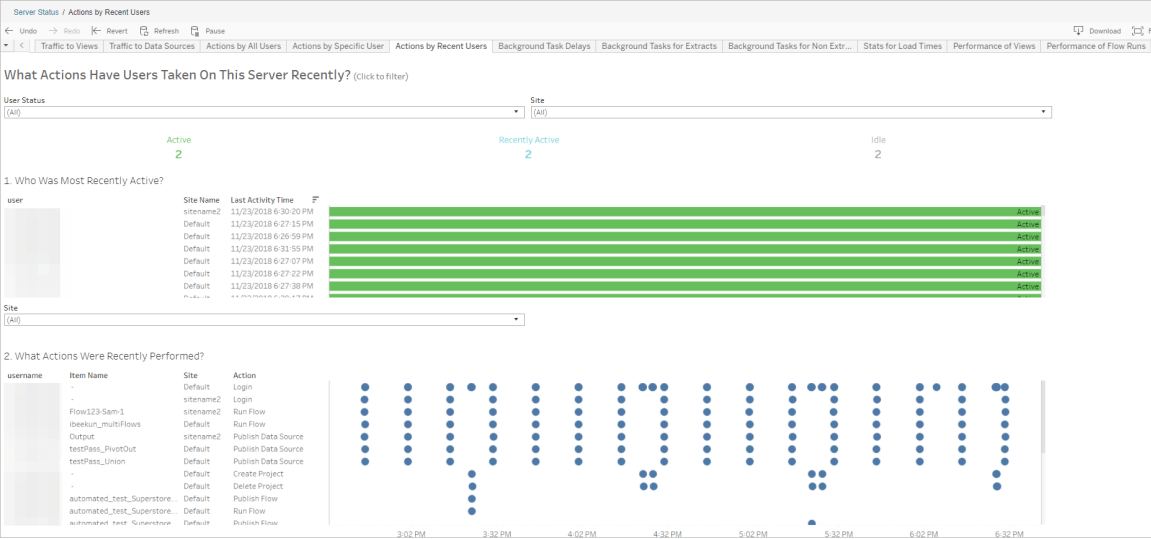
This can be useful if you need to do some maintenance activity on the server and want to know which users and how many this will affect, and what they're doing.

The view shows **Active**, **Recently Active** and **Idle** users that are currently signed in to Tableau Server.

For this view, an active user is one who took an action in the last 5 minutes, a recently active user is one who last took an action within 30 minutes, and an idle user is one who last took an action more than 30 minutes ago.

Select a user to see only the actions that user performed recently. Hover over an action to see details of the action.

# Tableau Server on Windows Help



## Background Task Delays

This view shows the delay for extract refresh tasks, subscription and flow tasks – that is, the amount of time between when they are scheduled to run and when they actually run. You can use the view to help identify places you can improve server performance by distributing your task schedules and optimising tasks.



Possible reasons for the delays and ways to reduce the delays include the following:

- Many tasks are scheduled for the same time.

In the example view, tasks that show long delays are clustered at the same time every day, which creates spikes in the wait time. You can set the Timeline filter to a single day to view task delays by hour and identify the hours of the day when many tasks are scheduled at the same time. One solution is to distribute the tasks to off-peak hours to reduce load on the server.

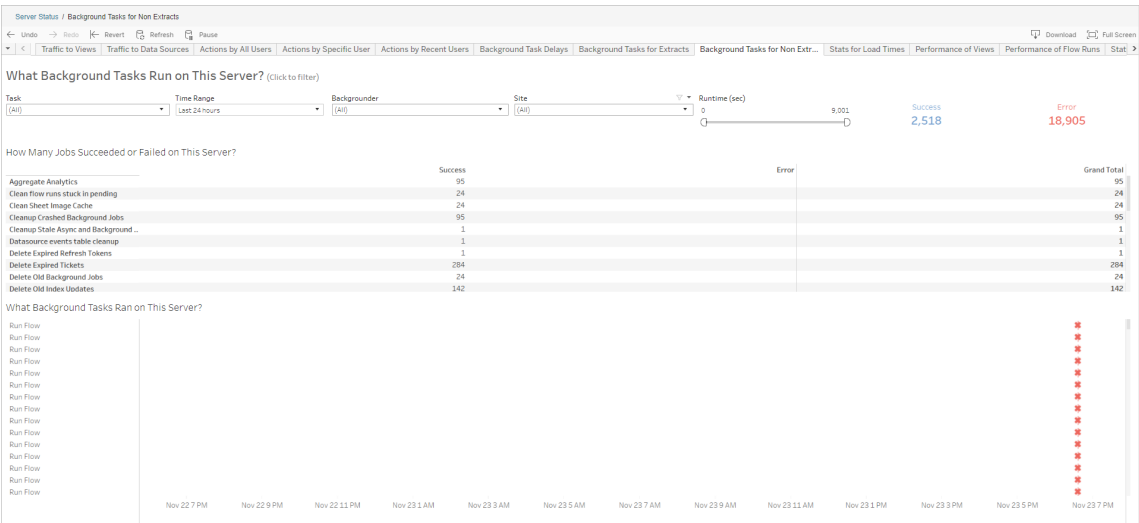
- Other server processes running at the same time are consuming server resources and slowing down performance.

Monitor the CPU and memory usage of server processes to identify processes that consume the most resources, then adjust the configuration of processes on your server.

For more information on monitoring processes, see [Collect Data with Windows Performance Monitor](#).

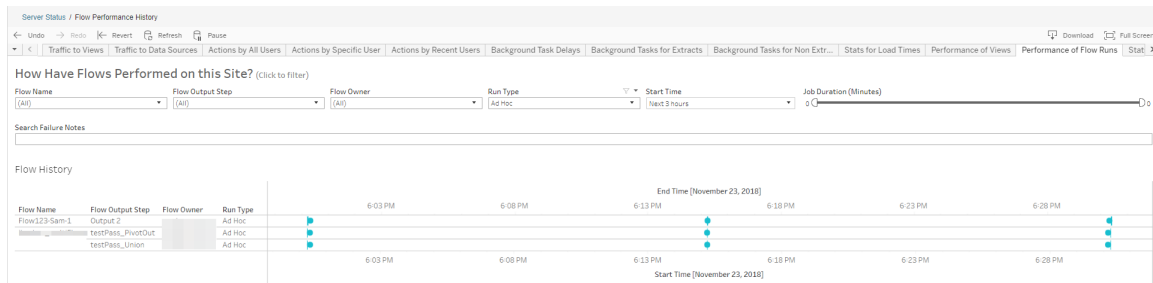
### Background Tasks for Non Extracts

Background Tasks are created to run flows (scheduled and ad hoc). You can use this view to see how many flow tasks succeeded or failed on this site. For details on a task, hover over its icon.



## Performance of Flow Runs

Use this view to see the performance history for all the flows on a site. You can filter by Flow Name, Output Step Name, Flow Owner, Run Type (Scheduled or Ad Hoc) and the time the flow runs were started.



Questions you can answer using this view include:

- **What flow tasks are currently scheduled?** - To do this, use the Start Time filter and select the time frame you want to look at. For example, to see flow tasks that are scheduled in the next 3 hours, select **Hours** -> **Next** -> and enter **3**.
- **What is the duration of flow tasks?** - To answer this, click on a mark in the view to see details, including the task duration.
- **How many flows were run ad hoc, and how many were scheduled runs?** - To answer this, use the **Run Type** filter and select **Ad hoc** or **Scheduled**.

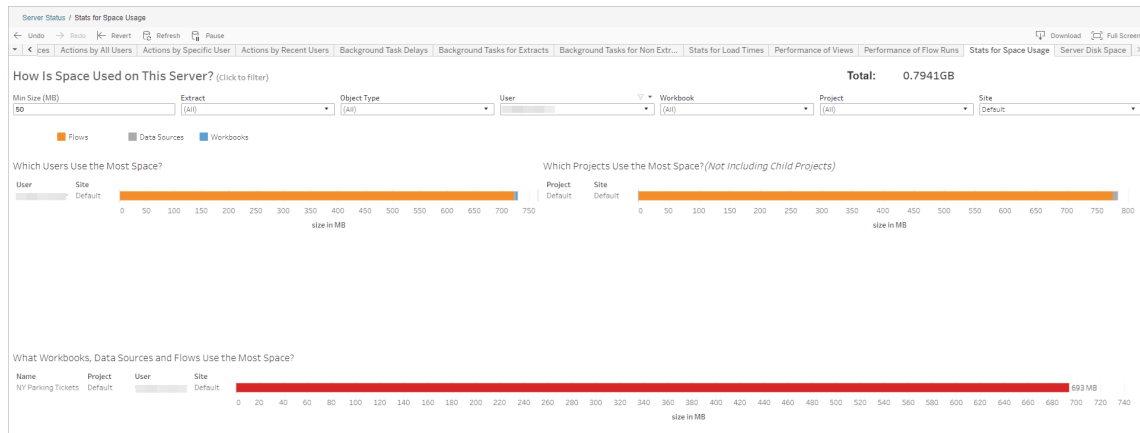
This view can also show you the following information:

- Flows with the highest run frequency have the most marks.
- To see flows that are currently running at the same time, hover over a mark that shows **"In Progress"** or **"Pending"** and select **"Keep Only"** to filter all flow runs that are currently running.
- To see flows that are running at the same time during a specific time range, select a

range for the **Start Time** filter. For example, select **“Next three hours”** to see which flows will be running in the next three hours.

