



TEAMCENTER

Teamcenter Installation on Linux Using TEM

Teamcenter 2412

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Support Center: support.sw.siemens.com

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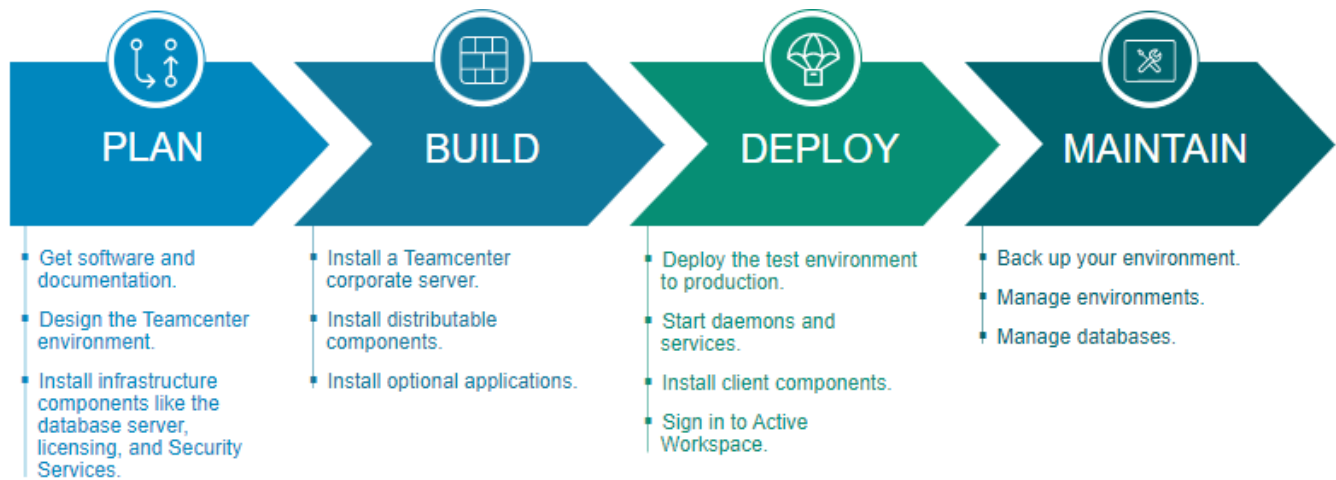
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1. Installing Teamcenter with Active Workspace

Teamcenter is a product lifecycle management (PLM) platform that supports product development from design through manufacturing. Active Workspace is a web-based Teamcenter client with powerful collaboration, search, and visualization capabilities.

Installing Teamcenter with Active Workspace is a flexible process that accommodates the set of applications you choose from its wide selection, the geographic distribution of your users, and other variables. A Teamcenter administrator performs the installation in phases:



If you do not use Active Workspace, you can alternatively install the Teamcenter *rich client*, a Java-based desktop client. Active Workspace requires no initial desktop installation or plug-ins like Java or ActiveX, runs in a web browser, and provides enhanced functionality compared to the rich client.

Where do I go from here?

If your starting point is:	And you want to:	Begin here:
No existing Teamcenter environment	Install Teamcenter and Active Workspace	Plan the Teamcenter Environment
Teamcenter with Active Workspace	Update Active Workspace	Upgrade Teamcenter with Active Workspace
Teamcenter without Active Workspace	Add Active Workspace	Adding Active Workspace to a Teamcenter environment
Teamcenter with rich client	Update Teamcenter and rich client	Teamcenter Rich Client Installation on Linux

Part I: Plan the Teamcenter Environment



Begin the Plan phase of Teamcenter installation by gathering Teamcenter documentation and software.

Learn the architecture of a Teamcenter environment, and guidelines for distributing Teamcenter components.

The *Teamcenter Deployment Reference Architecture*, available from the Teamcenter **Downloads** area on Support Center, is an essential resource for planning a Teamcenter environment with Active Workspace. It provides information such as:

- Detailed examples of Teamcenter and Active Workspace deployments.
- Guidelines for test environments and development environments and how to copy a Teamcenter environment for upgrade testing.

When planning your distribution of Teamcenter components, see the Connection and Communication Table (**Teamcenter_Deployment_Connection_and_Communication_Table.xlsx**) in the *Teamcenter Deployment Reference Architecture* package. This document contains helpful guidelines for planning communication between Teamcenter components.

Prepare the machines that will host your Teamcenter test and production environments. This includes installing database infrastructure, the license server, locale support, and software like Security Services that will support the Teamcenter and Active Workspace components.

2. Where to start

Get documentation

Teamcenter documentation is available from two sources:

- **Internet: Support Center**

This is Siemens Digital Industries Software's comprehensive support portal, which provides documentation for all Siemens software products and versions.

You require a Webkey account to access Support Center. However, you can avoid this requirement by installing the *Siemens Documentation Proxy*, which provides secure documentation access using a personalized API key, with no need to log on. Teamcenter clients can be configured to access help through the Documentation Proxy.

- **Intranet: Siemens Documentation Server**

This is a locally installed server that can host documentation for all your Siemens Digital Industries Software products. No Internet access is required. You can configure the server for single-machine use or network-wide access with no Webkey or API key required.

Teamcenter clients can be configured to access the help on the Siemens Documentation Server.

For an orientation to Support Center, see Siemens Software [Support Center videos](#) on YouTube.

Install the Documentation Proxy or the Documentation Server

Log on to Support Center and open the [Siemens Documentation Server Downloads](#) page:

Products→**Siemens Documentation Server**→**Downloads**

Choose how you want to access documentation, and then install the Documentation Proxy or the Documentation Server.

Installing Siemens Documentation Proxy	Installing Siemens Documentation Server
<ol style="list-style-type: none">1. Under Select a Version, choose Documentation Proxy 3, and then click the tile for the latest Documentation Proxy 3.x release.2. Download the Documentation Proxy installer: DocumentationProxy.version.aol	<ol style="list-style-type: none">1. Under Select a Version, choose Siemens Documentation Server 3, and then click the tile for the latest Siemens Documentation Server 3.x release.2. Download the Documentation Server installer:

Installing Siemens Documentation Proxy	Installing Siemens Documentation Server
<p>3. Install the Documentation Proxy according to the <i>Documentation Proxy Installation Guide for Linux</i>, available under Release Documentation on the software download page.</p> <p>Installing the Documentation Proxy requires generating an API key at the Siemens Support Center account site. This may require you to obtain your Siemens site ID from your Teamcenter administrator.</p>	<p>HelpServer.version.aol</p> <p>3. Install the Documentation Proxy according to the <i>Siemens Documentation Server Installation Guide for Linux</i>, available under Release Documentation on the software download page.</p>

Note the machine and port on which you configured the Documentation Proxy or Documentation Server. These are required to configure help access from Teamcenter clients.

Install the Teamcenter 2412 documentation kit

If you installed the Siemens Documentation Proxy, skip this section.

Teamcenter documentation is delivered in *documentation kits*. Each kit contains documentation content and an installation wizard that automatically installs documentation onto your Documentation Server.

1. Log on to Support Center and open the **Teamcenter Downloads** page:

Products→**Teamcenter**→**Downloads**

2. Under **Select a Version**, choose **Teamcenter 2412**, and then click the **Teamcenter 2412** tile.
3. Download the Teamcenter 2412 documentation kit:

docs-teamcenter-2412-locale.aol

4. Install the Teamcenter 2412 documentation onto the Documentation Server:

Enter the following commands:

```
sudo chmod 777 docs-teamcenter-2412-locale.aol
sudo teamcenter-2412-locale.aol
```

These commands require administrative privileges.

For more information about installing documentation kits and managing the Documentation Server, see the *Siemens Documentation Server Installation Guide for Linux*.

Verify documentation access

Open the Teamcenter 2412 documentation from your preferred source:

- Support Center (Webkey logon):

`https://docs.sw.siemens.com/en-US/doc/282219420/PL20240523460057788.tc_doc_home`

- Support Center (via Documentation Proxy):

**`http://doc-proxy-host:doc-proxy-port/en-US/doc/282219420/
PL20240523460057788.tc_doc_home`**

- Siemens Documentation Server:

**`http://doc-server-host:doc-server-port/en-US/doc/282219420/
PL20240523460057788.tc_doc_home`**

Enable help access in Teamcenter clients

Configure help in the rich client

If you use the rich client, configure the **Help** button in the client to open Teamcenter help from your preferred source.

During installation:

When prompted in TEM, enter your preferred documentation URL in the **Documentation server URL** box.

After installation:

Configure help access in the rich client.

Configure help in Active Workspace

Configure the **Help** button in the client to open Teamcenter help from your preferred source.

During installation:

The Active Workspace **Help** button links to Support Center by default and cannot be changed during installation. Accessing help directly on Support Center requires a Webkey account.

After installation:

If you use the Documentation Proxy or the Documentation Server, set the **TC_Help_Documentation_Link** preference to the path to your preferred documentation source. This configures the Active Workspace **Help** button to link to that source.

If you use Support Center via the Documentation Proxy, set this preference to **http://doc-proxy-host:doc-proxy-port/en-US/doc/282219420/PL20240523460057788**.

If you use Siemens Documentation Server, set the preference to **http://doc-server-host:doc-server-port/en-US/doc/282219420/PL20240523460057788**.

Get software

Installing Teamcenter requires the Teamcenter software kit, which includes microservice framework and Active Workspace software.

1. Log on to Support Center and open the **Teamcenter Downloads** page:

Products→**Teamcenter**→**Downloads**

2. Under **Select a Version**, choose **Teamcenter 2412**, and then click the **Teamcenter 2412** tile.
3. Download the Teamcenter 2412 software kit for Linux (**Tc2412_Inx64.zip**).
4. Expand the software kit to a directory that is accessible to the machines on which you install Teamcenter software.

If an update (patch) to Teamcenter 2412 is available, for example, Teamcenter 2412.0001, you can additionally download the update, and apply it during the Teamcenter installation.

Can I place the software in a remote location?

If you mount software kits on a remote NFS server, you must launch Teamcenter Environment Manager on the local server node.

Get started

If you are new to Teamcenter installation, the following resources may help you get started.

If you want to know more about:	See these resources:
Support Center	Support Center is Siemens Digital Industries Software's comprehensive support portal, providing software, documentation, and a variety of support content: https://support.sw.siemens.com

If you want to know more about:	See these resources:
	For a step-by-step orientation to Support Center, see Siemens Software Support Center videos on YouTube.
Teamcenter	If you are new to Teamcenter, learn about Teamcenter architecture and components . Also, see the <i>Teamcenter Deployment Reference Architecture</i> , which provides detailed examples of Teamcenter deployments, with sample deploy scripts and other resources. This package is available in the Teamcenter Downloads area on Support Center .
Active Workspace	If you are new to Active Workspace, learn about Active Workspace components in Teamcenter , and how Active Workspace installation is part of installing a Teamcenter environment.
Microservice Framework	Active Workspace requires the microservice framework. Learn about microservices and the microservice framework .
Deployment Center	If you are familiar with Teamcenter Environment Manager (TEM) but have not yet explored Deployment Center, learn how installing and managing a Teamcenter environment is different with Deployment Center. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: TEM is deprecated and will be obsolete in a future version of Teamcenter.</p> </div>

At a glance: Deployment Center vs. TEM

These two Teamcenter deployment tools use distinct approaches to building and maintaining Teamcenter environments.

- **Deployment Center**

Deployment Center manages environments from a central machine, and generates scripts and software packages for multiple machines. Deployment Center tracks the software applications and components installed on each machine.

In Deployment Center, selecting Teamcenter software to install primarily involves selecting *applications*, packages of administration data, software modules, and parameters that add specialized functionality to the Teamcenter environment. When you select applications, Deployment Center automatically selects the *components* required to support the selected applications. Components are the architectural pieces of Teamcenter, such as servers, services, and databases.

You select applications in the **Applications** tab. You select and configure components in the **Components** tab.

You can designate which machines host each component from a single instance of the Deployment Center web application. Deployment scripts supply machine information to components that communicate with each other.

- **Teamcenter Environment Manager**

Teamcenter Environment Manager (TEM) is run on individual machines, and the Teamcenter administrator tracks what software components are installed on each machine.

In TEM, applications and components are called *features*. Some feature groups like **Base Install** and **Server Enhancements** contain components.

You select features (applications and components) in the **Features** panel.

TEM refers to a collection of features that share a common Teamcenter data directory as a *configuration*. You can install multiple configurations on a single machine that share the same Teamcenter application root directory.

Run TEM on every machine where you install components. Record information about each machine to enter in configurations on other machines to enable components to communicate.

An environment created using TEM can be imported into Deployment Center by registering the environment in Deployment Center.

Table 2-2. Comparison: Installing applications

Step	Deployment Center	TEM
1. Select applications.	Select in the Applications tab.	Select in the Features panel.
2. Select dependent components.	Selected automatically.	Select dependent components to enable features for selection.
3. Enter parameter values.	Enter values in the Components tab.	Enter values in the sequence of panels.
4. Deploy software.	Generate deploy scripts in the Deploy tab, and then run scripts on affected machines.	Click Start in the Confirmation panel. Repeat steps on other affected machines.

Table 2-3. Comparison: Installing components

Step	Deployment Center	TEM
1. Select components.	Select in the Components tab.	Select in the Features panel.
2. Enter parameter values.	Enter values in the Components tab.	Enter values in the sequence of panels.
3. Deploy software.	Generate deploy scripts in the Deploy tab, and then run scripts on affected machines.	Click Start in the Confirmation panel. Repeat steps on other affected machines.

System requirements

Verify system software requirements

1. Log on to Support Center and open the [Support White Papers Certifications](#) page:
 - a. Open **Products**→**Teamcenter**→**Downloads**.
 - b. Under **Select a Version**, choose **Support White Papers**→**Support White Papers Certifications**, and then click the **Support White Papers Certifications** tile.

2. Download the following support documents:

Software Certifications Matrix (Tc2412PlatformMatrix-date.xlsx)

Contains information about system software certified for Teamcenter, such as operating systems and Java runtime environments (JREs).

Teamcenter Interoperability Matrix (Teamcenter Interoperability Matrix date.xlsx).

Lists versions of Siemens Digital Industries Software products that are compatible with Teamcenter 2412. It also lists supported Teamcenter paths.

Make sure you install versions of the required software that are listed in the Software Certifications Matrix and the Teamcenter Interoperability Matrix.

Platforms

Determine from the following table which Teamcenter 2412 components are supported on your operating system. Check marks (✓) indicate components supported on the given operating system.

Operating system	Corporate server	Web tier	Active Workspace	Rich Client	Business Modeler IDE client	TCCS
Microsoft Windows (desktop platforms)			✓	✓	✓	✓
Microsoft Windows Server	✓	✓			✓	
SUSE Linux	✓	✓	✓	✓	✓	✓
Red Hat Linux	✓	✓	✓	✓	✓	✓

- Linux hosts must have graphics capabilities to run Teamcenter installation tools.

For operating system requirements, see the Hardware and Software Certifications knowledge base article on Support Center.

- Linux hosts must have the **nslookup** utility available to ensure operation of the license server.

- Make sure Linux host names do not exceed 31 characters in length. Host names longer than 31 characters cause Teamcenter corporate server installation to fail during saving of the POM schema file in the `TC_DATA` directory.

Teamcenter installation tools do not require fully qualified domain names for host names. If your fully qualified domain name exceeds 31 characters, use the server short host name instead.

For more information, see the solutions document 002-7004480 on Support Center.

- Teamcenter Environment Manager (TEM) and Web Application Manager require the ISO8859-1 character set. Make sure this **character set** is available on your host.

Database

Teamcenter requires a relational database management system (RDBMS) for storing Teamcenter data. Before you install Teamcenter, you must **install an Oracle database server** or a **Microsoft SQL Server** database server.

If your database server is not a supported version, upgrade your database server to a supported version before you install Teamcenter.

Choose a database management system that suits the platforms of your Teamcenter servers and clients, and make sure your Teamcenter corporate server host has access to the database server.

If you use Oracle, set system parameters to recommended values to ensure adequate database performance.

Java Runtime Environment

Teamcenter Environment Manager (TEM) requires a supported 64-bit Java Runtime Environment (JRE) or Java Development Kit (JDK). If a certified JRE is not available on the host, TEM cancels installation.

Note:

If you use open-source Java, you must use a JDK, as some open-source JREs do not contain all required libraries.

Before you launch TEM to install Teamcenter:

1. Download and install a certified 64-bit JRE or JDK.

For certified Java versions, see the Software Certifications Matrix on Support Center.

2. Set the `JRE_HOME` environment variable to the location of the supported JRE or JDK. After installation is complete, TEM no longer requires this variable.

Alternatively, you can launch TEM in a command prompt and specify the JRE location using the **-jre** argument:

```
tem -jre JRE-path
```

For example:

```
tem -jre c:\apps\jre1.8
```

Web tier support

If you use the Teamcenter Java EE web tier, install the following software:

Java Runtime Environment (JRE)

Install a supported JRE on the host where you build Teamcenter web applications.

Java EE application server

Install a supported Java EE application server on the host where you deploy Teamcenter web applications.

Some web application servers require special configuration for use with Teamcenter.

Web browser

A web browser is required if you use the following:

- Teamcenter online help
- Active Workspace
- Deployment Center

For these products, Teamcenter supports the following web browsers:

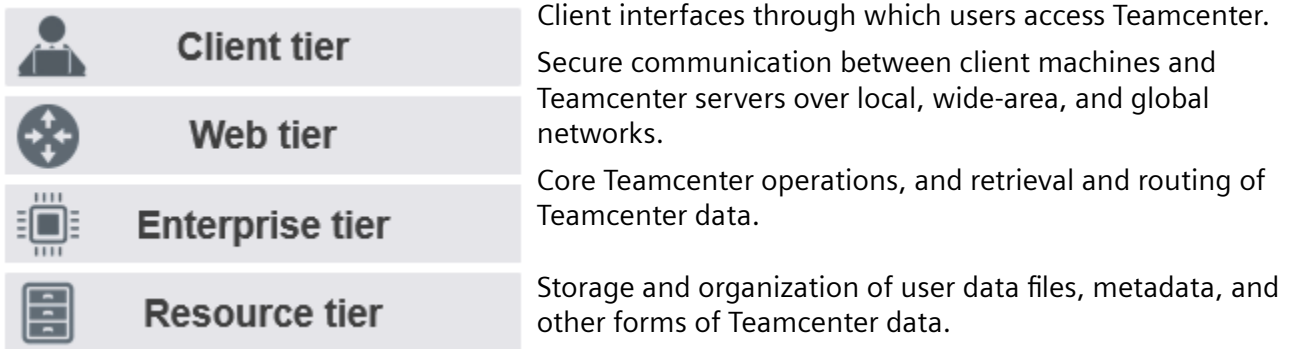
- Windows systems: Microsoft Edge, Mozilla Firefox, and Google Chrome
- Linux systems: Mozilla Firefox and Google Chrome

For supported browser versions, see the Software Certifications Matrix on the [Support White Papers Certifications](#) page on Support Center.

3. The Teamcenter environment

Four-tier architecture

The Teamcenter platform is a software architecture that consists of four logical *tiers* that provide the major functions:

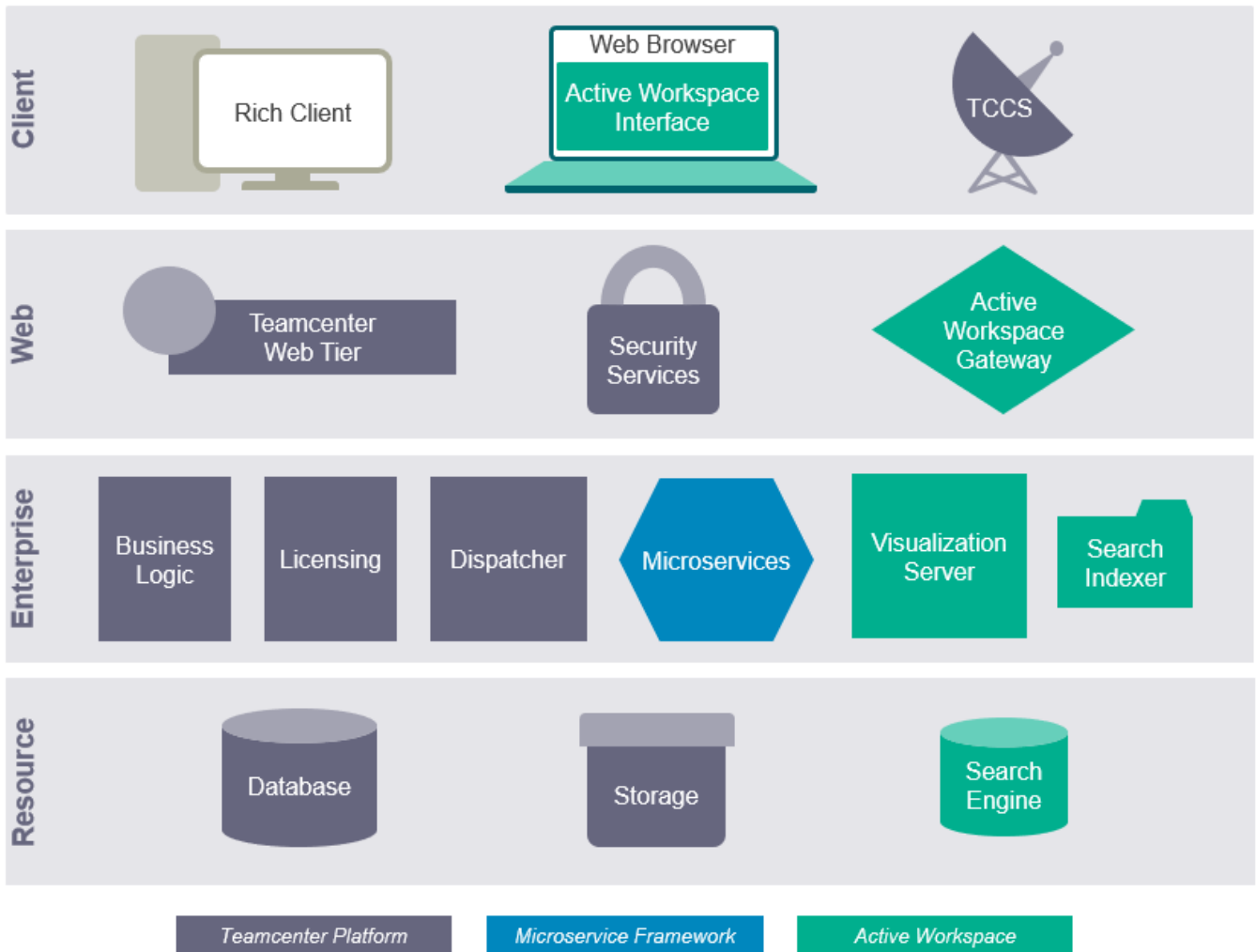


Teamcenter environment

Each tier of the architecture hosts Teamcenter *components*, software modules that provide supporting resources and services. Components may be installed on physical machines, virtual machines, or containers.

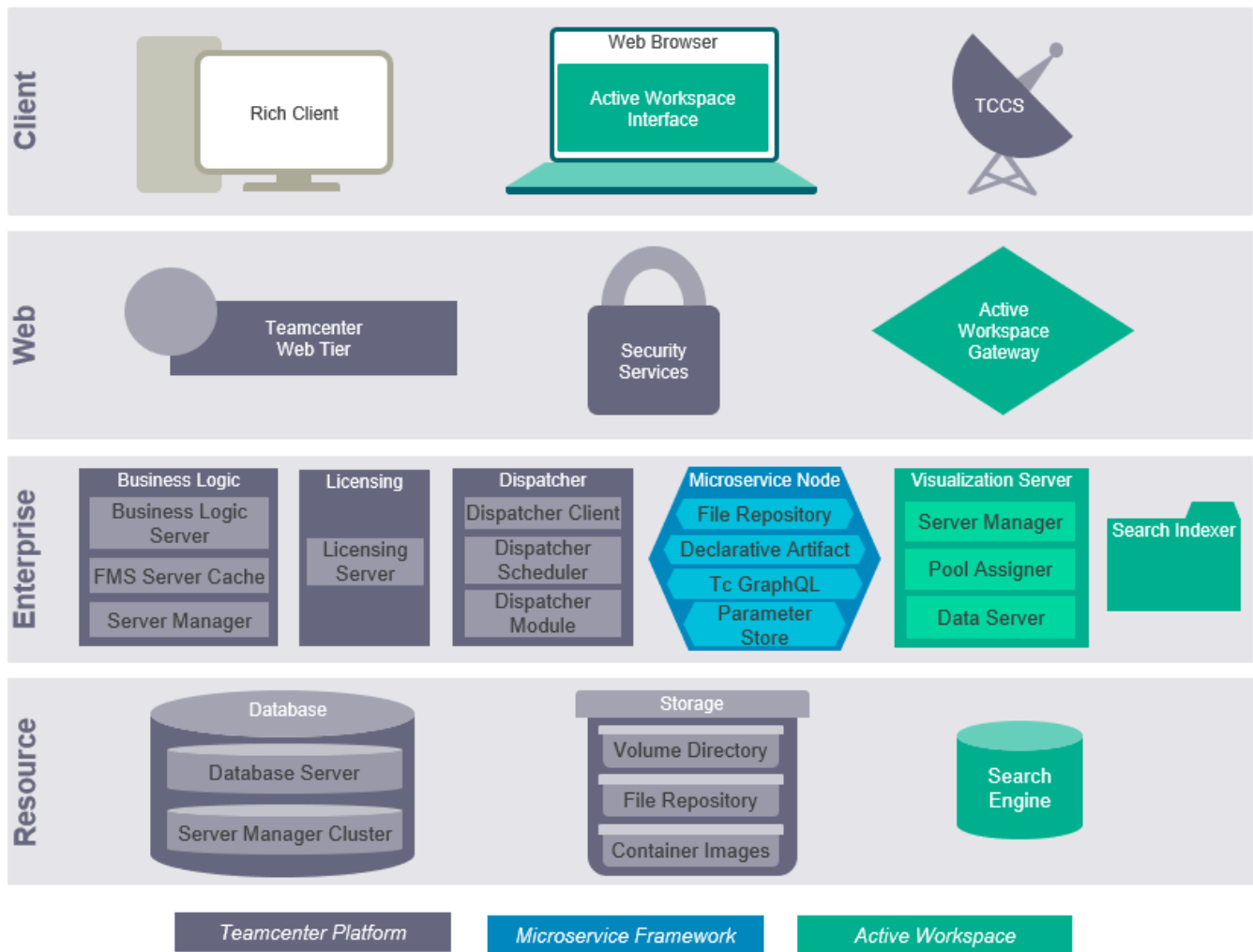
A Teamcenter *environment* consists of all client and server machines that share resources of a Teamcenter resource tier.

This simplified illustration shows groups of components representing the kinds of functionality performed in each tier.



Some components are contributed by the Teamcenter platform, some by Microservice Framework, and some by Active Workspace, as indicated.

This illustration shows names of common components in each group. These components can be selected for installation in TEM:



Components can be installed on a single machine, as in a *single box* environment, or distributed on multiple machines, as in a *distributed* environment.

The *Teamcenter Deployment Reference Architecture*, available on Support Center, provides detailed examples of distributions of Teamcenter and Active Workspace components.

Web architecture types

Teamcenter supports two third-party platforms for communication through the web tier between Teamcenter servers and clients.

Java EE The Java Platform, Enterprise Edition (Java EE) is supported on Windows and Linux systems. The Teamcenter **Java EE web tier** is built on the Java EE platform and requires a supported Java EE web server.

Microsoft .NET The Microsoft .NET framework is supported on Windows systems. The Teamcenter .NET web tier is built on this platform and requires Microsoft Internet Information Server (IIS).

Environment types

The four-tier architecture does not represent physical locations of software components, it is a logical organization for grouping components and functionality. Teamcenter components can be deployed on a single machine or multiple machines, in the following two types of environments:

- Single Box** All components are installed on one machine, and all tiers operate on that machine. This type of environment is useful for developing and testing Teamcenter deployment.
- Distributed** Components are installed on multiple machines, and the functions of the four logical tiers may be distributed across multiple machines. This type is common for production environments where software functions can be distributed over a network to optimize performance with load balancing, failover support, and high availability.

4. Design the Teamcenter environment

How many servers do I need?

A Teamcenter network requires one corporate server configuration. Additional servers are optional, but can help balance network loads and facilitate heterogeneous networks (networks with hosts running different operating systems).

If you install the optional servers, Siemens Digital Industries Software recommends installing in the following order:

1. Install a Teamcenter corporate server.

The corporate server is a network node used as an application file server (from the Teamcenter application root directory) and database-specific configuration file server (from the Teamcenter data directory). Run Teamcenter Environment Manager and install the Teamcenter executables and the directory containing the database-specific configuration files. Teamcenter can also run locally on this network node.

A Teamcenter corporate server contains the **Teamcenter Foundation** and **FMS Server Cache** features as a minimum.

2. Optionally install additional Teamcenter servers to provide the following capabilities:
 - Run Teamcenter executables and point to the existing data directory on the corporate server host or another Teamcenter server. This server can contain a Teamcenter application root directory structure on a network node that may be configured to run Teamcenter in the future.
 - Run Teamcenter Environment Manager and point to an existing database. This server can contain a Teamcenter network node to be used as a database-specific configuration file (Teamcenter data directory) server when the Teamcenter application root directory is mapped from a Teamcenter application server. Teamcenter can also be run locally on this system. You are creating an additional Teamcenter database for use with an existing Teamcenter application root directory.

Mixed platform considerations

Homogeneous network environment

In a *homogeneous environment*, all hosts run the same platform, for example, a corporate server, web tier, and Teamcenter clients all running on Microsoft Windows or all running on SUSE Linux.

When deploying the two-tier architecture, you can install Teamcenter application executable files on a single application server host, export the Teamcenter application root directory structure from the Teamcenter application server, and mount it using NFS on client workstations to run Teamcenter locally. Typically, the Teamcenter application server is also the Teamcenter data server.

Similarly, you can export the data directory structure and mount it using NFS to other Teamcenter clients to provide access to the database-specific information.

Heterogeneous network environment

In a *heterogeneous environment*, hosts do not all run the same platform, for example, a corporate server and a web application server may run on Linux hosts, and workstations on Microsoft Windows.

Installation considerations for a heterogeneous environment are the same as for a homogeneous environment, except that you must install Teamcenter for each type of workstation on the network, resulting in a Teamcenter application directory structure for each different type of workstation. You can configure one Teamcenter application server to serve many Teamcenter directory structures for different platforms.

Teamcenter volume data must be accessible by all Teamcenter clients in a heterogeneous network. **Configure File Management System** for volume access for all clients.

Make sure your Windows and Linux server configurations contain identical sets of Teamcenter features. For example, if you install features or custom templates on a Linux server, you must install the same features and templates on your Windows server.

Additional considerations:

- The Teamcenter root directory is platform-specific. The files within it can be shared only between systems of the same platform type. For heterogeneous Teamcenter environments that include Windows clients or Windows volume servers, configure File Management System to allow all clients to communicate with all volume servers.
- The Teamcenter root directory is specific to Windows or Linux systems (endian-specific). Maintain separate Teamcenter data directories on Windows and Linux systems.

Planning File Management System installation

Overview of FMS installation

File Management System (FMS) downloads and uploads file data for the rich client, embedded viewer, and Lifecycle Visualization. Multi-Site Collaboration also uses FMS servers to transfer data.

If you install File Management System, the FMS server cache (FSC) and the server manager must run on the same host server, with the same user ID.

If the FSC does not manage any volumes, that is, if it is purely a cache server, it can run as any user that is convenient.

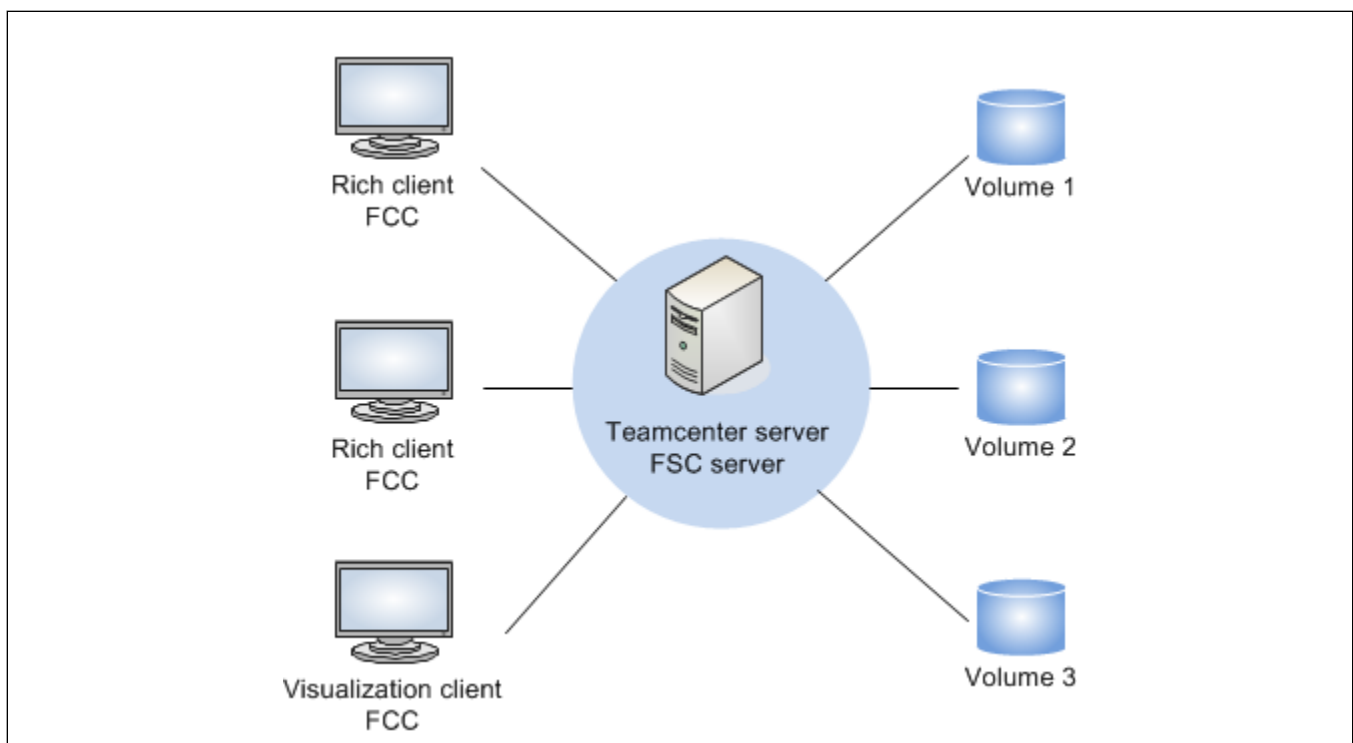
FMS provides the following functions:

- Volume server for file management
- Shared server-level performance cache for shared data access between multiple users
- Client-based private user cache for rich clients
- Transient data store mechanism for transporting reports, PLM XML, and other nonvolume data between the web and client tiers in the four-tier architecture

FMS caching enables placing the data close to the user, while maintaining a central file volume and database store.

FMS requires the installation of FMS server cache (FSC) and FMS client cache (FCC) components:

- The FSC component provides a server process and file caches for Teamcenter server hosts.
- The FCC component provides a client process and file caches for rich clients on user workstations.



Basic File Management System deployment

Installing the FMS server cache

You can configure the FMS server cache (FSC) server to perform any combination of the following functions:

- Volume server or performance cache server

When running on a host where a volume is located or directly mounted on the computer hosting the FSC, the FSC acts as a volume server.

When running on a host where a volume is not located or directly mounted, the FSC acts as a performance cache server.

As a volume or cache server, the FSC checks all file access requests for a ticket that Teamcenter generates to authorize file access. As a cache server, it manages two segment caches, one for downloading files and one for uploading files.

- Configuration server

As a configuration server, the FSC provides FMS configuration information to the FMS client caches and other FSCs.

- Transient server (in a deployment of the four-tier architecture only)

As a transient server, the FSC delivers PLM XML and other transient files to clients.

Any deployment of Teamcenter requires a minimum of one FSC server. You can deploy multiple FSC servers, each performing multiple roles or each performing a designated purpose as either a volume, a cache, or a configuration server. When you install multiple volumes on different hosts for the same database, the multiple FSC servers are linked through a common primary (master) FSC. (You can manually configure more than one primary FSC.)

You must install an FSC server on:

- Each host running a Teamcenter server manager.
- Each host that will contain a Teamcenter volume.

FSC servers and caches are configured using XML-based files, in a hierarchical structure:

- FMS primary configuration file (**fmsmaster_fsc_id.xml**)

The primary configuration file describes the File Management System network and defines FSC groups. It is the highest file in the hierarchy and can define default values for FSCs and FCCs, such as the maximum sizes of the caches.

Each installation of Teamcenter requires one FMS primary configuration file. At least one FSC server reads this file and is called the *primary FSC*. Other FSC servers in the network download FMS configuration information from the primary FSC server.

If you install only one FSC server in a Teamcenter network, it is the primary server.

- FSC configuration file (**fscfsc_id.xml**)

The FSC configuration file configures an individual FSC in a network. It specifies the address of the primary FSC (for downloading FMS network information) and defines such values as the maximum sizes of the server segment file caches and the upload timeout value.

This file can either inherit values from the primary file or override them. It can also define default values for FCCs.

- The FCC configuration file defines values for the FCC on client hosts, such as the maximum sizes of the caches.

It can either inherit values from the FSC configuration file or override them.

When planning your FMS installation, you must be prepared to supply the following information to the Teamcenter installation tools:

Data	Description
Read cache directory and size?	<p>For FMS to operate correctly, the location you specify must be on the local host.</p> <p>If you are installing a volume on the host, FMS does not use the read cache; Siemens Digital Industries Software recommends accepting the default cache size (10 megabytes). Do not specify 0; specifying 0 creates a file cache with a default size larger than 10 megabytes.</p> <p>If you are not installing a volume on this host, FMS acts as a cache server. In this case, Siemens Digital Industries Software recommends increasing the value to 1000 megabytes. However, choose a size that represents the maximum size of the data that must be processed. If you choose 1000 megabytes, and a user requests a 3 gigabyte assembly, the request fails.</p>
Write cache and size?	<p>This cache is required when the FSC acts as a cache server.</p> <p>For FMS to operate correctly, the location you specify must be on the local host.</p> <p>If you are installing a volume on this host, FMS does not use the write cache; Siemens Digital Industries Software recommends accepting the default cache size (10 megabytes). Do not specify 0; specifying 0 creates a file cache with a default size larger than 10 megabytes.</p> <p>If you are not installing a volume on this host, FMS acts as a cache server. In this case, Siemens Digital Industries Software recommends increasing the value to 512 megabytes or more. However, choose a size that represents the maximum size of the data that must be processed.</p>

Data	Description
Communication mode between FMS components?	Either HTTP or HTTPS.
Configure proxy servers?	<p>Either HTTP proxy server or HTTPS proxy server.</p> <p>If you choose to configure proxy servers, you must provide:</p> <ul style="list-style-type: none"> • The name of the host running the proxy server. • The number of the port the proxy server listens on.
Is this host an FMS primary (master)?	If you are installing only one FSC server in the network, it must be the primary host. Each Teamcenter network must have at least one primary configuration file and one FSC designated to read this file.
Symmetric or asymmetric keys for ticket validation?	By default, FMS uses symmetric keys for ticket validation. You can use Deployment Center to configure your site to use more secure public-private (asymmetric) key pairs.
Default settings for the FCC?	<ul style="list-style-type: none"> • Location of the cache directory for all Windows systems and for all Linux systems. • Default maximum size in megabytes of whole files downloaded from the volume to rich client hosts. Users cannot download a file whose size exceeds the value you set for this value. This default setting can be overridden by the FMS client cache configuration file. <p>Choose a size large enough to accommodate the largest whole file that users download from the volume. If the user requests a 3-gigabyte assembly when the cache size is set to 1000 megabytes, the request fails.</p> • Default maximum size in megabytes of whole files uploaded to a volume from rich client hosts. Users cannot upload a file whose size exceeds the value you set for this value. This default setting can be overridden by the FMS client cache configuration file. <p>Choose a size large enough to accommodate the largest whole file that users upload to the volume.</p> • Default maximum size in megabytes of the segment file cache used by the embedded viewer and the standalone application viewer on rich client hosts.

Data	Description
	<p>This default setting can be overridden by the FMS client cache configuration file.</p> <ul style="list-style-type: none"> If no or few rich client users in the network deploy Lifecycle Visualization, Siemens Digital Industries Software recommends setting this cache size to 10 megabytes. Do not specify 0; specifying 0 creates a file cache with a default size larger than 10 megabytes. If rich client users in the network deploy Lifecycle Visualization, Siemens Digital Industries Software recommends setting this cache size in the range of 2000 megabytes to 4000 megabytes. <p>The cache size is initially small, expanding to the maximum size only if a user launches Lifecycle Visualization to view a file of that size. The initial size of the cache is proportional to the value specify.</p>

Teamcenter installation tools install and initially configure the FSC servers, segment file caches, primary configuration file, and FSC configuration file or files. For small deployments of Teamcenter, this may be the only installation and configuration required. For large deployments, you can take advantage of FMS flexibility by manually configuring the FMS network.

Installing the FMS client cache

The FMS client cache (FCC) process runs on a client host and performs the following functions:

- Uploads files to an FSC server
- Requests files from an FSC server
- Caches files on the client host

The FCC process manages three file caches:

- A write cache containing whole files uploaded to a Teamcenter volume
- A read cache containing whole files downloaded from a Teamcenter volume
- A segment cache for Teamcenter lifecycle visualization

Installing the FCC supports the rich client and some other Siemens Digital Industries Software products.

- The rich client requires an FCC, and TEM automatically installs an FCC with each rich client.

The rich client uploads files to the Teamcenter volume and downloads files from the Teamcenter volume using the FCC. If Teamcenter lifecycle visualization 6.0 or later is installed on the workstation and used with the rich client, it optionally uses the FCC.

When you install the rich client on user workstations, configure the location of the cache on the workstation and the maximum size of files downloaded from the volume or uploaded to the volume. Installing the rich client on a workstation simultaneously installs the FCC process and caches. No additional configuration steps are required.

Configuring the FCC this way may be the only configuration you require, but you can take advantage of additional configuration options by manually configuring the FCC.

- If you use NX or Teamcenter lifecycle visualization, you can install the FCC and use it to upload files to and download files from the Teamcenter volume.

Installing the FCC enables users to take advantage of FMS features:

- Improved file transfer performance

FMS is a high-performance file transfer solution that gives client applications direct access to files over a high-performance network connection.

- File streaming

Teamcenter lifecycle visualization uses proprietary file streaming technology to download appropriate portions of the JT files over the network as they are needed. FMS supports segment file transfer to keep network loads down and support this high-performance file streaming technology.

- Built-in caching infrastructure

The FCC is dedicated to a specific user on the client. The FSC server can be shared by groups of users.

- Deployment flexibility

FMS components support a multitude of deployment configurations. This enables administrators to geographically locate volumes and shared FSC servers close to client workstations, providing the ability to tune the system for optimal file transfer performance.

Installing an FCC for use with NX and Teamcenter lifecycle visualization is described in the Teamcenter client installation guides for Windows and Linux.

Web tier dependencies and application integrations

Install the web tier for four-tier rich client and Active Workspace

If you use the four-tier rich client or Active Workspace, you must install a Teamcenter web tier to provide communication between clients and the corporate server. Teamcenter provides two web tier types:

Type	Framework	Installed using	Deployed on
.NET web tier	Microsoft .NET	Teamcenter Environment Manager (TEM)	Microsoft Internet Information Server (IIS)
Java EE web tier	Java EE	Web Application Manager	Any supported Java EE web server

Choose applications and install dependent software

Teamcenter provides many applications you can include in your environment, including integrations to third-party applications and other Siemens Digital Industries Software products. These are listed in the **Features** panel in TEM.