## Stats for Space Usage

Use this view to identify which flow outputs are taking up the most disk space on the server. Disk space usage is displayed by user, project and the size of flow output, and is rounded down to the nearest number.



Use the Min Size filter to control which flow outputs are displayed, based on the amount of space they take up. Use the object type filter for flows.

- **What Users Use the Most Space** – This section shows the users who own flows (when filtered for flows) that are taking up the most space. Click a username to filter the next two graphs for that user.
- **What Projects Use the Most Space** – This section shows the projects with flows (when filtered for flows) that are using the most space.
- **What Workbooks, Data Source and Flows Use the Most Space** – This section shows the flows (when filtered for flows) that take up the most space.



Who can do this

- **Tableau Server Administrators:**
  - Set up email notifications at the server level
  - Set up email notifications for a site
  - View errors
  - Resume suspended tasks
  - View alerts
  - view process status
- **Tableau Site Administrators:**
  - Set up email notifications at the site level
  - View errors
  - Resume suspended tasks
  - View alerts
- **Flow owners, project leaders and any user who is granted permissions to view the flow:**
  - View errors
  - Resume suspended tasks
  - View alerts (Flow owners)

## Developer Resources - REST APIs

Use Tableau Server REST APIs to automate and seamlessly integrate Tableau into your existing workflows. Tableau Server REST API gives you programmatic access to work with your content, users, sites and now flows. Manage provisioning, permissions and publishing on Tableau Server or Tableau Cloud via HTTP. The REST API gives you access to the functionality behind the data sources, projects, workbooks, site users, sites and flows. You can use this access to create custom applications or to script interactions with server resources.

Tableau REST API supports the following flow functionality:

New flow endpoints have been added to support publishing flows, scheduling flows, running flows on demand, managing permissions, downloading flows and such. For a full list of all the new REST API endpoints for flows, see [Flow Methods](#).

In addition, **existing endpoints** have been updated to support flow functionality such as Creating New Schedules for Flows, Creating new sites, updating existing sites and managing default permissions.

**Note:** The Data Management licence is required when using REST API to run flows.

## About Tableau Catalogue

Data is increasing in volume, formats and importance leading to more complex environments. With the rapid pace that data changes, it can be hard to keep track of that data and how it's being used in such complex environments. At the same time, more users need to access more of that data in more places, and it's difficult for users to find the right data. Ultimately, this causes a lack of trust in the data because people question whether they're using the right source or if the source is up to date.

Tableau Catalogue integrates features like lineage, impact analysis, data dictionary, data quality warnings and search into your Tableau applications, helping solve these problems differently from a stand-alone catalogue. It focuses on both IT and the end user so that everyone using Tableau Server or Tableau Cloud has more trust in and visibility into the data, while also enabling more discoverability. Tableau Catalogue builds a catalogue out of the Tableau content being used by your organisation, enabling comprehensive functionality like the following:

- **Impact analysis and lineage.**
  - You can see the workbooks and other Tableau content that depend on particular columns or fields from tables or data sources you manage. When you need to make changes to your data, you can notify the impacted Tableau authors using email.
  - As a workbook author, you can use lineage to trace the fields that your workbook depends on.
  - As a user, when you use a Tableau visualisation, you can see where the data came from that was used to create the view.
- **Curation and trust.** As a data steward, you can add helpful metadata, like descriptions and certification, so that users find the right data. You can set data quality warn-

ings, view data details on the Data Details pane, certify assets and remove assets from the catalogue.

- **Data discovery.** In Tableau Desktop or Tableau web authoring, you can use Tableau Catalogue to search for databases, tables, data sources and virtual connections to analyse in Tableau and connect to them from the search results.

Starting in 2019.3, Tableau Catalog is available as part of the Data Management offering for Tableau Server and Tableau Cloud. When the product key is active and enabled, the catalogue features described above are integrated into the product you're using, so you can work with the data where you find it.

## How Tableau Catalogue works

Tableau Catalogue discovers and indexes all the content on your site—workbooks, data sources, sheets, virtual connections and flows—to gather metadata about the content. From the metadata, external assets (databases, tables and other objects) are identified. Knowing the relationships between the content and the external assets enables Tableau to display the lineage of the content and external assets. Tableau Catalog also enables users to connect to external assets using Tableau Server or Tableau Cloud.

Users on your site can publish or delete content, can attach data quality warnings or certifications, or do anything else that changes the content or its metadata on the site, and Tableau Catalogue will update its information accordingly.

For information about how you can use Tableau Catalogue to support data governance in your organisation, see [Governance in Tableau](#) in the Tableau Blueprint Help.

## Key Tableau Catalogue terms

- **Metadata.** Information about the data.
- **Tableau content.** Content created in Tableau such as workbooks, data sources, virtual connections and flows.
- **External assets.** The metadata about the databases and tables used by Tableau content that's published to Tableau Server or Tableau Cloud.

## Licence Tableau Catalogue

Tableau Catalog is licensed through Data Management. For information about how Data Management licensing works, see [Licence Data Management](#).

## Enable Tableau Catalog

After Tableau Server or Tableau Cloud is licensed with the Data Management, you can enable Tableau Catalog by doing one of the following tasks:

- **For Tableau Cloud**, no action is necessary. Tableau Catalogue is on by default, configured to use derived permissions and ready to use. For more information about derived permissions, see the [Permissions on metadata](#) topic.
- **For Tableau Server**, the Server admin must first enable the Tableau Metadata API using the `tsm maintenance metadata-services` command. For more information, see [Enable Tableau Catalog](#).

After the Metadata API is enabled, Tableau Catalogue is on by default, configured to use derived permissions and ready to use. For more information about derived permissions, see the [Permissions on metadata](#) topic.

## Features and functionality

To learn more about the features you can use with Tableau Catalogue, see the following Help articles:

### Data discovery

- In the **Connect** pane on Tableau Desktop, under **Search for Data** select **Tableau Server** to [connect to data using Tableau Server or Tableau Cloud](#). When Tableau Catalogue is enabled, in addition to searching for published data sources to connect to, you can now search for and connect to the specific databases, tables and objects used by published data sources and workbooks on your Tableau Server or your Tableau Cloud site.
- **Search** is expanded to include results based on columns, databases, tables and other objects when Tableau Catalogue is enabled.

## Tableau Server on Windows Help

- If you author in the web, in addition to published data sources, you can also [connect to databases and tables](#).
- If you use Tableau Prep on the web, you can [create new flows based on external assets](#), such as databases and tables.
- If you [connect to Salesforce Data Cloud](#), you'll see support for native Data Cloud objects built into Tableau Catalogue. Data Lake Objects (DLOs), Data Model Objects (DMOs), and calculated insights appear distinct in search, connect and lineage pages, which makes discovering, connecting to and reusing them simpler.

### Curation and trust

- [Certify your data assets](#) to help users find trusted and recommended data.
- Set [data quality warnings](#) to alert users to data quality issues, such as stale or deprecated data.
- Add [sensitivity labels](#) to warn users about data that needs to be handled with care.
- Add [custom labels](#) to classify data in ways that suit the needs of your organisation
- [Manage data labels](#) to extend the label names and categories available to users.
- Categorise items on Tableau Server and Tableau Cloud using [tags](#) to help users filter external assets.
- Better understand published visualisations by using the [Data Details](#) tab to see information about the data used.
- [Add descriptions](#) to databases, tables and columns to help users find the data they're looking for.

### Lineage and impact analysis

- Use [lineage](#) to trace the source of your data and to analyse the impact of changes to your data and identify which users might be impacted.
- [Email owners](#) of a workbook, data source or flow about data-related updates. Do the same with database, table or object contacts.

### Developer resources

You can use metadata methods in the Tableau REST API to programmatically update certain metadata. For more information about the metadata methods, see [Metadata Methods](#) in the Tableau Server REST API.