If you use Teamcenter integrations to other Siemens Digital Industries Software products or third-party software, install those products *before* you install Teamcenter.

Some software products require separate licenses from Siemens Digital Industries Software. Purchase the required licenses and install them into the **Siemens License Server**.

If you use integrations with the rich client, make sure you install those applications in locations specified by the Teamcenter administrator. Some of these integrations include:

- NX integrations

Installing NX is not a prerequisite for installing or using Teamcenter, but if you intend to integrate NX with Teamcenter, install the following software before you install Teamcenter:

- NX

Install NX locally on every workstation according to the installation guide distributed with NX. This is required for NX integrations to function in a rich client environment.

- Teamcenter Integration for NX or NX Integration

Teamcenter Integration for NX and NX Integration provide the same NX user interface and are both installed with NX, but neither can be used until Teamcenter is configured.

When you install Teamcenter Integration for NX, allow the installation to modify system files so that it can create an **installed_programs.dat** file under the **ugs** directory. You can use this

installed_programs.dat file as a sample on other Linux workstations of the same type to access NX and Teamcenter Integration for NX. NX can be installed on a mount point.

If you include the **NX Foundation** feature on your Corporate Server, you must install this feature on every machine where Teamcenter Foundation is installed in the environment. Also, you must install the **NX Rich Client Integration** feature on all two-tier rich clients in your environment.

When you upgrade to a new version of NX, uninstall the **NX Rich Client Integration** feature, then reinstall it, specifying the path to the new NX installation in the **NX Install Location** box in TEM.

For more information about using Teamcenter with NX, see the installation guides distributed with NX.

- Teamcenter lifecycle visualization (embedded viewer)

Download the Lifecycle Visualization software kit and install a supported version of Lifecycle Visualization on your workstation.

When you choose this integration, Teamcenter lifecycle visualization executable files are installed on the local client host.

- Remote workflow

When you choose this option, the rich client is enabled to support the linking of objects between Teamcenter and other applications such as Teamcenter portfolio, program and project management. Separate installation of remote workflow components are required.

5. Configure language support

Supported Teamcenter localizations

Siemens Digital Industries Software provides localized versions of Teamcenter in the following locales:

Language	Locale code
Chinese (Simplified)	zh_CN
Chinese (Traditional)	zh_TW
Czech	cs_CZ
English	en_US
French	fr_FR
German	de_DE
Italian	it_IT
Japanese	ja_JP
Korean	ko_KR
Polish	pl_PL
Portuguese (Brazilian)	pt_BR
Russian	ru_RU
Spanish	es_ES

Use the appropriate locale codes to deploy Teamcenter localizations or launch Teamcenter clients in a desired locale.

If you provide your own localizations for locales not provided by Siemens Digital Industries Software, use the appropriate Java standard locale codes similar to the locale codes in the preceding table.¹

Localizing Teamcenter in Hebrew

Siemens Digital Industries Software does not provide a Hebrew translation but provides recommended configuration settings for Hebrew locales. In Hebrew locales, set the locale code to **en_US**. This allows data entry in Hebrew, but user interface text is in English.

¹ Standard locale codes are composed of a two lowercase character language code from the ISO 639-1 standard, followed by an underscore, followed by a two uppercase character country code from the ISO 3166-1-alpha-2 standard.

Choose the character set for Teamcenter

Choosing the correct character set for Teamcenter and the Teamcenter database is critical. If a Teamcenter client user enters a character that is not recognized by the Teamcenter database, the character is misinterpreted or corrupted when the user's data is checked into the Teamcenter database.

Determine the character set your Teamcenter network requires based on the following considerations.

Language support

Determine the languages you need to support, considering both initial needs and future needs. If you support one language currently but anticipate supporting additional languages in the future, choose a character set that accommodates those future requirements.

Some character sets support groups of languages. The **standard localizations provided with Teamcenter** support the following language groups:

Language group	Languages
Western European	English French German Italian Portuguese (Brazilian) Spanish
Eastern European	Czech Polish English
Japanese	Japanese English
Chinese (Simplified)	Chinese (Simplified) English
Chinese (Traditional)	Chinese (Traditional) English
Korean	Korean English
Russian	Russian English

If the languages you plan to support are all in the same language group, you may choose a non-UTF-8 character set for your Teamcenter network. But, if you plan to support languages that are *not* all within a single language group, you must choose the UTF-8 character set.

For example, if your Teamcenter hosts run in English, French, and German locales, which are all in the Western European language group, you may choose a non-UTF-8 character set *or* you may choose UTF-8. However, if you also need to support hosts in Japanese locales, you must choose UTF-8 because Japanese is not in the Western European language group.

The UTF-8 character set supports *all* languages supported by standard Teamcenter.

Choosing UTF-8 or non-UTF-8

Unicode encodings like UTF-8 enable seamless manipulation of all existing characters in all languages. Teamcenter supports non-Unicode and UTF-8 Unicode encodings.

In a system fully configured for UTF-8 (for example, a server host configured for UTF-8 and a database encoding of Oracle **utf8** or Oracle **al32utf8**), all characters can be entered in the application.

In a system configured for a non-Unicode encoding, only characters belonging to it can be entered. ASCII characters are always part of that character list. For example, if you choose Western European setup (Microsoft **cp1252** or ISO **iso-8859-1** encodings), you cannot enter Russian, Japanese, Chinese, Czech, Polish, Taiwanese, or Korean characters. Furthermore, database migration from one encoding to Unicode can be tedious. It is important, then, to fully consider present and future needs when choosing encoding.

Character support

Determine what special or extended characters you must support in Teamcenter data, and choose a character set that supports them. For example:

En dash (–) or em dash (—)

These characters are part of Windows 1252 code page, but not part of the **ISO8859_1** character set. However, the **UTF-8** character set supports these characters.

Currency symbols such as the euro (€)

This symbol is in the **we8iso8859p15** character set, but not in the **we8iso8859p1** character set.

To ensure correct character mapping, make sure the database and the Teamcenter server use the same encoding.

Platform and database

- **Platform**

Choose a character set that accommodates the platforms in your Teamcenter network. For example, if your Teamcenter server is a Linux host but your client hosts are Windows, and you use default character sets on each, data corruption can result because the default character sets for these platforms are not compatible. Choose a character set supported on both platforms.

The UTF-8 character set accommodates all platforms Teamcenter supports.

- **Database**

Oracle supports UTF-8 and non-UTF-8 character sets on all platforms.

Microsoft SQL Server does not provide native support for UTF-8. However, you can configure Teamcenter to use UTF-8 with a Microsoft SQL Server database. The **Enable UTF-8** option in the **Foundation Database** panel in TEM enables the Teamcenter server to convert character encoding to and from UTF-8 when interacting with the database.

Verify that your locale is supported

To verify that the desired locales are supported on your host, type the following command:

```
locale -a
```

This command returns a list of all locales the host supports. If a locale you need is not included in the list, contact your system administrator to install the required language pack.

Keep in mind that some Linux platform GUIs may allow you to set a locale that is not in the list of supported locales on the host. Make sure the locale you set is supported on the host.

To verify that a desired character set is available on your host, type the following command, which lists character sets supported on the host:

```
locale charmap
```

Configuring a UTF-8 environment for Teamcenter

Overview of UTF-8 configuration

Teamcenter supports the Unicode UTF-8 character set on Windows and Linux hosts that are configured to process UTF-8.

To configure your Teamcenter host to use Unicode UTF-8, perform the following steps before you install Teamcenter:

1. On Linux systems, configure your operating system to run Unicode UTF-8.
2. Install a database server and enable Unicode UTF-8 character set support during installation.

Set the required values for your platform, locale, and database type before you begin installing Teamcenter.

Enable UTF-8 support for Teamcenter servers and clients during Teamcenter installation

- **Teamcenter servers**

With UTF-8 support configured on your host, Teamcenter Environment Manager (TEM) can create a UTF-8-enabled Teamcenter database during Teamcenter installation.

If you use Microsoft SQL Server, select the **Enable UTF-8** option in the **Foundation Database** panel in TEM.

- **Two-tier rich client**

If the Teamcenter database is configured for the UTF-8 character set, **UTF8** is selected by default in the **TcServer Character Encoding Settings** panel in TEM.

- **Four-tier rich client**

When installing the Teamcenter web tier, in the **TcServer Character Encoding Settings** panel in TEM, select **UTF8**.

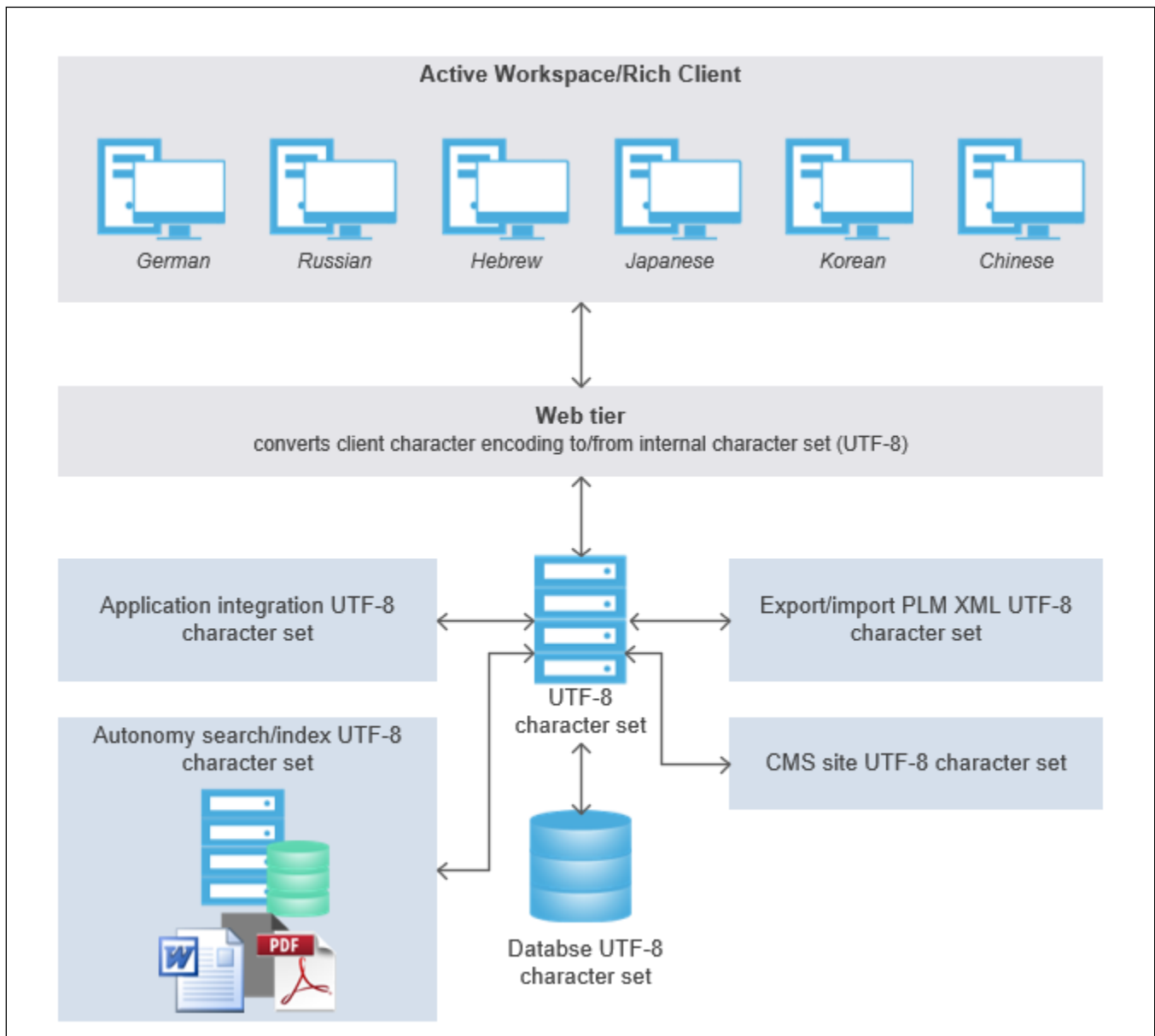
The four-tier rich client can run on any Windows or Linux platform running any language character set.

- **Web tier**

Make sure UTF-8 support is configured on the web tier host.

The web tier can run on any Windows or Linux platform running any language character set. The Teamcenter web tier converts client character encoding to and from UTF-8 as it passes through the web tier.

The following example shows a Teamcenter configuration for restricted Unicode UTF-8 character set support with clients displaying multiple locales. Servers in this configuration run a Unicode UTF-8 character set operating system.



Unicode homogeneous server platform configuration

- Your Linux platform administrator must configure the host to run the Unicode UTF-8 character set operating system by default. This enables all software running on in the operating system environment to recognize the default character set is UTF-8.
- Teamcenter does not support Unicode Supplementary Characters.²

² Unicode Supplementary Characters are characters in the Unicode Character Standard outside of the Basic Multilingual Plane (BMP), that is, characters with code point values larger than 0xFFFF.

- If you import translated content in languages that require multibyte characters, such as Russian and Chinese Simplified, you must configure your Teamcenter installation to support the UTF-8 character set to ensure that titles and other properties display correctly in your environment.

Configure UTF-8 environment settings

If you use UTF-8, select the **al32utf8** or **utf8** character set when you install your database server.³

For Microsoft SQL Server, no special setting is needed during database server installation. If you select the **Enable UTF-8** option in TEM (in the **Foundation Database** panel), the Teamcenter server converts character encoding to and from UTF-8. This allows Teamcenter to use UTF-8 with Microsoft SQL Server's (non-UTF-8) internal encoding.⁴

In addition, set the **LANG** and **LC_ALL** system environment variables to the appropriate values for your locale and platform. These variables must have identical values to function properly.

Values for LANG and LC_ALL

Locale	Value
Chinese (Simplified)	zh_CN.utf8
Chinese (Traditional)	zh_TW.utf8
Czech	cs_CZ.utf8
English	en_US.utf8
French	fr_FR.utf8
German	de_DE.utf8
Hebrew	he_IL.utf8
Italian	it_IT.utf8
Japanese	ja_JP.utf8
Korean	ko_KR.utf8
Polish	pl_PL.utf8
Portuguese (Brazilian)	pt_BR.utf8
Russian	ru_RU.utf8
Spanish	es_ES.utf8

In Hebrew locales, set the following additional variables:

1. In the `TC_DATA/tc_profilevars` file, set **TC_XML_ENCODING** to **UTF-8**.
2. In two-tier environments, set **TC_CHARACTER_ENCODING_SET** to **UTF8** in the following files:

³ Oracle recommends **al32utf8**. **UTF8** supports only supports Unicode Version 3.0 and earlier.
⁴ Microsoft SQL Server does not provide native support for UTF-8 character set encoding.

- `TC_ROOT/tccs/Start_TcServer1`
- `TC_ROOT/pool_manager/conf/MySQL/MYDB/mgrstart`

Do not set the `TC_XML_ENCODING` or `TC_CHARACTER_ENCODING_SET` environment variables in the system environment. TEM sets these values in the Teamcenter configuration.

Configuring a non-UTF-8 environment for Teamcenter

To ensure correct display and processing of Teamcenter data, set the required values in your operating system environment. Use the appropriate values for your locale and platform.

Environment settings on non-UTF-8 systems

Locale	Setting	Value	
		Linux	Microsoft Windows
Chinese (Simplified), GB2312-80 encoding	Database character set (Oracle)	<code>zhs16cgb231280</code> or <code>zhs16gbk</code>	<code>zhs16cgb231280</code> or <code>zhs16gbk</code>
	Database collation (MS SQL Server) ¹	N/A	<code>chinese_prc_bin</code>
	LANG and LC_ALL ²	<code>zh_CN</code>	N/A
Chinese (Simplified), GBK encoding	Database character set (Oracle)	<code>zhs16cgb231280</code> or <code>zhs16gbk</code>	<code>zhs16cgb231280</code> or <code>zhs16gbk</code>
	Database collation (MS SQL Server) ¹	N/A	<code>chinese_prc_bin</code>
	LANG and LC_ALL ²	<code>zh_CN.gb18030</code>	N/A
Chinese (Traditional)	Database character set (Oracle)	<code>zht16big5</code> or <code>zht16mswin950</code>	<code>zht16big5</code> or <code>zht16mswin950</code>
	Database collation (MS SQL Server) ¹	N/A	<code>chinese_taiwan_stroke_bin</code>
	LANG and LC_ALL ²	<code>zh_TW</code>	N/A
Czech	Database character set (Oracle)	<code>ee8mswin1250</code>	<code>ee8mswin1250</code>
	Database collation (MS SQL Server) ¹	N/A	<code>czech_bin</code>
	LANG and LC_ALL ²	<code>cs_CZ</code>	N/A

Notes:

1. The database collation you select during Microsoft SQL Server installation determines the database character set.
2. Set **LANG** and **LC_ALL** in the system environment variables. These variables must have identical values to function properly.
3. **we8iso8859p15** contains additional characters, including the euro symbol (€).
4. **we8mswin1252** contains more characters than **ISO-8859-15**.
5. No **ISO-8859-15** equivalent is available for this locale.
6. Siemens Digital Industries Software does not provide a Hebrew translation. The configuration settings shown allow data entry in Hebrew, but user interface text is in English.
7. If you migrate to **ko16ksc5601** from UTF-8, some data may be truncated. You must modify truncated valued because Teamcenter does not support modifying the default field size.

Locale	Setting	Value	
		Linux	Microsoft Windows
English	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL²	en_US or en_US.iso885915	N/A
French	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL²	fr_FR⁵	N/A
German	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL²	de_DE⁵	N/A
Hebrew ⁶	Database character set (Oracle)	iw8iso8859p8 or iw8mswin1255	iw8iso8859p8 or iw8mswin1255
	Database collation (MS SQL Server) ¹	N/A	hebrew_bin
	LANG and LC_ALL²	iw_IL.utf8	N/A
Italian	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴	we8iso8859p1 or we8iso8859p15³ or we8mswin1252⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL²	it_IT⁵	N/A
Japanese (EUC)	Database character set (Oracle)	ja16euc	ja16euc
	Database collation (MS SQL Server) ¹	N/A	N/A
	LANG and LC_ALL²	ja_JP.eucjp	N/A

Notes:

1. The database collation you select during Microsoft SQL Server installation determines the database character set.
2. Set **LANG** and **LC_ALL** in the system environment variables. These variables must have identical values to function properly.
3. **we8iso8859p15** contains additional characters, including the euro symbol (€).
4. **we8mswin1252** contains more characters than **ISO-8859-15**.
5. No **ISO-8859-15** equivalent is available for this locale.
6. Siemens Digital Industries Software does not provide a Hebrew translation. The configuration settings shown allow data entry in Hebrew, but user interface text is in English.
7. If you migrate to **ko16ksc5601** from UTF-8, some data may be truncated. You must modify truncated valued because Teamcenter does not support modifying the default field size.

Locale	Setting	Value	
		Linux	Microsoft Windows
Japanese (Shift-JIS)	Database character set (Oracle)	ja16sjis	ja16sjis
	Database collation (MS SQL Server) ¹	N/A	japanese_bin
	LANG and LC_ALL ²	ja_JP.sjis	N/A
Korean	Database character set (Oracle)	ko16ksc5601 ⁷	ko16ksc5601 ⁷
	Database collation (MS SQL Server) ¹	N/A	korean_wansung_bin
	LANG and LC_ALL ²	ko_KR.EUC	N/A
Polish	Database character set (Oracle)	ee8mswin1250	ee8mswin1250
	Database collation (MS SQL Server) ¹	N/A	polish_bin
	LANG and LC_ALL ²	pl_PL.ISO8859-2	N/A
Portuguese (Brazilian)	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15 ³ or we8mswin1252 ⁴	we8iso8859p1 or we8iso8859p15 ³ or we8mswin1252 ⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL ²	pt_BR ⁵	N/A
Russian	Database character set (Oracle)	cl8mswin1251 or cl8iso8859p5	cl8mswin1251 or cl8iso8859p5
	Database collation (MS SQL Server) ¹	N/A	cyrillic_general_bin
	LANG and LC_ALL ²	ru_RU	N/A
Spanish	Database character set (Oracle)	we8iso8859p1 or we8iso8859p15 ³ or we8mswin1252 ⁴	we8iso8859p1 or we8iso8859p15 ³ or we8mswin1252 ⁴
	Database collation (MS SQL Server) ¹	N/A	latin1_general_bin
	LANG and LC_ALL ²	es_ES ⁵	N/A

Notes:

1. The database collation you select during Microsoft SQL Server installation determines the database character set.
2. Set **LANG** and **LC_ALL** in the system environment variables. These variables must have identical values to function properly.
3. **we8iso8859p15** contains additional characters, including the euro symbol (€).
4. **we8mswin1252** contains more characters than **ISO-8859-15**.
5. No **ISO-8859-15** equivalent is available for this locale.
6. Siemens Digital Industries Software does not provide a Hebrew translation. The configuration settings shown allow data entry in Hebrew, but user interface text is in English.
7. If you migrate to **ko16ksc5601** from UTF-8, some data may be truncated. You must modify truncated valued because Teamcenter does not support modifying the default field size.

In Hebrew locales, set the following additional variables:

1. In the `TC_DATA/tc_profilevars` file, set `TC_XML_ENCODING` to `ISO-8859-8`.
2. In two-tier environments, set `TC_CHARACTER_ENCODING_SET` to `ISO8859_8` in the following files:
 - `TC_ROOT/tccs/Start_TcServer1`
 - `TC_ROOT/pool_manager/mgrstartMYDB`

Do not set the `TC_XML_ENCODING` or `TC_CHARACTER_ENCODING_SET` environment variables in the system environment. TEM sets these values in the Teamcenter configuration.

For non-English locales on Linux systems, you must specify the system locale when logging on to the system using KDE.

Verify required character set

You must have the same locale installed on your Teamcenter host as you use to communicate with your database server, and the database server must support this locale as well.

Teamcenter installation tools, verify that the required character set is loaded by running the `locale -a` command in a shell. If the output does not list the required character set, you must add this character set before you install Teamcenter.

1. Set or export the `LC_ALL` environment variable by typing `LC_ALL=character-set` or the equivalent command for your platform.
2. Verify the setting using the `echo` command or equivalent. Make sure the correct value for `LC_ALL` is displayed.
3. Run the `locale` command and make sure the `LANG` variable and all the `LC_x` variables are set the same as `LC_ALL`.
4. If `LANG` is still set to `C`, manually export `LANG` to be the same value as `LC_ALL`.
5. Launch Teamcenter Environment Manager (`tem.sh`) from the current shell.

Alternatively, your system administrator may modify the date file (named `TIMEZONE` in the `etc` directory), which can preset this environment, so every time you log on and launch a shell, the environment is preset.

The recommended method, however, is to log on to the system using the Common Desktop Environment (CDE) with the minimum required locale by choosing **Option**→**Language**→*character-set* during logon.

If the required character set is not loaded on your machine, contact your system administrator to have it installed before you install the GM Overlay.

This requirement is necessary because current Teamcenter versions use XML files rather than **.dat** files and associated scripts. Because of this, GM Overlay data is transformed from **.dat** files into XML files.

To read and parse the XML files correctly, the system must be able to process non-English (non-ASCII) locale characters. To facilitate this, the system must be first loaded with the fonts for that locale.

Choose the default language for the Teamcenter server process

Teamcenter server (TcServer) processes and other Teamcenter processes, and Teamcenter command-line utilities, start in the language specified in the **TC_language_default** environment variable. To make these display in a different preferred locale, set the **TC_language_default** environment variable to a supported locale code.

Teamcenter allows users to select a locale on their client hosts, regardless of the locale used by the Teamcenter server pool manager. Requested locales *must* be installed on the Teamcenter server (which may not be true for customized locales) and the server system be configured to accept the locale encoding.

6. Installing a database server

Install a database server

Teamcenter requires a supported relational database management system (RDBMS) for storing Teamcenter data. Before you begin installing Teamcenter, you must install and configure one of the following supported database systems:



- **Oracle**
- **Microsoft SQL Server**

Before proceeding with database server installation, make sure you are correctly licensed through your database vendor for the database edition you install.

For information about database versions supported for use with Teamcenter, see Support Center.

Because of Teamcenter's high resource demands, Siemens Digital Industries Software recommends a dedicated database server. At a minimum, there should be a dedicated database instance for Teamcenter. This allows the instance to be tuned specifically for Teamcenter.

Install and configure Oracle

Preparing the Oracle server

You may choose to create a new Oracle database or upgrade existing Oracle databases. Install a certified version of Oracle Server if a certified version is not installed on the system. For certified Oracle versions and disk space requirements, see the Hardware and Software Certifications knowledge base article on Support Center.

Teamcenter supports pluggable databases (PDB) with container databases (CDB) if you use Oracle 12c or later.

When installing the database server:

- Choose as an Oracle database server a host that is directly accessible by the Teamcenter server host. A database server host is usually a dedicated high-capacity server, specifically tuned for Oracle.
- Install Oracle on each database server or NFS-mount Oracle to each database server.
- Create databases locally on servers.

You can install Oracle from either of the following sources:

- Oracle software kit supplied by Siemens Digital Industries Software
- Oracle software kit supplied by Oracle Corporation

Prepare an Oracle database server and configure an Oracle database for Teamcenter:

1. Choose a name for the Oracle user for the Teamcenter database. Teamcenter uses this account as the owner of all Teamcenter-created tables. This account is used by the database administrator to perform tasks required by Teamcenter.
2. **Set shell limits and parameters on the Oracle server host.**
3. If you do not have a certified version of Oracle, install or upgrade Oracle:
 - If you do not have an Oracle server installed, **install a certified version of Oracle.**
 - If you have an Oracle server installed, but it is not a version certified for Teamcenter 2412, **upgrade your Oracle server.**
4. **Configure Oracle software** for Teamcenter.
5. **Create a database for Teamcenter.**

To ensure correct character mapping, make sure the database and the Teamcenter server use the same encoding.

Additional database instances

Create a database instance if one does not exist or if an additional database instance is required, for example, to support testing, training, or Repeatable Digital Validation (RDV).

If you are installing Repeatable Digital Validation (RDV) services, Siemens Digital Industries Software recommends strongly that you create a *new* database instance on an Oracle server with database partitions on a separate drive. RDV requires extensive data warehousing with large uploads and simple queries. Such a configuration also makes the fine-tuning of the database easier.

A separate RDV database is *not* required if you use cacheless search.

Set shell limits and parameters

Overview of shell limits and parameters

Oracle RDBMS uses extensive Linux resources such as shared memory, swap memory, and semaphore for interprocess communication. Inadequate parameter settings cause problems during installation and startup. Increasing the volume of data stored in memory reduces disk I/O activity and improves database performance.

The Oracle RDBMS installation program displays warnings if kernel parameters are not adequate. To avoid warnings and errors during or after installation, make sure kernel parameters meet the recommended settings for typical environments described in the following topics.

Before you install Oracle RDBMS, set initial parameters as described in Oracle documentation, and then adjust parameters according to available system memory. Set the **ulimit** parameter to **unlimited**.¹ Then, set the **kernel parameters** to recommended Teamcenter values for your operating system.

If you previously tuned kernel parameters for other installed applications to levels that meet or exceed the values recommended for Teamcenter, keep those existing values.

The parameter settings recommended herein are *minimum* values. For production database systems, Oracle recommends you tune values to optimize system performance. For information about performance tuning, see:

- Documentation for your operating system
- Teamcenter installation documentation on Support Center

Set SUSE Linux shell limits

1. Increase shell limits for the **oracle** user to the minimum values listed in the following table by adding the following lines to the **/etc/security/limits.conf** file:

```
oracle          soft    nproc    2047
oracle          hard    nproc    16384
oracle          soft    nofile   1024
oracle          hard    nofile   65536
```

Do not change the shell limit values if they were set for another program and the values are greater than the levels Oracle requires.

SUSE Linux shell limit	Item in limits.conf	Minimum hard limit
Maximum number of open file descriptors	nofile	65536
Maximum number of processes available to a single user	nproc	16384

2. Add or edit the following lines in the **/etc/pam.d/login** file:

```
session required /lib64/security/pam_limits.so
session required pam_limits.so
```

¹ The **ulimit** parameter specifies a maximum number of processes per user.

3. Change the **oracle** user default shell startup file:

- For the Bourne, Bash, or Korn shell, add the following lines to the **/etc/profile.local** file:

```
if [ $USER = "oracle" ]; then
    if [ $SHELL = "/bin/ksh" ]; then
        ulimit -u 16384
        ulimit -n 65536
    else
        ulimit -u 16384 -n 65536
    fi
fi
```

- For the C shell (csh or tcsh), add the following lines to the **/etc/csh.login.local** file:

```
if ( $USER == "oracle" ) then
    limit maxproc 16384
    limit descriptors 65536
endif
```

Upgrade an Oracle server and database

Export an Oracle database

1. Either log on to the Oracle server as **oracle** or switch the user to **oracle**:

```
su - oracle
```

2. Set the **PATH** environment variable to include the Oracle **bin** directory:

```
export PATH=$PATH:ORACLE_HOME/bin
```

3. Manually set the shared library path for Linux:

```
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:${ORACLE_HOME}/lib
```

4. Export the contents of the Teamcenter Oracle database to the dump file:

```
ORACLE_HOME/bin/exp db-user/password full=y file=file-name.dmp
log=export.log
```

Replace *db-user* with the Teamcenter database user account name; replace *password* with the database user account password; replace *file-name* with the name of the dump file to contain the exported data; replace *export* with the name of the log file to contain export output.

5. Store the dump file in a safe place.

If you have multiple databases, repeat this procedure for each database.

Caution:

Siemens Digital Industries Software strongly recommends backing up the dump file on tape or another disk. If the dump file becomes corrupted or lost, all data from the existing database is lost.

Terminate Oracle sessions

Before installing a new version of Oracle, you must terminate all Oracle sessions and Oracle processes.

1. Either log on to the Oracle server as **oracle** or switch the user to **oracle** as follows:

```
su - oracle
```

2. Set the **ORACLE_HOME** environment variable to point to the location of the Oracle files. For example:

```
export ORACLE_HOME=/u01/app/oracle/product/oracle-version
```

Replace the path with the system path to the Oracle files.

3. Define **ORACLE_HOME/bin** in the **PATH** variable:

```
export PATH=${PATH}:${ORACLE_HOME}/bin
```

4. Manually set the shared library path on Linux:

```
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:${ORACLE_HOME}/lib
```

5. If a **tnslsnr** listener process is running, terminate it. For example:

```
`${ORACLE_HOME}/bin/lsnrctl stop listener-name
```

Replace *listener-name* with the name of the listener process.

6. Shut down all Oracle database instances using the **dbshut** utility. Shut down database instances listed in the **oratab** file:

```
`${ORACLE_HOME}/bin/dbshut
```

Back up an Oracle installation

If you are upgrading to the certified Oracle version, back up the existing Oracle installation.

Back up the following files and directories:

- The Oracle home directory on each installed workstation.
- The directories containing database files for each configured database.
- The **oratab** file in the **/etc** directory.
- The Oracle Net **listener.ora** and **tnsnames.ora** configuration files in the **/etc** directory.

These are the only Teamcenter directories affected by Oracle installation. If you created other directories containing data used by Oracle, such as an administration script directory, you should also back up these directories.

Upgrading an Oracle server

Upgrade the Oracle server

Upgrade your Oracle server by one of the following methods:

- *Upgrade using the Oracle installer*
- *Upgrade by uninstalling/reinstalling Oracle*

Upgrade using the Oracle installer

1. **Launch the Oracle installer** to install a certified version of Oracle server.
2. When the Oracle installer prompts you to upgrade existing databases, enter the required information about the databases you want to upgrade.

Upgrade by uninstalling/reinstalling Oracle

1. Remove existing Oracle databases.
2. Uninstall all existing Oracle server software.
3. **Install a certified version of Oracle server.** Then, **configure Oracle** and **create an Oracle database.**
4. After Oracle installation is complete, import your Teamcenter database from the Oracle dump file into the new Oracle database. Enter the following command on a single line:

```
ORACLE_HOME\bin\imp db-user/password fromuser=db-user touser=db-user  
file=file-name.dmp log=import.log
```

Replace *db-user* with the Teamcenter database user account name, *password* with the database user account password, *file-name* with the full path and name of the dump file that contains the exported data, and *import* with the name of the log file.

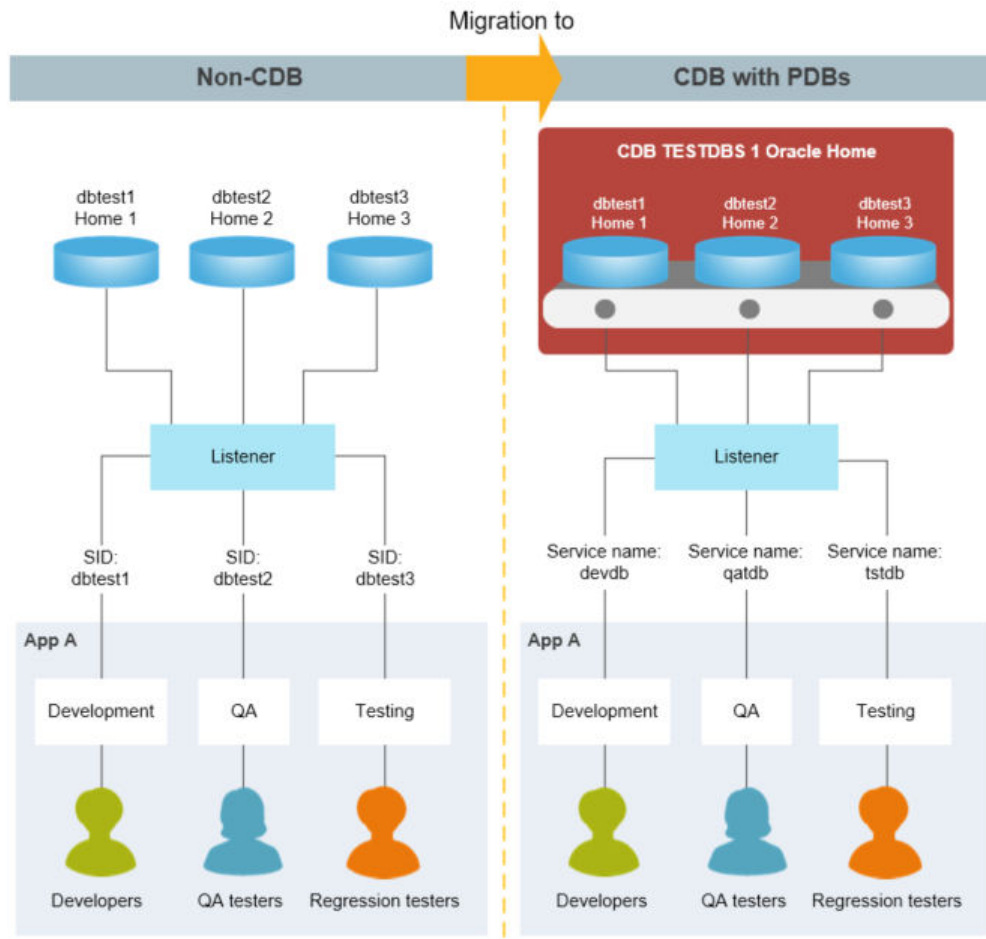
Migrate a non-CDB database to a CDB database

Teamcenter supports Oracle's **multitenant database architecture** if you use Oracle 12c or later. A multitenant architecture is deployed as a Container Database (CDB) with one or more Pluggable Databases (PDB).

A *Container Database* (CDB) is similar to a conventional (non-CDB) Oracle database, with familiar concepts like control files, data files, undo, temp files, redo logs, and so on. It also houses the data dictionary for objects owned by the root container and those that are visible to databases in the container.

A *Pluggable Database* (PDB) contains information specific to the database itself, relying on the container database for its control files, redo logs and so on. The PDB contains data files and temp files for its own objects, plus its own data dictionary that contains information about objects specific to the PDB. From Oracle 12.2 onward a PDB can and should have a local undo tablespace.

You can **migrate a non-CDB database to a CDB database** using Oracle tools. The following example illustrates the database architectures before and after migration.



Teamcenter supports CDB and non-CDB databases. Be aware that **Oracle has deprecated support for non-CDB databases** and may discontinue support after Oracle 19c.

If you migrate a non-CDB Teamcenter database to a CDB database, you must perform the migration *after* you upgrade to Teamcenter 2412.

Install Oracle server

You can download and install Oracle from Siemens Support Center if you have purchased it from Siemens Digital Industries Software, or by purchasing it directly from Oracle Corporation.

If you install Oracle from a hard disk, copy the *entire* contents of the Oracle software kit to the hard disk.

You can install Oracle application files on NFS file systems. However, Oracle Corporation does not support Oracle database files on . To ensure data integrity, create database files on local disk drives.

If you install Oracle from an NFS-mounted directory from a remote NFS server, you must execute the installation program on the local server node.

Caution:

- Do not run Oracle Universal Installer as the **root** user.
- Oracle Universal Installer automatically installs the Oracle-supplied version of Java Runtime Environment (JRE). This version is required to run Oracle Universal Installer and several Oracle assistants. Do not modify the JRE except by using a patch provided by Oracle Support Services.

1. Log on to the server host as the **oracle** user.
2. Record the name of the Oracle database server host. Teamcenter Environment Manager requires this name during corporate server installation.
3. If Oracle was previously installed on the host, search for the following Oracle Net configuration files in the **etc** and **var/opt/oracle** directories and either remove them or relocate them to the corresponding **network/admin** directory in the Oracle home directory:

```
listener.ora
tnsnames.ora
sqlnet.ora
```

This step is required for compliance with the standard of storing Oracle Net configuration files in the **network/admin** directory.

4. Locate the Oracle software kit.
5. If the **/tmp** directory does not have at least 400 MB of free space, set the **TEMP** and **TMPDIR** environment variables to a directory that meets this requirement:

```
$ export TEMP=directory-path
$ export TMPDIR=directory-path
```

Replace *directory-path* with the path to the directory with sufficient space, for example, **disk/tmp**

6. Start Oracle Universal Installer from the Oracle software kit directory as the **oracle** user:

```
$ umask 022
$ unset TNS_ADMIN
$ unset ORACLE_HOME
$ export ORACLE_BASE=/disk1/oracle
$ cd $HOME
$ /mount-directory/runInstaller
```

Replace *mount-directory* with the Oracle software kit directory. This example sets the **ORACLE_BASE** variable to the top level of the Oracle installation.

- In the Welcome window, click **Next**.
- If Oracle Universal Installer displays the **Specify Inventory Directory and Credentials** window, enter the directory where you want to install inventory files and the operating system group name for the group that owns the inventory directory; click **Next**.

Note:

Siemens Digital Industries Software recommends:

- Use the default directory (**oraInventory**) in the Oracle base directory.
- Use the default of the group the **oracle** account belongs to (**dba**).

- If Oracle Universal Installer prompts you to run the **oraInstRoot.sh** script, run it in a separate terminal window as the **root** user and then click **Continue**:

```
$ORACLE_BASE/oraInventory/oraInstRoot.sh
```

- In the **Configure Security Updates** dialog box, specify whether and how you want to be informed about security updates from Oracle, and then click **Next**.
- In the **Select Installation Option** dialog box, select **Install database software only**, and then click **Next**.
- In the **Select Database Installation Option** dialog box, select **Single instance database installation**, and then click **Next**.
- In the **Select Database Edition** dialog box, select **Enterprise Edition** and click **Next**.
- In the **Specify Installation Location** dialog box, specify:

- **Oracle Base**

Specifies the path in which to install all Oracle software and configuration files.

- **Software Location**

Specifies the path in which to install Oracle software files. This is the Oracle home directory.

Do not install a later version of Oracle into an Oracle home directory that contains earlier Oracle software.

- In the **Privileged Operating System Groups** dialog box, specify user groups for the database administrator, operator, and other roles.

16. In the **Perform Prerequisite Checks** dialog box, verify that all the prerequisite checks succeeded and click **Next**.

If a check fails, review the displayed cause of the failure for that check, correct the problem, and rerun the check.

A check occasionally fails erroneously, for example, when you install a later patch that obsoletes a listed patch. When you are satisfied that the system meets a requirement, manually verify the requirement by selecting the check box for the failed check.

17. In the **Summary** dialog box, review the information to ensure you have sufficient disk space and click **Install**.

If you encounter errors, see the Oracle documentation for troubleshooting information.

18. In the **Install Product** dialog box, monitor the success of the installation stages.

When the installer displays the **Execute Configuration scripts** dialog box, follow the instructions in the dialog box to run the **root.sh** script in the Oracle home directory. Running this script requires logging on as **root**.

The **root.sh** script sets the necessary file permissions for Oracle products and performs other **root**-related configuration activities.

19. After the **root.sh** script completes successfully, click **OK** in the **Execute Configuration scripts** dialog box.
20. In the **Finish** dialog box, click **Close** to close Oracle Universal Installer.

Link the Oracle server to the ODBC library

Make sure a link exists to the Open Database Connectivity (ODBC) library.

1. Change to the **TC_ROOT/lib** directory.
2. Locate the **libodbc** library:

```
ls -la | grep libodbc
```

3. Ensure that a link exists between **libodbc.so.2** and **libodbc.so**:

```
ln -s libodbc.so.2 libodbc.so
```

4. If the link does not exist, create the symbolic link:

```
ln -s libodbc.so.2 libodbc.so
```

Configure Oracle software

Configure Oracle Net

Teamcenter uses Oracle Net protocols to communicate with an Oracle database. These protocols require that you run a listener process () on the Oracle server to listen for remote connect requests and that all clients can translate the service alias identifying the server and database.

If your site uses Oracle Net Assistant for other databases, Siemens Digital Industries Software recommends that you copy the **listener.ora** and **tnsnames.ora** files containing entries for your designated Teamcenter database and install these copies on the Oracle server. Reload or restart the listener process so that it listens for connect requests to the new database.

Teamcenter Environment Manager copies the **tnsnames.ora** file and stores it in the Teamcenter data directory. Teamcenter uses the Oracle **TNS_ADMIN** environment variable to locate the **tnsnames.ora** file. However, if the system uses the **TNS_ADMIN** variable to locate configuration files created by Oracle Net Assistant, this setting overrides Teamcenter settings. In this case, you must use Oracle Net Assistant to add entries for Teamcenter databases to existing Oracle Net configuration files.

Configure Oracle listener

1. In the window in which you started Oracle Universal Installer, start Oracle Net Manager:

```
export ORACLE_HOME=/disk1/oracle/OraHome_1
$ORACLE_HOME/bin/netmgr
```

2. Create the **listener.ora** file:
 - a. Expand the **Local** icon.
 - b. Select the **Listeners** folder and choose **Edit**→**Create**.
 - c. Accept the default listener name (**LISTENER**) and click **OK**.
 - d. Click the **Add Address** button.
 - e. Specify the port number.

For the first listener, it is recommended you accept the default port number (1521).

Tip:

Record the number of the port used by the Oracle database server listener for entry during corporate server installation. Teamcenter Environment Manager requires this port number.

- f. In the **Local** tree, click **Profile**.
- g. In the **Naming** list (to the right of the **Oracle Net Configuration** tree), choose **General**.
- h. Click the **Advanced** tab.
- i. In the **TNS Time Out Value** box, type **10**.

This step sets the Oracle server-side **SQLNET.EXPIRE_TIME** parameter. This value determines how often the Oracle server checks for aborted client connections. Teamcenter requires that this parameter be set to a nonzero value, and the recommended value is **10** (10 minutes).