In addition to the REST API, you can use the [Tableau Metadata API](#) to programmatically query metadata from the content published to Tableau Server or Tableau Cloud. The Metadata API

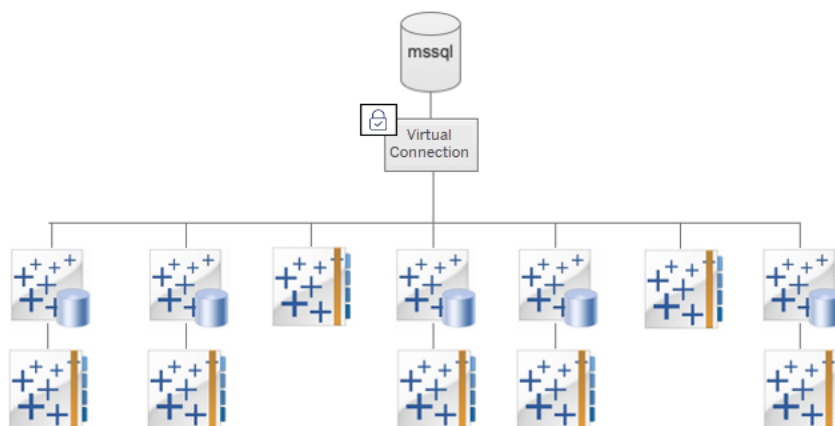
is fast and flexible and is best when you are looking to find out specific information about the relationship between metadata and its structures. Explore and test queries against the Metadata API using an interactive in-browser tool called [GraphiQL](#).

**Note:** Data Management is not required to use the Metadata API or GraphiQL.

## About Virtual Connections and Data Policies

Virtual connections are a Tableau content type, along with data sources, workbooks and flows, to help you see and understand your data. Virtual connections provide a central access point to data. Another key feature introduced with virtual connections is data policies, which support row-level security at the connection level, rather than the workbook or data source level. Row-level security data policies are applied to any workbook, data source or flow that uses the virtual connection.

A virtual connection can access multiple tables across several databases. Virtual connections let you manage extracting the data and the security in one place, at the connection level.



For information about row-level security options, see an [Overview of Row-Level Security Options](#) in Tableau.

Not every virtual connection has an associated data policy. You can also use a virtual connection simply as a central place to manage connection credentials.

## Key terms

- Virtual connection. A sharable resource that provides a central access point to data.
- Connection. The server name, database and credentials you use to access data. A virtual connection has one or more connections. Each connection accesses one database or file.
- Virtual connection table. A table in a virtual connection.
- Data policy. A policy that's applied to one or more tables in a virtual connection to filter data for users. For example, use a data policy to apply row-level security to tables in a virtual connection.
- Policy table. A fact or data table in a data policy that is filtered.
- Policy column. A column that's used to filter the data in the policy tables. A policy column can be in a policy table or in an entitlement table.
- Entitlement table. A table that includes both a policy column you can use to filter policy tables and another column you can relate (map) to a column in a policy table.
- Policy condition. An expression or calculation that is evaluated for every row at query time. If the policy condition is TRUE, the row is shown in the query.

## Licence virtual connections and data policies

Virtual connections and data policies are licensed through Data Management. For information about how Data Management licensing works, see [Licence Data Management](#).

## Enable virtual connections and data policies

Virtual connections and data policies are automatically enabled on Tableau Server and Tableau Cloud with Data Management.

## Permissions

Permissions for virtual connections work much like the permissions for other Tableau content. After you publish a virtual connection, anyone can view the connection. However, only the connection creator and administrators can access data using the connection until the connection creator explicitly grants more permissions.

When you create a virtual connection, you must set the permissions for the Connect capability to enable other users to connect to data using the virtual connection. The Connect capability

allows you to share a virtual connection and allows users to query it. With connect permissions, a user can view the tables in a virtual connection and create content using the tables. For more information, see [Set permissions on a virtual connection](#).

### Permissions vs. data policies

Permissions define what a person can or can't do with a piece of content in Tableau. Permissions are made up of capabilities – the ability to do things like view content, web edit, download data sources or delete content. Permission rules define which capabilities are allowed or denied for a user or group on a piece of content. The interplay between licence level, site role and potentially multiple permission rules factor into the final determination of what a person can or can't do – their effective permissions. See [Permissions](#) for details.

Data policies filter the data in a virtual connection, making sure that people see only the data they're supposed to see. A data policy is applied and filters the data when it's viewed in the Tableau content (for example, a workbook or flow). The policy condition in a data policy is a calculation or expression that defines access to the data. User functions are often used to limit access to users or groups. Access can be based on the user name, the group a user belongs to, or a region value. See [Create a Data Policy for Row-Level Security](#) for details.

Both permissions and data policies govern access. Simply put, permissions determine which *content* you can see, access, use or create; data policies determine which *data* you can see.

### How permissions and data policies work together

Tableau permissions are applied to Tableau content first. People can only do the things they have the capabilities to do with Tableau content – data policies don't override Tableau permissions. After permissions are evaluated, the data policy is applied to determine which data in the virtual connection the person can see based on the policy condition.

The following example describes the effects of permissions and data policies on a virtual connection that contains salary data:

- The virtual connection is in the HR project, which is restricted to Tableau users in the HR group. Anyone outside the HR group can't see content in the HR project, which means they can't browse to, connect to or view the virtual connection.



- The virtual connection has Connect permissions granted only to members of the HR Business Partners group. All others in the HR group can see that the virtual connection exists, but they can't view the data it contains. When they view a workbook that uses that virtual connection, they can't see any data.
- The virtual connection also contains a data policy that filters the salary data based on the individual user, so HR Business Partners can see only rows that pertain to employees in their business unit. When they view a workbook that uses that virtual connection, they see data only for their business unit.

## Features and functionality

For the manager of data, virtual connections provide:

- **Securely managed service accounts.** If you use a 'service account' model, now, instead of having to share that service account information with any user who wants to access that data, you can give the service account credentials to the few analysts who are empowered to create virtual connections.
- **Agile physical database management.** You must make database changes (for example, a field is added or table name is changed) only one time in the virtual connection, rather than in every piece of content where the data is used.
- **Reduced data proliferation.** By centrally managing extract refresh schedules, refreshes are scheduled once, ensuring that anyone who accesses the data from that virtual connection is seeing fresh data.
- **Centralised row-level security.** You can create data policies that apply row-level security to both Tableau extracts and live queries at the connection level. The data policies are applied to any workbook, data source or flow that uses the virtual connection.

**Note:** Data policies are valid for flow input data, but not for flow output data. Users with access to flow output data will see all of the data, and not only a subset of it that pertains only to them.

As the user of data, you benefit from virtual connections knowing that you have:

- **Appropriate access** to only the data you should see, because row-level security is already applied to the data.

- **Flexibility** to use data that's been curated and secured. The virtual connection stores and shares the connection information. All you have to do is create a data source with a data model specific to your needs.
- **Trust** that data is fresh because the extract refresh schedule has already been set.
- The ability to **share** content freely, assured that you won't put security at risk because data policies are always enforced.

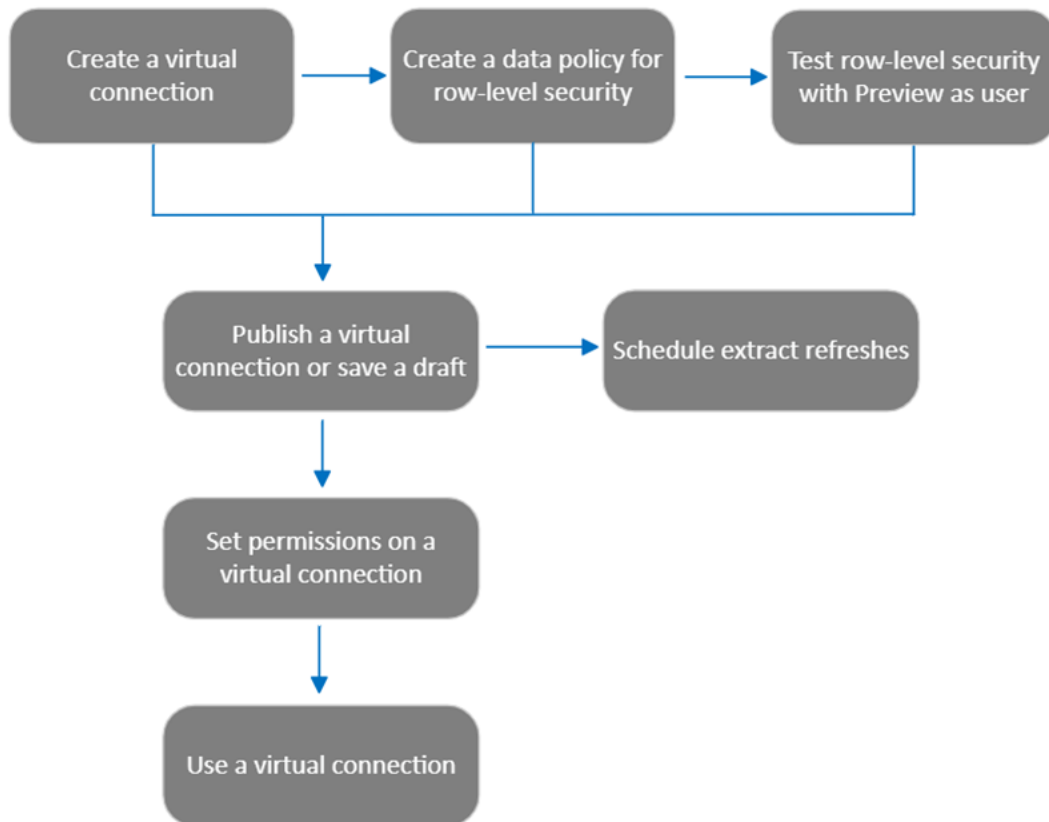
## Virtual connection editor workflow

The virtual connection editor enables you to create:

- Virtual connections, which are a Tableau content type that provides a sharable central access point to data.
- Data policies that support row-level security at the connection level.