- j. Select the **Service Naming** folder and choose **Edit→Create**.
- k. Type the **Net Service Name** for your pluggable database and then click **Next**.
- l. Select **TCP/IP (Internal Protocol)** and then click **Next**.
- m. Enter the host name for your Oracle server and then click **Next**.

If you chose to not use the default port during database creation, change the **Port Number**.

3. Type the **Service Name** and then click **Next**.
4. Click **Test...**
5. Change the **Login** value to the system user name and the **Password** value to the system password used during database installation and then click **Test**.
6. After the connection test is successful, click **Close**.
7. Click **Finish**.
8. Save the listener information, choose **File→Save Network Configuration**.

Oracle Net Manager saves the listener information and creates the **network/admin/listener.ora** and **network/admin/sqlnet.ora** files in the Oracle home directory.

9. Exit Oracle Net Manager, choose **File→Exit**.
10. In the same window in which you started Oracle Net Manager, start the listener service:

```
$ORACLE_HOME/bin/lsnrctl start LISTENER
```

Configure Oracle for TCPS

Teamcenter Environment Manager (TEM) allows you to install the corporate server and the server manager using a TCPS-enabled Oracle database. However, you need to configure the Oracle database for TCPS prior to deployment.

Teamcenter supports the TCPS configuration that uses the Diffie-Hellman anonymous authentication. With Diffie-Hellman anonymous authentication, neither the server nor the client is authenticated through SSL. Authentication must be completed using another method, for example, a user name and password.

In the Oracle database configuration, do not enter a specific cipher suite as this is not supported by TEM.

1. In the **listener.ora** section of the Oracle listener machine, set the **SSL_CLIENT_AUTHENTICATION** parameter to **FALSE** as the supported TCPS configuration only covers encryption and data integrity.
2. Verify that the Oracle wallet is stored on the same Teamcenter machine on which the corporate server and server manager are to be installed or upgraded.

During Teamcenter installation, in the **Foundation Database** panel in TEM, select **Enable TCPS** and enter the **Wallet Location** (location of the Oracle wallet on the Teamcenter machine) and **TLS Version** (SSL_VERSION specified in the Oracle database).

Create an Oracle database

Create an Oracle database instance with Oracle Database Configuration Assistant (DBCA). Siemens Digital Industries Software provides two templates for creating the Teamcenter database:

- **Teamcenter_Oracle** template is used to create a traditional non-CDB database instance with Oracle user accounts and tablespaces.
- **Teamcenter_Oracle_multitenant** template is used to create a Container and Pluggable database instance where the two databases are identified by their Oracle service names. Teamcenter supports the Oracle 12c multitenant architecture.

The following are key considerations when creating an Oracle Container (CDB) database instance in the Oracle multitenant architecture with Oracle 12c:

- Teamcenter Oracle database tablespaces and the Teamcenter Oracle user account are always created in the pluggable database.
- Teamcenter cannot be installed into the container database. TEM detects if a Container database is specified and does not allow the Teamcenter installation to proceed.
- The Teamcenter tablespaces are *not* created using the DBCA template, as this is not supported by Oracle. After you configure the pluggable database, you can manually create a tablespace for the pluggable database, or allow Teamcenter to create the tablespace automatically.

Using the existing non-CDB template *does* create tablespaces.

For best performance and reliability, database parameters set by Teamcenter templates should be customized to suit your installation. This can be performed by your Oracle administrator after Teamcenter installation is complete.

Teamcenter Environment Manager (TEM) verifies your Oracle version during installation. If your Oracle server does not meet the minimum required version, TEM does not allow installation to proceed. For information about supported database servers, see the Hardware and Software Certifications knowledge base article on Support Center.

Copy database creation scripts

1. Make sure you have access to the Teamcenter software kit.
2. Log on to the Oracle server host as the **oracle** user.
3. Copy the Siemens Digital Industries Software-supplied Oracle database template files:
 - a. Access the Teamcenter 2412 software kit.
 - b. Copy files from **tc/dbscripts/oracle** to the **templates** directory of the Oracle server:

```
cp /cdrom/tc/db_scripts/oracle/* ORACLE_HOME/assistants/dbca/templates
```

4. Open a shell window and set the **ORACLE_BASE** environment variable. For example:

```
export ORACLE_BASE=/disk1/oracle
```

By default, Oracle creates database files in the **oradata** directory in the directory pointed to by the **ORACLE_BASE** environment variable. Before running Oracle Database Configuration Assistant (DBCA), you can set the **ORACLE_BASE** environment variable to the directory where you want database files to reside.

Create the Oracle database

1. Make sure you are logged on as the Oracle user.
2. Start Oracle Database Configuration Assistant (DBCA):


```
ORACLE_HOME/bin/dbca
```
3. In the **Select Database Operation** dialog box, select **Create a database** and click **Next**.
4. In the **Select Database Creation Mode** dialog box, select **Advanced configuration** and click **Next**.

5. In the **Select Database Deployment Type** dialog box, in the list of templates, select the appropriate template:

- If you use a non-container (non-CDB) database, select the **Teamcenter_Oracle** template.
- If you use a container (CDB) database, select the **Teamcenter_Oracle_multitenant** template.

If you use a CDB database, the DBCA templates do *not* create tablespaces. The template no longer configures tablespaces for pluggable databases.

6. In the **Specify Database Identification Details** dialog box, enter the appropriate values according to the type of database you use:

- **Container database:**

- a. Accept the default database name in the **Global Database Name** box or type a different name and click **Next**.

The **SID** box is automatically filled in with the name you enter in the **Global Database Name** box.

Tip:

Record the SID of the Oracle instance for entry during corporate server installation. Teamcenter Environment Manager requires this name.

- b. Select the **Create as Container Database** check box.

The **Create a Container Database with one or more PDBs** radio button is selected by default. Do not change this setting.

- c. In the **PDB Name** text box, type the name of the pluggable database, and then click **Next**.

- **Traditional (non-container) database:**

- a. Accept the default database name in the **Global Database Name** box or type a different name and click **Next**.

The **SID** box is automatically filled in with the name you enter in the **Global Database Name** box.

Tip:

Record the SID of the Oracle instance for entry during corporate server installation. Teamcenter Environment Manager requires this name.

- b. In the **Database Identification** dialog box, either accept the default database name in the **Global Database Name** box or type a different name and click **Next**.

The **SID** box is automatically filled in with the name you enter in the **Global Database Name** box.

Tip:

Record the SID of the Oracle instance for entry during corporate server installation. Teamcenter Environment Manager requires this name.

7. In the **Select Database Storage Option** dialog box, select **Use template file for database storage attributes**.
8. In the **Select Fast Recovery Option** dialog box, select the **Specify Fast Recovery Area** check box and accept the default values.
9. In the **Specify Network Configuration Details** dialog box, verify the **listener you created and started** is running and selected in the **Listener Selection** tab.

If the listener is not running, **start the listener** and make sure it is selected before you continue.

10. In the **Select Database Options** dialog box, click **Next**.
11. In the **Specify Configuration Options** dialog box, select **Use Automatic Shared Memory Management**, and then click **Next**.
12. In the **Specify Management Options** dialog box, accept the default selections, and then click **Next**.
13. In the **Specify Database User Credentials** dialog box, select **Use the Same Password for All Accounts**, and then enter and confirm the password.

The password you enter is applied to the **SYS**, **SYSTEM**, and **PDBADMIN** accounts.

14. In the **Select Database Creation Option** dialog box:
 - a. Select **Create Database** check box.
 - b. Click **Next**.
15. In the **Summary** dialog box, verify your selections, and then click **Finish** to begin creating the database.

When the database is created, DBCA displays a window containing information about the created database.

16. In the **Progress Page** dialog box, click **Close** to exit DBCA.

After the database is created, check for possible errors in the installation log files. The log files are in the **admin/SID/create** directory in the Oracle base directory or, if you did not define the **ORACLE_BASE** environment variable, in the Oracle home directory.

If this script did not execute successfully, execute it again using the Oracle SQL*Plus utility. Log on to SQL*Plus as **sysdba**.

The first time Oracle Universal Installer runs, it creates the **ORACLE_BASE/oraInventory/logs** directory, containing an inventory of installed components and performed actions. The most recent log file is named **installActions.log**. Names of previous installation sessions are in the form **installActionsdate-time.log**. For example:

```
installActions2008-07-14_09-00-56-am.log
```

You can also view a list of installed components by choosing **Installed Products** on any Oracle Universal Installer window. Do not delete or manually alter the Inventory directory or its contents. Doing so can prevent Oracle Universal Installer from locating products you installed on the system.

Configure the pluggable database

If you use a container (CDB) database, create the Teamcenter Oracle user and set permissions for the pluggable database:

1. Open SQL*Plus and type the following command to connect to the container database:

```
connect user/password;
```

Replace *user* and *password* with the Oracle administrator user name and password. For example:

```
connect system/manager;
```

2. Type the following command to set the pluggable database so the Teamcenter Oracle user is created inside the pluggable database.

```
alter session set container=Tc-Oracle-user;
```

For example:

```
connect alter session set container=tcpdb;
```

If successful, SQL*Plus responds:

```
Session altered.
```

3. Set privileges for the Teamcenter Oracle user:

```
grant connect, create table, create tablespace, create procedure,
create view, create sequence, select_catalog_role, alter user,
alter session to Tc-Oracle-user identified by Tc-Oracle-user;
```

If successful, SQL*Plus responds:

```
Grant succeeded.
```

Create a tablespace for the pluggable database

You can manually create a tablespace for the pluggable database using the following steps. If you do not perform these steps, Teamcenter automatically creates a tablespace with the default size.

1. Open a command prompt and log on to sqlplus as the Oracle administrator, for example, **system**.
2. Create a new tablespace for the pluggable database:

```
create tablespacetablespace-namedatafile 'dbf-path/dbf-filename' sizedbf-sizeM;
```

Replace *tablespace-name* with the tablespace name. Replace *dbf-path*, *dbf-file*, and *dbf-size* with the path, file name, and size of the database file in megabytes. For example:

```
create tablespace tcpdb datafile 'D:\apps\oracle\oradata\tc\tcpdb.dbf' size 100M;
```

3. Grant all permissions on the new tablespace to the Teamcenter Oracle **user**:
 - a. Enter:

```
alter userTc-Oracle-userquotadbf-sizeM ontablespace-name;
```

For example:

```
alter user tcdba quota 100M on tcpdb;
```

- b. Enter:

```
grant unlimited tablespace to Tc-Oracle-user;
```

4. Log off **sqlplus** by typing **exit**.

Install and configure Microsoft SQL Server

Install Microsoft SQL Server

The steps to install Microsoft SQL Server and to configure a database for Teamcenter depend on your operating system, your edition of SQL Server, and your selections during installation.

To optimize MS SQL Server database performance, consider the following steps:

- To implement a Teamcenter network incrementally at multiple sites, configure each site in a Multi-Site Collaboration environment with separate hosts for the MS SQL database server (including Multi-Site Collaboration), the rich client, and volume servers, starting with the first phase. This allows you to configure and manage the network consistently, as you scale it in each phase. You can add CPUs, memory, and disks to the appropriate servers or deploy additional servers as required, without moving or reconfiguring server processes on different hosts or changing operational procedures.
- For large or critical system implementations, implement high-availability systems with mirrored, dual-ported disk arrays. For the Teamcenter volume, consider a file server with storage attached network (SAN) or network attached storage (NAS) disk arrays.
- To minimize system maintenance interruptions, create separate file backup server hosts to process metadata and volume data backups in real time. While the primary disk sets remain online, you can take secondary MS SQL Server and volume disk sets offline simultaneously and back them up together (assuring MS SQL Server and Teamcenter volume synchronization). When the backup is complete, you can return the secondary disk sets online and resynchronize them with the primary disk sets. The file backup servers also serve as fail-over machines.
- To ensure correct character mapping, make sure the database and the Teamcenter server use the same encoding.

For certified versions of MS SQL Server, see the Hardware and Software Certifications knowledge base article on Support Center. **Install the MS SQL Server database server** before you begin installing Teamcenter.

Teamcenter requires the TCP/IP protocol to be enabled, but this protocol is disabled by default when you install Microsoft SQL Server. Before you install Teamcenter, make sure you enable the TCP/IP protocol.

For information about enabling the TCP/IP protocol in Microsoft SQL Server, see <http://technet.microsoft.com>.

Typical Microsoft SQL Server installation on Linux

1. Install a supported version of Microsoft SQL Server on your Linux host.

For information about installing Microsoft SQL Server on Linux, see Microsoft documentation:

<https://docs.microsoft.com/>

2. Configure Microsoft SQL Server using Microsoft SQL Server Management Studio.

Note that the **bulkAdmin** server role is not supported in SQL Server on Linux.

3. After you install Microsoft SQL Server, install the Microsoft Open Database Connectivity (ODBC) driver for Linux as described in [Microsoft documentation](#).
4. During installation of the Microsoft ODBC driver, the driver installer prompts you to install the dependent UNIX ODBC driver manager (**unixODBC**). This is a third-party library that you can download from Microsoft. Make sure you install this driver manager.
5. Verify the ODBC driver. After you install the Microsoft ODBC driver and the **unixODBC** driver manager, verify the installation by executing the following command:

```
odbcinst -j
```

This command provides helpful information about the ODBC driver manager configuration. For example:

```
myhost:~> odbcinst -j
unixODBC 2.3.7
DRIVERS.....: /etc/unixODBC/odbcinst.ini
SYSTEM DATA SOURCES: /etc/unixODBC/odbc.ini -ILE DATA
SOURCES..: /etc/unixODBC/ODBCDataSources JSER DATA SOURCES..: /users/
nvh1wa/.odbc.ini
SQLULEN Size.....: 8
SOLLEN Size ..: 8
SQLSETPOSIROW Size.: 8
```

In this configuration, the ODBC driver manager version is **2.3.7**.

6. Configure the ODBC driver. Open the **odbcinst.ini** file from the location shown in the output of the **odbcinst -j** command. (In the preceding example, this is in the **/etc/unixodbc** directory.) Verify that this file contains a section with the heading **[SQL Server]**.

If the section does not exist in the file, create the **[SQL Server]** heading and copy the contents of the **[ODBC Driver 17 for SQL Server]** section into it. For example:

```
[ODBC Driver 17 for SQL Server]
Description=Microsoft ODBC Driver 17 for SQL Server
Driver=/opt/microsoft/msodbcsql17/lib64/libmsodbcsql-17.5.so.1.1
UsageCount=1
[SQL Server]
Description=Microsoft ODBC Driver 17 for SQL Server
```

```
Driver=/opt/microsoft/msodbcsql17/lib64/libmsodbcsql-17.5.so.1.1
UsageCount=1
```

This provides the necessary pointer to the correct driver path.

- After you complete the installation of Microsoft SQL Server, the Microsoft ODBC driver, and the UNIX ODBC driver manager, you can create a Teamcenter database in Microsoft SQL Server. Create the database during Teamcenter installation through TEM or **using the Teamcenter database template** in Microsoft SQL Server Management Studio.

Create an SQL Server database

Teamcenter Environment Manager (TEM) can create and populate a SQL Server database when you install a Teamcenter corporate server.² If you want TEM to create your Teamcenter database automatically, skip this topic. Otherwise, create your Teamcenter database using the SQL Server Management Studio.

- Make sure you have access to the Teamcenter software kit.
- Launch Microsoft SQL Server Management Studio. For example:
- In the SQL Server **Connect to Server** dialog box, log on using the system administrator (**sa**) logon name and password.
- Choose **File** → **Open** → **File** or press Control+O.
- Browse to the **tc/db_scripts/mssql** directory in the Teamcenter software kit.
- Select the **create_database.sql.template** file and click **Open**.

If SQL Server Management Studio prompts you to log on, enter the system administrator (**sa**) logon name and password.

- Edit the database template (**create_database.sql.template**) to replace the necessary values.

The following table describes the database parameters to replace in the template. Within the template file, there are also comments on values that must be replaced.

Parameter	Example value	Description
@DB_NAME@	TC	Name of the database to create.
@DATA_PATH@	/mssql_data	Path to the directory in which to place the data file.

- In the **Database Engine Selection** panel, TEM prompts you for database information for the SQL Server database. To create a new database, enter new values. To connect to an existing database, enter values for the existing database. For information about installing a corporate server, see *Create a Teamcenter environment using TEM*.

Parameter	Example value	Description
@USER_NAME@	tcdba	Database logon name for the Teamcenter database.
@PASSWORD@	tcdbapw	Password for the database logon name.
@COLLATION@	Latin1_General_BIN	Collation sequence you want the Teamcenter database to use. Choose the appropriate collation for your locale . The collation value must end with _BIN . ³ <i>Collation</i> defines the alphabet or language whose rules are applied when data is sorted or compared. The collation value determines the character set used by the database server.
@LANGUAGE@	us_english	Database language.

8. Save the newly modified file as *filename.sql*, removing the **_template** extension.
9. Open the new file in Microsoft SQL Server Management Studio.
10. In the SQL Editor toolbar, click **Execute** (or choose **Query**→**Execute** to begin creating the database).
11. When creation of the MS SQL database instance is complete, verify the newly created database. In the **Object Explorer** pane, under the MS SQL Server host name, expand the **Databases** tree. Verify the new database name is included in the list of databases.

³ Do not use the default collation value that ends with **_CI_AS**.

7. Install the Siemens License Server

Before you install Teamcenter, you must download and install the supported version of the **Siemens License Server** to distribute licenses to Teamcenter hosts.

For the version of the Siemens License Server certified with Teamcenter 2412, see the Hardware and Software Certifications knowledge base article on Support Center.

Download and install the Siemens License Server:

1. Open Support Center:

<https://support.sw.siemens.com>

2. Under **Product Centers**, find **Siemens License Server**.

Caution:

Make sure you download **Siemens License Server**, *not* **Siemens PLM Licensing**.¹

3. In the Siemens License Server product center, click **Downloads**, and then download the certified version of the Siemens License Server.
4. Install the License Server according to the *Siemens Digital Industries Software License Server Installation Instructions* available from the Siemens License Server downloads page.
5. On your designated Teamcenter corporate server host, set the following system environment variables:

SPLM_LICENSE_SERVER

Set to the location of the Siemens License Server:

port@host

Replace *port* with the port number and *host* with the machine name of the License Server, for example, **29000@tchost**.

TCP_NODELAY

Set to a value of **1** on the License Server host. This helps optimize logon time when launching Teamcenter.

¹ Siemens PLM Licensing is no longer supported by Teamcenter. The Siemens License Server is the currently supported license server.

6. Install Teamcenter licenses on the License Server according to the information provided to you by Siemens Digital Industries Software support.

The [Siemens License Server downloads page](#) contains additional links to documentation, Knowledge Base articles, and videos about installing and maintaining the License Server.

Caution:

The License Server must be running and two or more seats must be available on that license server during Teamcenter server installation. Otherwise, database creation fails because the **make_user** utility cannot create the required users in the database.

8. Installing Security Services

Install the Web Application Manager for Security Services

Install the Web Application Manager

1. In the Teamcenter software kit, locate the Security Services installation package:

kit-location/additional_applications/sso/TcSecurityServices2412_date.zip

Expand this package to a local directory on your Security Services machine. This local directory is referenced as *TCSS_ROOT*.

2. Create a home directory for the Security Services web applications on your Security Services machine, for example, */webroot*.

This directory is referenced as *WEB_ROOT*.

3. Expand the Web Application Manager files:

- a. Change to the *WEB_ROOT* directory.
- b. Type the following command to extract Web Application Manager files to your host:

```
cat TCSS_ROOT/TcSecurity/default/INSTALL_TCWEB.TZ | uncompress -c  
| tar xvf -
```

Note:

On Red Hat Linux systems, use the **gzip** command instead of **uncompress** to extract **INSTALL_TCWEB.TZ** file:

```
cat TCSS_ROOT/TcSecurity/default/INSTALL_TCWEB.TZ | gzip -d  
| tar xvf -
```

Expand Security Services ICD files

1. Create a home directory for the Security Services installable component descriptor (ICD) files.¹ For example, */tcss_icd*.

This directory is referenced as *TCSS_ICD*.

¹ ICD files provide solution information to the Web Application Manager.

2. Expand the Security Services ICD files:
 - a. Change to the `TCSS_ICD` directory.
 - b. Type the following command to extract Security Services ICD files to your host:

```
cat TCSS_ROOT/default/INSTALL_SSO.TZ | uncompress -c | tar xvf -
```

Note:

On Red Hat Linux systems, use the **gzip** command instead of **uncompress** to extract **INSTALL_SSO.TZ** file:

```
cat TCSS_ROOT/default/INSTALL_SSO.TZ | gzip -d | tar xvf -
```

3. If you want to install an additional locale for Security Services, repeat step 2, with the following changes:
 - Replace the **default** directory under **TcSecurity** with the directory corresponding to the locale you want to install:

Chinese (Simplified): zh_cn	German: de_de	Polish: pl_pl
Chinese (Traditional): zh_tw	Italian: it_it	Portuguese (Brazilian): pt_br
Czech: cs_cz	Japanese: jp_jp	Russian: ru_ru
French: fr_fr	Korean: ko_ko	Spanish: es_es
 - Replace **INSTALL_SSO.EXE|TZ** with **INSTALL_SSO_locale.EXE|TZ**.

Install Security Services web applications

The Security Services login service and identity service are Java EE web applications that provide the essential functions of Security Services. Build these applications using the Web Application Manager and deploy them on a supported Java EE web application server.

The Web Application Manager requires a supported Java Runtime Environment (JRE). For supported web application servers and Java Runtime Environments, see the Hardware and Software Certifications knowledge base article on Support Center.

Note:

If you deploy Security Services on JBoss/Wildfly, you must enable Apache JServ Protocol (AJP) before you configure the SSO gateway. Enable AJP as described in one of the following topics in the *Web Application Deployment* guide:

- *Deploy the Teamcenter web application on JBoss (H-S)*
- *Deploy on a JBoss application server (H-S)*

Build the Login Service web application

1. Launch the Web Application Manager. Change to the `WEB_ROOT` directory and type the `insweb` command.
2. Load Security Services ICD files. This populates the list of solutions available to install.
 - a. Click **Copy ICDs**.
 - b. In the **Copy ICD Files** dialog box, click **Browse**.
 - c. Browse to the `TCSS_ICD` directory, select the `icd` directory, and then click **Open**.
 - d. In the **Copy ICD Files** dialog box, click **OK** to load ICD files.

3. Click **Add** to begin creating a web application.

The Web Application Manager displays the **Add Web Application** dialog box.

4. In the **Name** box, type a name for the application, for example, **TcLoginService**.
5. In the **Staging Location** box, enter a path where you want to place the web application files. Typically, this is a directory under the `WEB_ROOT` directory. Web Application Manager creates the directory if it does not exist.

Optionally, in the **Description** box, type a description of the application.

6. Enter advanced web application options. Click **Advanced Web Application Options** and enter values in the **Advanced Web Application Options** dialog box:
 - a. In the **Deployable File Name** box, type a name for the web application WAR file, for example, **TcLoginService**.

Leave the **Automatically Build Deployable File** check box selected.

- b. Set the **Session Timeout** value **600**, as 600 minutes is the default session timeout set for the Identity Service `sessionLifetime` parameter.
- c. Leave the default values for remaining advanced options and click **OK** to return to the **Add Web Application** dialog box.

7. Enter software locations:
 - a. Clear the **Disk Locations for Install Images** list by selecting any default paths shown and clicking **Remove**.
 - b. Click **Add**.
 - c. In the **Add Disk Location** dialog box, browse to the path to the Security Services web application files (*TCSS_ROOT/TcSecurity/default*), and then click **OK**:
 - d. If you want to install an additional locale for Security Services, repeat step **Install Security Services web applications** to add the path to the locale-specific software: *TCSS_ROOT/TcSecurity/*
8. Click **Solutions**.
9. In the **Select Solutions** dialog box, select solutions to include in the web application:
 - a. Select **Teamcenter Security Services Login Service Web Application**.
 - b. If you are installing an additional locale for Security Services, select **Teamcenter Security Services Login Service Web Application Localization (language)**.
 - c. Optionally, select **Teamcenter Security Services Java API Documentation**. This solution provides a reference of APIs exposed by the Login Service and Identity Service.
 - d. Click **OK** to continue. The **Selected Solutions** box shows the solutions selected for installation.

Note:

The **Solution Type** box cannot be changed from its default value, **Web Tier**.

10. Click **OK** to begin building the web application.

When the web application creation is complete, click **OK** to close the **Progress** dialog box.

Build the Identity Service web application

To build the Security Services Identity Service web application, repeat the steps in *Build the Login Service web application*, with the following differences:

- Skip step **Install Security Services web applications** because ICD files are already loaded.
- For the **Name** and **Deployable File Name** values of the web application, enter a name for the Identity Service, for example, **TcIdentityService**.

- In the **Select Solutions** dialog box, select the **Teamcenter Security Services Identity Service Web Application**.

Deploy Security Services web applications

Locate the deployable files generated by the Web Application Manager for the Security Services Login Service and the Security Services Identity Service. These files are in the **deployment** directory under the staging location you specified for each application.

For example:

```
/webroot/staging1/deployment/TcLoginService.war
```

```
/webroot/staging2/deployment/TcIdentityService.war
```

Deploy the web applications on a supported application server. Deployment procedures for Teamcenter web applications on supported application servers are described in *Web Application Deployment*.

Note:

Make sure the Security Services web applications are installed and running before you launch TEM to install Teamcenter. TEM verifies the connection to Security Services and does not allow installation to proceed if the connection fails.

Deploying on an IPv6 network

If your network includes client hosts running on an IPv6 network, you must deploy Security Services web applications in an application server that supports an IPv6 URL as an external endpoint and uses IPv4 addresses to support all communication with the Teamcenter enterprise tier.

A typical environment for the Security Services web applications is a dual-stack machine that supports both IPv4 and IPv6 addresses in which the application server accepts HTTP requests from either IPv4 or IPv6.

Teamcenter server components that communicate within the same network are assumed to be on an IPv4 network and are not supported on IPv6. IPv6 is supported only with Teamcenter clients or integrations that use Teamcenter client communication system (TCCS) and Teamcenter components that communicate with clients on IPv6-enabled networks.

Moving to a new version of Security Services

To move to a new version of Security Services, perform the following steps.

1. Record your existing Security Services context parameter settings.²

2. Remove old Security Services WAR files from your web servers, undeploy Security Services components, and delete the old installation.
3. Install the latest version of Security Services, entering the context parameter settings you recorded in step 1.

2 You can record settings for the Security Services login service and identity service in the context parameter worksheets in Security Services Configuration.

Part II: Build the Teamcenter Environment



Prepare the machines that will host your Teamcenter test and production environments. This includes installing database infrastructure, license server, locale support, and software like Security Services that will support the Teamcenter and Active Workspace components.

Install Teamcenter and Active Workspace in a test environment, including the applications and components you want to use.

Installing a test environment allows to configure components and identify and resolve and potential issues before you commit your settings to a production environment.

The *Teamcenter Deployment Reference Architecture*, available from the Teamcenter **Downloads** area on Support Center, provides guidelines and examples for setting up test and development environments. It also provides sample configurations ready to deploy in Deployment Center as starter environments for testing.

9. Configure available units of measure

Administrators can configure the units of measure that are available across Teamcenter. This unit management system (UMS) based on classified units is first available in Teamcenter version 2406.

This procedure is not required, but if you want to include optional or custom units of measure in your Teamcenter environment, you can add them before you begin installation.

A list of nearly 1400 units of measure is provided in the Teamcenter installation kit. Out of the box, only a subset of the units are installed, depending on the applications installed. Installers and administrators can configure the units to add, and can add new units.

1. In the Teamcenter kit or in the `TC_ROOT\TD` folder, find and open `unit_definitions.csv`.

Application columns begin with column Q (**BASE**). Unit rows for which an application column has the value **1** will be considered by the `ums_import_unit_definitions` utility.

Note:

During initial installation, if an application is installed in the environment, unit rows for which the application column has the value **1** are imported to the database.

2. Edit the file to ensure that the unit definitions you want to administer have the value **1** for an application.

In the event that no class definition exists for a unit you want in your environment, create a new row.

3. Using the edited `unit_definitions.csv`, run the `ums_import_unit_definitions` utility.

10. Create user accounts and directories

Create the required user accounts and directories that Teamcenter requires for installation and maintenance.

Create required user accounts

On the local host where you install Teamcenter software, create the Teamcenter operating system user account.

All Teamcenter services run as this user account.

Ensure that all Teamcenter directories and files are owned and writable by this operating system user.

- **Operating system logon account**

Create an operating system logon account for Teamcenter. Teamcenter services run on the server as this user account.

Log on using this account when you install the Teamcenter environment and when you perform maintenance. Ensure that all Teamcenter directories and files are owned and writable by this operating system user.

The following are some services that may run under this user account:

Database Daemons	Schedule Manager
FSC	Dispatcher Module and Client
Linked Data Framework Web Services	AM Read Expression Service
Multi-Site IDSM and ODS daemons	Server Manager

- **Teamcenter administrative user account**

Teamcenter provides an administrative user account named **infodba**. Teamcenter Environment Manager automatically creates this account when you install Teamcenter on a server host. This account is used by the Teamcenter administrator to access the Teamcenter system administration functions to perform setup and maintenance tasks. You create a password for this account during Teamcenter installation.

Caution:

- The password must not be empty nor contain any whitespace characters such as space, tab, newline, carriage return, form feed, or vertical tab.

In addition, the password must not contain any of the following characters:

`! # @ $ % = & ' " ^ ; : . _ < > () { }`

- Never use the **infodba** user to create working data or initiate workflow processes. The **infodba** user is to be used *only* for specific installation tasks described in Teamcenter installation documentation. Using this account to create data or initiate workflow processes can cause unexpected and undesirable behaviors.

If you require a user with high-level privileges to create data, create a new user and grant database administrator privileges to that user.

- **Database user**

Create a database user to be the owner of Teamcenter-created tables and to perform tasks required by Teamcenter. You create this database user either by using the templates provided for Oracle databases, or by using Teamcenter installation tools to populate a database. Teamcenter installation tools refer to this user as **DB user**.

If Oracle and Teamcenter applications or files are shared using NFS/CIFS, you must standardize the user and group IDs of the Teamcenter and Oracle accounts to give them the same access privileges on all systems.

Each user and group is identified by an alphanumeric name and an ID number. The ID number is retained with the file information when a file is exported across a network. If the ID numbers do not match for a user or group, file access privileges may be unintentionally granted to the wrong user, or not granted at all, on an NFS/CIFS client.

Create required directories

Teamcenter installation root directory

Choose a parent directory to contain Teamcenter software. This parent directory must exist before installation. The Teamcenter root directory is created within this directory during installation. Requirements for this directory:

- If the directory is on a mapped drive or a UNC path (not on the local host) you must be logged on as an authenticated domain user to ensure the remote host recognizes you. Alternatively, you can set the permissions on the remote host to allow an anonymous user to access it. This is necessary to ensure Teamcenter services such as the FMS server cache (FSC) and Multi-Site Collaboration services can start.
- The directory must be on an NTFS partition, not a FAT partition. This is necessary to take advantage of the file security features of NTFS.

- If the directory is in an automounted NFS directory, but you must supply the automount link name for the Teamcenter application root directory. Do not supply the automounted directory (for example, */tmp/mnt/node-name*).
- If you install File Management System file caches and/or Multi-Site Collaboration services, the directory must be on a local disk.

**Teamcenter
volume
location**

Choose a parent directory to contain a Teamcenter volume or volumes.

This parent directory must exist before installation. The volume directory is created within this parent directory during installation.

Do *not* place the volume directory under the Teamcenter application root directory. Doing so can cause problems when upgrading to a new version of Teamcenter.

11. Create a Teamcenter environment using TEM

A **Teamcenter environment** contains components of Teamcenter Foundation, Active Workspace, and Microservice Framework.

The central component of a Teamcenter environment is the corporate server. With this and Active Workspace server extensions, you build the framework on which to install more core components of Teamcenter:

Server manager	Active Workspace Client	Visualization Server
Microservices	Indexing	Web tier
Active Workspace Gateway	Dispatcher	

You can further add applications and components from the extensive lists of features available in TEM:

- **Server Enhancements features**
- **Active Workspace Server Extensions features**
- **Active Workspace Client features**
- **Microservices features**

Before you begin creating a Teamcenter environment, make sure you download the **required software kit** for Teamcenter.

Launch TEM and choose software


1. Log on to the operating system with the Teamcenter user account you created for installing and maintaining the Teamcenter installation.
2. **Specify the path to the required Java Runtime Environment (JRE)** by setting the **JRE64_HOME** environment variable on your host.¹
3. Start Teamcenter Environment Manager (TEM):
 - a. Change to the root directory of the Teamcenter 2412 software kit.
 - b. Run the **tem.sh** script.

TEM starts and displays the **Installer Language** dialog box.

¹ Alternatively, you can **specify the JRE path when you launch TEM** from a command prompt using the **-jre JRE-path** argument.

- c. In the **Installer Language** dialog box, select a language and click **OK**.

Your language selection applies only to the TEM session, not the Teamcenter installation.

For information about any TEM panel, click the help button .

4. In the **Welcome to Teamcenter**, select **Teamcenter**.
5. Proceed to the **Install/Upgrade Options** panel. This panel contains the following options:

- **Install**

Installs a new Teamcenter configuration using a fully configurable installation process.

- **Quick Preconfigured Install**

Installs preconfigured corporate server and client configurations using a simplified installation process.

- **Upgrade**

Upgrades an existing Teamcenter configuration.

Click **Install** to begin creating the Teamcenter environment.

Note:

The **Install/Upgrade Options** panel also provides these installation options:

- **Create environment for upgrade testing**

TEM can create a copy of an existing Teamcenter environment for upgrade testing *only*. The copied environment *cannot* be used as a production database.

- **Create custom distribution**

To simplify installations of Teamcenter on multiple hosts, TEM can create a *silent distribution* or a *compact distribution*. Compact distribution is recommended only for Teamcenter client configurations, not for servers.

6. In the **Media Locations** panel, optionally specify locations of any Teamcenter patches you want to apply during your installation.

TEM applies updates in the order you specify. If updates contain different versions of the same software component, the update closest to the bottom of the list takes precedence. To change the order in which updates are applied, select an update in the list and click **Up** or **Down**.

Create a configuration and choose features

1. In the **Configuration** panel, type a unique ID and description for the new Teamcenter configuration.

The configuration ID identifies your Teamcenter configuration when you maintain, upgrade, uninstall, or add features to the configuration. Installation log files are also named based on the ID you enter.

2. In the **Solutions** panel, select the **Corporate Server** and **Active Workspace Server Extensions** solutions.
3. Proceed to the **Features** panel. This panel shows the features preselected by the **Corporate Server** solution:

Teamcenter Foundation
FMS Server Cache
NX Part Family Classification Integration

Also shown are features preselected by the **Active Workspace Server Extensions** solution:

Active Workspace	Reporting
Active Collaboration	Shape Search
Active Content Structure	Subscription
Audit	Workflow
Multisite Integration	TC XML Import and Export
Relationship Viewer	

4. Select any **additional features** you want to include in your configuration.

If you select additional features, TEM displays additional panels during installation that are not described in this procedure.

For help with any panel in TEM, click the help button .

You can add features to the corporate server later using TEM in maintenance mode. You can also install custom features by **installing a custom solution or third-party template**.

5. In the **Installation Directory** box, enter the path to a new directory where you want to install Teamcenter.

The **Installation Directory** value is the Teamcenter application root directory (*TC_ROOT*).

Do not set the **TC_ROOT** environment variable in the system environment. TEM sets this variable as required in Teamcenter configuration files. Setting this variable in the operating system can cause conflicts if you install multiple Teamcenter configurations.

The installation directory must meet the following requirements:

- The directory must *not* already exist on your system. (TEM creates the directory during installation.)
- The directory must be in a location excluded from real-time virus scanning.²
- The path to the installation directory must not exceed 64 characters.

Configure Teamcenter Foundation and the Teamcenter database

1. In the **Key Manager Configuration** panel, choose whether to install the Teamcenter *Key Manager*, an optional feature that enables you to manage, edit, and share encryption keys and policies for a distributed Teamcenter site.

To enable Key Manager, select the **Enable Key Manager** check box, and then enter the path to a key storage location on the local host in the **Satellite Location** box.

2. In the **File System Cache (FSC)** panel, type a unique identifier and port for the FMS server cache in the **FSC ID** and **Port** boxes.

A Teamcenter network must have at least one primary (master) FSC. If you want to designate the current FSC as an FSC primary, select the **Enable configuration master** check box. Otherwise, type the URL to the parent FSC in the **FSC Parent URL** box.

For advanced FSC configuration options, click **Advanced**.

3. In the **Foundation** panel, select how you want to create or designate the Teamcenter database and Teamcenter data directory (*TC_DATA*).

Database exists?	Database populated?	TC_DATA exists?	Select this option
No	N/A	No	Create and populate database, create new data directory No Teamcenter database or data directory exists and you want TEM to create both. This option is selected by default.
Yes	No	No	Populate database, create new data directory A database exists but is not populated with Teamcenter data. You want TEM to populate the database and create a new data directory.
Yes	Yes	No	Create new data directory using existing populated database

² Real-time virus scanning prevents Teamcenter from updating the persistent object manager (POM) schema during installation, causing installation errors.

Database exists?	Database populated?	TC_DATA exists?	Select this option
			A database exists and is populated. You want TEM to use this database and create a new data directory.
Yes	Yes	Yes	Use populated database and existing data directory A database exists and is populated, and a data directory exists. You want TEM to use both of these.

4. Enter the required values for your Teamcenter database according to your selection in the **Foundation** panel.

- **Create and populate database, create new data directory:**

- Proceed to the **Foundation Database** panel.
- Select the appropriate database server vendor (**Oracle** or **MS SQL Server**).
- Enter the required values for the database server, the database user, and the database administrator account.

- **Populate database, create new data directory:**

- Proceed to the **Foundation Database** panel.
- Select the appropriate database server vendor (**Oracle** or **MS SQL Server**).
- Enter the required values for the database server and the database user.

- **Create new data directory using existing populated database:**

- Proceed to the **Foundation Database** panel.
- Select the appropriate database server vendor (**Oracle** or **MS SQL Server**).
- Enter the required values for the database server and the database user.

- **Use populated database and existing data directory:**

No database information is required. Proceed to the **Data Directory** panel.

The directory you specify in the **Database Path** box must exist and you must have write permission to the directory.

Caution:

When you enter the password for the database system user, observe the following restrictions:

- The password must not be empty nor contain any whitespace characters such as space, tab, newline, carriage return, form feed, or vertical tab.
- In addition, the password must not contain any of the following characters:

! # @ \$ % = & ' " ^ : ; . _ < > () { }

5. If your database is Oracle, specify whether you want to enable TCPS support for your Oracle database:

Value	Description
Enable TCPS	Specifies whether your Oracle server is configured for secured communication using TCPS protocol. If TCPS is enabled, select the Enable TCPS check box and then type values for Wallet Location and TLS Version .
Wallet Location	Specifies the location of the wallet on the Teamcenter machine where Oracle wallets are kept.
TLS Version	Specifies the version of Transport Layer Security (TLS) configured on the Oracle server. This is equal to SSL_VERSION value specified on Oracle database machine.

6. In the **Data Directory** box, enter a location for the Teamcenter data directory.

The Teamcenter data directory is called the **TC_DATA** directory. TEM stores this location as the **TC_DATA** variable in Teamcenter configuration files. TEM creates shared data subdirectories and files in this location. Each data directory is associated with a single database user within a database instance.

TEM creates a security directory to store password files. In a distributed environment, you may place this directory on a network share, provided the location is secured. When you share a Teamcenter data directory (**TC_DATA**), all secondary servers have access to the same files. Make sure the configuration IDs are consistent across those machines.

As an alternative to shared Teamcenter data directories, you can create local data directories. Local data directories do not need to have matching configuration IDs, and password files do not need to be on a share, but you must ensure the separate data directories are kept synchronized.

Note:

Do *not* set **TC_DATA** as a system environment variable. Setting this variable in the operating system can cause conflicts if you install more than one configuration.

- Proceed to the **Volume Information** panel.

In the **Name** box, type a name for the Teamcenter volume you want TEM to create.

In the **Directory** box, type the absolute path to the directory in which to create the volume, or accept the default location.

Do not define the volume location under the Teamcenter application root directory (*TC_ROOT*). Doing so leads to complications when upgrading to a later version of Teamcenter.

- Proceed to the **Foundation Settings** panel.

Value	Description
Transient Volume Directories	<p>Specifies transient volume locations for Windows hosts, Linux hosts, or both.</p> <p>A <i>transient volume</i> is an operating system directory controlled by Teamcenter and used to store temporary data for transport of reports, PLM XML data, and other nonvolume data between the enterprise tier and client tier in a deployed four-tier architecture. All four-tier clients that access the corporate server you are installing use this transient volume.</p> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Caution:</p> <p>Do not define the path as a UNC path, for example, <code>\\server\shared-transient-folder</code>. You must use a direct path location.</p> <p>Some ZIP archive utilities do not accept UNC paths, resulting in failure of exports to Excel or Word.</p> </div>
Windows clients	Specifies the location for a transient volume for Windows client hosts.
Linux clients	Specifies the location for a transient volume for Linux client hosts.
Generate server cache	<p>Specifies you want to generate a shared server cache. If you select this option, TEM runs the <code>generate_client_meta_cache</code> utility at the end of the install, upgrade, or update action. This option reduces Teamcenter memory consumption by moving metadata to shared memory. Types, property descriptors, and constants are placed in a shared cache that is shared by all Teamcenter server instances.</p> <p>This option is selected by default in a Teamcenter server installation.</p>
Generate client cache	Specifies that you want to generate a cache of data that rich clients can download once at initial logon and then reuse on the client host. This option reduces server demand, reduces startup time, and improves overall performance. When this option is selected, TEM generates the client cache at the end of the install, upgrade, or update action. If you clear this option, but a client cache already exists, the old client cache is deleted.

Value	Description
	This option is selected by default in a Teamcenter server installation.
Production Environment	Specifies your new environment is to be used as a live environment where you will store your product data.
Test Environment	<p>Specifies your new environment is to be used for development, testing, or training. Selecting Test Environment enables the bulk loader tool to copy data from another environment (such as a production environment) into this test environment.</p> <p>If you designate this environment as a test environment, the designation cannot be changed.</p> <p>A test environment cannot participate in Multi-Site sharing with a production environment.</p>

For advanced Teamcenter Foundation options, click **Advanced**.

9. If you want to configure Teamcenter online help, click **Advanced** in the **Foundation Settings** panel and perform the following steps:
 - a. Click the **Online Help** tab.
 - b. Select the **Enable Online Help** check box.
 - c. In the **Documentation Server URL** box, type the Teamcenter online help URL.

Configure other features and begin installation

1. Proceed to the **Flex License Client** panel. Enter settings for the Siemens License Server.

The **Siemens License Server must be installed** before you begin Teamcenter installation.

2. Proceed to the **Teamcenter Administrative User** panel. Enter a password for the Teamcenter administrative user account.

The password must not be empty nor contain any whitespace characters such as space, tab, newline, carriage return, form feed, or vertical tab. In addition, the password must not contain any of the following characters:

! # @ \$ % = & ' " ^ : ; . _ < > () { }

3. Proceed to the **Password Security** panel. In the **Administrative Password Directory** box, enter the directory in which to place Teamcenter password files. TEM locks access to this directory to all users except the user performing Teamcenter installation.

4. In the **Operating System User** panel, type the password for the operating system account under which you install Teamcenter.
5. In the **AM Read Expression Settings** panel, in the **Sleep Time** box, specify the time in seconds for the Read Expression Manager service to wait until a new update task is performed. The default is **10** seconds.
6. In the **Indexing Engine User** panel, type the user name and password for the Solr administrator.

The Solr administrator's user name and password are defined when you **install the Indexing Engine**.

If the Indexing Engine is not installed yet, record the Solr administrator user name and password and make sure to use these credentials when you **install the Indexing Engine**. These credentials *must* match for Indexing Engine, the Indexer, Server Extensions, and the Active Content Structure Translator (if used).

7. In the **Active Workspace Server Extensions Settings** panel, type the Solr search engine URL. The format is:


`http://host:port/solr`

host is the machine designated to run Solr. This is the machine on which Indexing Engine is to be installed.

port is the port value used by Solr. The default is **8983**.

If your environment uses multiple Solr search engines for failover, select **Use additional search engine URLs**, and then type the URLs in the **Search Engine URL List**.

8. Proceed through any remaining panels, entering the required information for the features you selected.

For information about these panels, click the help button .

Note:

If your configuration includes the **Teamcenter Security Services** component, make sure **Security Services is installed** and running. TEM verifies the connection to Security Services and does not allow installation to proceed if the connection fails.

9. Proceed to the **Confirmation** panel. Verify the information you entered.

If you want to change any values, click **Back** to return to the panels you want to change. Otherwise, click **Start** to begin installing the Teamcenter corporate server.

If an error occurs during installation, follow the instructions in the error message displayed by TEM or see the available [troubleshooting solutions](#).

10. When installation is complete, close TEM.

12. Complete the Teamcenter server installation

Run the postinstallation tasks script

If you installed the corporate server without root privileges, a user with root privileges must run the root postinstallation tasks scripts. These scripts register daemons and perform other installation actions that require root privileges.

Run all scripts in the `TC_ROOT/install` directory that have names of the following form:

`root_post_tasksID.ksh`

Replace *ID* with the unique part of each script name.

Start database daemons

You can start Teamcenter database daemons manually by executing the following startup files.

Database daemon	Daemon startup script name
Action Manager Service	<code>rc.ugs.actionmgrd</code>
Subscription Manager Service	<code>rc.ugs.subscriptionmgrd</code>
Teamcenter Task Manager Service	<code>rc.ugs.task_monitor</code>
Tesselation Manager Service	<code>rc.ugs.tess_server</code>
Teamcenter Shared Metadata Cache Service	<code>rc.ugs.shared_metadata</code>
Teamcenter Revision Configuration Accelerator Service	<code>rc.ugs.revision_config_accelerator</code>
Teamcenter Read Expression Manager Service ¹	<code>rc.ugs.am_read_expression_manager</code>
Workflow Remote Inbox Service	<code>rc.ugs.schmgtwfd</code>

TEM places these startup files in the `TC_ROOT/bin` directory.

Install database triggers manually

The **TcFTSIndexer** process requires database triggers that enable database access for the Indexer to detect additions, modifications, and deletions to the database when performing run-time (synchronous) indexing.

¹ This service is installed by default and is not selectable in TEM

In most cases, TEM installs these indexing triggers automatically. However, if you do not provide the necessary values (logon values for the database user and the system user) to install them during your TEM session, TEM displays a **TODO** message about enabling database access to Teamcenter. If this happens, install the database triggers manually using the appropriate procedure for your database:

Install database triggers in Oracle

1. To grant the **create trigger** privilege to the Oracle user that owns the Teamcenter database, perform the following steps:

- a. Open a command prompt.

- b. Type:

```
sqlplus system/password
```

- c. Type:

```
grant Create trigger to Tc-Oracle-user identified by password;
```

- d. Type:

```
exit
```

2. Create the trigger:

- a. In the command prompt, type:

```
sqlplus Tc-Oracle-user/password
```

- b. Type:

```
@Teamcenter-installation-media\tc\install\sitecons\sitecons_install_triggers_oracle.sql
```

Install database triggers in Microsoft SQL Server

1. Open Microsoft SQL Server Management Studio.
2. Complete the **Connect to Server** dialog box:
 - a. In the **Server name** box, select the host on which Microsoft SQL Server is installed.
 - b. In the **Authentication** box, select **SQL Server Authentication**.
 - c. In the **Login** box, type the database administrative user name.

- d. In the **Password** box, type the database administrative user password.
- e. Click **Connect**.
3. In the **Object Explorer** panel of the **Microsoft SQL Server Management Studio** dialog box, expand the **Databases** tree and select the Teamcenter database name, for example, **tc**.
4. From the menu bar, choose **File**→**Open**→**File**.
5. In the **Open File** dialog box, navigate to the software kit for the Teamcenter release.

In the *Tc-software-path\tc\install\sitecons* directory, select **sitecons_install_triggers_mssql.sql**.

Microsoft SQL Server Management Studio opens the selected file.

6. Click **Query**→**Execute**.
- The query installs the database triggers.
7. Verify that the query completed with no errors.
8. Close the Microsoft SQL Server Management Studio.

Installing database triggers from the command line

If Microsoft SQL Server Management Studio is not installed on your host, you can install the database triggers from a command line. Type the following command in a Windows command prompt:

```
sqlcmd -H host -d database -U user -P password -i
path\sitecons_install_tables_and_triggers_mssql.sql
```

Replace:

- *host* with the database server host name.
- *database* with the Teamcenter database name.
- *user* with the database user name.
- *password* with the database user password.
- *path* with the path to the **sitecons_install_triggers_mssql.sql** file.

For example:

```
sqlcmd -H myhost -d TcDB -U dbUser -P dbPassword -i
C:\software\tc\install\sitecons\sitecons_install_triggers_mssql.sql
```

To verify the triggers installed successfully, log into Microsoft SQL Server and type the following commands in an SQL prompt:

```
1> Select name,is_disabled from sys.triggers2> Go
```

If the installation succeeds, Microsoft SQL Server displays a table similar to the following showing that the database triggers are not disabled:

name	is_disabled
fast_sync_add_trigger	0
fast_sync_delete_trigger	0

(2 rows affected)

13. Installing distributable components

Install the server manager

1. Launch Teamcenter Environment Manager (TEM).

If you are adding the server manager to an existing configuration, **launch TEM in maintenance mode**.

If you are creating a **new Teamcenter configuration**, launch TEM from the Teamcenter software kit.

2. In the **Features** panel, select **Server Enhancements**→**Server Manager**.

The **Server Manager** requires the following features. Select these if they are not yet included in your environment:

Base Install→**Teamcenter Foundation**
Server Enhancements→**File Management**→**FMS Server Cache**

3. Proceed to the **Multiplexing Proxy (MUX)** panel and specify values for the Teamcenter multiplexing proxy (*MUX*).

Value	Description
Port	Specifies the TCP/IP port on which the MUX listens for web tier requests. This is the Jetty server connector port.
TECS Admin Port	Specifies the port used by the Teamcenter Enterprise Communication System (TECS).

The MUX listens on a single port for incoming requests from the web tier, forwards those requests to an appropriate Teamcenter server using operating system named-pipe communication protocol, and then streams the response back to web tier. The MUX runs as an application within the Teamcenter Enterprise Communication System (TECS). The TECS container is based on the Teamcenter client communication system (TCCS) container used in the client tier.

4. Proceed to the **Communication Configuration** panel and enter the required values.

Value	Description
Pool ID	Type a name for the server pool.
JMX RMI Port	Type a port for the server pool.
Assignment Service Port	Type a port number for the Server Manager Assignment Service. The Server Manager Assignment Service is a service used by the Java EE web tier for business logic server assignment requests to the server manager. The

Value	Description
	assignment request is a POST HTTP request in which the input and output parameters are transmitted as XML payload.
Server Host	Type the logical host name of the server manager host. This value allows you to control which IP address is used when connecting to Teamcenter servers.
Startup Mode	Select one of the following: <ul style="list-style-type: none"> • Service/Daemon Specifies that you want to run the server manager as a daemon. This is the default mode. • Command Line Specifies you want to run the server manager manually from a command line.

5. Proceed to the **Server Manager Cluster Configuration** panel and enter remaining values as needed. For more information about fields in this panel, click the help button .
6. Proceed through remaining panels to the **Confirmation** panel. Click **Start** to begin installing the Teamcenter server with the server manager.
7. If you install the server manager in **Service/Daemon** startup mode, a user with root privileges must run the root post installation tasks script to register the server manager daemon.

In the `TC_ROOT/install` directory, locate and run the following script:

```
root_post_tasks_id.ksh
```

Alternatively, to use systemd to register the server manager daemon, follow the instructions in `TC_ROOT/pool_manager/conf/config-name/server.mgr.service_config-name_pool-id.readme`.

8. After you install the server manager, install the Teamcenter Management Console using the appropriate steps for Linux platforms.

When installation completes, exit TEM.

If you experience connection delays during server manager startup, see the [available troubleshooting solutions](#).

Java EE configuration files

You can install multiple server manager daemons on the same machine. Each server manager service has its own configuration directory:

`TC_ROOT/pool_manager/conf/config-name`

where *config-name* is the name of the server manager.

The server manager configuration directory contains configuration files, log files, and server manager scripts. These include the following.

File/Directory	Description
mgrstart	Script that launches the server manager in console mode.
mgrstop	Script that stops the server manager when started from a command line. If you run the server manager as a daemon, stop the service using the rc.tc.mgr_config script. You can also stop the server manager using the Teamcenter Management Console.
mgr.output	If you run the server manager as a daemon, this file contains all output from the server manager. This file is <i>not</i> used if you run the server manager from the command line.
logs	Directory that contains all server manager log files.

If you run the server manager as a daemon, it starts automatically.

Installing Teamcenter microservices

Microservices and the microservice framework

Various Teamcenter solutions and applications include microservices as part of their deployment. For example:

- Active Workspace requires TcGQL and File Repository microservices.

The File Repository provides centralized temporary storage for web client content accessed through the web client gateway. This storage gives other microservices an alternative to the File Management System (FMS).

- The Classification and Requirements Manager applications each have their own required microservices.
- The Product Configurator application can optionally employ its application-specific microservice to achieve better performance.

The microservice framework enables microservices to run seamlessly across diverse platforms.

To install the microservice framework and the microservices that run on it, you must configure and deploy a microservice node. If the server hardware has sufficient capacity, you can deploy a microservice node on the same hardware as a Teamcenter pool manager.

To increase capacity and provide failover, the microservice framework can include multiple nodes. For Linux deployments, a single node configuration is reused by the Docker swarm or the Kubernetes cluster. For Windows deployments, you can add and configure worker microservice nodes in addition to a master microservice node.

All microservice nodes in a Teamcenter environment must be hosted on servers of a single operating system type. The following table compares the characteristics of microservice nodes hosted on Linux and Windows.

	Linux 64-bit	Windows 64-bit
Prerequisite third-party software	<p>On the microservice node:</p> <ul style="list-style-type: none"> • Mirantis Container Runtime (formerly Docker Engine - Enterprise) • Kubernetes (only if deploying into a Kubernetes environment) <p>In a location accessible from the microservice node:</p> <ul style="list-style-type: none"> • A container registry 	None
Management of microservice framework and application microservices	Docker Swarm or Kubernetes starts, stops, restarts, and scales all Teamcenter microservices running as containers in a way that best utilizes resources.	On Windows, each microservice framework node includes a Teamcenter process manager to handle the microservices on that node.

Installation of microservice framework and Teamcenter microservices into a Kubernetes environment is *not* supported via Teamcenter Environment Manager (TEM).

Microservice framework constituents

The microservice framework has the following constituents:

Service Registry	Maintains a list of running microservice instances across all nodes.
Service Dispatcher	Receives microservice requests from a Teamcenter client, queries the service registry to find an instance of the requested microservice, and then routes the request to an instance of the microservice.
Microproxy	Forwards web tier application requests to the service dispatcher.

Teamcenter Process Manager (Windows hosts)	Starts the microservices and Active Workspace Gateway on the node (Windows hosts).
Microservice Parameter Store (MPS)	Manages logging levels for microservices.
File Repository	Manages files for web client and microservices.

Deploy MCR (Docker) on microservice node hosts

Mirantis Container Runtime (MCR, formerly Docker Engine - Enterprise) is a prerequisite for microservice nodes on Linux hosts. For certified versions of Linux and MCR (Docker) software, refer to the *Hardware and Software Certifications* knowledge base article on Support Center.

[Install and configure MCR](#)
[Working with Docker containers in Docker Swarm](#)
[Docker troubleshooting](#)

Install and configure MCR

1. Ensure the following ports are open to traffic to and from each microservice node host:

Port	Traffic type
TCP port 2377	Cluster management communications
TCP and UDP port 7946	Communication among nodes
UDP port 4789	Overlay network traffic

2. Install MCR.
3. Configure MCR to restart on system boot.
4. Configure IPv4 forwarding.

IP forwarding must be enabled for successful communication between Docker containers and the host machine. MCR installation alters the Linux iptables to allow forwarding of packets between the host and bridge networks when such forwarding is enabled. See MCR (Docker) documentation for information on how to partially restrict forwarding (based on IP addresses) for tighter security.

IP forwarding is controlled by Linux kernel parameters such as **net.ipv4.ip_forward** and **net.ipv4.conf.all.forwarding**, depending on the distribution and version of Linux. To check the current setting, you can use the command **sysctl net.ipv4.ip_forward** (sudo or root access is required). The value **0** disables forwarding; the value **1** enables forwarding.

- a. To temporarily enable IP forwarding for testing, run the following command:

```
sysctl -w net.ipv4.ip_forward=1
```

- b. To restart MCR, run the following command:

```
systemctl restart docker
```

- c. To preserve this setting across a machine reboot, edit the file `/etc/sysctl.conf` and set `net.ipv4.ip_forward` to 1.

Working with Docker containers in Docker Swarm

Use common Docker commands to control the Docker Swarm environment and monitor container status. Additionally, many open source tools, such as Portainer, are available to help manage a Docker Swarm.

Commonly used Docker commands

To do this	Run this command
List the Docker container stacks.	docker stack ls
List the services currently running.	docker service ls
Display the last five lines that were output by a particular service.	docker service logs -f --no-task-ids --tail 5 service_id <i>A service_id has the form stackname_servicename.</i>
List the nodes in a swarm.	docker node ls
List the images registered in the container registry on a node.	docker image ls

Managing containers with Portainer

Portainer is an open source product that provides a web-based UI to easily manage Docker swarms, services, and containers. You can use Portainer to do the following:

- View Docker container log files.
- View the Docker applications (stacks) that have been started.
- View the status and location of running services.
- Manage the nodes in a swarm and temporarily adjust scaling of services across the swarm.

Docker troubleshooting

What do I do when I receive the error `Cannot connect to the Docker daemon?`

1. To check whether `dockerd` is running, run

```
ps -eaf | grep dockerd
```

2. Perform remedial steps depending on the result from Step 1.

If dockerd is	Then do this
Not running	Restart Docker, and configure dockerd to restart on the next boot: <pre>sudo systemctl start docker sudo systemctl enable docker</pre>
Running	The user is likely not a member of the Docker Linux group. Add the user to the group. Ignore any error output from groupadd . <pre>sudo groupadd docker sudo usermod -aG docker \$USER</pre>

For more debugging information, refer to configuring the Docker daemon in the documentation at <https://docs.docker.com>.

What do I do if a Docker command does not behave as expected?

If the Docker command does not behave as expected, add the **-debug** option, run the command again, and review the log for issues.

Example:

You run the command **docker deploy -f mystack.yml mystack** and it does not behave as expected.

To enable logging, insert **-debug** after **docker**:

docker -debug deploy -f mystack.yml mystack.

How do I view logs from the Docker daemon?

To view logs from the Docker daemon, open a new shell and enter the following:

```
sudo journalctl -fu docker.service
```

This tails the log files and keeps outputting new log commands until the command prompt is closed or you enter **Ctrl-C**.

Where can I get help with more complicated environments?

For help with more complicated environments and networking when microservice nodes are on Linux hosts, see the Docker engine swarm mode documentation at <https://docs.docker.com/>.

Deploy a Docker container registry

For deployments of the microservice framework and microservices on Linux hosts, microservice container images are stored in a container registry. If you do not already have a container registry in your infrastructure, you can use the following procedure to deploy a Docker container registry.

For detailed documentation on Docker Registry, see <https://docs.docker.com/registry/>.

Prerequisites

- Mirantis Container Runtime (formerly Docker Engine - Enterprise, hereafter referred to as MCR) must be installed on both the machine that is used to initially fetch the Docker Registry container image and on the machine that will host the Docker Registry. For instructions on installing MRC, refer to [Deploy MCR \(Docker\) on microservice node hosts](#).
 - If the microservice framework is to be deployed on a Kubernetes cluster, Kubernetes must be installed on the Docker Registry machine in addition to MCR.
 - For a secure production environment, a PKI certificate and keys generated for the server hosting the Docker Registry must be available. It is a good practice to obtain certificates from a Certificate Authority.
1. Prepare to fetch the Docker Registry container image. On a machine with internet access and with MCR installed, extract the microservice framework Linux kit.

If the machine is not the intended Docker Registry server, its host operating system can be either Linux or Windows.

2. Copy the `/additional_applications/docker_registry.zip` file from the Teamcenter software kit to a local directory, and then unzip its contents.
3. In the directory that contains the unzipped file contents, run the appropriate script to fetch the tested version of the Docker Registry container image.

Linux	<code>getDockerRegistry.sh</code>
Windows	<code>getDockerRegistry.bat</code>

```

Command Shell
D:\>getDockerRegistry.bat
2.7.1: Pulling from library/registry
ddad3d7c1e96: Pull complete
6eda6749503f: Pull complete
363ab70c2143: Pull complete
5b94580856e6: Pull complete
12008541203a: Pull complete
Digest: sha256:bac2d7050dc4826516650267fe7dc6627e9e11ad653daca0641437abdf18df27
Status: Downloaded newer image for registry:2.7.1
docker.io/library/registry:2.7.1

D:\>dir docker*.tar
Volume in drive D is User1
Volume Serial Number is 4293-1C29

Directory of D:\

05/14/2021  08:56 AM           26,815,488  docker_registry_2.7.1.tar
             1 File(s)           26,815,488 bytes
             0 Dir(s)      712,721,211,392 bytes free

```

4. As needed, move the fetched `.tar` file to the machine that will run the Docker Registry service. Load the image.

```
docker image load -i tar_file_name
```

5. Deploy the registry for the planned microservice framework container manager type, either Docker Swarm or a Kubernetes cluster.
 - a. Create the following directories:

```
/scratch/docker_registry/data
```

```
/scratch/docker_registry/certs
```

```
/scratch/docker_registry/auth
```

If you use different paths, update the YML or YAML configuration files in the corresponding subdirectories of the microservice framework kit:

```
kit\additional_applications\docker_registry\deploy\swarm or kubernetes
```

- b. Add your certificate files to `/scratch/docker_registry/certs`.

See <https://docs.docker.com/registry/deploying/#run-an-externally-accessible-registry>

- c. Restrict access.

See <https://docs.docker.com/registry/deploying/#restricting-access>

- d. Deploy the registry to a new stack. This new stack is unrelated to Teamcenter, Active Workspace, and the microservice framework.

For this environment	Issue these commands
Docker Swarm	<code>docker stack deploy -c path/docker_registry.yml tcregistry</code>
Kubernetes cluster	<code>kubectl create namespace tcreg</code> <code>kubectl apply -f path/docker_registry.yaml -n tcregistry</code>

Caution:

Deploy to a unique cluster or stack separate from Teamcenter microservices. This protects the running registry if you delete the Teamcenter microservices Docker Swarm stack or Kubernetes cluster.

Validate functionality of Docker Registry

After you deploy the registry, check to see that it is running.

1. Run the following command to list the registry contents.

```
curl --cacert /scratch/docker_registry/certs/domain.crt https://vc16006:5000/v2/_catalog
```

The valid response shows an empty repository, as nothing has been pushed to it yet:

```
{"repositories":[""]}
```

Install microservices using TEM

Install microservices using TEM - Docker swarm

As an administrator, you can use the following procedure to create a microservice node for a Docker swarm deployment of microservices on a Linux host. This procedure cannot be used to install a microservice node for a Kubernetes cluster deployment of microservices. A Kubernetes deployment must be accomplished using Deployment Center.

Only one microservice node must be installed for a Docker swarm deployment. Additional servers can be joined to the swarm once the microservices stack is started on this node. For failover, additional nodes can be installed.

Before you install microservices:

- Review [Microservices and the microservice framework](#) for a comparison of the microservice framework requirements in different environments and a list of framework constituents.
- [Deploy a Docker container registry](#).
- Install a certified version of Docker on the host.

For certified versions of Linux and Docker software, see the Software Certifications Matrix ([Tc2412PlatformMatrix-date.xlsx](#)) in the [Support White Papers Certifications](#) page on Support Center.

Add the microservice feature

Add the microservice feature to the Teamcenter environment.

For this task	Perform these steps
Install a new Teamcenter environment	<ol style="list-style-type: none"> 1. Launch TEM (tem.sh) from the Teamcenter software kit. 2. Proceed to the Install/Upgrade Options panel and click Install. 3. Proceed to the Configuration panel, enter an ID and description for the Teamcenter configuration. 4. Proceed to the Features panel, and then install Teamcenter microservices.
Update an existing Teamcenter environment	<ol style="list-style-type: none"> 1. Stop all Teamcenter services except FSC services. 2. Launch TEM from its installed location (<i>TC_ROOT/install</i>). 3. In the Maintenance panel, select Updates Manager. 4. In the Apply Updates panel, enter the required paths: <ul style="list-style-type: none"> Update kit location Enter the path to the expanded Teamcenter software kit. Backup directory Enter a path in which to create backups of files replaced during the update. 5. Proceed to the Confirmation panel and click Start to add microservice features to TEM. When the update is complete, close TEM. 6. Launch TEM as specified in step 2. 7. In the Configuration Maintenance panel, select Perform maintenance on an existing configuration. 8. In the Old Configuration panel, select the configuration to update. 9. In the Feature Maintenance panel, select Add/Remove Features. 10. Proceed to the Features panel, and then install Teamcenter microservices.

Install Teamcenter microservices

1. In the **Features** panel in TEM, under **Microservices**, select **Microservice Framework** and the microservices you want to install.
2. Proceed to the **Microservice Framework** panel and specify values.

- a. Enter the **Container Registry URL** consisting of a host name or a fully qualified domain name and an optional port. Do not include a protocol in the URL. Additionally, enter the **Container Repository Name** where the microservice images will be stored. The repository name must already be defined in the container registry.
- b. Enter a **Keystore Password** to be used for generating the **.p12** files that contain keys for signing and validating authentication tokens. These tokens identify the logged on Teamcenter user.

Record and securely store the password for potential use in case you want to open and edit the keys.

- c. In **Dispatcher Port**, type the port for the service dispatcher.

On Linux hosts, the microservice framework service registry is handled internally. If only one node and service registry is configured in the environment, then no additional service registry URL value is needed in **.yml** files.

When multiple service registry services are set up for failover support, edit the **eureka.yml** and **service_dispatcher.yml** files to list additional service registry services. Modify microservice **.yml** files to list the additional Eureka service registry URL.

Example:

```
{
  "eureka1": {
    "image": "eureka_server-1.9.12_1.2.1",
    "environment": [
      "ARGS=-Deureka.serviceUrl.default=
        http://eureka1:8787/eureka/v2,
        http://eureka2:8787/eureka/v2,
        http://eureka3:8787/eureka/v2"
      "JETTY_PORT=8787"
    ]
  }
}
{
  "eureka2": {
    "image": "eureka_server-1.9.12_1.2.1",
    "environment": [
      "ARGS=-Deureka.serviceUrl.default=
        http://eureka1:8787/eureka/v2,
        http://eureka2:8787/eureka/v2,
        http://eureka3:8787/eureka/v2"
      "JETTY_PORT=8787"
    ]
  }
}
{
  "eureka3": {
    "image": "eureka_server-1.9.12_1.2.1",
    "environment": [
      "ARGS=-Deureka.serviceUrl.default=
```

```

        http://eureka1:8787/eureka/v2,
        http://eureka2:8787/eureka/v2,
        http://eureka3:8787/eureka/v2"
    "JETTY_PORT=8787"
    ]
}
}

```

3. Proceed to the **Microservices** panel. Review the instance quantity for each service that you want to be available in the Docker swarm. Increase the instance quantity as needed to handle system load.
4. Proceed to the **File Repository Microservice** panel and enter parameter values.

In **File Repository Storage Location**, enter the path to the shared location for persistent file storage.

The path must be accessible by all microservice nodes.

5. Proceed through the remaining panels and enter configuration values for your selected microservices.
6. Review the **Confirmation** panel and click **Start** to begin the installation.
The framework and microservices are installed, and signer and validator keys are generated.
7. When installation is complete, carefully examine any messages to determine what post-installation steps are necessary.
8. Add microservices support to the Teamcenter web tier, as applicable for **Java EE** or .NET web tier architecture.
9. **Start the Docker swarm and the microservice stack.**

Add microservice framework support to a Java EE web tier

If you used Teamcenter Environment Manager to install the microservice framework, use the following procedure to add microservice framework support to a Teamcenter Java EE architecture web tier WAR file.

This procedure assumes you installed the Web Application Manager and the *WEB_ROOT* directory as described in the appropriate Teamcenter installation guide for Windows or Linux.

If you use scripts generated by Deployment Center to install the microservice framework, you do not need to manually perform this procedure.

1. Install a microservice framework *master* node.

Locate the keystore ZIP file (**keys.zip**) in the *TC_ROOT/jwt_config_tool* directory of the *master* microservice node host.

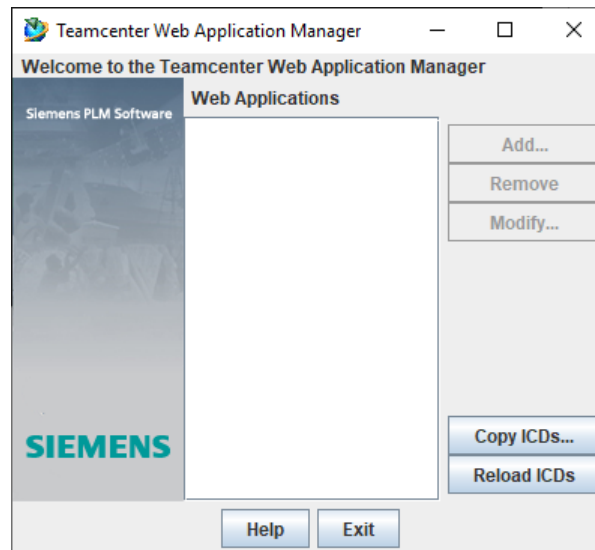
2. Copy the keystore ZIP file (**keys.zip**) to a location on your local machine and extract the ZIP file contents.

The keystore ZIP file contains a directory named **signer_config**.

Caution:

Safeguard the keystore files. A best practice is to remove them from any temporary locations once you complete this procedure.

3. Locate the following software kits:
 - Teamcenter software kit for your installed version of Teamcenter
 - Microservices Framework
4. Change to the *WEB_ROOT* directory and launch the Web Application Manager using the appropriate command:
 - Windows systems: **insweb.bat**
 - Linux systems: **insweb.sh**



5. Copy ICD files from the software kits. This populates the list of solutions available to install.
 - a. Click **Copy ICDs**.

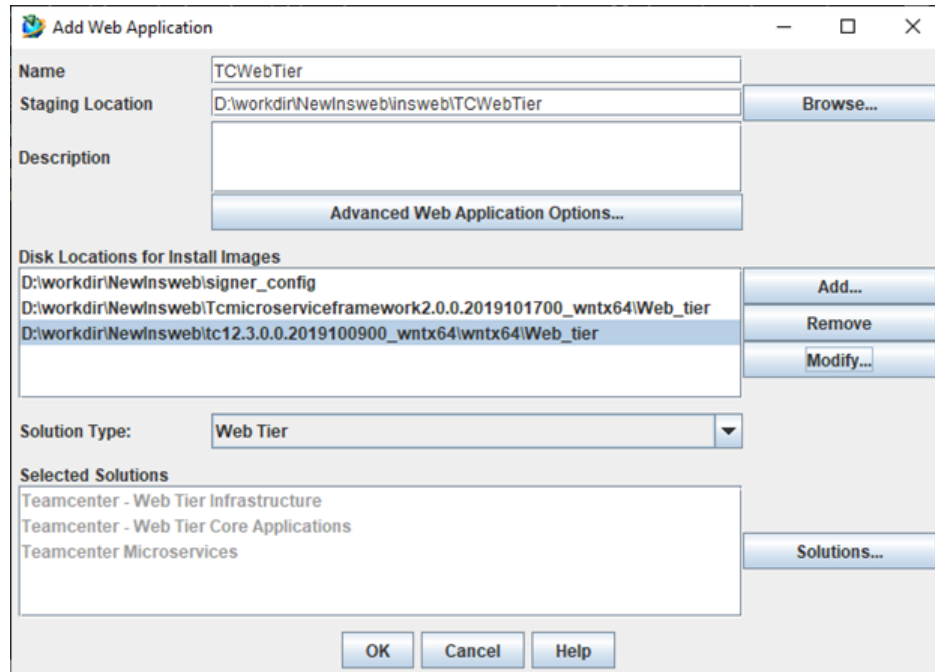
- b. In the **Copy ICD Files** dialog box, click **Browse** and browse to the following location:

Teamcenter-kit\Web_tier\icd

- c. Click **OK** to copy ICD files from the kit.
- d. Repeat steps a through c, specifying the path to the Microservices Framework ICD files:

Microservices-Framework-kit\Web_tier\icd

6. Click **Add** to begin creating a new web application.
7. In the **Add Web Application** dialog box, create the web application:
 - a. Type a **Name** and **Staging Location** for the web application.
 - b. Enter software locations:
 - A. Click **Add**.
 - B. In the **Add Disk Location** dialog box, enter software locations:
 - i. Click **Browse**, browse to the **signer_config** directory from the keystore ZIP file you extracted in step 2, and then click **Apply**.
 - ii. Click **Browse**, browse to the location of the Microservice Framework kit, and then click **Apply**.
 - iii. Click **Browse**, browse to the location of the Teamcenter software kit, and then click **OK**.
 - c. Select solutions:
 - A. Click **Solutions**.
 - B. In the **Select Solutions** dialog box, select the following web tier solutions:
 - **Teamcenter - Web Tier Infrastructure**
 - **Teamcenter - Web Tier Core Applications**
 - **Teamcenter Microservices**
8. Verify your selections, and then click **OK** to continue creating the web application.



9. In the **Modify Required Context Parameters** dialog box, ensure the following context parameters have correct values:

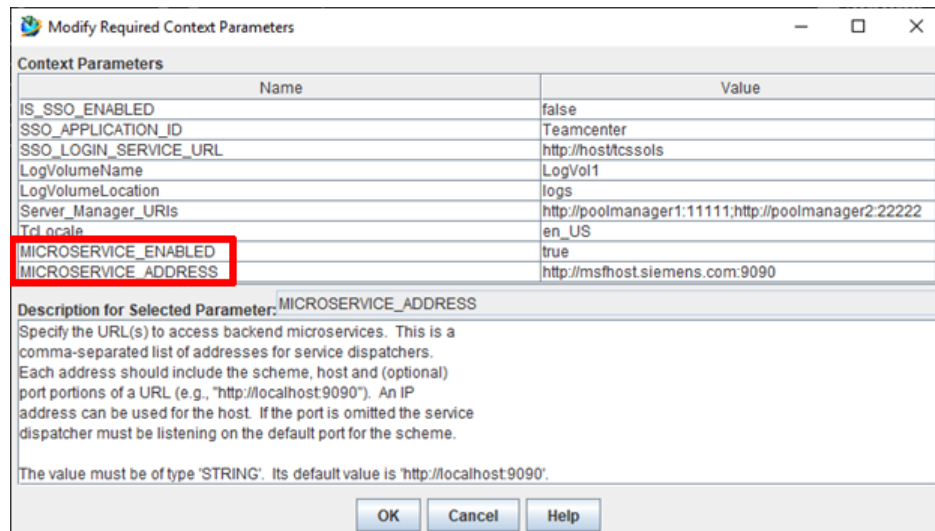
MICROSERVICE_ENABLED

Set to **true**.

MICROSERVICE_ADDRESS

Specifies a comma-separated list of service dispatcher URLs of the form:

`http://host:port`



- Click **OK** to begin building the WAR file.

When the web application generation is complete, close the Web Application Manager.

- Locate the WAR file (**tc.war**) in the **deployment** directory under the staging location you specified.
- Deploy the web application on a supported application server, as described in *Web Application Deployment* in the Teamcenter help.

Start microservices in Docker Swarm

When your microservice framework is deployed for Docker Swarm, use the following procedure to start Docker and then start microservices.

Start Docker

To start Docker on a microservice framework node, run the following command:

```
docker swarm init
```

The output of the command is similar to the following:

```
Swarm initialized: current node (lccilqci5tpvy6xmsjlu8gap3) is now a manager.
```

To add a worker to this swarm, run the following command:

```
docker swarm join --token SWMTKN-1-26h1be2gk2kozzecvgkw93smho5ueb7azn8uw1j2079isc8b25-dfc8r1f6qhh50ev250tb4st9r 192.168.0.8:237
```

Tip:

If this is the master node and you intend to later join other servers to this swarm as workers, save the output command string for later use.

Once you have started Docker on a node, you can **join the node to a running swarm**.

Deploy the microservice stack

During the installation of microservice nodes, one node must be configured. Microservice **.yml** files are copied to this node. These files define the microservice container parameters and are used to deploy the microservice containers. Once the stack of containers is deployed on this node, Docker manages the stack across the swarm, automatically deploying containers as needed on other servers that join the swarm.

- Change to the Docker *installation-path*/**container** directory.
- Run the following commands to deploy a stack for the microservice framework service:

```
docker stack deploy -c tc_eureka.yml myStackName
docker stack deploy -c service_dispatcher.yml myStackName
```

- Using the same command pattern and the same stack name, deploy all other **.yml** files in the directory.

Join a server to a Docker Swarm

Once a microservice node has started a Docker Swarm, you can join additional servers to the swarm as either *workers* or *managers*. Any number of servers can be added as workers. If the swarm includes multiple manager nodes, the manager nodes vote to determine which node is the controlling node. To ensure a decisive vote, the swarm must have an odd number of manager nodes.

- Start Docker** on the server.
- Use the appropriate procedure to join the server to the swarm as a worker or as a manager.

For this join mode	Do this
<i>Worker</i>	<p>Run the Docker command that you saved from the output when the swarm was started.</p> <pre>docker swarm join --token SWMTKN-1-26h1be2gk2kozzecvgkw93smho5ueb7azn8uw1j2079isc8b25-dfc8r1f6qhh50ev250 tb4st9r 192.168.0.8:237</pre> <p>If a saved join token is not available, on the original node run the following command to request a token:</p> <pre>docker swarm join-token</pre>
<i>Manager</i>	<ol style="list-style-type: none"> Ensure that in Teamcenter Web Application Manager (insweb) you configure the Teamcenter WAR file to include the node host's URL in the Context Parameters value list for MICROSERVICE_ADDRESS. On the original node, run the following command to request a manager token: <pre>\$ docker swarm join-token manager</pre> <p>The output of the command is similar to the following:</p> <pre>To add a manager to this swarm, run the following command:</pre> <pre>docker swarm join --token SWMTKN-1-26h1be2gk2kozzecvgkw93smho5ueb7azn8uw1j2079isc8b25-ct7cb2rwewvmff mi69c7gt1zn 192.168.0.8:2377</pre>

For this join mode	Do this
	<p>c. Copy the command output and paste it to a command line on the machine you want to join to the swarm.</p> <pre data-bbox="464 415 1528 495">docker swarm join --token SWMTKN-1-26h1be2gk2kozzecvgkw93smho5ueb7azn8uw1j2079isc8b25-ct7cb2rwewvmff mi69c7gt1zn 192.168.0.8:2377</pre> <p>The output of the command is similar to the following:</p> <pre data-bbox="464 615 997 638">This node joined a swarm as a manager</pre>

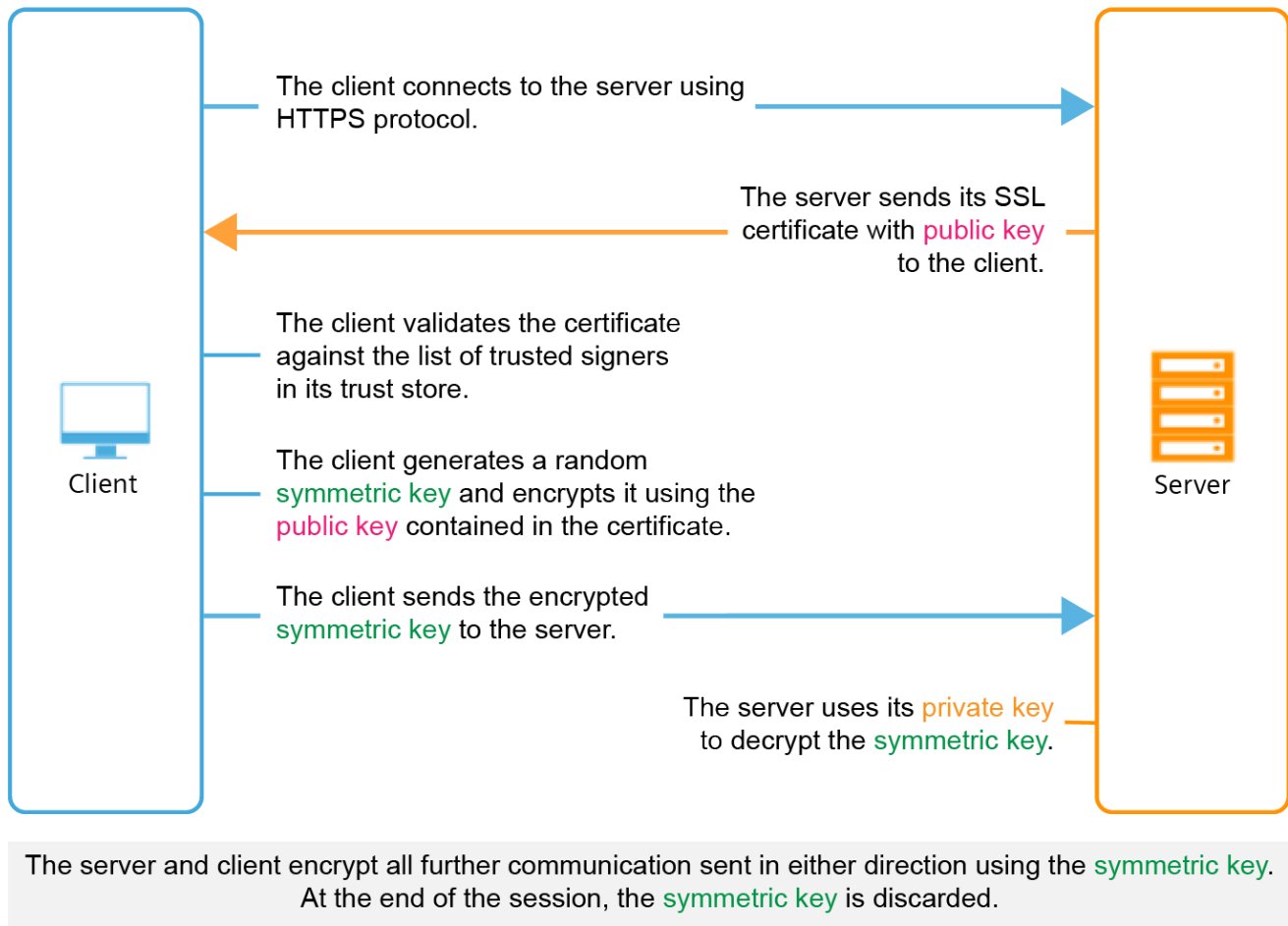
Securing microservices

Encrypting microservices traffic for Docker swarm

An administrator can configure the microservice framework to encrypt data traffic based on an SSL certificate.

Note:

For a Kubernetes container manager, encryption can be configured for the ingress controller and service mesh. Refer to the documentation for the specific ingress controller or service mesh. Example service mesh implementations are Istio and Linkerd.



Configuring the microservice framework and microservices for encrypted communication requires the following:

- Obtain an SSL certificate and keys for the server that will host the service dispatcher.

A server certificate signed by a certificate authority (CA) can be purchased from a CA, and is recommended. Alternatively, cryptographic tools such as OpenSSL can be used to create a self-signed certificate and its keys. In the case of a self-signed certificate, the certificate issuer must be added to the client machine's trust store.

- When configuring a microservice node, for the **Service Dispatcher Setting**, choose the **HTTPS** protocol and complete the configuration parameters in the **HTTPS Config** component.
- When configuring the web client gateway, if you choose to override the default service dispatcher URL, ensure that you enter the HTTPS protocol for the **Service Dispatcher URL**.
- When deploying the container registry, for example, Docker Registry, **ensure that the container registry uses the HTTPS encryption protocol**.