After you create a virtual connection and its associated data policies, you can publish it and set the permissions to share with other users. You can also schedule extract refreshes so that all content that uses the virtual connection is accessing fresh data.

The following diagram shows the workflow to create a virtual connection. At any time during the process, you can publish or save a draft of your connection, but the connection must be published before you can schedule extract refreshes or use (or edit) a virtual connection. You must also set permissions before others can use the connection.



Click on a step in the process to go to that help topic.

## Next step


The first step is to Create a Virtual Connection.

## Create a Virtual Connection

A virtual connection is a Tableau content type that provides a sharable central access point to data, and supports row-level security at the connection level. Creating a virtual connection is a multi-step process. This topic covers connecting to the data you want to share and working in the Tables tab of the virtual connection editor.

### Connect to data


To create a virtual connection in Tableau Cloud or Tableau Server:

1. From the Home or Explore page, click **New > Virtual Connection**.
2. In the Connect to Data dialog box, select the connector for your data. For a list of supported connectors for virtual connections, see [Creators: Connect to Data](#) in the Tableau Desktop and Web Authoring help.
3. Enter the information you're prompted for. The credentials you enter are saved in the virtual connection, so connection users don't have to enter credentials to connect to the data.
4. Click **Sign In** if prompted. To add another connection, click  and select a connector, enter credentials and sign in.

A virtual connection can have multiple connections. Each connection accesses one database or file.

**Note:** For Tableau Cloud, virtual connections that connect to private network data use Tableau Bridge to keep data fresh. For information about configuring Tableau Bridge, see [Configure and Manage the Bridge Client Pool](#). For information about supported connections, see [Connectivity with Bridge](#).

#### Add another connection

As needed, add another connection to a virtual connection and connect to more than one database by clicking  next to **Connections**. You can add a connection to a different server or database, or to the same server or database.

With multiple connections, you can:

- Use a table from any connection or database as an entitlement table in a data policy that secures tables from other connections and databases.
- Add or replace tables in a virtual connection with tables from a different database. For example, say you migrate data from one database to another. In the virtual connection editor, you can add a connection to the second database and replace the existing tables from the first database with tables from the second one.
- Add multiple connections to the same server or database. This can be helpful when you need to, for example, access data from the same database but with different credentials.

## Tableau Server on Windows Help

- Share a group of tables that are related or meant to be used together, no matter where they're physically located. For example, from multiple databases you can group tables related to employee information.

When you open a virtual connection to edit it, if prompted, you must authenticate connections in sequence. If any connections fail to authenticate, you can't edit the virtual connection.

Select tables to include in the connection

If necessary, select a database to view the tables in it.

1. On the left, under **Tables**, select the tables and click or drag them to the Tables tab on the right. You can include tables from different connections. Include an entitlement table, if you're using one.
2. (Optional) Click **New Custom SQL** to create a custom table schema.

**Note:** Virtual connections don't support tables with a spatial data type.

Select live or extract mode for tables

You can set individual tables – whether they're from multiple connections or not – to either live or extract mode in the same virtual connection.

- **Live** – Tables are queried directly from the database. (Live is the default.)
- **Extracts** – Tables are extracted and saved to Tableau.

As an example, you can set some tables to extract mode so that they're not impacted by report generation or heavy customer traffic.

Under Tables, select the table or tables you want to change the mode for and select **Actions**, and **Change to Live** or **Change to Extract**. Alternatively, select the Actions Menu (...) in the table's row and select **Live** or **Extract**.

Incremental Extracts

Starting in Tableau Cloud June 2024 and Tableau Server 2024.2, you can configure table extracts for incremental refresh.

When configuring an incremental extract, you specify a key column that is used to identify new rows. When the incremental extract is refreshed, only the rows where the key column has increased will be added to the extract. Fewer rows processed means a faster extract refresh job and less load on the database.

For example, suppose we have an extract for the **Batters** table, and the data in the extract is:

<b>Year</b>	<b>Team</b>
1978	Lions
1979	Tigers

The **Batters** table is configured for incremental extract refresh, and the key column is **Year**.

The live table is updated with a new row for **1980**:

<b>Year</b>	<b>Team</b>
1978	Lions
1979	Tigers
1980	Bears

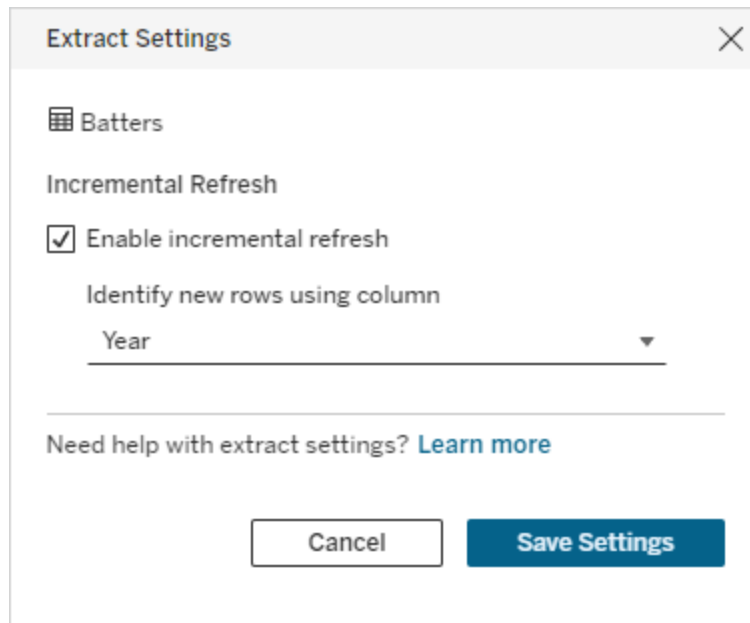
When the **Batters** table's extract is refreshed incrementally, only rows that exceed the greatest value in the extract's key column are added. In this case, that means that the **1980** row is added to the extract. Instead of refreshing the entire extract file, only 1 row is processed and appended.

You can still do a full refresh on an extract configured for incremental refresh if you want to refresh the entire extract.

To configure incremental refresh for a table extract:

1. Change the table from **Live** to **Extract**.
2. Select the Actions Menu (...) in the table's row and select **Extract Settings....**
3. Tick **Enable incremental refresh**.

4. Select an incrementing column to use when determining which rows to add.
5. Select **Save Settings**.



### Convert to Custom SQL

Starting in Tableau Cloud June 2024 and Tableau Server 2024.2, you can approximate the SQL used to connect to a table and use that as a starting point for your own custom SQL. Custom SQL allows you to filter or make other query changes that can modify the result set. Creating custom SQL this way instead of using **New Custom SQL** in the data pane is less impactful to existing virtual connections. Downstream assets see the table as the same table instead of a new one.

To convert a table to custom SQL:

1. Select the Actions menu (...) in the row for the table.
2. Select **Convert to Custom SQL**.
3. In the **Edit Custom SQL** dialog, edit the SQL as needed.
4. Select **Generate Table**.

Note: The SQL that first appears in the dialog should be considered a starting point, and may not work without modification. The virtual connection editor lacks nuanced

information about the specific SQL syntax used in the connection. If you encounter errors when selecting the Generate Table button, try removing or changing single quotes, double quotes, back quotes and square brackets to make the SQL compliant with the database you're using.

To edit the custom SQL:

1. Select the Actions menu (...) in the row for the table.
2. Select **Edit Custom SQL**.
3. In the **Edit Custom SQL** dialog, edit the SQL.
4. Select **Generate Table**.

To return the table to its default state, without custom SQL:

1. Select the Actions menu (...) in the row for the table.
2. Select **Replace**.
3. In the replace table dialog, select the original table name.
4. Select **OK**.

Extract table data

After a table or tables are changed from live to extract but haven't been extracted yet, click **Create Pending Extracts** (or **Run Pending Extracts** in Tableau Server 2023.3 and earlier) to run the pending extracts. After all pending extracts are run, click **Refresh All Extracts** (or **Run All Extracts** in Tableau Server 2023.3 and earlier) to extract all table data at that time.