For these microservices	Do this
	<pre data-bbox="495 262 1234 514"> - cert_file_name.pem secrets: validator_keystore.pem: file: ./secrets/validator_keystore.pem cert_file_name.pem: file: ./secrets/cert_file_name.pem </pre> <p data-bbox="456 604 1409 638">For additional information about this variable, see NodeJS documentation.</p> <p data-bbox="391 680 1195 747">3. To update a running container image, deploy the updated ChangeMeServiceName microservice files.</p>
<p data-bbox="147 766 240 800">ep-app</p> <p data-bbox="147 905 261 938">FileRepo</p> <p data-bbox="147 976 245 1010">mfe-vis</p> <p data-bbox="147 1047 326 1081">odata_service</p> <p data-bbox="147 1119 321 1186">req-compare-service</p> <p data-bbox="147 1312 358 1379">(Source code language: Java)</p>	<p data-bbox="391 766 1219 800">1. Ensure that the following arguments are passed to the JVM:</p> <pre data-bbox="526 842 1414 953"> -Djavax.net.ssl.trustStorePassword=trust_store_password -Djavax.net.ssl.trustStoreType=trust_store_type </pre> <div data-bbox="542 974 1455 1104" style="border: 1px solid black; padding: 5px;"> <p data-bbox="561 995 634 1024">Note:</p> <p data-bbox="561 1050 1179 1083">Enter the appropriate type, one of jks or pkcs12.</p> </div> <pre data-bbox="526 1146 1287 1180"> -Djavax.net.ssl.trustStore=path_to_truststore_file </pre> <div data-bbox="477 1201 1455 1833" style="border: 1px solid black; padding: 5px;"> <p data-bbox="496 1222 613 1255">Example:</p> <pre data-bbox="496 1276 1373 1833"> version: "3.3" services: filerepo: hostname: filerepo image: vcl6005:5000/teamcenter/file-repo:6.3.0 user: 0:0 deploy: mode: replicated replicas: 1 volumes: - /scratch/msf/filerepo:/fms/fsc/volume ##logging: ## driver: fluentd ## options: ## fluentd-address: 0.0.0.0:24223 ## fluentd-async-connect: 'true' </pre> </div>

For these microservices	Do this						
	<pre data-bbox="493 264 1435 1346"> #@# tag: 'javamd.{{.Name}}.{{.ID}}' environment: - ARGS=-Deureka.serviceUrl.default=http:// eureka:8080/eureka/v2/ -Dsecrets_path=../../run/secrets/ -DdispatcherUrls=https:// vcl6005.net.plm.eds.com:9090/ -Djavax.net.ssl.trustStorePassword=private -Djavax.net.ssl.trustStore=/run/secrets/trust_store_file_name.p12 -Djavax.net.ssl.trustStoreType=pkcs12 secrets: - tc_micro_security.properties - validator_keystore.p12 - signer_tc_micro_security.properties - signer_keystore.p12 - trust_store_file_name.p12 depends_on: - eureka secrets: tc_micro_security.properties: file: ./secrets/tc_micro_security.properties validator_keystore.p12: file: ./secrets/validator_keystore.p12 signer_tc_micro_security.properties: file: ./secrets/ signer_tc_micro_security.properties signer_keystore.p12: file: ./secrets/signer_keystore.p12 trust_store_file_name.p12: file: ./secrets/trust_store_file_name.p12 </pre> <p data-bbox="391 1413 1284 1478">2. To update a running container image, deploy the updated ChangeMeServiceName microservice configuration (YAML) file.</p>						
<p data-bbox="147 1497 334 1581">Google Online Office Online</p>	<p data-bbox="391 1497 1403 1562">1. Copy your self-signed certificate in PEM format to the appropriate location depending on the host operating system.</p> <table border="1" data-bbox="456 1566 1230 1715"> <thead> <tr> <th data-bbox="461 1572 816 1612">For this operating system</th> <th data-bbox="816 1572 1226 1612">Use this location</th> </tr> </thead> <tbody> <tr> <td data-bbox="461 1619 816 1659">Red Hat</td> <td data-bbox="816 1619 1226 1659">/etc/pki/ca-trust/source/anchors</td> </tr> <tr> <td data-bbox="461 1665 816 1705">Suse</td> <td data-bbox="816 1665 1226 1705">/usr/share/pki/trust/anchors/</td> </tr> </tbody> </table> <p data-bbox="391 1755 1105 1789">2. Install the certificate on the host operating system.</p>	For this operating system	Use this location	Red Hat	/etc/pki/ca-trust/source/anchors	Suse	/usr/share/pki/trust/anchors/
For this operating system	Use this location						
Red Hat	/etc/pki/ca-trust/source/anchors						
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For these microservices	Do this						
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For this operating system	Run this command						
Red Hat	update-ca-trust						
Suse	sudo update-ca-certificates						
Command Prediction	<p>1. Copy your self-signed certificate in PEM format to the appropriate location depending on the host operating system.</p> <table border="1"> <thead> <tr> <th>For this operating system</th> <th>Use this location</th> </tr> </thead> <tbody> <tr> <td>Red Hat</td> <td>/etc/pki/ca-trust/source/anchors</td> </tr> <tr> <td>Suse</td> <td>/usr/share/pki/trust/anchors/</td> </tr> </tbody> </table>	For this operating system	Use this location	Red Hat	/etc/pki/ca-trust/source/anchors	Suse	/usr/share/pki/trust/anchors/
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Red Hat	update-ca-trust						
Suse	sudo update-ca-certificates						
reqexportservice							
reqimportservice							
Teamcenter Share	<p>3. To verify that the certificate is installed, run the command trust list and check that your certificate is in the list.</p> <pre>pkcs11:id=%88b7d33a352d2d6164a8ac0defb26fa2f5bb71cd;type=cert type: certificate label: vcl6005 trust: anchor category: other-entry</pre>						
(Source code language: C#)	<p>4. Run the trust utility to generate a ca bundle file.</p> <pre>sudo trust extract --filter=certificates --format=pem-bundle /location/to/tcroot/microservices/ container/secrets/tls-ca-bundle.pem</pre>						

For these microservices	Do this
	<p>5. Edit each microservice configuration file (YAML) to include a config object for the updated CA certs file. Replace occurrences of ChangeMeServiceName with the microservice name.</p> <pre data-bbox="457 413 1328 699"> config: - source: tls-ca-bundle.pem target: /etc/pki/ca-trust/extracted/pem/tls-ca-bundle.pem mode: 0755 configs: tls-ca-bundle.pem: file: /etc/pki/ca-trust/extracted/pem/tls-ca-bundle.pem name: ChangeMeServiceName-tls-ca-bundle.pem </pre> <p>6. To update a running container image, deploy the updated ChangeMeServiceName microservice files.</p>

High availability for microservices

In a distributed Teamcenter production environment, ensure high availability by configuring redundant microservice node servers and service instances. For detailed deployment examples and sample configurations, see *Teamcenter Deployment Reference Architecture*, available from the Teamcenter documentation and also from the [Support White Papers Teamcenter Deployment Reference Architecture](#) page on Support Center.

Capacity

With the many variables affecting a Teamcenter environment, no simple formula exists that can prescribe the precise combination of microservice nodes and microservice instances. As with all server-side deployments, monitor the consumption of CPU and memory on each microservice node. If you observe resource contention, you can increase resources for microservice execution by deploying additional microservice nodes and services running on additional hardware.

Failover

Windows

Achieving failover capability on Windows requires that a service registry, a service dispatcher, and instances of all microservices must each be running on at least two nodes. By default, an instance of the service registry and service dispatcher run on the master node; additional instances can be running on any worker nodes. When installing microservice nodes through TEM, be sure to list all instances of the service registry and the service dispatcher.

Docker Swarm

Achieving failover capability with Docker Swarm on Linux requires that an odd number of servers be joined to the swarm as managers, typically three or five. This helps the Docker swarm effectively manage the swarm by majority vote. Any number of servers can be joined to the swarm as workers.

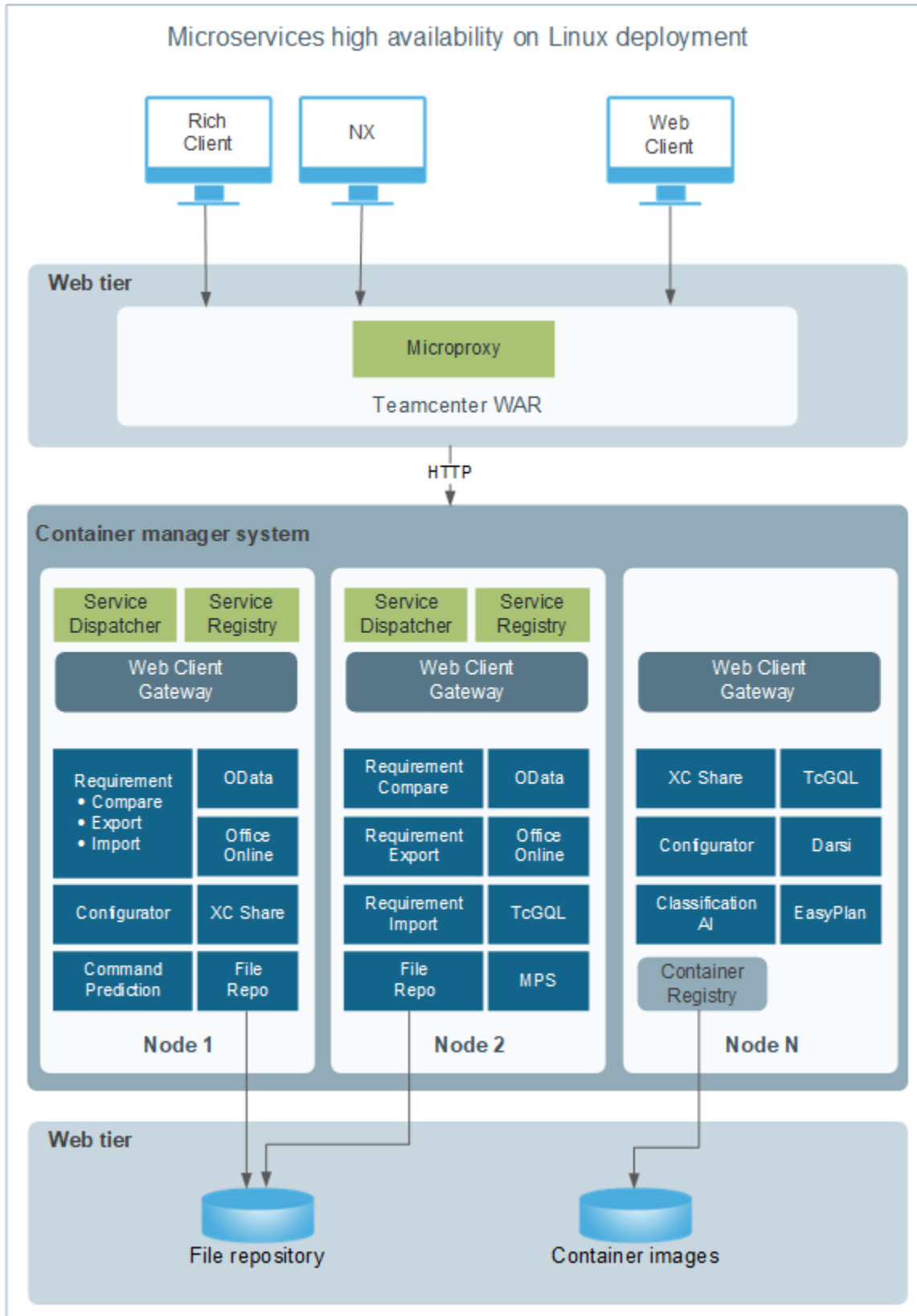
Kubernetes

Control Plane	Follow the vendor documentation. If using a cloud provider, the provider typically provides a Control Plane with failover.
Microservice nodes	<p>To avoid a single point of failure, in on-site deployments implement at least two microservice nodes. Ensure that these nodes are allocated on different physical hardware. Allocate at least two replicas of every component to avoid a single point of failure. For nodes in cloud deployments, to avoid location-specific outages, ensure that the nodes are spread across different failure zones (such as AWS Availability Zones).</p> <p>The exception to replicating components is the Service Registry. A single Service Registry is sufficient. This is because in the event that the Service Registry (Eureka) container goes down, the Eureka Client Cache provides needed information during the brief period of time that passes while the container manager brings back up the container.</p>

If possible, test for node failure conditions and validate that client requests are handled using service load balancing. Ensure desired scale once the nodes are recovered.

For backup options, consult the vendor documentation.

Example microservice deployment topologies for high availability



In a high availability configuration, where there is more than one File Repository microservice deployed, with the File Repository storage shared between the multiple instances of File Repository, the Active Workspace publish operation needs to be performed only once, from one of the nodes (preferably the primary node). This updates the shared storage of the File Repository microservice, so the publish does not need to be repeated from another node. Any new publish will overwrite the previous publish in the shared storage. Additionally, the publish should always be done from the same node (for example, the primary node) as used for the previous publish. It is not recommended to publish from a different node in a subsequent publish, as this may cause errors.

Install microservices

The **microservice framework** must be installed before you begin these steps. You can add microservices to an existing microservice node or install the microservices and Microservice Framework at the same time.

1. Launch TEM in maintenance mode and select the configuration that contains the microservice node.
2. In the **Features** panel, find the **Microservices** feature group and select the following microservices:
 - **File Repository Service**
 - **Teamcenter GraphQL Service**
 - **Declarative Artifact Service** (optional)
3. Configure the microservices with the required values.

Table 3-4. File Repository Service

Value	Description
File Repository Storage Location	Type a location for the file repository to be used by the web client gateway. The path must exist on the machine that hosts the microservice node. For example: <code>c:\tc\file_repository</code> The file repository stores web client content.
User ID	(Linux only) Type the user ID of the user installing the File Repository Microservice.
Group ID	(Linux only) Type the Group ID of the user installing the File Repository Microservice.

Table 3-5. Teamcenter GraphQL Service

Value	Description
Teamcenter Web Tier URL	In TEM, type the path to the deployed Teamcenter web tier, for example:

Value	Description
	<code>http://host:port/tc</code>

Note:

On Linux systems, microservices Worker Nodes must contain the same installed microservices as the Master Node.

- After you complete the microservices installation, start the microservices using the appropriate method for your operating system.

Install Active Workspace Gateway

Active Workspace Gateway requires the keystore ZIP file (**keys.zip**) from the microservice master node. Before you install Active Workspace Gateway, copy the **keys.zip** file from the **jwt_config_tool** directory under **TC_ROOT** on the microservice master node host to a directory on the Active Workspace Gateway host.

You can install Active Workspace Gateway in a new or an existing Teamcenter environment.

Note:

Install Active Workspace Gateway using the same tool with which you **install Active Workspace microservices**. For example, if you install microservices using Deployment Center, install Gateway using Deployment Center. Or, use TEM for both installations.

When entering URLs, ensure you use URLs with fully qualified domain names or IP addresses.

- If you are installing Active Workspace Gateway in a *new* configuration (on a machine with *no* existing Teamcenter environment), skip to step **2**.

If you are adding Active Workspace Gateway to an *existing* configuration:

- Add Active Workspace and microservices** to the Teamcenter host.
- Launch the installed TEM in maintenance mode.
- Skip to step **6**.

- Make sure you have access to the Teamcenter 2412 software kit.
- Launch TEM from the Teamcenter software kit.

On Windows hosts, right click the **tem.bat** program icon and choose **Run as administrator**.

- Proceed to the **Install/Upgrade Options** panel and then click **Install**.

5. Proceed to the **Configuration** panel. Enter an **ID** and a **Description** for the configuration.
6. In the **Features** panel, under **Base Install>Active Workspace>Client**, select **Active Workspace Gateway**.

If you are installing a new configuration, enter an installation location in the **Installation Directory** box.

7. In the **Gateway Settings I** panel, enter the required values:

Value	Description
Teamcenter Web Tier URL	Enter the URL for the Teamcenter web application, in the following form: http://host:port/tc
Visualization Assigner URL	Enter the URL to the Visualization Server Assigner, in the following form: http://host:port
Easy Plan URL	Enter the URL to the Easy Plan application, if installed. The URL should be of the following form: http://host:port/application-name
NGP URL	Enter the URL to the Next Generation Planning (NGP) application, if installed. The URL should be of the following form: http://host:port/application-name
Service Dispatcher URLs	Enter the URL to the service dispatcher, based on the service dispatcher <i>host</i> and <i>port</i> you used when you installed the microservice node: http://host:port The default <i>port</i> is 9090 . If you installed multiple nodes, you may enter multiple URLs as a comma-separated list. Use fully-qualified domain names or IP addresses in URLs.
Container Registry URL	Specifies the registry URL to store Docker images. The value should be in the form of a host name, FQDN, or IP:port. Do not include protocol, such as http:// or https:// . For example: registry.example.com This value should reference a live container registry. TEM attempts to connect to the registry. If the connection attempt fails, TEM does not allow you to continue.

Value	Description
Container Repository Name	Specifies the name of the container repository. The default value is teamcenter . This value must not contain spaces. The repository name must already exist in the container registry.
Gateway Service Port	Enter the port used by the Active Workspace Gateway. The default value is 3000 . The URL to the Active Workspace client interface is based on this port.
Under FMS Settings , enter the following settings for accessing FMS volumes:	
Use as Bootstrap URLs	The Active Workspace client uses FMS to download and upload files. You define the FSC servers that are used by selecting either Use as Bootstrap URLs or Use Assigned FSC URLs . To use bootstrap URLs, select this option and fill in the Bootstrap URLs and Bootstrap Client IP boxes. On Linux hosts, if you select Use as Bootstrap URLs , you need to ensure the client map is configured correctly.
Bootstrap URLs	Enter a comma-separated list of URLs to one or more existing FMS server caches (FSCs). URLs must be of the form: http://host:port By default, the IP address from the HTTP connection of the requestor is used unless a Bootstrap Client IP value is provided. (The client/requestor is the host on which Active Workspace Gateway is deployed.)
Bootstrap Client IP	Enter the FMS bootstrap client IP address to be used for the assignment. On Linux hosts, enter the internal IP address of the Active Workspace Gateway machine.
Use Assigned FSC URLs	Specifies whether you want to assign FSC servers. Select this only if you want explicit control of the FSCs used. To use assigned FSCs, select this option and fill in the Assigned FSC URLs box.
Assigned FSC URLs	Enter a comma-separated list of one or more assigned FSC URL values. The URL values entered are directly used for file operations. This allows you to declare the FSC servers that should be used.

For information about other values in the **Gateway Settings** panel, click the help button .

- In the **Gateway Settings II** panel, enter the required values:

Value	Description
Enable Teamcenter Share Collaboration	Select this check box to enable Teamcenter Share Collaboration.
Teamcenter Share	Values for configuring the Teamcenter Share Collaboration integration to Teamcenter.
Teamcenter Share URL	Specifies the URL to the Teamcenter Share site. The default value is https://share.sws.siemens.com .
Client ID	Specifies the SAMAuth client ID you obtained through SAM URL.
Client Secret ID	Specifies the client secret ID you obtained through SAM URL.

9. In the **Gateway Security Settings** panel, enter the required values:

Value	Description
Keystore Zip File	Enter the location of the keystore zip file (keys.zip) generated when you installed the microservice master node. The keystore file is generated in the jwt_config_tool directory under TC_ROOT on the microservice node host. For security, copy the keys.zip file to a directory on the Active Workspace Gateway host and specify that location here.
Under Enable TcSS Support , enter values for configuring Security Services.	
Enable TcSS Support	Select this check box if you want to enable Security Services support in Active Workspace.
TcSS Application ID	Type the Security Services application ID.
TcSS Login URL	Type the logon URL for the Security Services application. For details about configuring Security Services, see <i>Security Services Configuration</i> . When you configure Active Workspace for Security Services, be sure to only install the language packs for the Security Services that Active Workspace supports. If Active Workspace is deployed on a different URL, you must configure Security Services with multiple application IDs.
Under Security Key Settings , enter security key values for Teamcenter.	
Security Certificate	Enter the path to the security certificate. The file must be in .pem format.
Security Key	Enter the path to the security key file. The file must be in .pem format and must be without a password.

10. In the **Confirmation** panel, click **Start** to begin the installation.

11. When the installation is complete, close TEM.
12. Verify the FMS server cache (FSC) service is running.
13. On Linux hosts, start the Docker swarm, microservices node, and the Gateway service.

Install the Active Workspace client

Before you install the Active Workspace client using TEM, you must complete the following:

- *Install microservices*
- *Install Active Workspace Gateway*



Install the Active Workspace client configuration using the Teamcenter 2412 software kit.

Install the Active Workspace client

1. Launch TEM from the Teamcenter 2412 software kit.
2. Proceed to the **Install/Upgrade Options** panel and then click **Install**.
3. Proceed to the **Configuration** panel. Enter an **ID** and a **Description** for the configuration.
4. In the **Features** panel, under **Base Install**→**Active Workspace**→**Client**, select **Active Workspace Client**.

Select any **additional client features** you want to include in your Active Workspace environment. (See [Active Workspace Client features](#).)

Note:

- Some features add additional panels to the installation process that are not described in this procedure. For information about any TEM panel, click the help button .
- To search for a feature by name, type the name or a partial name in the search box, and then click the search button .
- Some features depend on other features. Prerequisite features are usually listed earlier than the features that depend on them.

5. In the **Active Workspace Client Settings** panel, enter the required values:

Value	Description
Publish to Gateway	<p>Select this check box to enable automatic publishing of Active Workspace content to the Gateway.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note:</p> <p>The Active Workspace Gateway must be installed <i>and</i> running before content can be published.</p> </div>
Gateway URL	<p>Type the URL to Active Workspace Gateway:</p> <p style="text-align: center;">http://host:port</p> <p>Replace <i>host</i> with the host on which you installed the Gateway. Replace <i>port</i> with the port you specified when you installed the Gateway.</p>

For information about other values in the **Active Workspace Client Settings** panel, click the help button .

6. In the **Confirmation** panel, click **Start** to begin the installation.
7. When the installation is complete, close TEM.

Installing indexing components

The Indexing Engine and the Indexer provide global search capabilities for Active Workspace. Install these components using TEM:

- **Indexing Engine**

Installs the Solr enterprise search platform. The search engine stores indexed Teamcenter data for global search in Active Workspace.

Selected product data is indexed in Solr, an open source search platform from Apache. The master product data is not stored in Solr. It is always loaded from Teamcenter.

- **Indexer**

Installs a four-tier SOA client that exports Teamcenter data for merging into Solr. The indexer manages overall indexing processes. **TcFTSIndexer** manages the initial indexing for object data. You can then schedule synchronization to run periodically for subsequent updates to object data or structure data indexes.

TcFTSIndexer indexes external and Teamcenter objects into Solr. It connects to the server manager to query and extract Teamcenter data to be indexed into Solr.

There are two modes for installing the **Indexer: Standalone** for object data and **Dispatcher-based** for Active content structures.

For information about indexing components and planning your indexing deployment, see the *Indexing Data and Configuring Search* in the Active Workspace documentation.

During installation of indexing components, you may need to enter or verify the following information:

Indexing Engine Configuration		
Parameter	Where value is defined	Your value
Teamcenter machine name and installation path	Teamcenter installation	
TC_DATA	Teamcenter installation	
Java location	Indexing Engine installation	
Solr directory and credentials	Indexing Engine installation	
Solr URL (http://host:8983/solr)	Indexing Engine installation	
Indexing Engine credentials	Indexing Engine installation	

Install Indexing Engine (Solr)

You can install the Indexing Engine (Solr) in a new or existing environment.

Prerequisites

This procedure assumes you have an existing Teamcenter environment with Active Workspace.

Procedure

1. Launch TEM in maintenance mode.
2. In the **Maintenance** panel, choose **Configuration Manager**.

3. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.
4. In the **Old Configuration** panel, select the configuration you want to modify.
5. In the **Feature Maintenance** panel, select **Add/Remove Features**.

Options in the **Feature Maintenance** panel vary depending on the features in your configuration.

6. Proceed to the **Features** panel and select the **Active Workspace Indexing Engine** feature (under **Base Install**→**Active Workspace**→**Indexing Server**).

If you select additional features in this step, TEM may display additional panels not described in this procedure.

7. Proceed to the **Indexing Engine User** panel. Type the user name and password for the Solr administrator. These credentials must match the credentials you entered when you installed the Active Workspace server extensions.


The indexing user must have read access to object data, datasets, and their associated files to index their text content.

8. In the **Indexing Engine Configuration** panel, enter required values for the indexing engine:

Value	Description
SOLR schema files location	<p>Specifies the location of the Solr schema files.</p> <p>Enter the path that contains the Solr schema files. This allows the Solr and Teamcenter schemas to be automatically merged during installation of the Indexing Engine. If you leave this box blank, the schemas are not automatically merged; you must manually merge them after installing the Indexing Engine.</p> <p>The Solr schema files are created on the corporate server when you install the Active Workspace Server Extensions. Two schema files are located in <code>TC_DATA\fts\solr_schema_files</code>:</p> <ul style="list-style-type: none"> • <code>TC_ACE_SOLR_SCHEMA.xml</code> • <code>TC_SOLR_SCHEMA.xml</code> <p>If you did not install the Server Extensions on the corporate server, you can complete the installation of the Indexing Engine, but the schemas are not automatically merged. You must manually merge the Solr and Teamcenter schemas after installing the Indexing Engine and the Server Extensions.</p>
JRE Location	Specifies the location of the Java Runtime Environment (JRE) on the Indexing Engine host.
Install indexing	Specifies you want to install the Indexing Engine as a service. If you leave this check box cleared, you must start the Indexing Engine manually.

Value	Description
engine as a service	

- Proceed through any remaining panels in TEM, entering the required parameters for the components you selected.

For information about each panel, click the help button .

- When TEM displays the **Confirmation** panel, click **Start** to begin installation.

When installation is complete, close TEM.

- Configure indexing and search after completing the Indexing Engine installation.

Install the Indexer (TcFTSIndexer)

You can install the Indexer (TcFTSIndexer) in a new or existing environment.

Prerequisites

This procedure assumes you have an existing Teamcenter environment with Active Workspace.

Procedure

- Launch TEM in maintenance mode.
- In the **Maintenance** panel, choose **Configuration Manager**.
- In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.
- In the **Old Configuration** panel, select the configuration you want to modify.
- In the **Feature Maintenance** panel, select **Add/Remove Features**.

Options in the **Feature Maintenance** panel vary depending on the features in your configuration.

- Proceed to the **Features** panel and select the **Active Workspace Indexer** feature (under **Base Install**→**Active Workspace**→**Indexing Server**).

If you select additional features in this step, TEM may display additional panels not described in this procedure.


7. Proceed to the **Teamcenter Administrative User** panel. Type the password for the Teamcenter administrative user account.
8. Proceed to the **Indexing Engine User** panel. Type the user name and password for the Solr administrator. These credentials must match the credentials you entered when you installed the Active Workspace server extensions.

The indexing user must have read access to object data, datasets, and their associated files to index their text content.

9. In the **Active Workspace Indexer Settings** panel, type the required values to configure the Indexer:

Value	Description
Teamcenter Web Tier URL	<p>Specifies the URL for the deployed Teamcenter web application. The URL should be of this form:</p> <p style="text-align: center;"><code>http://host:port/web-app-name</code></p> <p>Replace <i>host</i> with the machine on which the Teamcenter web application is deployed. Replace <i>port</i> with the port used by the web application server. Replace <i>web-app-name</i> with the name of the Teamcenter web application. (The default name is tc.)</p>
Maximum Teamcenter Connections	<p>Specifies the maximum number of connection between the Teamcenter server and the indexer to be open at a given time. This value should be less than the number of warmed up Teamcenter servers available in the server manager. The default value is 3. The minimum value allowed is 1.</p>
Teamcenter Retry Count	<p>Specifies the number of tries to connect to the Teamcenter server. The default value is 5. The minimum value allowed is 1.</p>
Indexer Service Settings	<p>Specifies the names and intervals for indexer services that can be installed.</p> <p>Select the Install Indexer as a Service <input checked="" type="checkbox"/> check box if you want to install the objdata synchronization flow and the suggestion builder synchronization flow of the indexer as services.</p> <p>The Indexing Service Name and Builder Service Name fields populate with suggested names for the services and can be edited.</p> <p>The Service Interval fields populate with suggested intervals for the synchronization flows and can be edited.</p> <p>Select the Start Service <input checked="" type="checkbox"/> check box to automatically start the service.</p>

10. Proceed through any remaining panels in TEM, entering the required parameters for the components you selected.

For information about each panel, click help .

- When TEM displays the **Confirmation**, click **Start** to begin installation.

When installation is complete, close TEM.

- Configure indexing and search after completing the Indexer installation.

Install shape search

You can install the shape search feature on a new or existing environment to search for objects of a similar shape or size.

Prerequisites

- This procedure assumes you have an existing Teamcenter environment with Active Workspace.
- Install, configure, and complete indexing for Geolus. See the [Geolus](#) documentation.
- Verify system software requirements:

- Log on to Support Center and open the [Support White Papers Certifications](#) page:

- Open **Products**→**Teamcenter**→**Downloads**.
- Under **Select a Version**, choose **Support White Papers**→**Support White Papers Certifications**, and then click the **Support White Papers Certifications** tile.

- Download the following support documents:

Software Certifications Matrix (Tc2412PlatformMatrix-date.xlsx)

Contains information about system software certified for Teamcenter, such as operating systems and Java runtime environments (JREs).

Teamcenter Interoperability Matrix (Teamcenter Interoperability Matrix date.xlsx).

Lists versions of Siemens Digital Industries Software products that are compatible with Teamcenter 2412. It also lists supported Teamcenter upgrade paths.

Teamcenter 2412 supports upgrades from Teamcenter 13.x or later. If your current Teamcenter environment is using an earlier version than 13.x, you must upgrade to version 13.x or later before you upgrade to Teamcenter 2412.

Procedure

- Add the **Shape Search** application to your Teamcenter environment:

In Teamcenter Environment Manager (TEM), in the **Features** panel, select **Shape Search** and any prerequisite features.

2. Proceed through the remaining panels to complete the installation.

Enter the Geolus server URL in the following format: *protocol://gServer:gPort/gContext*

- *protocol* can be **http** or **https**.
 - *gServer* is the machine name or IP address of the machine running the Geolus server. It must be accessible to all Teamcenter clients that need to connect to it.
 - *gPort* is the port number that the server uses to handle HTTP or HTTPS requests.
 - *gContext* is the context root of the Geolus server.
3. Configure shape search in NX so JT files are read in Teamcenter and shape search results are displayed in Active Workspace. For more information, see **NX** documentation.
 - a. In NX, choose **File > Utilities > Customer Defaults > Gateway > JT Files > Export**, and select **Save JT Data**.
 - b. In NX, choose **File > Preferences > Teamcenter Integration > Active Workspace**, and select **Display Shape Search Results in Active Workspace**.

Install Dispatcher

The Teamcenter *Dispatcher* is an asynchronous executor and load balancer of scheduled jobs. If you use Dispatcher, install the Dispatcher server and client as described in *Dispatcher — Deployment and Administration*. Then, install the following Dispatcher translators, which Active Workspace uses:

- **Active Content Structure Translator**

Install this translator if you use Dispatcher-based indexing for structure data. This feature must be installed in the same environment as the Dispatcher server.

- **ReqMgmtWordToHtmlTrans** (optional)

This translator converts requirements content that has been edited and saved in Microsoft Word from Teamcenter (stored as a full-text dataset), so that it can be viewed in the rich text editor in Active Workspace.

- **AsyncService** (optional)

This translator provides asynchronous reporting and printing.

To set up email notifications this translator uses, set the following preferences:

- **MAIL_OSMAIL_ACTIVATED = true**

- `MAIL_INTERNAL_MAIL_ACTIVATED = true`
- `MAIL_SERVER_CHARSET = ISO-8859-1`
- `MAIL_SERVER_NAME = mail-server-name`
- `MAIL_SERVER_PORT = 25`
- `MAIL_SUBSCRIPTION_NOTIFY_SUB_GROUP_TOO = FALSE`
- `WEB_DEFAULT_SITE_SERVER = host:port`
- `WEB_DEFAULT_SITE_DEPLOYED_APP_NAME = Teamcenter-web-tier-application`

Add a business logic server

A *business logic server* processes requests from Teamcenter clients, applying your business model and rules when accessing the Teamcenter database and files in Teamcenter volumes. It contains the Teamcenter server process (**TcServer**), which performs the core functions of Teamcenter.

The *corporate server* is the primary business logic server in your environment. Every Teamcenter environment contains one corporate server. But, a distributed environment can contain multiple additional business logic servers. (A single box environment supports only one business logic server, the corporate server.) Business logic server interaction with the Teamcenter database is managed by a server manager (the **Server Manager** component).

When you install a component that requires a Teamcenter server process on a machine other than the corporate server machine, Deployment Center automatically adds a **Business Logic Server** component on that machine. You can also optionally add a business logic server on a specific machine to further distribute server processes.

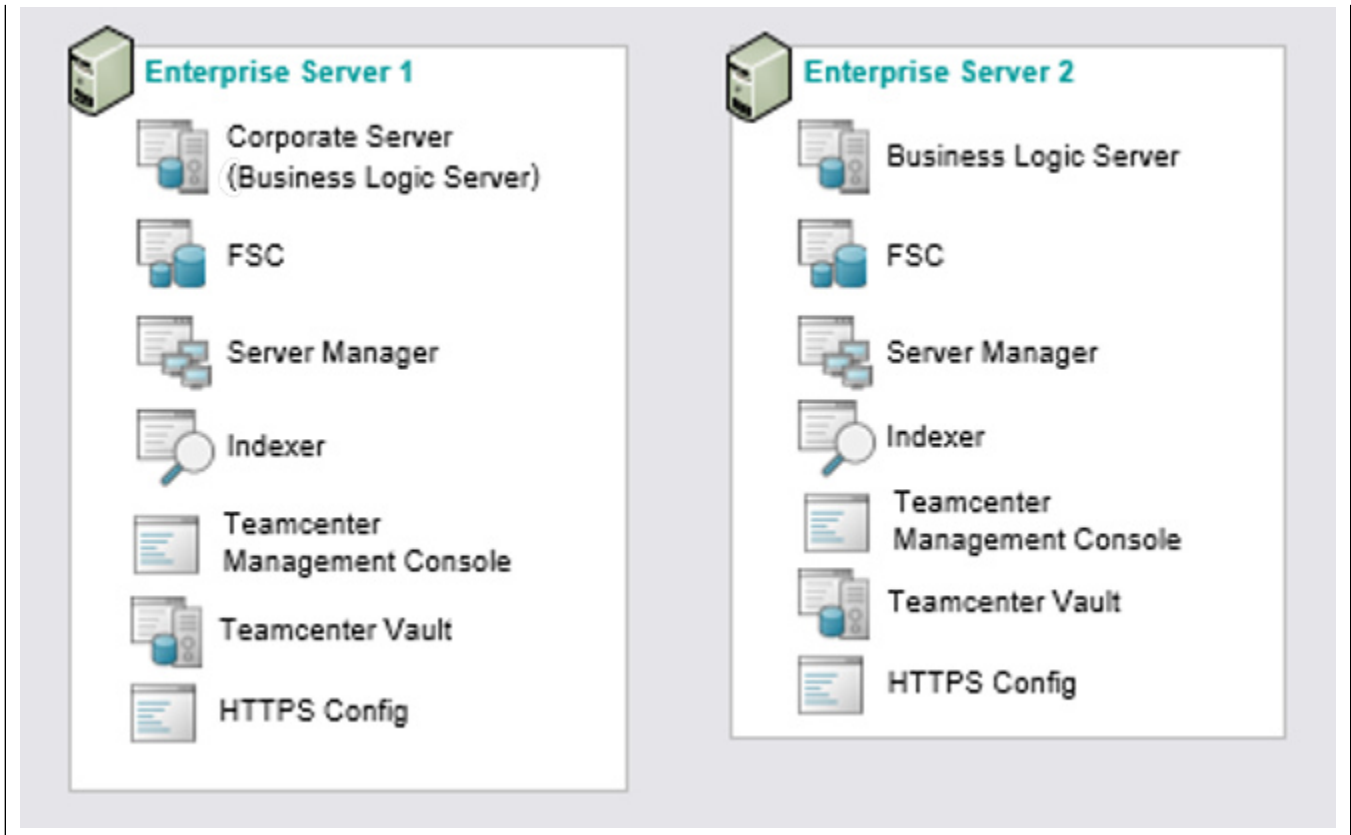


Figure 3-1. Example: Corporate server and business logic server in a distributed environment

A business logic server contains the same libraries as the corporate server and can share an existing Teamcenter application directory (*TC_ROOT*) or a Teamcenter data directory (*TC_DATA*) with another business logic server. Or, it can use its own local application and data directories.

To add a business logic server, go to the **Components** tab, click **Add a component to your environment** ⊕, select **Business Logic Server** in the **Available Components** list, and then click **Update Selected Components**.

Configure the business logic server:

1. Go to the **Components** tab. In the **Selected Components** list, select **Business Logic Server**.
2. Set the **Machine Name** and **OS** for the business logic server.
3. If you want to use a local Teamcenter application directory and data directory on the business logic server machine, type the Teamcenter installation path or accept the default **Teamcenter Installation Path** shown. Then, proceed to step 6.
4. If you want to use a shared Teamcenter application directory, select the **Shared TC_ROOT?** check box. Then, supply the path to the shared *TC_ROOT* location by choosing one of the following options:

- **Use Shared Teamcenter Root Path**

Type the path to the `TC_ROOT` location on the target machine.

- **Use Environment Variable `TC_ROOT_SHARED` during deployment**

Set the `TC_ROOT_SHARED` system environment variable on the target machine to path to the `TC_ROOT` location.

5. If you want to use a shared Teamcenter data directory, select the **Shared `TC_DATA`?** check box. Then, supply the path to the shared `TC_DATA` location by choosing one of the following options:

- **Use Shared Teamcenter Data Path**

Type the path to the `TC_DATA` location on the target machine.

- **Use Environment Variable `TC_DATA_SHARED` during deployment**

Set the `TC_DATA_SHARED` system environment variable on the target machine to path to the `TC_DATA` location.

6. Click **Save Component Settings**.

You can add a business logic server to a distributed environment only. It is not supported in single box environments.

Visualization Server

Visualization Server overview

The Visualization Server provides dynamic 3D and 2D visualization functionality to the Active Workspace client. If you do not use the 3D viewer or the 2D part of the universal viewer in Active Workspace, do not install the Visualization Server.

The Visualization Server comprises three components:

Visualization Server Manager

The Visualization Server Manager (VSM) starts and stops rendering processes as needed and streams visualization data to the Active Workspace client.

The Visualization Server Manager is required for any use of the 3D viewer or the 2D viewer part of the universal viewer in Active Workspace.

Siemens Digital Industries Software recommends that you install the Visualization Server Manager on a machine that does not have a Teamcenter corporate server.

Visualization Server Pool Assigner

The Visualization Server Pool Assigner (VPA) manages Visualization Server Managers and routes users to an available VSM to open 3D documents.

Each Visualization Pool Assigner hosts two MXBeans that contain information about its current state: **Assigner** and **Assigner monitoring**. The MXBeans are located in the **Administer Assigner manager** folder.

Siemens Digital Industries Software recommends that you install the Visualization Server Manager on a machine that does not have a Teamcenter corporate server.

Visualization Data Server (optional)

The Visualization Data Server (VDS) improves Visualization performance by caching visualization data close to the Visualization Server Manager.

The Visualization Data Server is required for using MMV feature in Active Workspace. Additionally, you need to index structure data for the product configurations that you want to view using MMV.

For appropriately indexed product configurations, the VDS performs the following to promote faster rendering and streaming to the Active Workspace client:

- Caches product structure
- Prepopulates JT files in the FCC
- Computes Massive Model Visualization (MMV) spatial hierarchies
- Provides bounding box validation

You can use bounding box validation to suppress display of parts that fall outside a defined assembly box. This can help avoid assemblies opening zoomed out to accommodate errant parts located far outside the actual assembly. Bounding box validation can also limit a view to include only a preferred range of the assembly.

Bounding box validation is described in *Visualization — Deployment and Administration* in the Active Workspace help library.

A single Visualization Data Server can support one or more Visualization Server Managers.

A Visualization Server Manager is required on the same host as the Visualization Data Server. A Visualization Data Server is required for implementation of MMV, but is otherwise optional.

Choosing client-side or server-side rendering

At a glance: client-side rendering versus server-side rendering

Client-side rendering (CSR) uses WebGL to leverage client-side graphics capabilities using the Active Workspace browser. Server-side rendering (SSR) does not require WebGL and is suited to larger structures. The following comparison may help you decide which option to use.

Conditions	CSR	SSR
Data size limit	The data size limit is affected by browser memory, transfer time tolerance, and WebGL performance as the data size increases. Using render acceleration can increase this limit significantly.	This option provides the highest data size limit, because the server has substantial CPU, RAM, and GPU resources.
Load speed	All data is streamed to the client. Browser caching for client-side rendering is supported.	Best option for loading speed. Data is localized to the render server.
User experience interaction	Best experience within the limits of WebGL performance. All drawing and interactions are local. Rendering is unaffected by network traffic, so is more responsive and less latency sensitive.	Good experience, especially with low latencies. Better-to-best experience when working with significantly increased data sizes.
Server cost per user	Lower cost. No server-side graphics card is required. Offloading rendering to clients means the system can support more users per server. However, the triangles of the model must be loaded onto the client machine before it can render.	This option has a higher cost, but it can be more cost effective than putting a high-end graphics device on every user's desk.
Device support	Devices that support WebGL and an HTML5 web browser.	Devices that support an HTML5 web browser. This option is necessary for devices that do <i>not</i> support WebGL.

Reserve slots on SSR servers for SSR users unless all CSR capacity is consumed

To optimize resource utilization, the Visualization Server Pool Assigner directs SSR users to SSR-capable servers, while diverting CSR users to servers that can support CSR users only. However, since SSR servers can also support CSR users, when all CSR servers are busy and the SSR servers still have capacity, you can use SSR servers to support CSR users. This provides flexibility within the enterprise while reserving SSR servers for users who need that resource.

To adjust or disable this behavior, you can contact Siemens Digital Industries Software support.

Rendering 3D data

In Active Workspace, the **3D** viewer is displayed within the universal viewer area of the **Overview** tab for objects that have viewable attachments. The 3D viewer is also displayed in the **3D** tab, where you can explore 3D data (JT) associated with parts and assemblies. The render location setting applies to both viewer locations.

Visualization Server is required for visualizing 3D data in Active Workspace with CSR. However, the Visualization Server Manager can be installed on a server without a graphics card.

For better user experience and certain functionality to work, ensure the following:

- The client machine for CSR must have a valid graphics card.
- You must enable WebGL on the browser.
- For SSR, even the server must have a valid graphics card.

Set default rendering method

To set the default rendering method for the 3D viewer and the universal viewer, set the value of the **AWV0ViewerRenderOption** Teamcenter preference to either of the following:

- For client-side rendering (default option): Set the value to **CSR**.
- For server-side rendering: Set the value to **SSR**.

End users can change the rendering method on the **Viewer Options** panel in Active Workspace.

Additional settings for CSR

Ensure that you are not using integrated graphics, and perform the following steps to switch to your graphics card:

1. Open the NVIDIA Control Panel.
2. Click **3D Settings**→**Manage 3D Settings**.
3. Click the **Program Settings** tab.
4. From the list shown, select the program for which you want to choose a graphics card.
5. Select the preferred graphics processor from the list.

Alternatively, ensure that the GPU is used when running Google Chrome:

1. Open Windows settings (Windows key+I).
2. Search for graphics settings or GPU.

Should I use MMV?

Massive Model Visualization (MMV) is a visualization technology that uses Visibility Guided Rendering (VGR) to increase performance and scalability when viewing extremely large 3D models, such as cars, airplanes, and ships. Models of this size typically consist of a massive amount of geometry arranged in a relatively compact space with a huge amount of internal geometry hidden behind the outer shell of the product. It can take hours to display such models in their entirety, because every piece of geometry in the model needs to be retrieved and processed, far exceeding the typical capability most hardware. MMV technology resolves this problem by leveraging VGR techniques to load only those parts that are required to render a given scene; parts that are not visible because they are occluded by other parts in the foreground are not loaded. As a result, large 3D models become visible in a fraction of the time previously required.

Note:

If a structure has more than 30,000 BOM lines, MMV is recommended. If a structure has more than 120,000 BOM lines, MMV rendering is required for scalability and performance.

Visualization of MMV data in the Active Workspace requires an MMV license. If the necessary license is not present, the full model loads as standard JT data.

A Visualization Data Server is required for implementing MMV but is otherwise optional.

To use the Visualization Data Server to compute Massive Model Visualization (MMV) spatial hierarchies of structures, you must do the following actions:

1. Apply the MMV index structure flag to the product configurations that you want to view using MMV.
2. Use the **bomindex_admin** utility to include the configurations in the list of structures to index.

The Visualization Data Server has a structure and JT pre-caching feature that can help improve visualization performance for structures not indexed for MMV. To use this feature:

1. Apply the VDS indexing flag for product configurations that will be viewed frequently but are not indexed for MMV.
2. Use the **bomindex_admin** utility to include the configurations in the list of structures to index.

Visualization Server Manager

Visualization Server Manager prerequisites

Operating systems

The Visualization Server Manager (VSM) supports both large model visualization (LMV) and massive model visualization (MMV) on supported Microsoft Windows and Linux server platforms.

On a Linux machine without a GPU or without a supported level of OpenGL, client-side rendering is supported, but server-side rendering is not supported and fails to load.

For supported OS versions, see the Hardware and Software Certifications knowledge base article on Support Center.

Server hardware and graphics cards

The following hardware is supported for VSM:

- **For server-side rendering:**

Server class hardware certified by NVIDIA to support NVIDIA RTX 6000, RTX 8000, T4, A10, A40, GRID K1, K2, Tesla M60, or P40 graphics cards. Note that any server capable of supporting server-side rendering also supports client-side rendering.

- **For client-side rendering:**

GPU hardware requirements for desktop Visualization applications (Lifecycle Visualization) are sufficient for client-side rendering.

If no server-side rendering is needed, any web server class hardware is sufficient to support client-side rendering (CSR).

The Visualization Server is required for visualizing 3D data in Active Workspace with client-side rendering. However, to use client-side rendering, you must install the Visualization Server Pool Assigner and VSM on a server without a graphics card.

Sizing of hardware should be appropriate to support intended data sizes and usage patterns. See [VSM hardware sizing](#) for more info about hardware sizing.

Windows Server versions supported with the VSM support a maximum of 8 GPUs, with certain exceptions. For example, on a Windows Server 2012 R2 machine with two NVIDIA GRID K1 cards, the legacy VGA device makes the fourth GPU on one card unavailable for use.

Active Workspace supports virtualized server-side rendering for [certain hardware and software combinations](#).

NVIDIA usage requires NVIDIA virtual application licenses — one per concurrent user.

For information about server hardware compatible with supported NVIDIA GRID graphics cards, see www.nvidia.com.

Virtualization

If you use only client-side rendering, the VSM can be virtualized.

If you use server-side rendering, the VSM must be installed on physical hardware, unless you follow a supported virtualization combination.

Active Workspace visualization supports virtualization for certain combinations of:

- Host OS and version
- Virtualization layer
- Guest OS and version
- NVIDIA GPU

For information about supported combinations, see the Graphics Card Certification Matrix in the Hardware and Software Certifications knowledge base article on Support Center: <https://support.sw.siemens.com>

For information about NVIDIA virtual GPU compatibility, see NVIDIA virtual GPU (vGPU) software documentation at docs.nvidia.com.

VSM hardware sizing

Sizing of VSM hardware should allow for typical and maximum expected usage by considering the following factors:

- Expected numbers of concurrent Active Workspace visualization users
- Expected product data sizes
- CPU, RAM, VRAM and GPU resources consumed by expected product data

In general, a high end server with:

- A maximum number of CPU cores with processing speeds of 3.0 GHz or faster
- A minimum of 64 GB of RAM

- A minimum of 256 GB of disc space

In addition, a VSM that will support server-side rendering requires an NVIDIA GRID graphics card. For information about server hardware compatible with supported NVIDIA GRID graphics cards, see www.nvidia.com.

For additional guidance in sizing of VSM hardware, contact your field services professionals.

Environment information

Make sure you know the following values. These are needed during installation of the VSM.

Visualization Server Pool Assigner host and port

These are defined in [Install the Visualization Server Pool Assigner](#).

Visualization Data Server host and port (if VDS is to be installed)

These are defined in [Install the Visualization Data Server](#).

Host and port of FCC parents

These are defined during Teamcenter installation.

Linux machine configuration

Before you run the VSM on a Linux machine, perform the following steps:

1. Make sure the machine has the [required RPM package managers](#).
2. Install the required fonts:

```
sudo yum install '*font*' --skip-broken
```

3. Make sure that Xserver is installed and running on **DISPLAY :0**. One way to verify this is to type the following command to determine whether the **X** or **Xorg** process is running:

```
ps -ef | grep "/usr/./X.*:0" | grep -v grep
```

The command returns output similar to the following:

```
>ps -ef | grep "/usr/./X.*:0" | grep -v grep
root      9533      1  0  2023 ?        00:00:00 sudo /usr/bin/Xorg :0
           -background none -verbose -auth /run/user/471/gdm/Xauthority
           -seat seat0 -listen tcp vt7
root      9534  9533  0  2023 tty7      00:25:42 /usr/bin/Xorg :0
           -background none -verbose -auth /run/user/471/gdm/Xauthority
           -seat seat0 -listen tcp vt7
```

The exact output from the **grep** command may vary depending on the configuration of your Linux environment, but the output *must* contain **/user/bin/Xorg :0** or **/user/bin/X :0** where shown above. This indicates that the Xserver is running on **DISPLAY :0** and that your environment is supported.

If you reboot the system, you must restart Xserver.

Note:

The Xserver allows graphical user interfaces on a Linux system. When you install Linux, if you installed a minimal text-only environment, you must install Xserver according to your Linux Xserver installation and setup guide.

If you installed a graphical environment, Xserver and Xorg should already be installed. The Xserver manages the display hardware to provide a graphical interface. To use X applications, install the Xorg X11 apps package.

For information about configuring Xserver, see your Linux system configuration documentation.

4. After you verify that Xserver is running on **DISPLAY :0**, configure Xserver for offscreen and headless operation for use by the visualization server processes.

- **Linux machine with no GPU:**

After you verify that Xserver is running on **DISPLAY :0**, run the following commands:

```
setenv DISPLAY :0
xhost +
```

You must run these commands after a reboot.

The commands return output similar to the following:

```
>setenv DISPLAY :0
>xhost +
access control disabled, clients can connect from any host
```

- **Linux machine with GPU:**

Set up the NVIDIA GPU on the Linux machine by running the **setup_xserver.sh** script provided in the Visualization Server Manager installation.

- a. Change to the **TC_ROOT/vispoolmanager/jetty** directory.
- b. Type the following command:

```
setup_xserver.sh default
```

The `default` parameter specifies to use the graphics card and bus id discovered by the script. If you do not specify this parameter, the script prompts you to confirm the card and bus id, and provides the opportunity to change these values if you want.

Install the Visualization Server Manager

You can install the Visualization Server Manager in a new Teamcenter configuration or in an existing Teamcenter configuration.

If you are adding the Visualization Server Manager to an *existing* configuration, launch the installed TEM in maintenance mode and skip to step 8 below.

Otherwise, if you are installing the Visualization Server Manager on a host with *no* existing Teamcenter environment, proceed with the following steps:

1. Ensure you have access to the Teamcenter 2412 software kit.
2. Launch TEM from the Teamcenter 2412 software kit.

On Windows systems, launch TEM with administrator privileges by using right-click→**Run as administrator**.

3. In the **Welcome to Teamcenter** panel, select **Teamcenter**.
4. In the **Install / Upgrade Options** panel, click **Install**.
5. In the **Media Locations** panel, you can optionally specify the locations of any Teamcenter update software kits you want to apply to your configuration. Otherwise, proceed to the next step.
6. In the **Configuration** panel, enter values for **ID** and **Description**.
7. In the **Solutions** panel, make no selections.
8. Proceed to the **Features** panel, and under **Base Install**→**Active Workspace**→**Visualization Server**, select the **Visualization Server Manager** feature.

In the **Installation Directory** box, enter the location in which to install the Visualization Server Manager.

9. In the **File Client Cache (FCC)** panel, set the **FMS_HOME** environment variable.
10. In the **FCC Parents** panel, define the list of FSC parents to which the Visualization Server Manager connects.

You must provide the protocol, host, and port of the FSC parent. To add rows to the table, click **Add**.

Note:

If you are using a Visualization Data Server, the Visualization Data Server and the Visualization Server Manager should use the same FSC.

11. In the **Configuration** section of the **Visualization Server Manager** panel, provide values for the Visualization Server Manager.

Local Host Alias Specifies the alias for the local Visualization Server Manager.

Server Host Specifies the host where the Visualization Server Manager is running. This must be the local machine name and must be resolvable by the Visualization Pool Assigner machine (the machine running the Active Workspace Gateway). Do not use **localhost** or **127.0.0.1**.

Server Port Specifies the port on which the Visualization Server is listening.

Max Servers in Sub-Pool Specifies the maximum number of Visualization Server processes allowed to run in this pool for a single-host configuration or in this subpool for a multihost configuration.

For example, on Windows machines, the default value is **30**. On Linux machines, the default value is **200**.

Min Warm Servers Specifies the minimum number of Visualization Server processes in this pool that are started but not assigned.

Note:

If necessary to maintain the minimum number of warm servers while not exceeding the maximum number of server processes, the server manager times out the servers in use.

12. If you use a Visualization Data Server, provide the values for this server in the **Visualization Data Server Configuration** section of the **Visualization Server Manager** panel.

Add Visualization Data Server Select this if you are using a Visualization Data Server.

Host Type the name of the host on which the Visualization Data Server is installed.

Port Type the port value used by the Visualization Data Server.

A Visualization Data Server improves performance by caching product structure and JT parts files.

13. In the **Visualization Server Manager Settings** panel, define the settings for how the Visualization Server Manager communicates with the pool assigners.
14. In the **Operating System User** panel, type the user's password.

Override local node settings Select this option to override the host name and the port value. Enter the **Host** and **Vis Assigner Port** values of the local machine. In the **Gateway Connection Port** box, enter the port used by the Active Workspace Gateway.

Visualization Server Pool Assigners Lists the pool assigners that this Visualization Server Manager uses.

- **Assigner Host**

Host name of the machine where the Visualization Server Pool Assigner runs.

- **Assigner Port**

Port value of the pool assigner.

15. In the **Confirmation** panel, click **Start**.
16. When the installation is complete, close TEM.

Start Visualization Server Manager

Start Visualization Server Manager on Linux

To start the Visualization Server Manager (VSM) on a Linux machine, type the following command:

```
TC_ROOT/vispoolmanager/run_servermgr.sh
```

Optional: Start VSM as a Linux daemon

Alternatively, you can start Visualization Server Manager as a daemon by running the **installservice.sh** command for each jetty server with admin permissions:

```
installservice.sh unique-service-name port user
```

If you do not specify parameters, the script will run in interactive mode and prompt you for the information.

For example, from the `TC_ROOT/vispoolmanager/jetty` directory, type:

```
sudo ./installservice.sh MyUniquePoolManager1 8090 MyUser
```

Uninstalling the Linux daemon:

To *uninstall* the VSM daemon, run the **uninstallservice.sh** command for each jetty server with admin permissions:

```
uninstallservice.sh service-name
```

For example, from the *TC_ROOT/vispoolmanager/jetty* directory, type:

```
sudo ./uninstallservice.sh MyUniquePoolManager1
```

If you do not know the name of the service, search the *TC_ROOT/vispoolmanager/jetty/* directory or the */etc/systemd/system* directory for a file named *service-name.service*. The *service-name* is the unique service name you provided to the **installservice.sh** command.

Test Visualization from the Active Workspace client interface

Before you begin the following procedure, make sure the Visualization Server Manager installation *and* the Active Workspace client installation tasks are complete.

You can test the Visualization Server by logging on with the Active Workspace interface and viewing Visualization data, for example, a JT file.

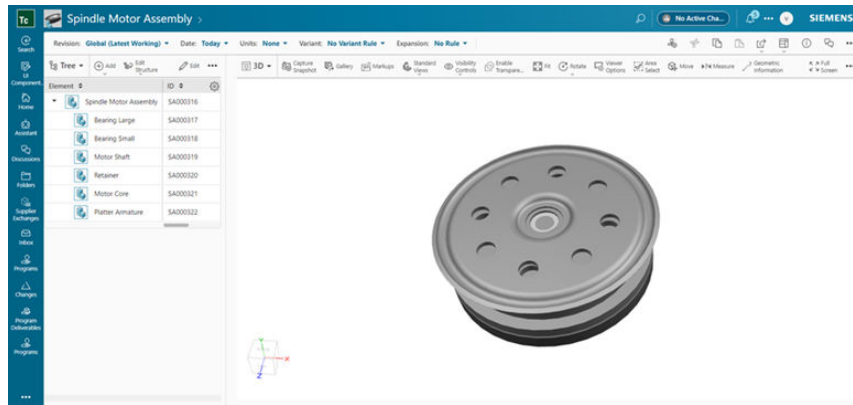
1. Ensure that the following are running:
 - Visualization Server Manager
 - Visualization Pool Assigner
 - Active Workspace Gateway
 - Web application server hosting the Teamcenter web tier application
 - Teamcenter server manager
 - Teamcenter database
2. Open a supported web browser.
3. Open Active Workspace at the following URL:

```
http://host:port
```

host is the machine running the Active Workspace Gateway.

port is the port used by the Active Workspace Gateway.

4. Sign in with a valid user name and password.
5. Search for and open an object that has an attached JT file.
6. Click the **3D** tab to display the JT file.



Configure the locale for Visualization Server Manager

You can configure the Active Workspace client to display the user interface in any of the supported Teamcenter locales. However, some visualization data, such as Product and Manufacturing Information (PMI), requires Visualization Server Manager (VSM) configured for the same locale as the information. For visualization data to display correctly in Active Workspace, you must have at least one VSM configured to run in each locale that you support. With a VSM in place to support each localization being used, visualization processes are then routed to the appropriate server based on locale.

VSMs can be configured to support the following languages:

Brazilian Portuguese	English	Korean
Chinese (Simplified)	French	Polish
Chinese (Traditional)	German	Spanish
Czech	Italian	Russian
French	Japanese	

You can configure a VSM with any one of these languages. If you want to configure a cluster of VSMs to support more than one language, you need at least one VSM per language.

To change the language of a VSM, set the operating system to the required language, location, and locale:

1. Run the following command to list all languages currently available on the machine: **locale -a**.
2. To configure the VSM to support a particular language, set the environment variables **LANG** or **LC_ALL** in the *jetty.service.properties* file.

Example:

To set the VSM to run using the German UTF8 locale, set these values in the *jetty.service.properties* file:

- VisPoolProxy.envset.LANG = de_DE.utf8
- VisPoolProxy.envset.LC_ALL = de_DE.utf8

Note:

Some Asian locales may require a restart of the Visualization Server to force the necessary fonts for the desired language to load correctly.

If all VSMs are configured to use the same language, all clients use the available language regardless of browser preferences.

Note that if you have a VSM system configured for two or more different languages, then Siemens Digital Industries Software highly recommends that at least one VSM be configured for English, even though this may require a minimum of three VSMs. When the server system is configured with multiple languages, if at least one VSM is configured for English, then the English locale is a default.

The following table shows the VSM system response to a visualization data request from a client when the client is not in one of the preconfigured languages.

VSM system configured for two or more languages	Client is not in a preconfigured VSM language
VSM for English exists.	The data request is routed to an English VSM.
No VSM for English.	The data request is rejected.

Visualization Server Pool Assigner

Visualization Server Pool Assigner prerequisites

Software

The Visualization Server Pool Assigner requires the following software:

- A supported Microsoft Windows Server operating system or Linux operating system on the Visualization Server Manager host.

For supported versions, see the Hardware and Software Certifications knowledge base article on Support Center.

- The **Visualization Extension** Server Extensions feature on the corporate server and on any server that has Teamcenter Foundation installed.

Environment information

Make sure you know the following values. These are needed during installation of the Visualization Server Manager.

Visualization Server Pool Assigner host and port

Visualization Data Server host and port (if VDS is to be installed) These are defined in [Install the Visualization Data Server](#).

Host and port of FCC parents These are defined during Teamcenter installation.

Install the Visualization Server Pool Assigner

You can install the Visualization Server Pool Assigner in a new Teamcenter configuration or in an existing Teamcenter configuration.

If you are adding the Visualization Server Pool Assigner to an *existing* configuration, launch the installed TEM in maintenance mode and skip to step **8** below.

Otherwise, if you are installing the Visualization Server Pool Assigner on a host with *no* existing Teamcenter environment, proceed to step **1**.

1. Ensure you have access to the Teamcenter 2412 software kit.
2. Launch TEM from the Teamcenter 2412 software kit.

On Windows systems, launch TEM with administrator privileges by using right-click→**Run as administrator**.

3. In the **Welcome to Teamcenter** panel, select **Teamcenter**.
4. In the **Install / Upgrade Options** panel, click **Install**.

5. In the **Media Locations** panel, you can optionally specify the locations of any Teamcenter update software kits you want to apply to your configuration. Otherwise, proceed to the next step.
6. In the **Configuration** panel, enter values for **ID** and **Description**.
7. In the **Solutions** panel, make no selections.
8. Proceed to the **Features** panel, and under **Base Install** → **Active Workspace** → **Visualization Server**, select the **Visualization Server Pool Assigner** feature.

In the **Installation Directory** box, enter the location in which to install the Visualization Server Manager.

9. In the **Visualization Server Pool Assigner Settings** panel, enter settings to configure the Visualization Server Pool Assigner:

Value	Description
Host	Specifies the host on which this Visualization Server Pool Assigner runs. This is the host on which this Visualization Server Pool Assigner is deployed. You may type the host name or the IP address of the host.
Vis Assigner Port	Specifies the port used by the local Visualization Server Pool Assigner.
Gateway Connection Port	Specifies the port through which the Active Workspace Gateway connects to the Visualization Server Pool Assigner. The default value is 3000 .
Add pool assigner	Specifies whether additional Visualization Server Pool Assigners are used. Select the Add pool assigner check box to add pool assigners.
Peer Assigners	The Peer Assigners table lists other Visualization Server Pool Assigners known to the local Visualization Server Pool Assigners.
Assigner Host	Specifies the host on which a peer Visualization Server Pool Assigner is deployed. This value can be the host name or IP address.
Assigner Port	Specifies the port number used by the peer Visualization Server Pool Assigner.
Server Side 4-tier URL	Specifies an alternate four-tier URL for the viewer to connect to Teamcenter. The Visualization Server uses this in case the primary four-tier URL is blocked by a firewall, or if a more direct route is needed for performance.

10. In the **Confirmation** panel, click **Start**.
11. When the installation is complete, close TEM.

Start Visualization Server Pool Assigner

To start Visualization Server Pool Assigner (VPA) on a Linux machine, type the following command:

```
TC_ROOT/visassigner/run_assigner.sh
```

Alternatively, you can start the VPA as a daemon by running the **installservice.sh** command for each jetty server with admin permissions:

```
installservice.sh unique-service-name port user
```

If you do not specify parameters, the script runs in interactive mode and prompts you for the information.

For example, from the `TC_ROOT/visassigner/jetty` directory, type:

```
sudo ./installservice.sh MyUniqueAssigner1 7780 MyUser
```

Visualization Data Server (optional)

Visualization Data Server prerequisites

Software

The Visualization Data Server requires the following software:

- A supported Microsoft Windows Server operating system or Linux operating system on the Visualization Server Manager host.

For supported versions, see the Hardware and Software Certifications knowledge base article on Support Center.

- The **Visualization Extension** Server Extensions feature on the corporate server and on any server that has Teamcenter Foundation installed.
- A **Visualization Server Manager** installed on the Visualization Data Server host.
- An FMS client cache (FCC) component on the Visualization Data server host.
- Structure indexing configured on the Visualization Data server host.

The Visualization Data Server uses the structure indexing infrastructure of Active Workspace to keep cached product structure up-to-date.

Hardware

- Graphics card: No requirements.
- Network: You must deploy the Visualization Data Server on a high speed LAN near the Visualization Server Manager.
- Memory: The Visualization Data Server host should have a minimum of 16 GB of RAM, but may require more.

Note:

How to determine memory needed:

The amount of RAM needed depends on the number of structures to be indexed and their size.

A rough rule of thumb is to count the number of lines in the unconfigured structure to be indexed and allow at least 2000 bytes per line. For example, if there are 1 million lines in the unconfigured product index, then $1 \text{ million} * 2000 = 2 \text{ GB}$ of RAM.

If you are not sure of the size of the structures, Siemens Digital Industries Software recommends that you allow approximately 4 GB of RAM for each structure you are planning to cache in the Visualization Data Server. For example, if 4 structures are to be indexed, 16 GB of RAM is recommended.

Environment information

You need to know the following values to install the Visualization Data Server:

- FCC parents
- Teamcenter web tier URL
- Host name and port for the Visualization Data Server

Recommendations

Siemens Digital Industries Software recommends that you install the Visualization Data Server on a machine with the following:

- **Multiple processors**

The Visualization Data Server is a multithreaded server program and is thus resource intensive; multiple processors are utilized if they are available. Standard server class machine hardware is sufficient.

- **FSC cache or FSC volume**

If you deploy the Visualization Data Server remote (on a WAN) from the FSC volume, you should deploy an FSC cache on a LAN near or on the Visualization Data Server host machine.

- **Visualization Server Manager**

For maximum performance, the Visualization Data server should be installed on the same machine as the Visualization Server Manager and should use the same cache.

A single Visualization Data Server can support one or more Visualization Server Managers.

Install the Visualization Data Server

You can install the Visualization Data Server (VDS) in a new or an existing Teamcenter configuration. Siemens Digital Industries Software recommends that you install the Visualization Data Server on a machine that does *not* have a Teamcenter corporate server.

If you are adding the Visualization Data Server to an *existing* configuration, launch the installed TEM in maintenance mode and skip to step **8** below.

Otherwise, if you are installing the Visualization Data Server on a host with *no* existing Teamcenter environment, proceed to step **1** below.

1. Ensure you have access to the Teamcenter 2412 software kit.
2. Launch TEM from the Teamcenter 2412 software kit.
3. In the **Welcome to Teamcenter** panel, select **Teamcenter**.
4. In the **Install / Upgrade Options** panel, click **Install**.
5. In the **Media Locations** panel, you can optionally specify the locations of any Teamcenter update software kits you want to apply to your configuration. Otherwise, proceed to the next step.
6. In the **Configuration** panel, enter values for **ID** and **Description**.
7. In the **Solutions** panel, make no selections.
8. In the **Features** panel, select the **Visualization Data Server** feature:

Base Install→**Active Workspace**→**Visualization Server**→**Visualization Data Server**

In the **Installation Directory** box, enter the location in which to install the Visualization Data Server.

9. In the **File Client Cache (FCC)** panel, set the **FMS_HOME** environment variable. The FCC must be installed on the same machine as the Validation Data Server.
10. In the **FCC Parents** panel, define the list of FSC parents to which the Visualization Data Server connects.

You must provide the protocol, host, and port of the FSC parent. To add rows to the table, click **Add**.

Note:

To improve performance, the Visualization Data Server and the Visualization Server Manager should use the same FSC.

11. In the **Teamcenter Administrative User** panel, enter the user's password.
12. In the **Visualization Data Server Configuration** panel, enter the required values:

- **Server Port**

This is the port number on which the Visualization Data Server listens.

- **Teamcenter 4-tier URL**

This is the URL of the Teamcenter web tier application. The format is:

`http://host:port/tc-web-app`

host is the machine running the web application server on which the Teamcenter web application is deployed.

port is the port value used by the web application server.

tc-web-app is the name of the Teamcenter web application. The default is **tc**.

13. In the **Confirmation** panel, click **Start**.
14. When the installation is complete, click **Close**.

MMV indexing data

If you use Massive Model Visualization (MMV), configure MMV indexing.

When structures using MMV rendering are indexed, the last valid indexed data is always retained. So, you can always see MMV indexed data; however, the data in a structure may be more recent.

When MMV data is being indexed it may use a backup system. It is recommended that the administrator retains interim files so when an error occurs, they can be analyzed to determine the issue. These two Teamcenter preferences can be used to control the output of the generated files:

- **MMV_keep_generated_files**

Use this preference to preserve the generated files for further examination. You can specify when generated files are kept by using these values:

1: Keep the generated files when an error occurs.

2: Always keep the generated files.

3: Never keep the generated files.

- **MMV_staging_directory**

Use this preference to control the working directory to be used for the **tcxml2mmp** conversion process on the Teamcenter server. If this is not set, the default temporary directory is used as staging directory.

Start Visualization Data Server

To start Visualization Data Server Manager, enter the following command:

```
TC_ROOT/VisDataServer/bin/VisDataServer
```

After the Visualization Data Server is started, it automatically detects and caches product configurations that have been indexed with the MMV flag. These cached product configurations are ready for fast visualization with the MMV technology.

For a product configuration is ready for MMV visualization, the following criteria must be met:

- The product configuration has been indexed.
- Visualization Data Server has detected, downloaded, and cached the structure.
- Visualization Data Server has prepopulated the FMS system.

If you attempt to visualize a product configuration that is not yet completely indexed and cached in the Visualization Data Server, the viewer uses the regular non-MMV mode by default. Changes in the product configuration need to be re-indexed and reread by the Visualization Data Server before they can be displayed by the viewer.

Additional configuration for the Visualization Data Server is available in the **etc/VisDataServer.properties** file. This includes detailed logging and fine tuning for other settings. If you make changes to the properties file, you need to restart Visualization Data Server.

Optional: Start the Visualization Data Server as a Linux daemon

To install these services, run the **installservice.sh** located in the **VisDataServer/bin** folder. Run this command with administrator permissions:

```
installservice.shunique-service-nameuserFMS_HOME
```

For example, from the **VisDataServer/bin/** directory, type:

```
sudo ./installservice.sh VDS MyUser /VIS/VisServer/FCC
```

If you do not specify arguments, the script runs in interactive mode and prompts you for the required values.

To uninstall services, run the **uninstallservice.sh** script for each Jetty server. Run this command with administrator permissions:

```
uninstallservice.shservice-name
```

For example, from the **VisDataServer/bin/** directory, type:

```
sudo ./uninstallservice.sh VDS
```

If you do not specify arguments, the script runs in interactive mode and prompts you for the required values.

If you do not remember the name of the service, find it using the following steps:

1. Change to the *VisDataServer/bin/* directory or */etc/systemd/system* directory.
2. Search for a file named *name.service*. The *name* in this file name is the *unique-service-name* you specified when you installed the service using **installservice.sh**.

Rebuild VDS repository from scratch

As the VDS repository is updated via deltas containing incremental changes from Teamcenter that occur as design data evolves, the repository used to support MMV viewing may introduce errors. To reduce errors, a good practice is to periodically regenerate the VDS repository from scratch. The default threshold for this scratch rebuild is every 500 delta updates, but this value is configurable by an administrator. A full regeneration of the VDS repository can be set to occur more or less often, depending on the observed need.

To change the number of deltas that are processed before a scratch rebuild of the VDS repository, set the **MMV_delta_collection_accumulation_limit** Teamcenter preference to a value higher or lower than the default value of 500. This will change how often the VDS rebuilds its repository from scratch.

Note:

To manage the number of delta files that are to be deleted, use the **MMP_PERCENTAGE_OF_DELTA_TO_PURGE** preference. Its default value is 100, but based on your need, you can set it to any value from 10 to 100. Refer to the following table to understand preference value limits:

If preference value is set to	then preference value processed is
≤ 10	10
$10 < \text{value} < 100$	value
≥ 100	100

All delta files are deleted when the **MMP_PERCENTAGE_OF_DELTA_TO_PURGE** preference value is set to 100.

Example:

Set the **MMV_delta_collection_accumulation_limit** preference value to 500.

In this case, since the value is set to 500, it becomes the maximum delta limit. After 500 deltas are processed, a completely new mmp file is created.

To delete 100% of the old delta files in the MMV dataset, set the **MMP_PERCENTAGE_OF_DELTA_TO_PURGE** preference value to 100. If you want to delete only 10% of the old delta files in the MMV dataset, set the **MMP_PERCENTAGE_OF_DELTA_TO_PURGE** preference value to 10.

Visualization Data Server status log settings

Configuration for the Visualization Data Server is available in the **etc/VisDataServer.properties** file. This includes detailed logging and fine tuning for other settings. If you make changes to the properties file, you must restart the Visualization Data Server.

Log information includes the status of all products hosted by the Visualization Data Server.

```
#
# Status logger settings. The status logger can be of help showing
# the current indexing status
# and also the current and waiting task to be processed.
#
# The interval to generate the status log (see the "Interval"
```

```

documentation
  for more info).
StatusLogger.StatusInterval=120
# This will output the name of the top level (root) node.
StatusLogger.ShowRootName = true
# Shows the timestamp of the indexed product.
StatusLogger.ShowTimestamp = true
# Shows the available revision rules of indexed product.
StatusLogger.ShowRevRule = true
# Shows the status of the Spatial JTs.
StatusLogger.ShowSpatialJt = true
# If ShowSpatialJt is true, also shows the file path of the Spatial JTs.
StatusLogger.ShowSpatialJtPath = true
# If ShowSpatialJt is true and a Spatial JT is missing, the string will
be added
in from of the path.
# This can be used if a specific string is needed to search for a
missing
file (like using the grep utility).
StatusLogger.MissingSpatialJtMessage = (missing)
# Shows all the versions of a product instead of just the latest one.
StatusLogger.ShowAllVersions= false
# Shows the active tasks being processed.
StatusLogger.ShowActiveTasks=true
# Shows any waiting tasks to be processed.
StatusLogger.ShowWaitingTasks=true

```

Install the Java EE web tier application

The Teamcenter Java EE web tier application provides communication between Teamcenter clients and the enterprise tier.

Before you install the Java EE web tier, make sure you install:

- A Teamcenter server and server manager.
- A supported Java EE application server and the Java Runtime Environment (JRE) on the web tier host.¹

Install the Web Application Manager

1. Create a home directory for the Teamcenter web tier, for example, **/tweb**. This directory is referenced as **WEB_ROOT**.
2. Change to the **WEB_ROOT** directory.

¹ For information about supported application servers and Java versions, see the Hardware and Software Certifications knowledge base article on Support Center.

3. Type the following command to extract Web Application Manager files to your host:

```
cat path/INSTALL_TCWEB.TZ | uncompress -c | tar xvf -
```

Replace *path* with the full path to the Teamcenter software kit.

Note:

On Red Hat Linux systems, use the **gzip** command instead of **uncompress** to extract **INSTALL_TCWEB.TZ** file:

```
cat path/INSTALL_TCWEB.TZ | gzip -d | tar xvf -
```

4. To launch the Web Application Manager, change to the *WEB_ROOT* directory and enter the following command:

```
insweb
```

Build the Teamcenter web tier application

1. Launch the Web Application Manager (**insweb**).
2. Copy ICD files from the Teamcenter software kit. This populates the list of solutions available to install.
 - a. Click **Copy ICDs**. In the **Copy ICD Files** dialog box, click **Browse**.
 - b. Browse to the **Web_tier** directory in the root directory of the Teamcenter software kit and select the **icd** directory, and then click **Open**.
 - c. In the **Copy ICD Files** dialog box, click **OK** to load ICD files.
 - d. Repeat steps a through c to copy ICDs from the Teamcenter 2412 software kit.
3. Click **Add** to begin creating a web application.

Web Application Manager displays the **Add Web Application** dialog box.

4. Create the Teamcenter Web Tier web application:
 - a. In the **Name** box, type a name for the application, for example, **Teamcenter Web Tier**.
 - b. In the **Staging Location** box, enter a path where you want to place the web application files. Typically, this is a directory under the *WEB_ROOT* directory. Web Application Manager creates the directory if it does not exist.

- c. Optionally, in the **Description** box, type a description of the application.
- d. Enter software locations:
 - A. Click **Add**, next to the **Disk Locations for Install Images** box.
 - B. In the **Add Disk Location** dialog box, enter the path to the **Web_tier** directory on the Teamcenter software kit:

path/Web_tier

- C. Repeat steps A through B to add the path to the **Web_tier** directory on the Teamcenter 2412 software kit.

To modify or remove a location in the **Disk Locations for Install Images** list, click **Modify** or **Remove**.

Do not change the default solution type (**Web tier**) shown in the **Solution Type** box.

5. Select the solutions to include in the Teamcenter web tier web application:
 - a. Click **Solutions**.
 - b. In the **Select Solutions** dialog box, select the required solutions:

Teamcenter - Web Tier Infrastructure

Teamcenter - Web Tier Core Applications

6. Click **Advanced Web Application Options** to select the following advanced options, if applicable:
 - If you want the web tier application to submit the client-side session cookie over HTTPS, select the **Secure Cookie** check box.
 - If you deploy the web tier application in a cluster configuration, select the **Distributable** check box. This makes the web tier WAR file distributable.
7. Click **OK**.

The Web Application Manager displays the **Modify Required Context Parameters** dialog box.

8. Enter or verify values for the following required context parameters. Default values are acceptable for most parameters

Local Service Port (when using TCP communication protocol)	Enterprise Application Lookup ID
Connection Timeout	Deployable File Name
Server_Manager_URIs	IS_SSO_ENABLED
LogVolumeName	SSO_APPLICATION_ID
LogVolumeLocation	SSO_LOGIN_SERVICE_URL
Enterprise Application Registration ID	SSO_SERVICE_URL
Max_Capacity	TcLocale

To set a context parameter, double-click the **Value** box for the given parameter and enter the new value. To view a description of any context parameter, click the parameter name in the **Modify Required Context Parameters** dialog box.

Note:

If your network uses IPv6 (128-bit) addresses, use the hostname in URIs and do not use the literal addresses, so the domain name system (DNS) can determine which IP address should be used.

- Click **OK** to begin building the web application.

When the application is complete, click **OK** to close the **Progress** dialog box.

- Click **Exit** to exit the Web Application Manager.
- Locate the deployable file (**tc.war**) generated during installation. This file is in the **deployment** directory under the staging location you specified.
- Deploy the web application on a supported application server.²

Deploying on an IPv6 network

If your network includes client hosts running on an IPv6 network, the Java EE web tier must be deployed in an application server that supports an IPv6 URL as an external endpoint and uses IPv4 addresses to support all communication with the Teamcenter enterprise tier, such as communication with the Java EE server manager.

² *Web Application Deployment* provides Teamcenter web tier deployment procedures for several supported application servers.

A typical environment for the Java EE web tier is a dual-stack machine that supports both IPv4 and IPv6 addresses in which the application server accepts HTTP requests from either IPv4 or IPv6.

Teamcenter enterprise tier server components that communicate with other server components in the same network are assumed to be on an IPv4 network and are not supported on IPv6. Teamcenter IPv6 support is limited to clients or integrations that use Teamcenter client communication system (TCCS) and Teamcenter components that communicate with clients on IPv6-enabled networks.

Sharing an application server instance for multiple four-tier environments (Optional)

Teamcenter supports deploying more than one instance of the same Teamcenter web tier application (WAR file) into one application server instance. Multiple WAR files can be configured to run as discrete applications, each with a unique entry point. This allows you to connect each application to a different enterprise tier without the need to manage multiple application server instances. The following example shows a possible scenario with three web applications (WAR files) deployed in a single application server instance.

Client tier	Web tier	Enterprise tier	Resource tier
Clients	Single application server instance	Server managers	Databases
Client A	← http://host:port/tc01 →	← svrmgr1 →	← DB1 →
Client B	← http://host:port/tc02 →	← svrmgr2 →	← DB2 →
	← http://host:port/tc03 →	← svrmgr3 →	← DB3 →

To deploy multiple web applications in a single web application server instance, perform the following tasks:

1. **Install multiple server managers** with unique server manager cluster configuration settings.
2. **Create web applications**. Assign each application a unique name.
3. Set the following web tier context parameters to *unique* values for each web application.

Context parameter	Description
DEPLOYABLE-FILE-NAME	Name of the deployable file you are creating for the web tier application.
Enterprise Application Registration ID	Identifier for the web application. If you want to deploy multiple Teamcenter web tier applications in a single

Context parameter	Description
	application server instance, each application must be assigned a unique ID.
Enterprise Application Lookup ID	Specifies the ID by which the Teamcenter presentation tier accesses the application identified by the Enterprise Application Registration ID parameter. If you deploy your WAR file with other WAR files in the same application server instance, these two IDs should be set to the same value for a given application.
Server_Manager_URIs	The server manager URI(s) for the appropriate server manager.

4. Deploy web application WAR files in the web application server instance.

Multiple WAR file deployment is not supported on JBoss. If you use JBoss as your web application server, you must deploy each WAR file in a separate application server instance.

Install a volume server

By default, you can create volumes only on local disks, but if you want to write files to volumes residing on remote disks (shared across the network), you can create a stand-alone volume server.



1. Log on to the operating system with the user account you want to own the volume.
2. Start Teamcenter Environment Manager (TEM):
 - a. Change to the root directory of the Teamcenter software kit.
 - b. Run the **tem.sh** script.

Teamcenter Environment Manager starts and displays the **Choose Install Language** dialog box.


- c. Select a language for the installation program and click **OK**.

The language you select is used only for the installation program.

3. In the **Welcome to Teamcenter** panel, select **Teamcenter**.
4. Proceed to the **Install/Upgrade Options** panel. Click **Install**.

5. (Optional) In the **Media Locations** panel, enter paths to any Teamcenter patches or minor releases you want to apply during installation.
6. Proceed to the **Configuration** panel. Enter a unique ID and description for the new Teamcenter configuration.
7. Proceed to the **Solutions** panel. Select the **Volume Server** solution.

For descriptions of solutions, point to the solution in the list or click **Help** or see the complete [list of features](#).

8. Proceed to the **Features** panel. This panel shows the **FMS Server Cache** feature preselected by the **Volume Server** solution.
9. In the **Installation Directory** box, enter the absolute path to the directory where you want to install the volume server.
10. Proceed to the **Operating System User** panel. Type the password for the operating system account to which you logged on to install the volume server.
11. Proceed to the **File System Cache Service (FSC)** panel. Enter required values for the FMS server cache (FSC) service. For information about required values, click the help button .
12. Proceed through the remaining panels, entering required values for the volume server.
13. Proceed to the **Confirmation** panel. Verify the information you entered. If you want to change any values, click **Back** to return to the panels you want to change. Otherwise, click **Next** to begin installing the volume server.
14. When installation is complete, close TEM.

This procedure installs a single volume server. To configure multiple volume servers for load balancing, and other advanced FMS configuration, see *Teamcenter Administration*.

14. Installing optional applications

Install the Business Modeler IDE

Choose a Business Modeler IDE installation type

Several types of Business Modeler IDE installation are possible. All BMIDE installation types can be used to create, import, and modify a template project, and can generate a template package which can be deployed using TEM or Deployment Center.

An important difference among the installation types is whether and how the BMIDE connects to a Teamcenter site. A Teamcenter site connection is necessary for some tasks:

Perform data exchanges, such as:

- Synchronize the data model in a BMIDE template project with the Teamcenter server database.
- Live update non-schema data, such as lists of values (LOVs), from the BMIDE to a production server without shutting down the production server.
- Live deploy a template to a test Teamcenter server.
- Incorporate live update changes made to the production environment into a BMIDE standard template project.

Create certain data model elements, such as:

- Business object display rule
- Dynamic list of values
- Business context rule
- Item revision definition configuration (IRDC)
- System stamp configuration
- Subtype of ApplInterface, and many others

Use the following general procedure for choosing a Business Modeler IDE installation type.

1. Ensure that the machine meets prerequisites for a BMIDE.

Caution:

Do not install BMIDE on a production environment corporate server. Doing so could have unintended consequences, especially during Teamcenter upgrade.

2. Choose the BMIDE installation type that you want to perform.

Installation type	Teamcenter connection type	Advantage	Limitation
2-tier	Two-tier environment via TCCS.	Allows live deployments even while a web tier is inactive or down for maintenance.	Requires local network access.
4-tier	Four-tier environment via HTTP server.	Allows remote access and live deployments.	Requires an active web tier.
Standalone	None	No requirement for or possibility of unintentional interaction with any Teamcenter site.	Cannot perform actions that require connection to a Teamcenter site.

You may alternatively choose to add BMIDE functionality into your existing Eclipse environment. This consists of manually patching your Eclipse environment with BMIDE jar files. Doing so offers the advantage of allowing you to work on BMIDE templates within your existing custom Eclipse environment. However, adding BMIDE functionality into your existing Eclipse environment does not offer BMIDE functionality to perform actions that require connection to a Teamcenter site.

Add the Business Modeler IDE to an existing Eclipse SDK environment

If you already have an existing Eclipse SDK environment with the version of Eclipse that is certified for your Teamcenter platform, and Business Modeler IDE plugins have never been installed into the environment, then you can install the Business Modeler IDE plugins into your existing Eclipse environment.

Caution:

If your Eclipse environment contains Business Modeler IDE plugins installed from an earlier version of Business Modeler IDE, then installing a later version of Business Modeler IDE plugins into the same environment results in version incompatibilities and is not supported.

1. Ensure that your Eclipse SDK environment uses the Eclipse version that is certified for your Teamcenter platform.

For information about system hardware and software requirements, see the Software Certifications Matrix ([Tc2412PlatformMatrix-date.xlsx](#)) in the [Support White Papers Certifications](#) page on Support Center.

To check your Eclipse version, start Eclipse and select **Help>About Eclipse SDK**.

2. In the Teamcenter software kit for your Teamcenter platform, go to the following directory:

additional_applications\bmide_plugins (Windows) or **additional_applications/
bmide_plugins** (Linux)

In that directory, find the file **bmide_plugins.zip**.

This archive contains the Business Modeler IDE plug-ins within an internal **eclipse\plugins** directory.

3. Extract the contents of the **eclipse\plugins** directory within **bmide_plugins.zip** to your *ECLIPSE_HOME\ eclipse\plugins* directory.
4. In the Teamcenter software kit for your Teamcenter platform, go to the following directory:

bmide\compressed_files

In that directory, find the file **bmide.zip**.

5. Extract the **bmide.zip** content to some temporary local directory. For example **C:\bmide** (Windows) or **/bmide** (Linux).
6. From the **plugins** directory within this local directory, copy the following directories and their contents to your *ECLIPSE_HOME\ eclipse\plugins* directory.
 - antlr
 - commons_lang
 - commons_xmlschema
 - httpclient_version
 - org.apache.poi.39
7. Create a list of software repository site URLs for the following plugins. Use the Eclipse site to identify the proper URLs. The examples shown are for Eclipse SDK version 2018-12 (4.1.10.0).

You will use this list in step 9.

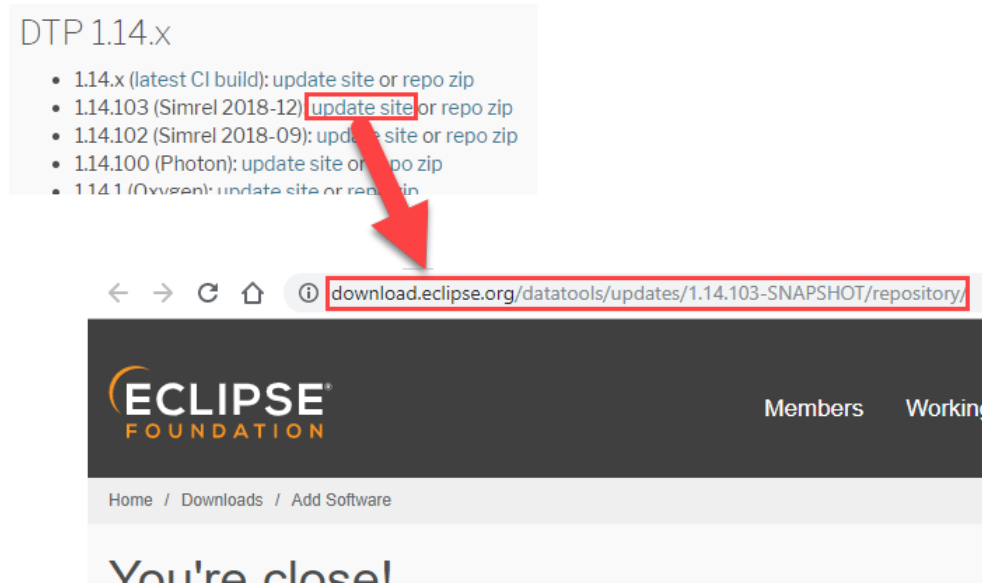
For this plugin	Do this
CDT	<p>Browse to https://www.eclipse.org/cdt/downloads.php and find the URL for the CDT software repository for your Eclipse version. The URL looks similar to this: https://download.eclipse.org/tools/cdt/releases/9.6</p> <p>Record the URL in your list of plugin software repository sites.</p> <p>CDT 9.6.0 for Eclipse 2018-12</p> <p>Eclipse package: Eclipse C/C++ IDE for 2018-12.</p> <p>p2 software repository: http://download.eclipse.org/tools/cdt/releases/9.6</p>
DTP	<p>Browse to https://www.eclipse.org/datatools/downloads.php and find the DTP row for your Eclipse version. Click the update site link.</p>

**For
this
plugin**

Do this

The URL of the page that opens looks similar to this: <https://download.eclipse.org/datatools/updates/1.14.103-SNAPSHOT/repository/>

Record the URL in your list of plugin software repository sites.



EMF Add <http://download.eclipse.org/modeling/emf/updates/releases/> to your list of plugin software repository sites.

For details about the requirement for Eclipse version and software repository URL for **EMF**, browse to <https://www.eclipse.org/modeling/emf/>

GEF Add <http://download.eclipse.org/tools/gef/updates/releases> to your list of plugin software repository sites.