Alternatively, in Tableau Cloud June 2024 or Tableau Server 2024.2 and later, select the Actions Menu (...) in the table's row and select **Refresh Extract...** If incremental refresh is not configured for the table, you can only select **Refresh (Full)**. If incremental refresh is configured, you can choose either **Refresh (Full)** to refresh the extract completely, or **Refresh (Incremental)** to incrementally refresh the extract.

You must run any pending extracts before you publish the virtual connection. You can't edit the connection while extracts are generated.





## Tableau Server on Windows Help

Schedule extract refreshes of the tables in your virtual connection on the virtual connection page after you publish the connection. See [Schedule Extract Refreshes for a Virtual Connection](#).

### Set the table visibility state

Use the Visibility toggle on the Tables tab to show or hide tables and their data from users.




 Users can see table data. You can create a data policy to govern which data users can see. (Visible is the default.)

 Users can't see table data. You can use hidden tables in a data policy and as an entitlement table.

### See table details


Click a table at the top of the Tables tab to see its details. You can make simple edits in the Table Details section, such as changing a table name, hiding or renaming a column or changing a data type.

Switch the table information you see using these icons:

-  A list of columns in the table and each column's data type.
-  Sample data for each column and linked keys, if available. Linked keys show which columns link to other tables. They're visible only when databases have primary and foreign key information.
-  The range of values in a histogram for each column selected.



### Refresh data from the database

Click the refresh icon  in the toolbar to get the latest data from the database for all the connections in a virtual connection, including:

- The lists of databases, tables and columns. Both the tables included in a virtual connection and not included are refreshed.
- Table and histogram data.

For tables in live mode, refreshing retrieves the latest list of databases, tables and columns and the most recent table and histogram data. For tables in extract mode, refreshing retrieves the updated list of tables and columns. But to see the most recent table and histogram data, you must start a new extract. For example, when there's a new column in a database table and you click the refresh icon, the new column appears in the editor but its data does not. To see the most current data, you must start a new extract.

Refreshing data invalidates any currently cached data. Closing and reopening the editor, switching tables from extract to live mode and changing a connection credential like username or password also refreshes data.

Who can do this

To create a virtual connection, you must

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.

Next steps

After tables have been added and configured on the Tables tab, you can choose to Create a Data Policy for Row-Level Security or Publish a Virtual Connection and Set Permissions.

See also

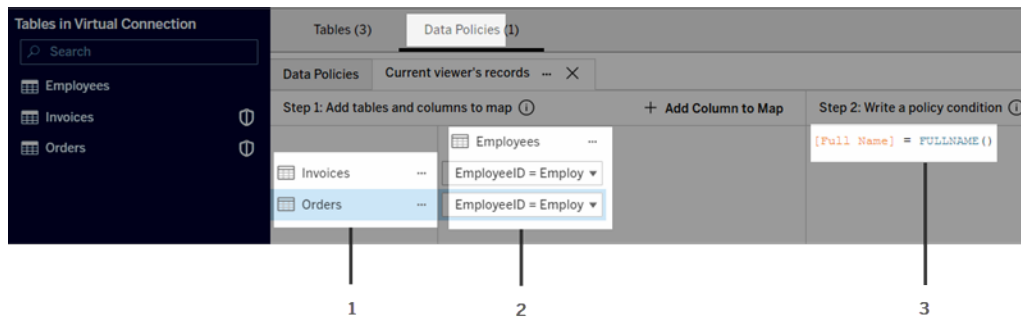
[Use a PROPERTIES file to customise a JDBC connection](#) – If you're customising a JDBC-based connection, you can also make customisations in a PROPERTY file

## Create a Data Policy for Row-Level Security

Use a data policy to apply row-level security to one or more tables in a virtual connection. A data policy filters the data, ensuring that users see only the data they're supposed to see. Data policies apply to both live and extract connections.

About data policies

A data policy has three main components:



1. The tables they apply to are called policy tables. These are the tables that are filtered.
2. The mapped columns that define the relationships between tables (for example, between entitlement and fact tables) and between table columns and policy columns. A policy column is the column used to filter data.
3. The policy condition, which is an expression or calculation that is evaluated for every row at query time. If the policy condition is TRUE, the row is shown in the query.

When you create a data policy, you need a column you can use to filter the data. This column is called a policy column. Data is filtered by the policy condition, usually using a user function, such as USERNAME() or FULLNAME().

If your policy table includes a column that you can filter on, then use that column as your policy column.

When a policy table doesn't include such a column, use an entitlement table with a column you can use to filter the data. An entitlement table is a table that includes both a policy column you can use to filter policy tables and another column you can relate (map) to a column in a policy table (as shown in the data policy example image above).


#### Filter with a policy column from a policy table

The most common way to filter data is to use a column in the table that has the data that you want to filter on. Use that column as a policy column and then map the appropriate table columns to the policy column.

To use a policy column to filter your data, first, add tables to the policy from the left pane. To add a table, do one of the following:

## Tableau Server on Windows Help

- Double-click on the table name.
- Click the drop-down arrow near the table name and select **Manage table with policy**.
- Or, drag the table to the right and drop it on **Add as Policy Table**.

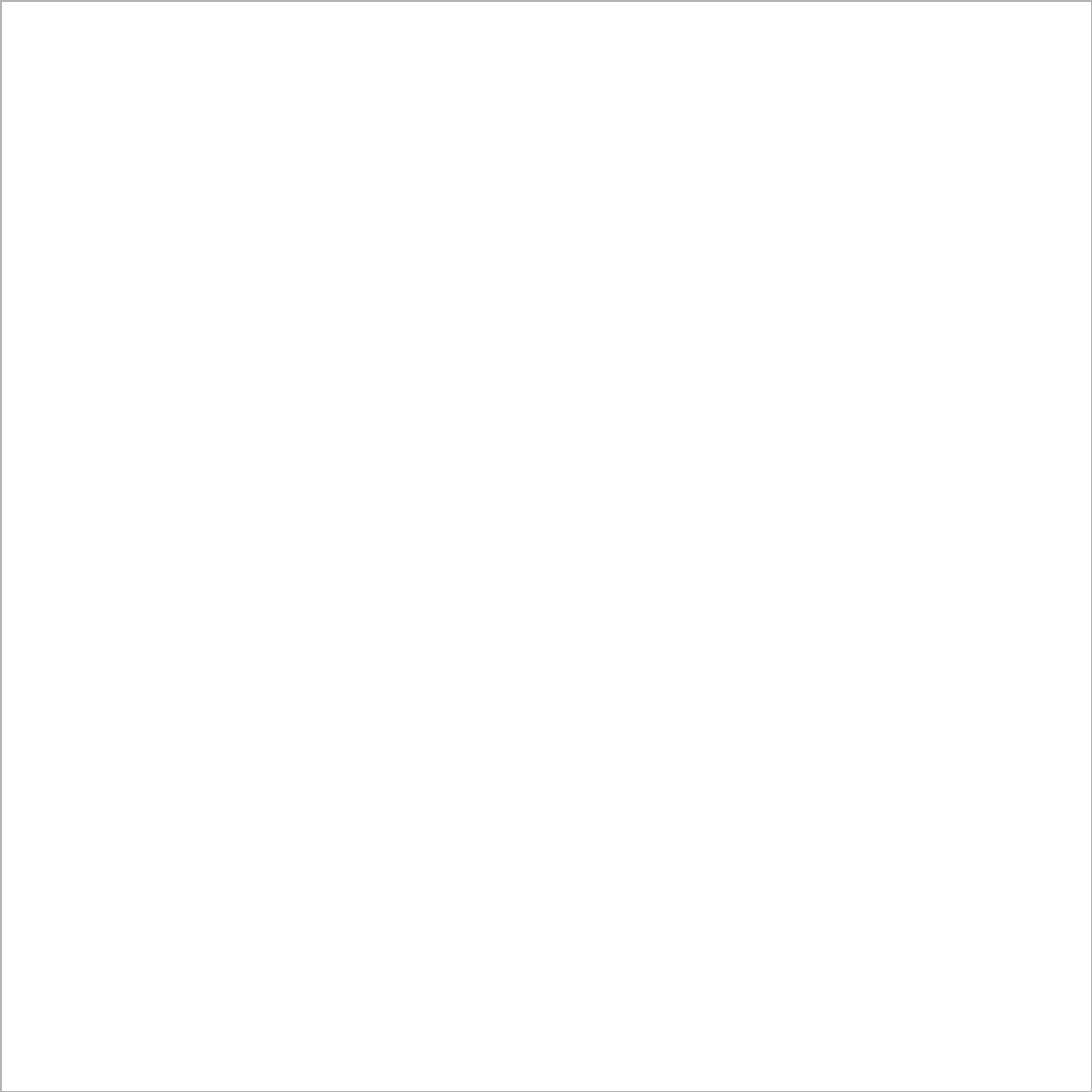
After a table is added to a policy, a shield icon  appears to the right of the table name in the left pane indicating that it's a policy table.