For details about the requirement for Eclipse version and software repository URL for **GEF**, browse to <https://projects.eclipse.org/projects/tools.gef>

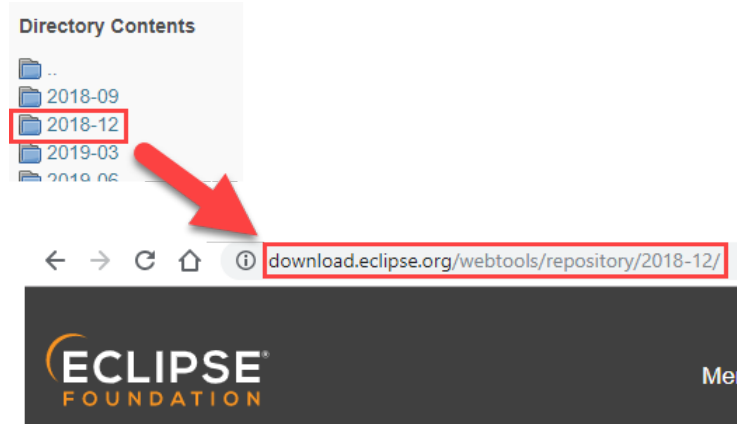
WTP Browse to <https://download.eclipse.org/webtools/repository/> and then find the directory for your Eclipse version. Click the directory link.

The URL for the resulting page looks similar to this: <https://download.eclipse.org/webtools/repository/2018-12/>

Record the URL in your list of plugin software repository sites.

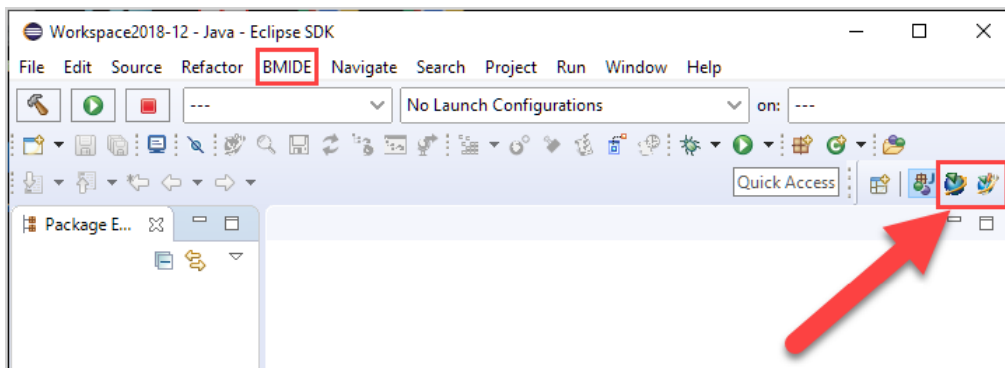
For
this
plugin

Do this



8. Launch Eclipse.
9. From the top menu bar, choose **Help>Install New Software**. Use the Eclipse software installation feature to add the CDT, DTP, GEF, EMF and WTP plugin software update sites and install all of the plugins. Refer to the list of plugin software update URLs you created in step 7.

After all the plugins are installed and you have restarted Eclipse, a **BMIDE** item appears on the top menu bar. Command buttons to open the BMIDE **Advanced** and **Standard** perspectives appear on the toolbar.



Allocate memory to the Business Modeler IDE

Allocate memory to the Business Modeler IDE so that it has enough to launch and run.

If you perform live updates, you must have a minimum of 2 GB of RAM on the system running the Business Modeler IDE to allow for other processes.

You can allocate memory in the following ways:

- **BusinessModelerIDE.ini** file

To increase the memory allocated to the Business Modeler IDE, open the *install-location\bmide\client\BusinessModelerIDE.ini* file and change the **-Xmx1024M** value to a higher number to allocate maximum Java heap size. For example, if you have 2 GB available to dedicate for this purpose, set the value to **-Xmx2048M**. Do this only if your machine has the available memory.

The **Xms** value in this file sets the initial Java heap size, and the **Xmx** value sets the maximum Java heap size.

- **BMIDE_SCRIPT_ARGS** environment variable

To allocate the memory required by scripts during installation, update, or load of templates with large data models, create a **BMIDE_SCRIPT_ARGS** environment variable. Set the **BMIDE_SCRIPT_ARGS** variable to **-Xmx1024M** to allocate 1 GB of RAM to the Business Modeler IDE scripts. If your system has more memory that you can allocate to the Business Modeler IDE, you can set the value higher.

If you are running the Business Modeler IDE in an Eclipse environment, run the following command to increase virtual memory to 2 GB:

```
eclipse.exe -vmargs -Xmx2048M
```

Caution:

Java standards require that no more than 25 percent of total RAM be allocated to virtual memory. If the amount allocated to the Business Modeler IDE is higher than 25 percent of total RAM, then memory disk swapping occurs, with possible performance degradation.

If you set the **Xmx** value to a higher value than the RAM your system has, you may get the following error when you launch the Business Modeler IDE:

```
Could not create the Java virtual machine.
```

Set the **Xmx** value to a setting that your system supports, in both the **BMIDE_SCRIPT_ARGS** environment variable and the **BusinessModelerIDE.ini** file.

Start the Business Modeler IDE

Start a Business Modeler IDE in one of several ways, depending on the installation type:

Installation type	Platform	Procedure to start Business Modeler IDE
BMIDE Standalone, 2-tier, or 4-tier	Windows	Click the Start button and choose All Programs>Teamcenter [version]>Business Modeler IDE . This runs the bmide.bat file.
	Linux	Run the bmide.sh file in the <i>install-location/bmide/client</i> directory.
Eclipse environment to which BMIDE plug-ins have been added	Windows	Navigate to the directory where Eclipse is installed and execute the Eclipse.exe command. <code>Eclipse.exe -vmargs -Xmx2024M</code>

Installation type	Platform	Procedure to start Business Modeler IDE
		To ensure that you have enough memory to run Eclipse, run the command with a virtual memory argument. In the example, the argument increases virtual memory to 2 GB.
	Linux	Navigate to the directory where Eclipse is installed and execute the Eclipse command. <code>Eclipse -vmargs -Xmx2024M</code>

For BMIDE operations that require connection to the Teamcenter server, users of the BMIDE must be members of the Teamcenter database administrators (**dba**) group. To add a user to the **dba** group, in the Teamcenter rich client use the Organization perspective.

If a perspective fails to open, it could be that not enough memory is allocated to the Business Modeler IDE.

Installing custom software

Installing a custom solution or third-party template

Use TEM to install custom templates you package using the Business Modeler IDE.

Install a template using TEM

After you package extensions, install the resulting template to a production environment using Teamcenter Environment Manager. You can also use this procedure to install a third-party template. You could also install a template using Deployment Center, or the **tem** command line utility with its `-install` argument.

1. Ensure that you have a good back up of the Teamcenter environment.
2. Copy the template files from the **packaging** directory on your Business Modeler IDE client to a directory that is accessible by the server.

By default, packaged template files are located in the Business Modeler IDE workspace directory in the folder under the project.

On Linux, users must have permissions to the workspace directory.

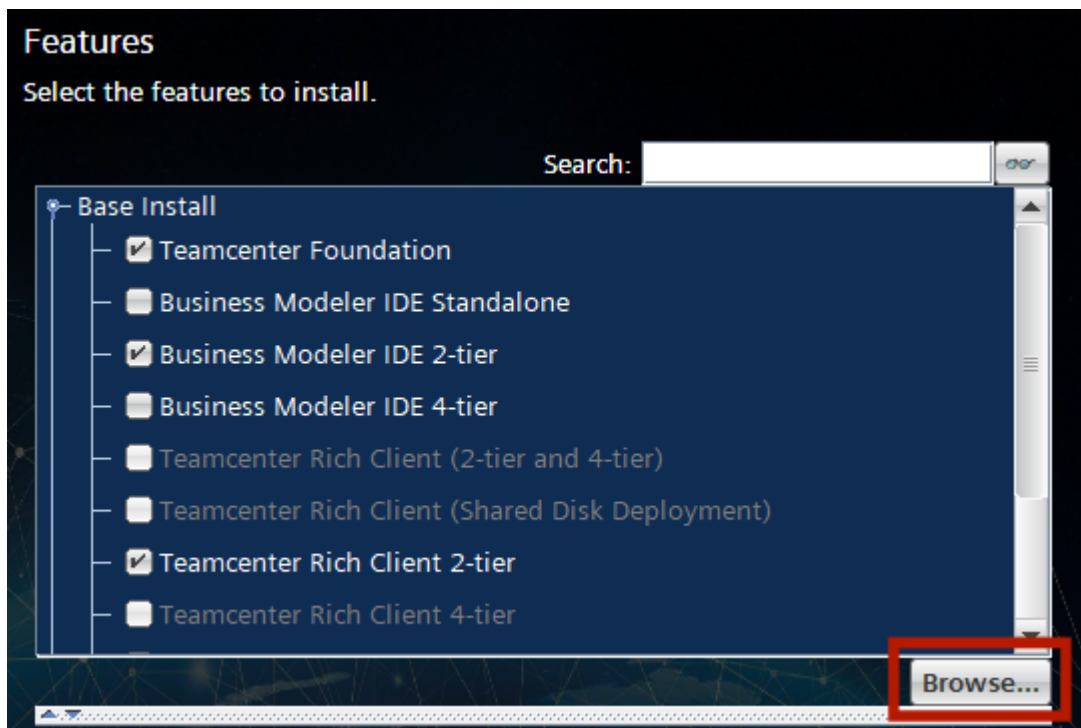
3. Start Teamcenter Environment Manager (TEM).
4. In the **Maintenance** panel, choose **Configuration Manager** and click **Next**.
5. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration** and click **Next**.

6. In the **Configuration** pane, select the configuration from which the corporate server was installed. Click **Next**.
7. In the **Feature Maintenance** panel, under the **Teamcenter** section, select **Add/Remove Features**. Click **Next**.

If you already installed a template to the database and want to update the template, under the **Teamcenter Foundation** section, select **Update the database**. This option should not be used to install a new template but only to update an already installed template.

Use the **Add/Update templates for working within the Business Modeler IDE client** option under **Business Modeler Templates** only if you want to add a dependent template to your Business Modeler IDE.

8. In the **Features** panel, click the **Browse** button beneath the features list on the right side of the panel.

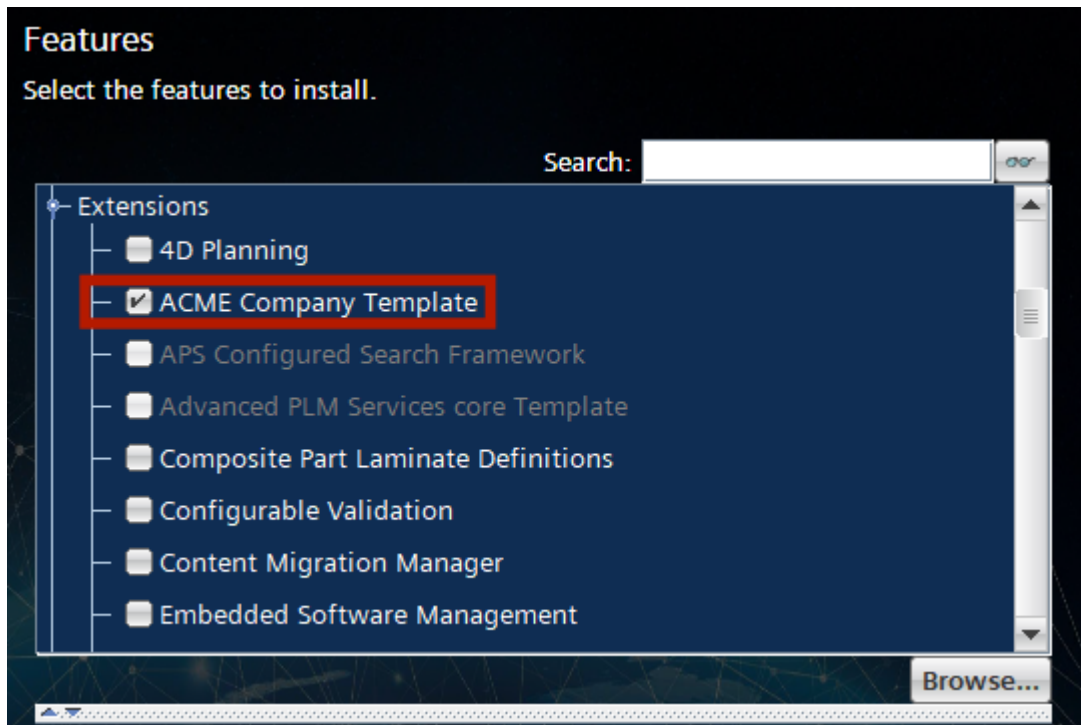


9. Browse to the directory where you have copied the template files. In the **Files of type** box, ensure that **Feature Files** is selected so that you see only the installable template (feature) file. Select your template's feature file (**feature_template-name.xml** in the **tem_contributions** directory) and click the **Select** button.

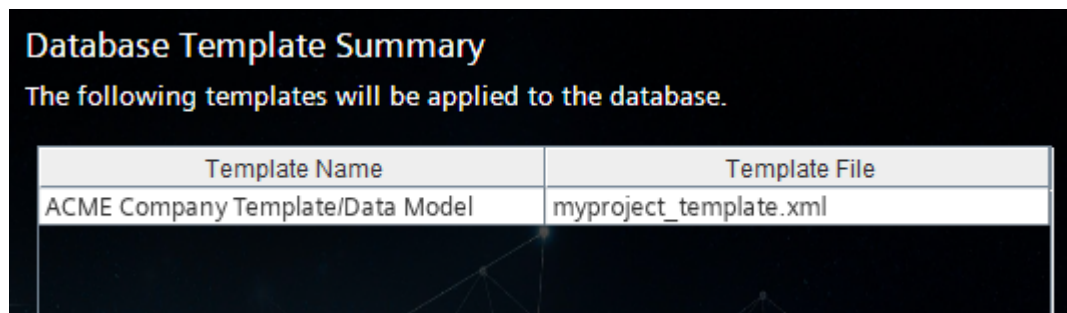
The template appears as a new feature under **Extensions** in the **Features** panel.

You can change the location of the feature in the **Features** panel and add a new group to place the feature under.

10. Select the new template in the **Features** panel. Click **Next**.



11. In the **Teamcenter Administrative User** panel, enter your user name and password to log on to the server. Click **Next**.
12. The **Database Template Summary** panel displays the list of templates that are installed as part of your template install. Click **Next**.



13. In the **Confirmation** panel, click **Start**. The new template is installed.

Note:

If the installation fails because of invalid data model, perform the following steps:

- a. Fix the incorrect data model and repackage the template.
- b. Locate the *template-name_template.zip* in your project's **packaging** directory and unzip it to a temporary location. Copy the following files to the server in the *TC_ROOT/install/template-name* folder:

```
template-name_template.xml
template-name_dependency.xml
template-name_tcbaseline.xml (if the file exists)
```

- c. Launch Teamcenter Environment Manager in the maintenance mode and continue with recovery.

14. To verify the installation of the new template, confirm that the *TC_DATA* directory on the Teamcenter server contains the new template files.

Also log on to the server and confirm that you can create instances of your new data model.

Note:

To have libraries read on the user system, the **TC_LIBRARY** environment variable must be set to the platform-specific shared library path. This environment variable is set to **LD_LIBRARY_PATH** on Linux systems. The platform is detected when the Teamcenter session is initiated.

Update a template using TEM

If you already installed a template as a new feature and want to update it because you have added more data model definitions to it, perform the following steps in the Teamcenter Environment Manager (TEM).

Note:

You can also update a template using the **tem** command line utility, for example.

```
tem -update -full -templates=template-name-1,template-name-2 -path=location-of-template-files
-pass=password
```

1. Ensure that you have a good back up of the Teamcenter environment.
2. Copy the packaged template files from the **packaging** directory on your Business Modeler IDE client to a directory that is accessible by the server.

By default, packaged template files are located in the Business Modeler IDE workspace directory in the folder under the project. .

3. Start Teamcenter Environment Manager (TEM).

4. In the **Maintenance** panel, choose **Configuration Manager** and click **Next**.
5. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration** and click **Next**.
6. The **Configuration** panel displays the installed configuration. Click **Next**.
7. In the **Feature Maintenance** panel, under the **Teamcenter Foundation** section, select **Update Database (Full Model - System Downtime Required)**. Click **Next**.

Note:

Use the **Add/Update Templates for working with the Business Modeler IDE Client** option under **Business Modeler** only if you want to add or update a dependent template to your Business Modeler IDE.


8. Click **Next**
9. In the **Teamcenter Administrative User** panel, enter your user name and password to log on to the server. Click **Next**.

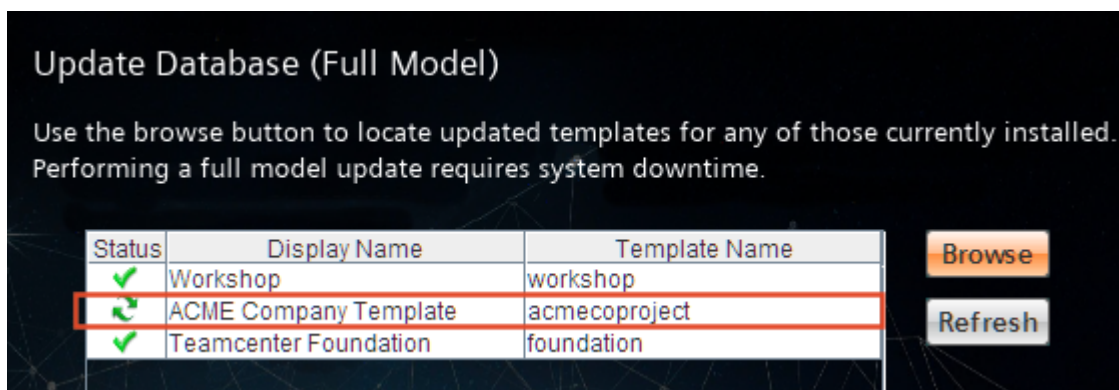
The **Update Database** panel displays currently installed templates.

10. Click the **Browse** button to navigate to the directory where the packaged template files are located. Select the updated **feature_template-name.xml** file.

Note:

If you are fixing a COTS template (for example, the Foundation template) using a new template file provided in a patch, you must copy the template's **feature_template-name.xml** and the **template-name_install.zip** files to the same temporary directory containing the new **template-name_template.zip** file.

The template displays a refreshed status icon .



11. Click **Next**.
12. In the **Confirmation** panel, click **Next**.

The new template is installed.

13. To verify the installation of the revised template, log on to the server and confirm that you can create instances of your new data model.

15. Installing the Security Services Session Agent

Install the Session Agent using the stand-alone installation wizard

The Security Services Session Agent replaces Java applets (session agent, session detector, and status reporter), making Security Services applet-free. Install the Session Agent on client machines to provide a single sign-on experience without Java applets.

1. Close all programs before you begin installing the Session Agent.
2. Copy Session Agent installation files to your Teamcenter client host.
 - a. In the Teamcenter software kit, change to the following location:

kit-location/additional_applications/sso

- b. Copy the following files to your Teamcenter client host:

```
install.bin  
TEAMCENTER_SSO_COMMON.zip  
TEAMCENTER_SSO_SESSIONAGENT.zip  
TEAMCENTER_SSO_SESSIONAGENT_COMPAT.zip
```

3. On your Teamcenter client host, type the **install.bin** command to launch the Session Agent installation program.
4. Choose a language for the installation wizard, and then click **OK**.¹
5. Proceed to the **License Agreement** dialog box, and select the check box to accept the terms of the license agreement.
6. In the **Choose Install Folder** dialog box, enter a destination folder for the installation.

If you accept the default path, the Session Agent automatically installs in a hidden folder.

On Windows systems, if you select a path in the **Program Files** folder, the location is available to any user logging onto the system.

7. Proceed to the **Compatibility Settings** panel.

¹ The list of available languages depends on your operating system locale. If the language you need is not in the list, change your operating system locale to the correct language and restart the installation wizard.

If you have Teamcenter client applications released with Teamcenter 13.2 or earlier that you are not yet updating, select the **Install XML-RPC libraries** check box. This option ensures Security Services compatibility with earlier Teamcenter versions.

8. In the **Pre-Installation Summary** dialog box, verify your selections, and then click **Install** to install the Session Agent.
9. If the installation is successful, a dialog window indicates the location where the Session Agent files were installed. Click **Done** to close the installation wizard.

On Windows systems, you can verify the installation of the Session Agent by locating **Teamcenter Security Services Session Agent** in the list of installed programs on the machine.

Configure the Session Agent

Sharing an instance of the Session Agent

A local administrator can install the Session Agent in a common location, and that instance can be shared among multiple users. If an administrator has already installed the Session Agent on your client, then set the **TCSO_SESSION_AGENT_PATH** user environment variable to the location of the Session Agent installation.

16. Verify Active Workspace installation

To verify the Active Workspace installation is complete and successful, open the Active Workspace URL in a web browser:

`http://host:port`

Replace *host* and *port* with the host and port of the Active Workspace Gateway.

For example:

`http://myhost:3000`

In the Active Workspace logon screen, enter the user name and password for the Teamcenter administrative account.

If installation is successful, the browser displays the Active Workspace client.

You can also verify the status of Active Workspace Gateway and services using the Active Workspace gateway ping:

`http://myhost:3000/ping`

17. Configure heterogeneous operating system environment

If you are adding Windows Teamcenter clients to a Linux Teamcenter environment, you must perform the following tasks:

1. Install Teamcenter and configure the database (Teamcenter application root and data directories) on a Windows system that can serve a common mount point for all Windows clients.

This allows the Windows and non-Windows Teamcenter clients to interoperate, particularly in volume management.

2. Synchronize the following files in the separate Teamcenter data directories:
 - POM schema files (*TC_DATA\pom_schema_server_sid*)
 - POM transmit files (*\pom_transmit*.sch*)
 - Dataset definition files (*TC_DATA\gs_info*.des*)
3. Make sure your Windows and Linux server configurations contain identical sets of Teamcenter features. For example, if you install features or custom templates on a Linux server, you must install the same features and templates on your Windows server.
4. Configure File Management System (FMS) on Linux and Windows volume servers.

Conversely, if you create a Teamcenter database by running the Teamcenter setup program from a Windows workstation, you must install Teamcenter on Linux clients you want to connect to the database.

18. Creating a custom distribution

Overview of custom distributions

Teamcenter supports the following custom distributions to simplify installation of Teamcenter on multiple hosts.

- Silent distribution

A *silent distribution* is an XML-based configuration file you can use to install Teamcenter *silently* (without user interaction) on another host. Silent installation suppresses most installation prompts and requires minimal user interaction. As an alternative to installing and configuring Teamcenter on individual hosts in your network, silent installation provides an efficient way to deploy Teamcenter on multiple hosts in your network.

The silent installation configuration file records the selections and values you enter during a Teamcenter installation and enables TEM to perform these steps noninteractively on other hosts. You can modify a silent configuration file to change certain Teamcenter settings before installation.

Silent distributions are supported for Teamcenter servers, two-tier rich clients, and four-tier rich clients.

- Compact distribution

A *compact distribution* is an installable package with a selected subset of Teamcenter client features. It is much smaller than a full Teamcenter software kit and is more easily distributed to multiple hosts in an organization.

A compact distribution is an alternative to installing Teamcenter from a full Teamcenter software kit. A compact deployable package can contain a selected subset of Teamcenter features rather than the entire set of features in the release. This reduces network loads and simplifies large-scale Teamcenter deployments by providing an installation package that is smaller and more easily distributed to an organization. For example, a two-tier rich client installation can be packaged in a deployable media as small as 580 MB, where a full Teamcenter distribution can require up to 5 GB. A four-tier rich client compact distribution can be as small as 283 MB, and a Client for Office compact distribution can be only 93 MB.

Compact distributions are supported for Teamcenter two-tier and four-tier rich clients.

Create a silent distribution

Create a silent installation configuration file

1. Log on to the Teamcenter corporate server host and change to the root directory of the Teamcenter software kit.

2. Start Teamcenter Environment Manager (**tem.sh**) from the Teamcenter software kit.
3. In the **Welcome to Teamcenter** panel, select **Teamcenter**.
4. In the **Install/Upgrade Options** panel, select the **Create custom distribution** check box, and then click **Install**.
5. In the **Custom Distribution Options** panel, select **Create silent configuration file**, and then specify the path to the silent installation file, for example, **silent.xml**. The specified path must be to an existing directory and the file name must end in **.xml**.
6. Proceed through the remaining panels to complete the Teamcenter installation.

Teamcenter Environment Manager creates the silent installation file you specified in step 5. This file records your settings and selections during the installation. You can use this file to silently install Teamcenter on another host with the same settings.

Teamcenter Environment Manager creates a silent installation file (**.xml**) and a decryption key file (**.dat**) with the name you specified in step 5, for example, **silent.xml** and **silent.dat**. To reproduce your installation on another host, copy *both* of these files to the target machine, then **install the rich client silently**.

Caution:

If you install a rich client silently using a compact distribution and your silent configuration file requires features not included in the compact distribution, the silent installation fails. To avoid this, make sure your silent configuration requires only features in the **compact distribution**, or install using a full Teamcenter software kit.

Launch a silent installation

To launch a **silent installation**, type the following command:

```
tem.sh -s file-name.xml
```

Replace *file-name* with the name of the silent installation configuration file.

After installation is complete, you can view a log of the installation in the **installxxx.log** file under the **install** directory in the Teamcenter application installation directory.

Note:

Before you launch the silent installation, make sure the prerequisite software is installed on the client machine. The silent installation script does not install the prerequisite software.

The rich client can be uninstalled only through the TEM interface. Silent uninstallation is not supported.

Modify the silent installation configuration file

The **silent installation configuration file** is XML-based. After creating the file and establishing the file structure using Teamcenter Environment Manager, you can change the installation by manually modifying the values of the XML elements described in the following table.

Caution:

Use an XML editor to ensure well-formed XML code. Do not change the XML structure of the file. If XML file structure is incorrect, or the XML code is not well-formed, installation fails.

Element	Description
features	Lists all the Teamcenter modules and features to be installed. These are selected on the Features panel of Teamcenter Environment Manager.
feature	Specifies one feature of a Teamcenter module. The code attribute identifies the feature. To define whether Teamcenter Environment Manager installs the feature, set the selected attribute to either true or false .
data	Lists all Teamcenter Environment Manager Java classes and values defining aspects of installation, such as the path to the installation directory for Teamcenter application files. For additional information, see the comments in the configuration file. The comments describe the class and valid values.

Sample silent installation configuration file

```

<?xml version="1.0" encoding="UTF-8"?>
<root>
<tem engine="2008.0.0" />
  <settings>
    <installDir value="C:\\Program Files\\Siemens\\Teamcenter2412" />
    <sourceDir value="D:\\kits\\tc2412\\win64" />
    <application value="tceng" />
    <silentMaintenance value="false" />
    <installingUser value="osuser" />
    <installLanguage value="ENGLISH" />
    <aboutFullVersion value="2412" />
    <version value="12000.1.0.20181207" />
  </settings>
  <sourceLocations>
    <coreLocations>
      <directory value="D:/kits/tc2412/win64" />
    </coreLocations>
    <browsedLocations />
  </sourceLocations>
  <config name="My Configuration 1" id="config1">
    <mode type="install" clone="false">
      <checkpoints>
        <checkpoint value="featureProperties">
          <point value="vcruntimes:vc2005,latest" />
          <point value="minMSSQL2005Version:10.50" />
          <point value="coreTemplate:foundation_template.xml" />
          <point value="feature_id:datamodel,rtserver" />
          <point value="vcruntimes:latest" />
          <point value="template_file:foundation_template.xml" />
          <point value="minDB2Version:9.7.4" />
          <point value="minOracleVersion:11.2.0.1" />
          <point value="template_name:foundation" />
          <point value="typeAnalysis:true" />
        </checkpoint>
      </checkpoints>
    </mode>
    <comments />
    <data>
      <adminUser guid="2E53CFC3AC75665E50FF0F207D1D013B">
        <password value="holrvvg6fpj40nGt7ZlCM2Q" encrypt="true" />
        <user value="tcdba" />
      </adminUser>
      <director guid="661AA2A766CA975D998EBE61455F3EA3">
        <saveStateOnFail value="true" />
        <status value="0" />
        <script>
          <temBase />
          <copyFeature name="Microsoft Visual C++ Runtimes"
feature="AOCF69C3A0BC61770EB81BD22667EA52" />
          <copyFeature name="Business Modeler IDE"
feature="A9CECD82127A11DB9804B622A1EF5492" />
          <copyFeature name="VC 2008 Redistributables"
feature="DPBL8RC6MUS0LCPS10NIPGR85RI7HPHQ" />
          <copyFeature name="Teamcenter File Services"
feature="BC76F9D1AB7C93A848D0FE3602F59097" />
          <copyFeature name="Flex License Server"

```

```

feature="D1d683A8B2CE1EB821B97CD2EE5D7627" />
  <copyFeature name="VC 2005 Redistributables"
feature="UDR4NG0DEZ1TN9XHKG7Z8AFDPVVTZXL2" />
  <copyFeature name="VC 2013 Redistributables"
feature="NJCMQH3ZMYTPPPGA8BS4Q1C7OV6IXVXU" />
  <copyFeature name="VC 2010 Redistributables"
feature="R08U30BA5KZYSNDFKMGXKKHWEYOVD7V" />
  <copyFeature name="VC 2012 Redistributables"
feature="Z9ICW073V9QXU4H5F8BK6CXG6KIFYWBQZ" />
  <copyFeature name="Business Modeler Templates"
feature="A909338A1CB411DB8AF6B622A1EF5492" />
  <copyFeature name="Digital Dashboard"
feature="A9CECD82127A11DB9804B622A1EF5599" />
  <copyFeature name="FMS Server Cache"
feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
  <copyFeature name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />
  <copyFeature name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804EFB0D2
010FD613" />
  <copyFeature name="Server Manager" feature="BF0E78AFE4280DCB08594EA2F3671BE8" />
.
.
.
  <unpack name="Microsoft Visual C++ Runtimes"
feature="A0CF69C3A0BC61770EB81BD22667EA52" />
  <unpack name="FMS Server Cache" feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
  <unpack name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />
  <unpack name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804EFB0D2010FD
613" />
  <preInstall name="Microsoft Visual C++ Runtimes"
feature="A0CF69C3A0BC61770EB81BD22667EA52" />
  <preInstall name="FMS Server Cache" feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
  <preInstall name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />
  <preInstall name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804EFB0D20
10FD613" />
  <install name="Microsoft Visual C++ Runtimes"
feature="A0CF69C3A0BC61770EB81BD22667EA52" />
  <install name="FMS Server Cache" feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
  <install name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />

  <install name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804EFB0D2010F
D613" />
  <postInstall name="Microsoft Visual C++ Runtimes"
feature="A0CF69C3A0BC61770EB81BD22667EA52" />
  <postInstall name="FMS Server Cache"
feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
  <postInstall name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />
  <postInstall name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804EFB0D2
010FD613" />

```

```

    <featureInstalled name="Microsoft Visual C++ Runtimes"
feature="A0CF69C3A0BC61770EB81BD22667EA5
    2" />
    <featureInstalled name="FMS Server Cache"
feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" />
    <featureInstalled name="Teamcenter Foundation"
feature="8C061DD51E13E0CB9DC4687B1A3348BE" />
    <featureInstalled name="NX Part Family Classification Integration"
feature="B176F6B6E9E91D9804E
    FB0D2010FD613" />
</script>
</director>
<FSCService guid="F2FCBCEC03DFF7F9D1E3A11EC9B64BD2">
  <fscReadCacheDir value="$HOME\\FSCCache" />
  <fscWriteCacheDir value="$HOME\\FSCCache" />
  <addToBootstrap value="true" />
  <fscReadCacheSize value="10" />
  <serverID value="FSC_tchost_osuser" />
  <log value="" />
  <fscWriteCacheSize value="10" />
</FSCService>
<FSCMasterSettings guid="EBC3422F77C6BF18FE0E3A821EFE1134">
  <masterModel value="Simple Model" />
</FSCMasterSettings>
<FscSiteImport guid="630BECF927EC742A748A97486D5868DA">
  <remoteSites value="" />
</FscSiteImport>
<tcdata guid="4500621E2BE24BF0DD6ABF31EBA01088">
  <serverHostLocation value="tchost" />
  <path value="C:\\Program Files\\Siemens\\tcdata" />
  <create value="true" />
  <shareName value="" />
  <dsmKeyPath value="" />
</tcdata>
<FSCServiceFCCDefaults guid="7311DC5E94724BED0DD7419FCDE055CF">
  <writeCacheSize value="1000" />
  <readCacheSize value="1000" />
  <cacheDirUnix value="/tmp/$USER/FCCCache" />
  <partialReadCacheSize value="3000" />
  <cacheDirWin value="$HOME\\FCCCache" />
</FSCServiceFCCDefaults>
<FccSite guid="35EE6A66B85467D5EDE5B3D91871EACE">
  <siteListString value="" />
</FccSite>
<FSCServiceConnections guid="E4BDA0B521CB10A49F0CE123C9F326F1">
  <connections value="http,4544,;" />
</FSCServiceConnections>
<OSUser guid="CA769D31FD7E122E5E509A0BBBD7E809">
  <password value="+rfq6mTJVSuqaYJixkwntg" encrypt="true" />
  <user value="DOMAIN\\osuser" />
</OSUser>
<flexClient guid="7221ECFBC9555CDF997FC3F575022761">
  <nX5String value="28000@flexhost" />
  <port value="27000" />
  <nX4String value="27000@flexhost" />
  <nX5Port value="28000" />
  <host value="flexhost" />
  <nX5Host value="flexhost" />
  <nX5CheckBox value="true" />
  <envServerString value="28000@flexhost" />

```

```

</flexClient>
<signatureCertificate guid="RRK3WTCSY4020QSZO90QFJWMISFAC2AX">
  <replaceCerts value="false" />
  <certificates value="" />
</signatureCertificate>
<foundationSettings guid="LHBY67ZYMYHSKED26FHDNDHFJTZD84I7">
  <templatesToBeInstalled value="" />
  <genClientCache value="generate all" />
  <genServCache value="" />
  <productionEnvironment value="true" />
  <requestMetaCacheRebuild value="true" />
  <enableGenServCache value="true" />
  <quickClone value="false" />
</foundationSettings>
<transientVolume guid="983980098FF188A8C4BF08E8168A32A8">
  <windowsVolume value="C:\\Temp\\transientVolume_tcdbuser" />
  <unixVolume value="/tmp/transientVolume_tcdbuser" />
</transientVolume>

<TcOracleSystem guid="1EF0859AC04962CBFA41C4C8C84499A1">
  <password value="WsRDrEfD0/4vnL00/mj2wA" encrypt="true" />
  <user value="system" />
  <tablespaces
value="tcdbuser_IDATA:90;tcdbuser_ILOG:5;tcdbuser_INDX:5;tcdbuser_TEMP:5;tcdbuser_MM
V:5" />
  <tablespacePath value="/db/oradata/tc/tcdbuser" />
</TcOracleSystem>
<security guid="ZUG630E2YRNFD1VY13KCEZM52XFJP45D">
  <adminDirectory value="$TC_ROOT\\security" />
</security>
<volume guid="1F16971107DE44C0C7827F800EE4AEF8">
  <port value="4544" />
  <fscModel value="Simple Model" />
  <location value="C:\\Program Files\\Siemens\\volume" />
  <name value="volume" />
  <hostName value="tchost" />
  <fscId value="FSC_tchost_osuser" />
</volume>
<TcOracleEngine guid="F4F7C0852B27D6E56B8C64BE77FFA14C">
  <port value="1521" />
  <createUser value="true" />
  <host value="dbhost" />
  <flush value="false" />
  <populate value="true" />
  <service value="tc" />
  <uTF8Enabled value="true" />
  <password value="AdxT7Jmz2/WbYF60/eqX9g" encrypt="true" />
  <user value="tcdbuser" />
  <create value="true" />
</TcOracleEngine>
</data>
<features>
  <add feature="A0CF69C3A0BC61770EB81BD22667EA52" name="Microsoft Visual C++
Runtimes" />
  <add feature="90C2A1C96F6A61FAB397AF88ABE4AAC1" name="FMS Server Cache" />
  <add feature="8C061DD51E13E0CB9DC4687B1A3348BE" name="Teamcenter Foundation" />
  <add feature="B176F6B6E9E91D9804EFB0D2010FD613" name="NX Part Family
Classification Integration"

```

```

    />
  </features>
</config>
<updateManager />
</root>

```

Create a compact distribution

Create a *compact distribution*, a Teamcenter installation package that contains selected features, using Teamcenter Environment Manager (TEM).

Compact distribution is recommended only for Teamcenter client configurations, not for servers.

1. Log on to the Teamcenter corporate server host and change to the root directory of the Teamcenter software kit.
2. Start TEM (**tem.sh**) from the Teamcenter software kit.
3. Proceed to the **Install/Upgrade Options** panel, select the **Create custom distribution** check box, and then click **Install**.
4. In the **Custom Distribution Options** panel, select **Create compact deployable media**. Enter the path in which to create the compact distribution and a file name for the package, for example, **temp/tc.zip**.

The specified path must be to an existing directory and the file name must end in **.zip**.

5. Proceed through the remaining panels to complete the Teamcenter installation.

TEM creates the compact distribution file you specified in step 4. You can use this file to install Teamcenter clients on other hosts.

Caution:

If you **create a silent installation** using a compact distribution and your silent configuration file requires features not included in the compact distribution, the silent installation fails. To avoid this, make sure your silent configuration requires only features in the compact distribution, or install using a full Teamcenter software kit.

Embedding Active Workspace in a high-security environment

In case the rich client host does not have an internet connection, an administrator can replace the distributed WV2R with a "Fixed" distribution to provide necessary support for Active Workspace functionality.

Functionality of Active Workspace when embedded in the rich client depends on the Microsoft Edge WebView2 Runtime (WV2R). The type of WV2R distributed with Teamcenter is Evergreen, which automatically provides regular platform updates and security patches through an internet connection.

Use the following procedure to configure the Fixed version of WebView2.

1. Download the Fixed version of the **WebView2 Runtime** package from the Microsoft site <https://developer.microsoft.com/microsoft-edge/webview2#download-section>.
2. Decompress the WebView2 Runtime package using the command-line command **expand {path to the package} -F:* {path to the destination folder}** or by using a decompression tool such as WinRAR.

Avoid decompressing through File Explorer. It may not generate the correct folder structure.

3. Include all the decompressed Fixed Version binaries in your app package for deployment on the target machine.
4. During your app's installation on the client machine, set the **org.eclipse.swt.browser.EdgeDir** system property to the location of the WebView2 destination folder.

Embedded Active Workspace user data location

The default location for the WV2R user data cache is **%LOCALAPPDATA%\richclient\ActiveWorkspaceBrowser**. If for some reason a different location for the user data cache is desired, set the **com.siemens.splm.browser.interop.AWDataDir** system property to the desired location.

Part IV: Maintain the Teamcenter Environment



Back up your environment after initial installation, and periodically for added security. Add applications and components to Teamcenter environments. Perform database maintenance.

19. Back up new installations

Siemens Digital Industries Software strongly recommends backing up new Teamcenter and Oracle installations before using them by performing the following actions:

Terminate Teamcenter sessions

1. Instruct all users to check in all Teamcenter business objects, and then close and log off of Teamcenter sessions, including **tcsrvr** processes.
2. Open a Teamcenter command prompt.
3. Use the **clearlocks** utility to check for nodes connected to the database:

```
$TC_ROOT/bin/clearlocks -node_names
```

4. Note the node names returned, and then type the following command for each node name returned:

```
$TC_ROOT/bin/clearlocks -assert_dead node-name
```

Replace *node-name* with a returned node name.

5. Stop all Teamcenter services, including FMS.

Back up existing Teamcenter data

Back up the following directories:

- The Teamcenter application root directory on each installed workstation
- The Teamcenter data directory for each configured database
- The Teamcenter volume directories for each configured database

These are the only directories affected by Teamcenter installation. If you created other directories that contain data used by your existing Teamcenter installation, such as a separate POM transmit schema directory, Siemens Digital Industries Software recommends that you back up these directories as a precautionary measure.

20. Choose a display language

The default language displayed is the one specified by your operating system locale settings. You can choose to override the default display language if required.

At each logon, you can choose between multiple languages, depending on your company's policy and installation. Choose a language in the logon dialog when you log on to Teamcenter.

Alternatively, you can specify the language in your browser preferences.

Your ability to set the language for the client depends on the character set encoding of the Teamcenter server host and also the character set encoding of the Teamcenter database.

To prevent mixed-language display after you change the client display language, clear your web browser cache. This prevents the interface from displaying in mixed languages.

You can also configure language display during Teamcenter installation.

21. Manage environments

Add or remove software in the repository

Add software to the Deployment Center repository or remove software you no longer need to free space on the software repository machine.

Add software kits into the repository

1. Download the software kits for the software versions that you want to deploy in your Teamcenter environment.
2. Unzip the software kits and copy the unzipped directories to the *software* subdirectory in one of your registered Deployment Center repository locations.
3. Log on to Deployment Center, and click **SOFTWARE REPOSITORIES**.

The **Software Repositories** page opens the **Active Media** tab of the repository and displays the **Software Media** table.

4. Check the list of software to verify that the software you added is included in the list. If the list does not update immediately, wait a few minutes for Deployment Center to finish scanning the repository.

If the software you added still does not appear in the list, verify that you placed the complete, unzipped software kit contents in the **software** directory.

If necessary, troubleshoot the Deployment Center repository service.


Remove obsolete software kits from the repository

When a software kit is no longer being used in a registered Teamcenter environment, you can remove it from the **Active Media** list.

1. Open the **Active Media** tab to display all the registered software kits. Click the software kit you want to remove.
2. Click **Remove** ⊖ on the command bar and confirm the deletion.

If the software is used by an environment, an error message explains that it can't be removed and which environments are using it.

If the software is not used and is free to be removed, the selected software is moved to the **Obsolete Media** tab. Deployment Center deletes the software and the software directory from the file system.

To complete the software kit removal from Deployment Center, click the **Obsolete Media** tab, select the software to remove, and then click **Remove**  on the command bar.

The repository scanner removes the software kit registration and removes the software from Deployment Center database. The selected software no longer appears in the **Obsolete Media** tab.

Create a configuration in TEM

When you installed Teamcenter executables using Teamcenter Environment Manager (TEM) from the software kit, you created the first configuration.

You can **modify features in an existing configuration**, or create an additional Teamcenter configuration in your existing TEM instance:


1. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.
2. In the **Maintenance** panel, choose **Configuration Manager**.
3. In the **Configuration Maintenance** panel, choose **Create new configuration**.
4. In the **Configuration** panel, type a description and unique ID for the new configuration.
5. In the **Solutions** panel, optionally select one or more solutions.

For a description of a solution, point to the solution name in TEM or see the **solutions reference**.

6. In the **Features** panel, select features to include in the configuration.

For a description of a feature, point to the feature name in TEM or see the **features reference**.

7. Proceed through the remaining panels in TEM, entering the required information for the features you selected.

For information about each panel, click the help button .

8. When TEM displays the **Confirmation** panel, click **Start** to begin installation.

Adding applications and components

Add applications

Applications contain administration data, software modules, and parameters that add specialized functionality to the Teamcenter environment.

Adding applications using TEM

1. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.
2. In the **Maintenance** panel, choose **Configuration Manager**.
3. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.
4. In the **Old Configuration** panel, select the configuration you want to modify.
5. In the **Feature Maintenance** panel, select **Add/Remove Features**.

Options in the **Feature Maintenance** panel vary depending on the features in your configuration.


6. In the **Features** panel, select applications to add to the configuration.

If an application has dependent components, you must first select those components to enable the application. Hover over the application name in the feature list to display the required components below the feature list. Find and select the required components to enable the desired application, and then select the application.

To find an application or component by name, enter a search string in the **Search** box in the **Features** panel, and then click the search button.

For information about an application, see the list of [Teamcenter features](#).

7. Proceed through the remaining panels in TEM, entering the required parameters for the applications you selected.

For information about each panel, click the help button .