Next, map columns to create a relationship between the column name in the table and the policy column name. Use the policy column name in the data policy condition to control row-level data access for users:

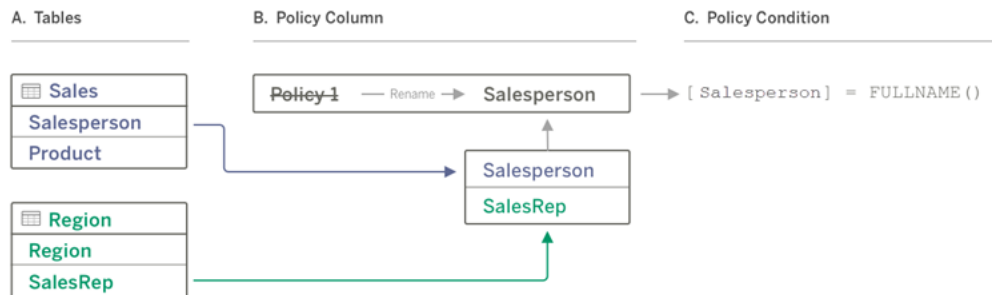
1. Click **+Add Column to Map** to add one or more columns you'll use to filter data.
2. Name the policy column. You'll use this name in the policy condition.
3. For each table the policy applies to, use the drop-down menu to select the table column that maps to the policy column.
4. Repeat this process for as many policy columns as you want to use in the policy condition.



**Tip:** Instead of using the +Add Column to Map button, you can start typing the calculation in the policy condition area and use auto-complete to choose the column name, which will then populate the policy column information under Step 1.



An example using a policy column from a policy table



- A. The Sales table has a [Salesperson] column, and the Region table has a [SalesRep] column. The Salesperson and SalesRep data matches the full name of Tableau users on your site.
- B. You want to filter the Sales and Region data by Salesperson, so you name the policy column "Salesperson", and then map the Salesperson column from Sales and the SalesRep column from Region to the Salesperson policy column.
- C. Then write the policy condition to filter both tables. Use the [Salesperson] policy column and the FULLNAME() user function so that each user can see only their own data.

Filter with policy column from an entitlement table

Entitlement tables are used when your policy table doesn't contain a column you can filter on. You can use the entitlement table to map a column in the data table to a column in the entitlement table. Note the following:


- Be sure to include the entitlement table as a table in the virtual connection. You can use a table from any connection or database as a central entitlement table that secures tables across many other databases. In some cases, an entitlement table that's in the same database as the tables you're securing can be a potential security risk because of the potential for exposing employee data. And having an entitlement table in a different database can make it easier to control permissions, for example, to grant someone access to a database.
- If you don't want virtual connection users to see the entitlement table, you can toggle the setting in the Visibility column on the Tables tab to hide it. Once hidden, the enti-



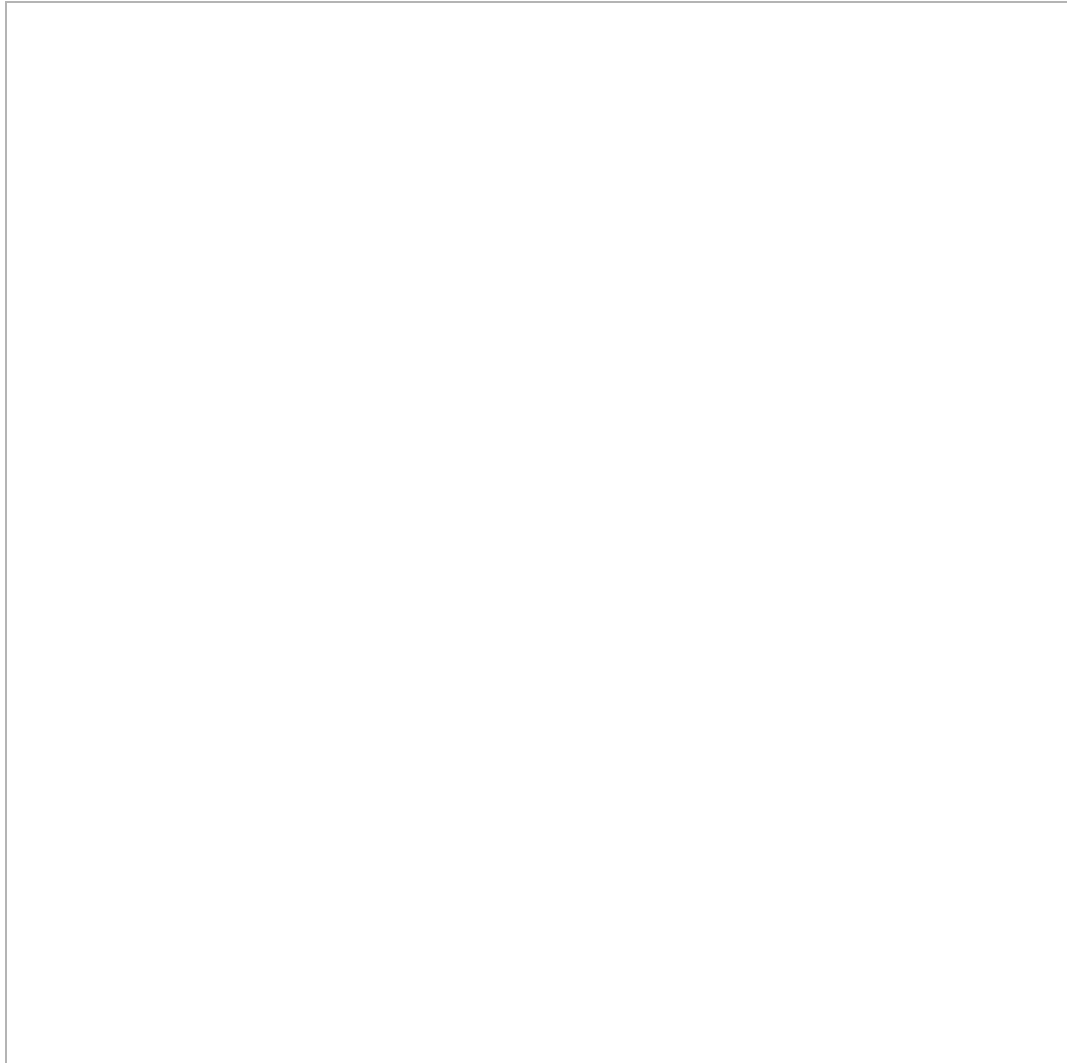
Entitlement table is still available for policy filtering but can't be used in vizs or workbook data sources.

**Note:** Connecting directly to a flow output (.hyper file) is not supported for the entitlement table. The flow output must write directly to the database.

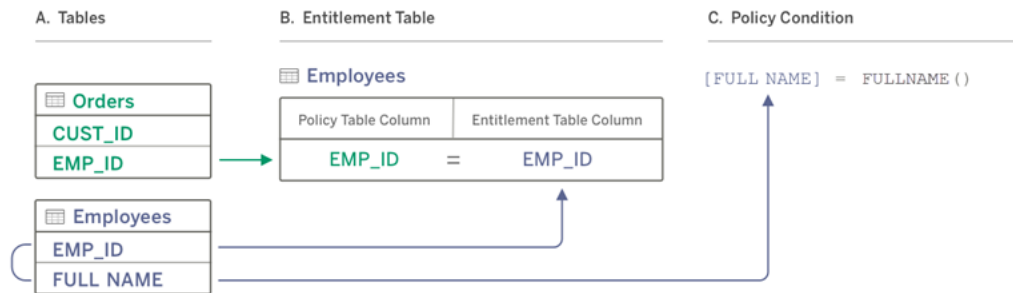
To use an entitlement table to filter your data:

1. Add the data tables that you want the data policy to apply to. Do one of the following:
  - Double-click on the table name.
  - Click the drop-down arrow near the table name and select **Manage table with policy**.
  - Or, drag the table to the right and drop it on **Add as Policy Table**.
2. After a table is added to a policy, a shield icon  appears to the right of the table name in the left pane indicating that it's a policy table.
3. Select the entitlement table, then either:
  - Click the drop-down arrow and select **Use as entitlement table**.
  - Or, drag the table to the right and drop it on **Add as Entitlement Table**.
4. For each table that the policy applies to, click the drop-down menu and select the

column to map the policy table to the entitlement table.



## An example using a policy column from an entitlement table



- The data you want to filter has an EMP\_ID column, but not an employee name column. However, you have a second table that includes columns for both EMP\_ID and the employee's FULL NAME. And, the values in the employee FULL NAME column match the full name of Tableau users on your site.
- You can add Employees table to the policy as an entitlement table, and then map the policy table column name EMP\_ID to the entitlement column name EMP\_ID for each table.
- Then use the FULLNAME() function in your policy condition to match the Tableau Server user's full name with the entitlement table's [FULL NAME] column (which is the policy column) so that each user can see only their own data.

## Write a policy condition

The last step in creating a data policy is to write a policy condition, which is a calculation or expression used to define row-level access. Policy conditions are often used to limit access to users or groups through user functions.

## A policy condition:

- Is required in a data policy.
- Must evaluate to true or false.
- Shows rows when the policy condition is true.

## Policy condition examples

Shows only rows where the Region column value is North:

```
[Region] = "North"
```

Enables a signed-in user to see the rows where the user's name matches the value in EmployeeName:

```
FULLNAME() = [EmployeeName]
```

Enables members of the Managers group to see all rows, while users can see only the rows where their username matches the value in the employee\_name column:

```
ISMEMBEROF('Managers') OR USERNAME() = [employee_name]
```

**Note:** When you close a policy tab, it doesn't discard your work.

Supported Tableau functions in policy conditions

Policy conditions support a subset of Tableau functions:

- Logical (except null-related)
- String
- User
- Date
- Number: MIN, MID, MAX

To see which specific functions are supported, in the virtual connection editor, on the Data Policies tab, see the **Reference** panel on the right.

Who can do this

To create a data policy, you must

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.

Next steps

After you create a data policy, the next step is to verify that it works as you expect it to. See [Test Row-Level Security with Preview as User](#). Or, if you're ready to share the virtual

connection and its data policies with others, see [Publish a Virtual Connection and Set Permissions](#).

### Resources

For detailed information about calculations, see [Understanding Calculations in Tableau](#) in the Tableau Desktop and Web Authoring help.

For information about user functions, see [User Functions](#) in the Tableau Desktop and Web Authoring help.


For information about other row-level security options in Tableau, see [Overview of Row-Level Security Options in Tableau](#) in the Tableau Server help.

## Test Row-Level Security with Preview as User

Use **Preview as user** to test your data policy. You can see the data as the user sees it and ensure that row-level security is working as expected. This helps when the data policy keeps you from seeing the rows in the table (for example, if only salespeople can see rows and you're not a salesperson).

To preview the data when the data policy is applied:

1. Select a table.
2. In the Table Details section, tick the **With policy applied** box.
3. Click **Preview as user**, select a **Group** (optional) and a **User**.
4. Verify that the policy shows the correct data for that user in the table details.
5. Repeat for other users as needed.

**Tip:** In Table Details, click  to show the range of values for a column, including which values appear and which are filtered out by the data policy. Select one or two columns that are good indicators that the policy is correctly filtering the data.

Who can do this

To test a virtual connection, you must

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.


### Next step

After you test your data policy, when you're ready to share the virtual connection with others, see [Publish a Virtual Connection and Set Permissions](#).

## Publish a Virtual Connection and Set Permissions

When you work in the virtual connection editor, your changes are automatically saved as a draft while you work. To share a new virtual connection with other users, you need to publish it.

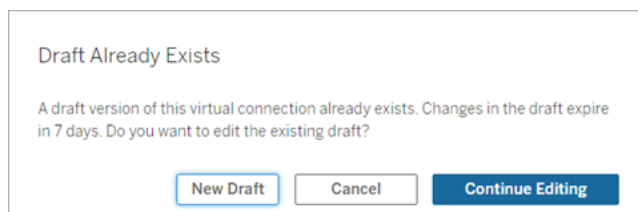
### Save a draft

You can manually save a draft of the connection by clicking the save icon  in the toolbar or by selecting **File > Save Draft** from the menu.

When editing a published virtual connection, the connection stays available to users in its current published state. You can save your updates as a draft while you work on the connection in the editor. To share the updates to the virtual connection with other users, you need to publish it.

### Draft in progress

If you close the editor while updating a published virtual connection, the next time you open the connection in the editor within seven days, you have the option of continuing to make edits to the existing draft, starting a new draft or opening the connection in its current published state by clicking **Cancel**.



## Tableau Server on Windows Help

To return to a draft version of an unpublished virtual connection, you need to manually save the URL of the draft **before** you close the editor. You can use the URL to open the draft in the editor the next time you want to work on the connection within seven days. For example:

```
https://yourserver.test.com/published-connection-edit-  
or/?draft=d1789edc-5d9f-40ae-988d-9fc879f37a98
```

### Publish the connection

To publish a new connection:

1. Click the **Publish** button in the upper right corner of the editor or select **File > Publish** from the menu.
2. In the Publish dialog box:
  - a. Type a name in the **Name** field.
  - b. Select a project to save the connection to.
3. Click **Publish**.

To publish an updated connection, click the **Publish** button in the upper right corner of the editor or select **File > Publish** from the menu.

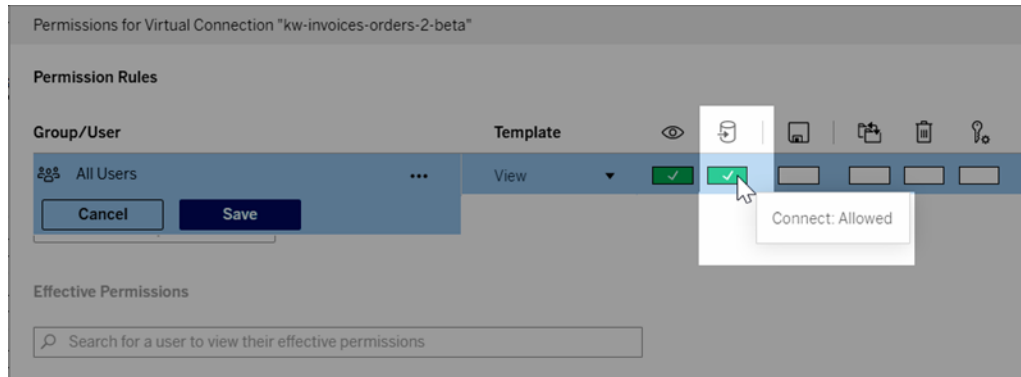
### Set permissions on a virtual connection

After you publish a virtual connection, you need to set the permissions so that others can use it. By default, all users can **View** the connection – in other words, see it listed under Virtual Connections in Tableau – but unless you set the **Connect** capability to Allowed, only you and administrators can use the virtual connection. For more information on the Connect capability, see Permissions.

To set permissions:

1. Navigate to the virtual connection.
2. Open the Actions menu (...) and click **Permissions**.

3. Tick the box under the Connect icon so that connect is allowed for all users.



**Tip:** You can add additional rules if you want to grant the permission only to certain users or groups.

4. Click **Save**.

For more information about permissions on Tableau content, see [Permissions](#). For information on embedding passwords when you publish Tableau content such as a data source or workbook that uses a virtual connection, see [Virtual connections](#) in the Tableau Server help.

Who can do this

To publish a virtual connection or set permissions, you must

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.

Next step

After you publish a virtual connection and set its permissions, you can [Use a Virtual Connection](#).

## Schedule Extract Refreshes for a Virtual Connection

One of the benefits of virtual connections is that you can reuse the same extract multiple times, reducing data proliferation and removing redundant extract refresh jobs. To ensure that extract data is fresh for any content that uses a virtual connection, you can create an extract refresh schedule for the tables in your connection after you publish the connection.



You can also schedule extract refreshes of data sources and workbooks that use virtual connections. See [Schedule Refreshes on Tableau Cloud](#) and [Refresh Data on a Schedule](#) (Tableau Server).

Extract tables

See [Extract table data](#).

Schedule extract refreshes on Tableau Server

1. Navigate to the virtual connection page. (From the **Home** or **Explore** page, click **Virtual Connections** from the drop-down menu, then select your virtual connection.)
2. At the top of the page, a heading should say **Data is Extract**. If it says **Data is Live**, refresh your browser.
3. Select the **Scheduled Tasks** tab and click **+New Task**.
4. The **Create Scheduled Task** dialog box opens. The **Create Scheduled Task** dialog box looks different in Tableau Server and Tableau Cloud. If you're using Tableau Cloud, see [Schedule Extract Refreshes for a Virtual Connection](#) in the Tableau Cloud Product Help.
5. Select a schedule from the dropdown menu.
6. For cases when multiple tables use extracts, select **Dependent** or **Independent**. (In Tableau Server 2023.3 and earlier, these options were "Keep tables in sync" and "Refresh tables independently", but the underlying meaning is the same.)
  - **Dependent** means that none of the extracts will be updated if one or more tables' extract refresh jobs fail.
  - **Independent** means that the success or failure of a table's extract job doesn't affect whether or not other tables' extracts are updated.
7. Select **Refresh Type**. You can configure the type of extract in the virtual connection editor. For more information, see the Incremental Extracts section of the [Create a Virtual Connection page](#). (In Tableau Server 2023.3 and earlier, virtual connections don't support incremental extracts, so you won't see these options.)
  - **Full** means that full extract refresh jobs will be run on all extracts in the virtual connection, regardless of whether they are configured for full extract refresh or incremental extract refresh.
  - **Incremental** means that incremental extract refresh jobs will be run on all incremental extracts in the virtual connection. For all other extracts in the virtual connection, full extract refresh jobs will be run.
8. Select **Add or Edit Tables** and select the tables you want to refresh.

9. Select **OK**.
10. Select **Apply**.

Create Scheduled Task

×

Select a schedule to run extract refresh task.

Weekday early mornings — Every Mon, Tue, Wed, Thu, Fri, at 4:00 AM (UTC+00:00) Etc/UTC

▼

☒ Dependent: If any table extract refresh fails, none of the extracts are updated.  
☐ Independent: If a table extract refresh fails, only that table's extract isn't updated.

Refresh Type

☐ Full: Fully refresh all extracts, including those configured for incremental extract.  
☒ Incremental: Add new rows to incremental extracts. Fully refresh other extracts.

[Add or Edit Tables](#)

Table	Refresh type
Batters	Incremental refresh
Calcs	Full refresh

Cancel

Apply

### Time limit for extract refreshes

To ensure that long-running refresh tasks don't take up all system resources and don't prevent refreshes of other extracts on your site, extract refreshes for a virtual connection are subject to a two-hour time limit. For more information about the timeout limit for refresh tasks and suggestions for resolving these errors, see [Time limit for extract refreshes](#). However, note that virtual connections support only full and not incremental refreshes.

### Who can do this

To publish a virtual connection or set permissions, you must

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.

#### Next step

After you schedule extract refreshes for a virtual connection, you can [Use a Virtual Connection](#)

## Use a Virtual Connection

After a virtual connection is published and permissions are set, it's available to users to connect to data in the same ways that users access all data in Tableau. When you must edit a virtual connection or the data policy in the connection – for example, when the underlying schema changes – simply open the connection in the virtual connection editor, make your changes and either save or publish the updates. You can also replace an existing data source in a workbook with a virtual connection.

#### Connect to a virtual connection

For web authoring in Tableau Cloud or Tableau Server:

1. On the Home or Explore page, click **New**.
2. Select the type of content you want to create: workbook, flow or published data source.
3. In Connect to Data > On This Site > Content Type drop-down menu, select **Virtual Connections**.
4. Select the name of the connection and click **Connect**.

For Tableau Desktop and Tableau Prep:

1. On the Connect pane, under Search for Data, click **Tableau Server**.
2. Enter the server name and click **Connect**, or click **Tableau Cloud**.
3. Enter the information prompted for.
4. On the Search for Data dialog box, from the Content Type drop-down menu, select **Virtual Connections**.
5. Select the name of the connection and click **Connect**.

**Note:** There's no need to enter credentials when you connect using a virtual connection. The credentials to access the data are embedded in the connection.

## Edit a virtual connection or data policy

When editing a published virtual connection, the connection stays available to users in its current published state. For more information, see [Publish a Virtual Connection and Set Permissions](#).

To edit a connection, navigate to it from the Explore page. Note that even though database credentials are embedded in the connection, only those with the database credentials can make any changes to a virtual connection.

1. From the drop-down menu, select **All Virtual Connections**, then select the connection you want to edit.
2. Click **Edit Virtual Connection**.
3. Enter the information prompted for to connect. To edit a connection, you must enter the credentials required to access the data.
4. Click **Sign In**.
5. In the virtual connection editor, make your changes and then either save a draft or publish the connection.

## Respond to underlying schema changes

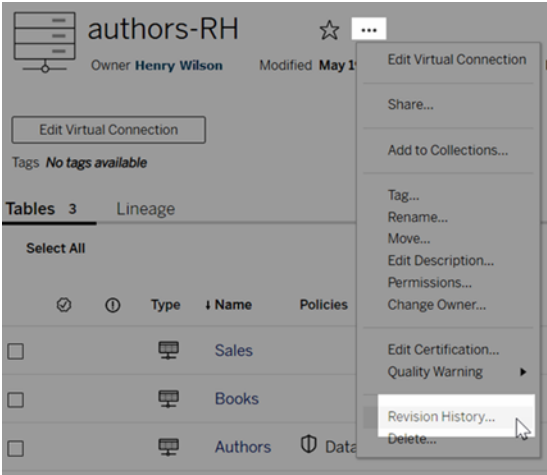
When the underlying schema in a virtual connection changes – for example, a table is added or deleted, or a column is added or renamed – you must edit the virtual connection to reflect the schema changes and then republish the connection. (If the connection has extracts, remember to refresh the extracts.) This way, you can add or edit the tables, columns and policies in the connection before new data is exposed to everyone.

## Work with virtual connection revision history

When you publish a virtual connection, a version is saved in the revision history for Tableau Cloud or Tableau Server. You can revert to a previous version at any time.

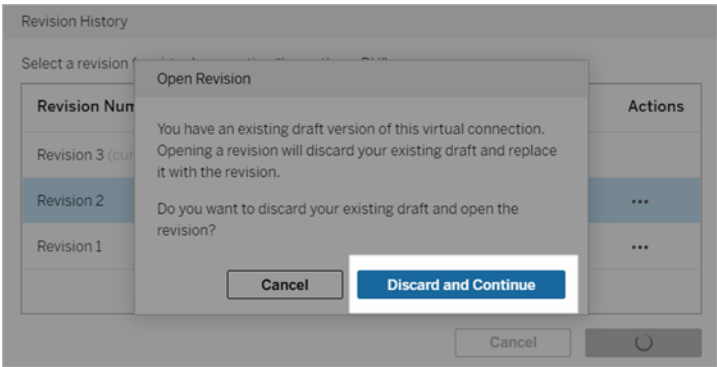
To access revision history, you must have a **Creator** site role and the **View** and **Overwrite** permissions.

To see the virtual connection revision history, click the actions menu ( . . . ) for the virtual connection, then click **Revision History**.

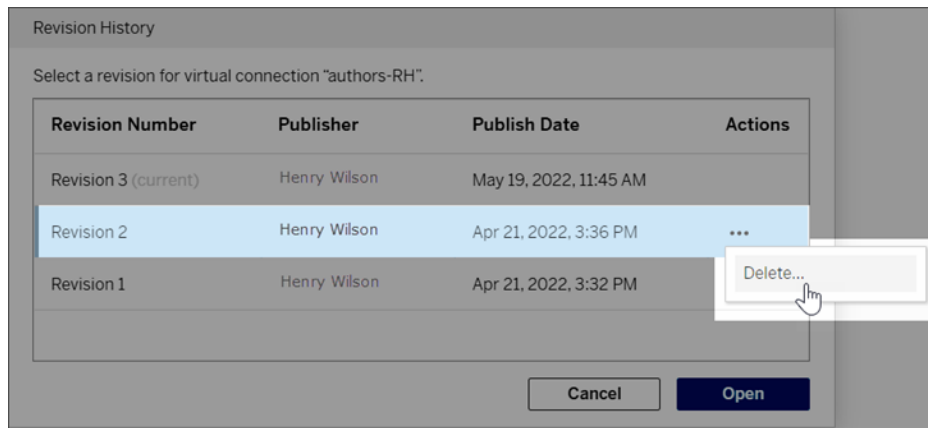


Restore or delete a virtual connection revision

To restore a virtual connection revision, select a revision and then click **Open**. You are then prompted to discard the existing version of the connection. When you click **Discard and Continue**, the revision you selected becomes the current version of the connection.



To delete a revision, from the revision's actions menu ( . . . ), click **Delete**.



Replace an existing data source in a workbook with a virtual connection

For web authoring in Tableau Cloud or Tableau Server:

1. Download the workbook. For more information, see [Download Views and Workbooks](#) in Tableau Desktop Help.
2. In Tableau Desktop, open the workbook and replace its existing data source with a virtual connection. For more information, see [Replace Data Sources](#) in Tableau Desktop Help.
3. In Tableau Desktop, upload the workbook to your Tableau Cloud or Tableau Server site. For more information, see [Upload Workbooks to a Tableau Site](#) in Tableau Desktop Help.
4. In Tableau Cloud or Tableau Server, click **Publish** to save your changes to the server.

For Tableau Desktop:

1. Open the workbook and replace its existing data source with a virtual connection. For more information, see [Replace Data Sources](#) in Tableau Desktop Help.
2. Republish the workbook. For more information, see [Simple Steps to Publish a Workbook](#) in Tableau Desktop Help.

Who can do this

To use a virtual connection, you must be a server or site administrator, or Creator.

To edit a virtual connection or data policy, you must

## Tableau Server on Windows Help

- have credentials to the database that the virtual connection connects to, and
- be a server or site administrator, or a Creator.

To migrate existing content to use a virtual connection, you must

- be a server or site administrator, or
- be a Creator who is also the data source owner.