8. When TEM displays the **Confirmation** panel, click **Start** to begin installation.

Can I remove an application after it is installed?

In TEM, you can attempt to remove an installed application from your configuration by deselecting its feature in the **Features** panel, and then proceeding through the remaining panels to update the configuration.

If you remove a feature that added data model objects to the Teamcenter database, the data model is *not* removed when you remove the feature. Relations and objects created using the removed feature persist in the database.

If no instances of the feature's data model objects were created in the database, you can attempt to remove the template.

Caution:

If you installed an application using Deployment Center, *do not* attempt to uninstall it using TEM. Deployment Center does not populate the uninstall information required by TEM. Uninstalling an application using TEM may not remove it in Deployment Center, or may cause inconsistencies in the environment in Deployment Center.

Add components

Components are the architectural pieces of Teamcenter, such as servers, services, and databases.

Adding components using TEM

In TEM, adding components involves the same steps as adding applications.

1. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.
2. In the **Maintenance** panel, choose **Configuration Manager**.
3. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.
4. In the **Old Configuration** panel, select the configuration you want to modify.
5. In the **Feature Maintenance** panel, select **Add/Remove Features**.

Options in the **Feature Maintenance** panel vary depending on the features in your configuration.


6. In the **Features** panel, select components to add to the configuration.

If a component has dependent components, you must first select those components to enable the desired component. Hover over the component name to display the required components, find and select the required components, then select the component.

To find a component by name, enter a search string in the **Search** box in the **Features** panel, and then click the search button.

For information about a component, see the list of [Teamcenter features](#).

7. Proceed through the remaining panels in TEM, entering the required parameters for the components you selected.

For information about each panel, click the help button .

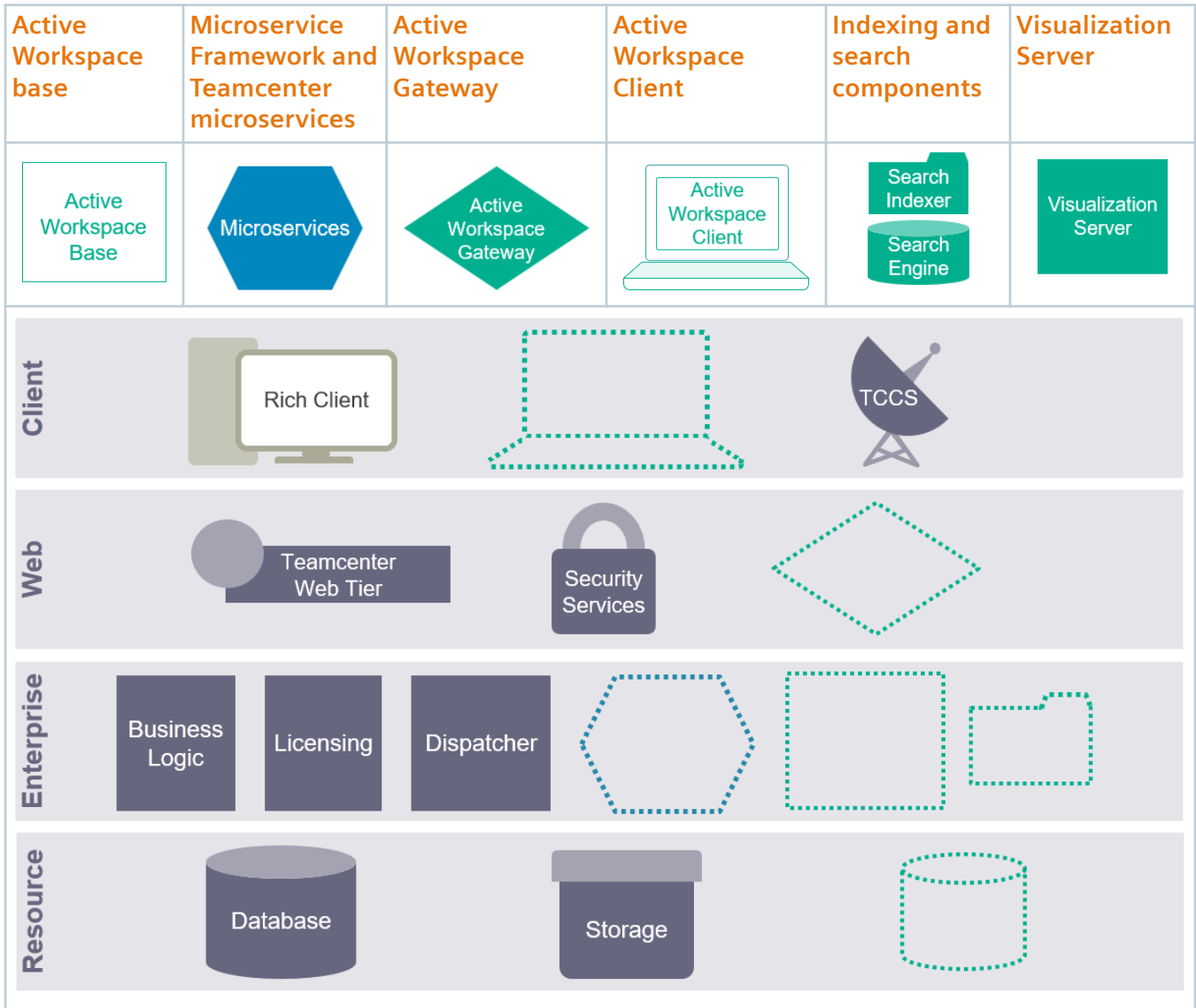
8. When TEM displays the **Confirmation** panel, click **Start** to begin installation.

Caution:

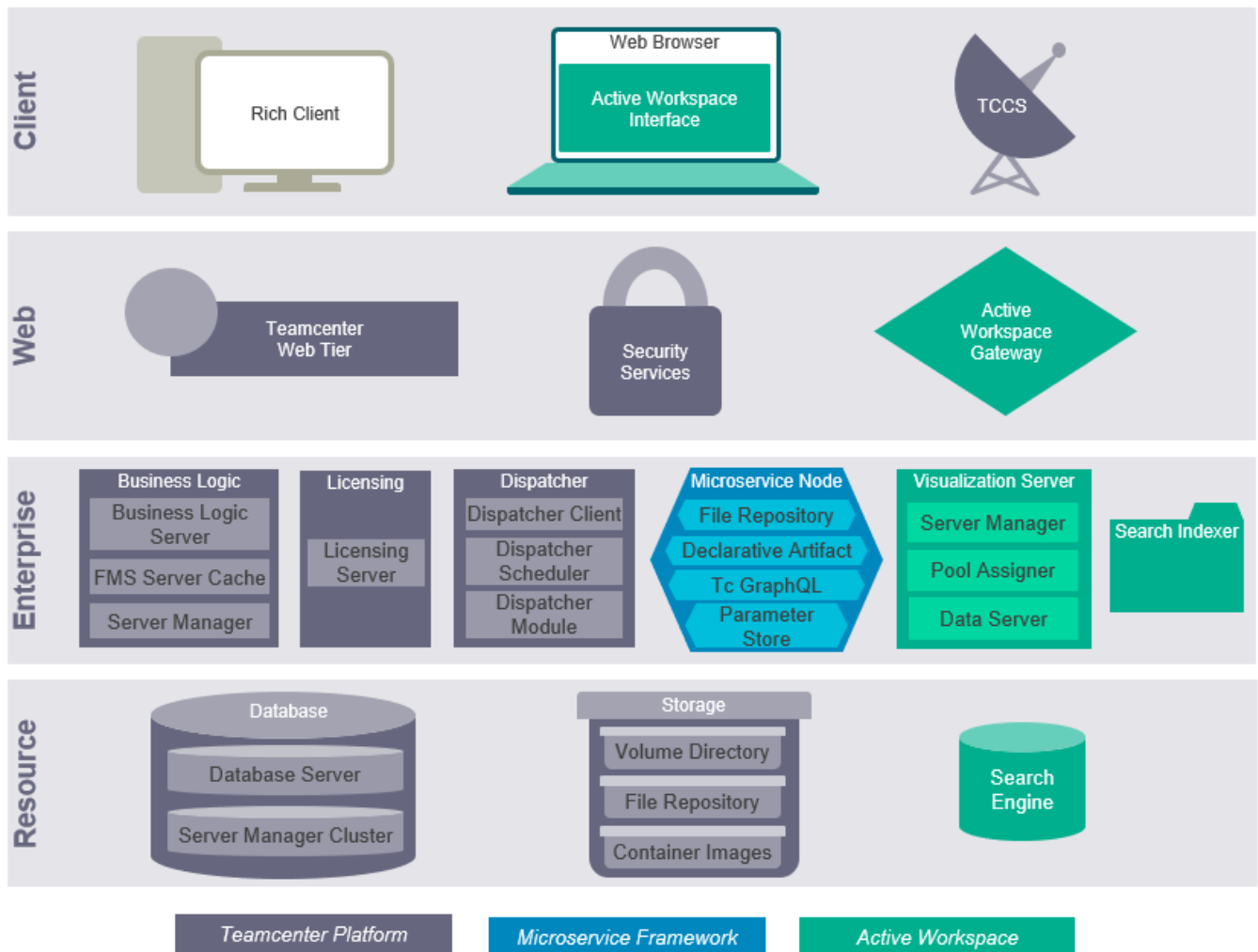
If you installed a component using Deployment Center, *do not* attempt to uninstall it using TEM. Deployment Center does not populate the uninstall information required by TEM. Uninstalling a component using TEM may not remove it in Deployment Center, or may cause inconsistencies in the environment in Deployment Center.

Adding Active Workspace to a Teamcenter environment

If you have an existing Teamcenter environment without Active Workspace components, you can add Active Workspace by installing the following Active Workspace and Microservice Framework components in your environment:



After you install components, **deploy the Teamcenter environment** to complete the installation of Active Workspace in your environment.



Install Active Workspace base

The Active Workspace base applications are a group of features selected by the **Active Workspace Server Extensions** solution in TEM.

1. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.
2. In the **Maintenance** panel, choose **Configuration Manager**.
3. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.


4. In the **Old Configuration** panel, select the configuration to which you want to add Active Workspace.
5. In the **Feature Maintenance** panel, select **Add/Remove Features**.

Options in the **Feature Maintenance** panel vary depending on the features in your configuration.

6. In the **Solutions** panel, select **Active Workspace Server Extensions**.
7. Proceed to the **Features** panel. Note that the **features that comprise the Active Workspace Server Extensions solution** are preselected.

For information about an application, see the list of **Teamcenter features**.

8. Proceed through the remaining panels in TEM, entering the required parameters for the Active Workspace Server Extensions features.

For information about each panel, click the help button .

9. When TEM displays the **Confirmation** panel, click **Start** to begin installation.

Install Active Workspace client

The Active Workspace base applications are a group of features selected by the **Active Workspace Client** solution in TEM.

1. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.

2. In the **Maintenance** panel, choose **Configuration Manager**.
3. In the **Configuration Maintenance** panel, choose **Perform maintenance on an existing configuration**.

4. In the **Old Configuration** panel, select the configuration to which you want to add Active Workspace.
5. In the **Feature Maintenance** panel, select **Add/Remove Features**.


Options in the **Feature Maintenance** panel vary depending on the features in your configuration.

6. In the **Solutions** panel, select **Active Workspace Client**.

7. Proceed to the **Features** panel. Note that the **features that comprise the Active Workspace Client solution** are preselected.

For information about an application, see the list of **Teamcenter features**.

8. Proceed through the remaining panels in TEM, entering the required parameters for the Active Workspace Client features.

For information about each panel, click the help button .

9. When TEM displays the **Confirmation** panel, click **Start** to begin installation.

Migrate TEM to a different JRE

The Java Runtime Environment (JRE) used by Teamcenter and Teamcenter Environment Manager (TEM) is set by TEM during Teamcenter installation. If you upgrade or install a new JRE, you must migrate Teamcenter to the new JRE using TEM.

Caution:

Do not remove your previous JRE until after you complete migrating Teamcenter to the new JRE. If you removed your old JRE before performing this procedure, **problems or error messages may occur**, and TEM fails to start.

To change the JRE used by Teamcenter and TEM, perform the following steps.

1. If you changed the password for the Teamcenter administrative user after you installed the FMS server cache (FSC) service, update the logon credentials for the FSC service to specify the current password.
2. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for the Teamcenter installation or configuration you want to modify.
 - b. Run the **tem.sh** script.
3. In the **Maintenance** panel, select **Migrate Teamcenter to another JRE** and then click **Next**.
4. The **Migrate Teamcenter to another JRE** panel lists Teamcenter services that depend on the JRE and must be shut down before the migration can begin.

After you make sure these services are shut down, select **All features from the above list have been shut down**, and then click **Next**.

5. In the **JRE Location** panel, enter the path to the JRE you want Teamcenter to use.

Depending on the features in your configuration, TEM may prompt you for the operating system user password.

Caution:

Make sure you specify a 64-bit JRE.

6. In the **Confirmation** panel, click **Start** to migrate Teamcenter to the specified JRE.

If you encounter problems migrating Teamcenter to the new JRE, see the available [troubleshooting solutions](#).

22. Manage databases

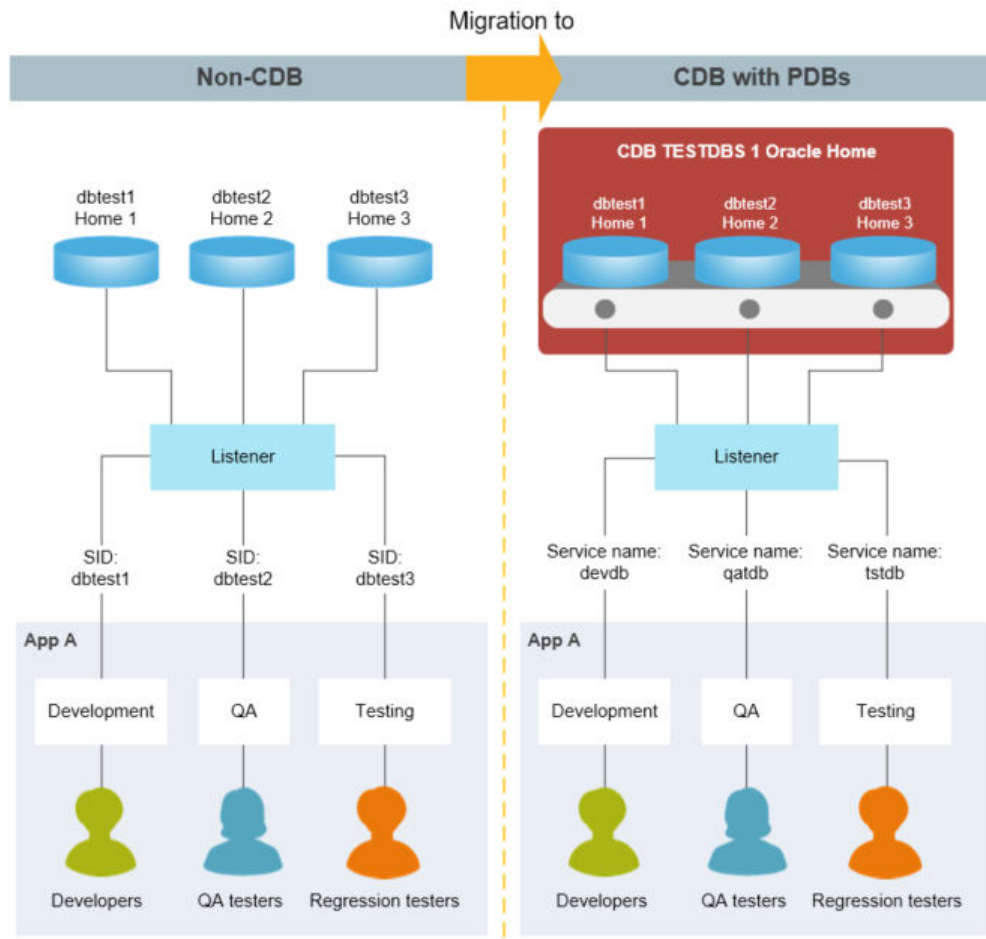
Migrate a non-CDB database to a CDB database

Teamcenter supports Oracle's **multitenant database architecture** if you use Oracle 12c or later. A multitenant architecture is deployed as a Container Database (CDB) with one or more Pluggable Databases (PDB).

A *Container Database* (CDB) is similar to a conventional (non-CDB) Oracle database, with familiar concepts like control files, data files, undo, temp files, redo logs, and so on. It also houses the data dictionary for objects owned by the root container and those that are visible to databases in the container.

A *Pluggable Database* (PDB) contains information specific to the database itself, relying on the container database for its control files, redo logs and so on. The PDB contains data files and temp files for its own objects, plus its own data dictionary that contains information about objects specific to the PDB. From Oracle 12.2 onward a PDB can and should have a local undo tablespace.

You can **migrate a non-CDB database to a CDB database** using Oracle tools. The following example illustrates the database architectures before and after migration.



Teamcenter supports CDB and non-CDB databases. Be aware that **Oracle has deprecated support for non-CDB databases** and may discontinue support after Oracle 19c.

If you migrate a non-CDB Teamcenter database to a CDB database, you must perform the migration *after* you upgrade to Teamcenter 2412.

Add an existing Teamcenter database using TEM

You can add a Teamcenter database to an installation by creating a configuration that references an existing Teamcenter data directory and its configured database. A data directory is associated with one (and only one) database instance.

1. In the **install** directory of the Teamcenter application root directory of the configuration, type the **tem.sh** program to start Teamcenter Environment Manager (TEM).
2. In the **Configuration Maintenance** panel, select **Add new configuration**.
3. In the **Configuration** panel, enter a description of and unique ID for the configuration you are creating.

4. Proceed to the **Features** panel. Select the **Teamcenter Foundation** feature only and specify an installation directory for the new configuration the **Installation Directory** box. The installation directory must not already exist on your system. (TEM creates the directory.)
5. In the **Foundation** panel, select **Use populated database and existing data directory** and enter the full path to the existing data directory in the **Data Directory Location** box.
6. In the **Data Directory** box, enter a location for the Teamcenter data directory. The directory must exist.

The Teamcenter data directory is called the `TC_DATA` directory. This value is stored in the `TC_DATA` environment variable on your system. TEM creates shared data subdirectories and files in this location.

Do not set `TC_DATA` in the system environment. TEM sets this variable as required in various scripts. Setting this variable in the operating system can cause conflicts if you install more than one configuration.

7. In the **Teamcenter Administrative User** panel, enter the password for the Teamcenter administrator.

Caution:

The password must not be empty nor contain any whitespace characters such as space, tab, newline, carriage return, form feed, or vertical tab.

In addition, the password must not contain any of the following characters:

`! # @ $ % = & ' " ^ : ; . _ < > () { }`

8. In the **Confirmation** panel, review your selections and click **Start** to add the database.

Add a new database using TEM

You can simultaneously configure a Teamcenter database and add it to an installation by creating a new configuration. Because you are configuring a database, you must also install and configure File Management System and create a data directory.

Prerequisites:

- **A database server must be installed** (Microsoft SQL Server or Oracle).
- A database instance must exist, either a specific instance configured for Teamcenter or a multipurpose instance to be configured in this procedure.

1. In the **install** directory of the Teamcenter application root directory of the configuration, type the **tem.sh** program to start Teamcenter Environment Manager (TEM).

2. In the **Configuration Maintenance** panel, select **Add new configuration**.
3. In the **Configuration** panel, enter a description of and unique ID for the configuration you are creating.
4. Proceed to the **Features** panel. Select the **Teamcenter Foundation** feature only and specify an installation directory for the new configuration the **Installation Directory** box. The installation directory must not already exist on your system. (TEM creates the directory.)
5. In the **Foundation** panel, select **Create new data directory using existing populated database**.
6. In the **Foundation Database** panel, enter access information for the existing database.

In the **Data Directory** box, enter a location for the Teamcenter data directory. The directory must exist.

The Teamcenter data directory is called the *TC_DATA* directory. This value is stored in the *TC_DATA* environment variable on your system. TEM creates shared data subdirectories and files in this location.

Do not set *TC_DATA* in the system environment. TEM sets this variable as required in various scripts. Setting this variable in the operating system can cause conflicts if you install more than one configuration.

7. In the **Teamcenter Administrative User** panel, enter the password for the Teamcenter administrator.

Caution:

The password must not be empty nor contain any whitespace characters such as space, tab, newline, carriage return, form feed, or vertical tab.

In addition, the password must not contain any of the following characters:

`! # @ $ % = & ' " ^ : ; . _ < > () { }`

8. In the **Confirmation** panel, review your selections and click **Start** to add the database.

Change the Oracle password

If you use an Oracle database and want to change the password Teamcenter uses to connect to the database, you can do this two ways using the **install** utility:

- **Encrypt the password file** using the **-encryptpwf** argument.
- **Encrypt the database connection string** using the **-encrypt** argument.

Encrypt the password file

To encrypt a password file, you set a temporary environment variable to the password you want to encrypt, and then generate an encrypted password file using the **-encryptpwf** argument for the **install** utility.

1. Open a Teamcenter command prompt.
2. Create a temporary environment variable and set it to the password you want to encrypt:

```
set variable-name=password
```

For example:

```
set temp_pw=mypassword
```

For security, choose a unique and obscure name for the environment variable, and delete the variable promptly after completing this procedure.

3. Type the following command:

```
install -encryptpwf -e=variable-name -f=password-file
```

Replace *variable-name* with the name of the environment variable you created. Replace *password-file* with the path and name of the password file to create. For example:

```
install -encryptpwf -e=temp_pw -f=pwd.txt
```

This command generates an encrypted password file that can be used for connecting to the Teamcenter database. The password file can also be used with Teamcenter utilities that use the password file (**-pf**) argument.

4. Delete the temporary environment variable you created in step 2.

Caution:

This step is important for security.

Encrypt the database connection string

To encrypt the database connection string, you must temporarily set the **TC_DB_CONNECT** environment variable and then re-encrypt the connection string using the **-encrypt** argument for the **install** utility.

1. Open a Teamcenter command prompt.
2. Set the **TC_DB_CONNECT** environment variable:

```
set TC_DB_CONNECT="db-user:password@database-ID"
```

Replace *db-user* with the database user name (the Oracle user). Replace *password* with the new database password. Replace *database-ID* with the Oracle database name.

3. Type the following command:

```
install -encrypt
```

This command generates a new database connection string with the new Oracle password encrypted. Copy the new database connection string.

4. Open the *TC_DATA/tc_profilevars* file in a plain text editor.
5. Locate the following line in the file:

```
set TC_DB_CONNECT=connection-string
```

6. Replace the existing *connection-string* with the string generated by the **install -encrypt** command.
7. Save the changes to the **tc_profilevars** file.

Part V: Appendices

Supplemental procedures and references for installing Teamcenter and Active Workspace.

23. Troubleshooting

Troubleshooting Teamcenter server installation

Installation log files

Teamcenter Environment Manager generates files in the **install** directory under the Teamcenter application root directory.

- **installdate-time_configuration-ID.log**

Teamcenter Environment Manager generates a log file for each installation and configuration you create. The log file contains a record of activities performed by Teamcenter Environment Manager. Keep these files to maintain a complete history for troubleshooting purposes.

- **configuration.xml**

This file contains a record of the Teamcenter installation. Teamcenter Environment Manager uses the configuration file to enable you to maintain the installation, including adding and removing components, patching installations, and upgrading installations.

Caution:

Do not remove the **configuration.xml** file. Removing the **configuration.xml** file results in the inability to modify the installation using Teamcenter Environment Manager.

- **uninstall.xml**

This file contains a record of the Teamcenter uninstallation.

In addition, auxiliary programs called by Teamcenter Environment Manager generate files in the **logs** directory under the Teamcenter application root directory. Most files have the format:

program-name.syslog
program-name.log

Of these files, the system log (**.syslog**) files usually contain the most relevant error data.

Problems/error messages

See the following information for help resolving errors encountered during Teamcenter installation.

Problem/error message	Possible cause	Solution
<p>Siemens License Server reports an error similar to the following:</p> <pre>Cannot find license file.</pre>	<p>Make sure the SPLM_LICENSE_SERVER system environment variable contains the correct port and host name of the Siemens License Server, for example, 29000@myhost.</p>	<p>If a path in the CLASSPATH environment variable contains whitespace characters, those paths must be enclosed in double quotes (""). For example:</p> <pre>"C:\Program Files\Microsoft\Web Platform Installer";D:\TcSE\apache-ant-1.9.4\bin</pre>
<p>Teamcenter Environment Manager (TEM) cannot connect to the Microsoft SQL Server database.</p>	<p>If your Microsoft SQL Server database uses a named instance and the Server Browser service is not running on the database host, TEM cannot verify the connection to the database.</p>	<p>Make sure the Server Browser service is running on the database host.</p>
<p>During an installation or upgrade, the FMS server cache (FSC) reports a startup failure with a message similar to the following:</p> <pre>Installation interrupted due to the following reason: Processing <upgrade> of feature FMS Server Cache failed: FSC service failed to start with an error 1</pre>	<p>Another service on the same host was running on the same port that the FSC is configured to use. This causes a fatal error to the FSC and the FSC startup log shows a bind exception on the port.</p> <p>Some services, such as JBoss, allow the FSC to bind to its port, resulting in failure of the FSC to start, but no errors in the FSC log.</p>	<p>Change the FSC settings to use a different port.</p>
<p>However, the FSC startup log shows no errors and indicates the FSC is left running.</p>		
<pre><<null>>\\<<null>> on host host-name does not have administrator privileges</pre>	<p>This error most likely indicates you attempted to start Teamcenter Environment Manager using the Windows runas command or the Run as menu command. Teamcenter</p>	<p>Start Teamcenter Environment Manager as a user logged onto the system with Administrator group privileges and the Log on as a service right.</p>

Problem/error message	Possible cause	Solution
	Environment Manager cannot be started as a user other than the user logged on to the operating system.	
Client credential too weak	<p>This problem can occur on SUSE Linux 11 when executing the following ODS startup command:</p> <pre>/ods -u=Tc-admin-user -p=Tc-admin-pw -g=dba</pre> <p>The command shell displays the following error:</p> <pre>Cannot register service: RPC: Authentication error; why = Client credential too weak pid = 31635, unable to register (ODSPROG = 536875585, ODSVERS = 1)</pre> <p>This problem can also occur when the idsminetd program is used for custom Multi-Site configuration.</p>	<p>Restart the remote procedure call (RPC) portmapper service (rpcbind) with the following options:</p> <pre>kill -15 rpcbind-process rpcbind -i -w</pre> <p>Alternatively, you can set the rpcbind startup scripts to always run with the -i option. The /etc/sysconfig/rpcbind file controls this on SUSE Linux. This may vary on other Linux variants.</p>

Update Manager FTP errors

The following table describes errors that can occur while connecting to the update server or while downloading updates.

Error	Resolution
Cannot contact server	Host or port may be incorrect. Check Host and Port values and try again.
Cannot log on	User name or password may be incorrect. Check User and Password values and try again.
Incorrect Path	Path to the directory on the update server may be incorrect. Check the path and try again.

Error	Resolution
Timeout Error	The update manager received no response from the update server. Try connecting later or contact your system administrator for assistance.
Transfer Error	Contact with the update server was interrupted. Try your operation again or contact your system administrator for assistance.

Resolving web tier connection problems

Diagnosing web tier connection problems

If the Teamcenter web tier and the corporate server do not reference the same web application name, the web tier cannot connect to the Teamcenter server.

The web application name specified in the Teamcenter web tier must match the web application name specified on the corporate server.

During installation of the Teamcenter corporate server, you specify this value in the **Web Application Name** box in the **Default Site Web Server** panel of Teamcenter Environment Manager. The default web application name is **tc**.

During installation of the Teamcenter web tier, the Web Application Manager assigns the web application the default name of **tc**.

If you specify a web application name other than **tc** during corporate server installation, you must change the corresponding value during web tier installation. If the web tier and the corporate server do not reference the same web application name, the web tier cannot connect to the Teamcenter server.

To ensure the web tier and the corporate server reference the same web application name, perform one of the following procedures:

Change the deployable file name on the corporate server

Change the deployable file name on the web tier

Change the deployable file name on the corporate server

Using Teamcenter on a two-tier rich client host, set the **WEB_default_site_deployed_app_name** preference to reflect the deployable file name specified in Web Application Manager. (Alternatively, you can set this preference using the **preferences_manager** utility from a command prompt.)

Change the deployable file name on the web tier

1. In Web Application Manager, select your web application and click **Modify**.

2. In the **Modify Web Application** dialog box, click **Modify Web Application Information**.
3. Change the value in the **Deployable File Name** box to reflect the web application name you entered during corporate server installation.
4. Click **Generate Deployable File** to rebuild your web application.
5. Deploy the rebuilt web application on your web application server.

Java exception errors during command-line updates

When making updates in TEM through the command-line interface, such as adding Teamcenter features or data model update operations, certain Java exception errors may occur.

TEM performs error checking when processing command line parameters and exits quickly if it detects an error such as an invalid parameter setting. In such cases, a Java exception error similar to the following may occur:

```
Data model update
  Loading features from path
  Type: FULL
  Configuration: TEMFLOW1
  Verifying password
  Unable to locate:
    alpha_template.zip Exception while removing reference:
java.lang.InterruptedExce
  java.lang.InterruptedExce
  java.lang.ref.ReferenceQueue.remove(ReferenceQueue.java:118) at
  java.lang.ref.ReferenceQueue.remove(ReferenceQueue.java:134) at
  sun.java2d.Disposer.run(Disposer.java:125) at
java.lang.Thread.run(Thread.java:619)
```

These types of Java exception errors are not a cause for concern because TEM begins shutting down when a problem is detected, *before* any data model updates are performed. These errors occur while threads are closing. In the above example, the **java.lang.InterruptedExce** error occurs because the main Java thread begins to exit while the Swing (GUI) thread is waiting to close.

Web Application Manager needs location of Java file when installing rich client

Under certain circumstances, the Web Application Manager does not find the Java **jakarta-regexp-1.3.jar** file required to install the four-tier rich client.

To resolve this problem, make the **jakarta-regexp-1.3.jar** file available to the Web Application Manager.

1. Locate the **bmide/compressed_files** directory in the Teamcenter software kit.
2. Expand the **bmide.zip** file to a temporary directory. (This file contains the **jakarta-regexp-1.3.jar** file.)

3. Add the temporary directory to the list of **Disk Locations for Install Images** in the Web Application Manager.
4. Build your web application WAR file using the Web Application Manager.
5. Deploy your WAR file.

Troubleshooting microservices

Problem/error message	Possible cause	Solution
404 error for a microservice request with the Service Dispatcher logging a message that the HTTP header is too large.	In a deployment with a load balancer configured, due to the addition of large cookies by the load balancer, some requests exceed the limit for the header size.	Create a CUSTOM_REQUEST_BUFFER_SIZE environment variable and set its value higher than the default microservice service dispatcher request buffer size of 8192 (8 KB), and then restart the service dispatcher.

Troubleshooting four-tier architecture deployment

Identify the problem you encountered in your four-tier rich client architecture and perform the solution described.

Problem	Solution
Cleaning FIFO entries in /tmp/tctp disables server manager, MUX, and TcServer processes.	<p>On Linux hosts, if the server manager is running when the /tmp directory is cleaned up by deleting its entries, Teamcenter Transfer Protocol (TCTP) is disabled. Running TcServers cannot accept new requests. The server manager no longer accepts server ready health notifications, so new servers are not published, and new user sessions will get a "no servers available" error.</p> <p>In some customer environments and some operating systems, including Redhat Linux, the /tmp directory may be automatically cleaned up periodically at a time other than boot time, particularly files that have not been used recently. Also, the /tmp directory may be mapped to memory, and need to be cleaned up often. See the tmpwatch command, which is often run as a cron job.</p> <p>To configure the location of the TCTP FIFO entries to a directory not monitored by tmpwatch, set the TC_PIPE_NAME_PREFIX</p>

Problem	Solution
	environment variable to the location of the FIFO entries, to avoid locations that are automatically cleaned.
Out-of-memory error during a call to <code>getAttrMappingsForDatasetType</code>	If you use WebSphere and this occurs when launching NX from the rich client, you must modify the JVM arguments in WebSphere to increase memory allocation.
Error messages about the server manager pool ID	These messages indicate that the pool ID is in use by another server manager in the cluster. Either place the server managers in different clusters or configure a distinct pool ID.
Configuration is correct, but run-time errors occur	<p>Determine from logs whether users are frequently losing a server due to the server timing out and are then having a new server assigned.</p> <p>Server startup can consume a great amount of CPU. Consider increasing timeout values and/or the pool size.</p>
<p>Teamcenter web application fails to deploy on JBoss (WildFly) with the following error message:</p> <pre>Did not receive a response to the deployment operation within the allowed timeout period [60 seconds]. Check the server configuration file and the server logs to find more about the status of the deployment.</pre>	<p>The Teamcenter web application takes longer than the default 60 seconds the JBoss (WildFly) deployment scanner allows for deployments. Add the deployment-timeout attribute to the deployment-scanner element and set the value to at least 600 seconds before attempting to deploy the web application.</p> <pre><subsystem xmlns="urn:jboss:domain:deployment-scanner:1.1"> <deployment-scanner path="deployments" relative-to="jboss.server.base.dir" s scan-interval="5000" deployment-timeout="600"/> </pre>
Long running service request that crosses firewalls or proxy servers results in closed connections.	<p>If a user is performing a time-consuming action such as running a large BOM expansion, the server may not respond for 15 minutes or more. When this happens across a firewall, or other proxies, the firewall might automatically close the perceived idle connection. This results in a closed connection in the client application and loss of data.</p> <p>To avoid exceeding these idle connection time limits, enable TCP keepalive functionality in the operating system (OS) of at least one of the machines on the client or server side of the each of the HTTP connections between the client applications and the Teamcenter server.</p> <p>For example:</p> <ul style="list-style-type: none"> If a client machine connects to web tier machine, enable TCP keepalive in the OS of the machine where the web tier server runs. This supports both the HTTP connection between client applications and the web tier, and the HTTP connection between the web tier and the Teamcenter server (Server Manager/MUX).

Problem	Solution
	<ul style="list-style-type: none"> If you use a reverse proxy server between a client machine and the web tier machine, enable TCP keepalive in the OS of the machine where the reverse proxy runs. <p>If your network configuration requires you to <i>not</i> enable TCP keepalive on the TCP endpoint (such as a proxy server), you must enable keepalive in the OS on each <i>client</i> machine.</p> <p>On Windows machines, enable TCP keepalive by setting the appropriate Windows registry keys. On Linux machines, set TCP keepalive using kernel parameters. See your operating system documentation for information on how to enable TCP keepalive.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>Note:</p> <p>TCP keepalive is enabled in Teamcenter client and web tier software by default, and only requires TCP keepalive in the OS of affected hosts to be enabled.</p> <p>Alternatively, if you do not want to enable TCP keepalive, you can increase the timeout setting in the firewall to allow requests to complete.</p> </div>

Troubleshooting Oracle

Finding Oracle errors

When Oracle detects an error, an error code is displayed in the system console window and written to the Teamcenter trace and log files. To assist troubleshooting, Oracle embeds object names, numbers, and character strings in error messages.

The **oerr** utility provides additional troubleshooting information. Often, the additional information offers a solution to the problem.

View additional information about an Oracle error message

1. Manually set the Oracle environment by entering the following command:

```
export ORACLE_HOME=/u01/app/oracle/product/oracle-version
```

Replace *oracle-version* with the installed Oracle version, for example, **920**.

2. Enter the following command:

```
$ORACLE_HOME/bin/oerr facility error-number
```

Replace *facility error-number* with the Oracle error code, for example **ORA 7300**. ORA is the facility and 7300 is the error number.

This command displays cause and action messages that you can use to troubleshoot the problem.

Troubleshooting Microsoft SQL Server

Microsoft SQL Server 2014 performance is poor

If you migrate a database application to Microsoft SQL Server 2014 from a previous version, the database server may consume excessive CPU resources and cause poor performance.

To correct this problem, change the SQL Server 2014 Compatibility Level setting from SQL Server 2014 (120) to SQL Server 2012 (110).

For more information about this issue, see the following Microsoft support article:

<https://msdn.microsoft.com>

Teamcenter update fails with ODBC error

When upgrading a Microsoft SQL Server server, an error similar to the following can occur:

```
+++++
ODBC error. SQLSTATE: 42000 Native error: 5074
Message: [Microsoft][ODBC SQL Server Driver][SQL Server]The column '***'
is
dependent on column '***'.
ODBC error. SQLSTATE: 42000 Native error: 4922
Message: [Microsoft][ODBC SQL Server Driver][SQL Server]ALTER TABLE
ALTER COLUMN
<name> failed because one or more objects access this column.
+++++
```

This error occurs when the upgrade process attempts to modify a column that has a dependent column with an index. Microsoft SQL Server does not allow changes to columns with indexes. Also, local DBA indexes may exist that don't match the standard OOTB template for indexes, so it was not anticipated.

This problem can happen because columns that have manually-created statistics attached cannot have their properties modified without first dropping the statistics object. This to ensure the statistics object accurately reflects the content of the column. Manual creation of statistics objects is important to ensuring query performance if you set `AUTO_CREATE_STATISTICS = OFF`.

An auto-created statistics object does not prevent a modify action to a column because auto-created statistics objects can be removed automatically. But, if the system encounters a manually-created statistics object, it cannot be removed automatically, and may result in an access error.

To resolve this problem, perform the following steps:

1. Delete the index *******.
2. Delete the dependent column *******.
3. Continue the upgrade.
4. Run the **index_verifier** utility to re-create standard OOTB indexes:

```
index_verifier -u=tc-admin -p= -g=dba -o=DO_IT
```

Replace *tc-admin* with the Teamcenter administrative user.

Troubleshooting Lifecycle Visualization

Certain software libraries are required to run Lifecycle Visualization on SUSE Linux platforms. If the required libraries are not installed on your system, Lifecycle Visualization may display an error that contains the following text:

```
error while loading shared libraries
```

If this occurs, you must install the missing required libraries.

To display a list of the required RPM packages for Lifecycle Visualization on SUSE Linux, type the following command:

```
env LD_LIBRARY_PATH=Linux_x86_64_SuSE/bin_64 rpm -qf `ldd
Linux_x86_64_SuSE/bin_64/* |
& egrep '/lib/|/lib64/' | awk '{print $3}' | sort -u` | sort -u
```

From the resulting output, identify the missing libraries and install them on your system.

Tuning WebSphere JVM memory consumption

If your Teamcenter application requires more memory than what is currently allocated in WebSphere, out-of-memory errors can occur. For example, if you use the NX Integration and attempt to launch NX from the rich client, Teamcenter may report an out-of-memory error during a call to **getAttrMappingsForDatasetType**.

If errors like this occur, you must modify the JVM arguments in WebSphere to increase memory allocation. For information about how to modify JVM arguments, see the IBM support article titled *Setting generic JVM arguments in WebSphere Application Server* at the following site:

<http://www-01.ibm.com>

Before you tune JVM arguments, use memory profiling tools to analyze your memory issues and determine which tuning options you need to use. The following table provides some suggestions, but these may not be suitable in all cases.

JVM options for tuning the WebSphere Application Server memory usage

JVM option	Description	Typical default value	Suggested value
-Xms	Controls the initial size of the Java heap. Properly tuning this parameter reduces the overhead of garbage collection, improving server response time and throughput. For some applications, the default setting for this option may be too low, resulting in a high number of minor garbage collections.	50 MB	512 MB
-Xmx	Controls the maximum size of the Java heap. In general, increasing the minimum/maximum heap size can improve startup, reduce the number of garbage collection occurrences, and increase the throughput until the heap no longer resides in physical memory. After the heap begins swapping to disk, Java performance suffers drastically. Therefore, The heap sizes should be set to values such that the maximum amount of memory the VM uses does not exceed the amount of available physical RAM.	256 MB	1024 MB
-XX:PermSize	Sets the section of the heap reserved for the permanent generation of the reflective data for the JVM. This setting should be increased to optimize the performance of applications that dynamically load and unload many classes. PermSize memory consumption is in addition to the -Xmx value set by the user on the JVM options. Setting this to a value of 128 MB eliminates the overhead of increasing this part of the heap.	Client: 32 MB Server: 64 MB	128 MB
-XX:MaxPermSize	Allows for the JVM to be able to increase the PermSize setting to the amount specified. Initially, when a VM is loaded, the MaxPermSize is the default value, but the VM does not actually	N/A	256 MB

JVM option	Description	Typical default value	Suggested value
	<p>use that amount until it is needed. If you set <i>both</i> PermSize and MaxPermSize to 256 MB, the overall heap increases by 256 MB in addition to the -Xmx setting.</p> <p>If an application needs to load or reload a large number of classes, the following error may result:</p> <pre>messageOutOfMemoryError: PermGen space</pre> <p>Typically, this means that the JVM started with an insufficient maximum value for permanent generation.</p>		

Troubleshooting document rendering

If you are not successful rendering document revisions to translate dataset files, your administrator should review your installation and configuration systematically and verify the following requirements are met.

- Installation of Teamcenter lifecycle visualization Convert software is required by the **previewservice** feature.
 - You must select the **Convert** feature; the **Print** feature is optional.
 - The destination installation directory name must not contain spaces.
 - To accommodate high levels of input and output, modify the **vvcp.ini** file on Windows systems, or the **vvcp.platform.cfg** file on Linux systems.

```
FileCheckWait=600
FileCheckWaitForZero=30
```

- When the installation is complete, verify the **Convert** option **prepare.exe** program exists under the **VVCP** installation directory.
- You must enable the **RenderMgtTranslator** service and one or both of the following services:
 - **PreviewService**

Configure translation services by enabling and configuring translators using TEM.

- **PreviewService**

Requires Teamcenter Visualization Convert. Source authoring applications such as Microsoft Office applications are also required.

- **RenderMgtTranslator**

Required for either **PreviewService**, **PdfGenerator**, or any other service to be added.

- Use Business Modeler IDE to set up and deploy IRDC and dispatcher service configuration objects to the Teamcenter database.

Troubleshooting Teamcenter Integration for NX

Teamcenter Integration for NX may be unresponsive in a four-tier rich client if you specify an incorrect value for **Web Application Name** during installation of the Teamcenter corporate server.

During corporate server installation, TEM prompts for the web application name in the **Default Site Web Server** panel. The web application name you enter is used to populate the **WEB_default_site_deployed_app_name** preference in the Teamcenter database. When you build the Teamcenter Integration for NX web application in Web Application Manager, you specify the actual name of the web application.

If the name of the deployed web application does not match the value specified in TEM, the web application fails to connect to the Teamcenter server.

If you experience problems starting Teamcenter Integration for NX from the four-tier rich client, inspect the **ugs_router** system log for messages that resemble the following example:

```
INTEROP: Executing: O:\win32\ugnx5.0.0.22\ugii\ugraf.exe -pim=yes -
http_url=http://AcmeCorp:8080/tc/aiws/aiwebservice -soa_url=http://AcmeCorp:8080/tc"-
http_cookie=IMAN=0810000000000000madakash45b765e1cd0ea854705e5f8f; path=/" -
http_vmid=b6e51c5aaaf5b200:-58275229:1104f3e3952:-8000 "-role=ALL" -
portalinfo=localhost:2377:PROCESS_COMMAND_LINE -
invoke=com.teamcenter.rac.commands.objectschanged.ObjectsChangedCommand+-uids=%s+-
src=madakash@4Tier_w__NX :madakash@4Tier_w__NX 4-tier
INTEROP: Waiting for UG/Manager V23.0 1 to start up...
```

This message results from the rich client expecting a web application named **tc** but being unable to find it.

To resolve this problem, set the **WEB_default_site_deployed_app_name** preference to the correct name of the deployed web application. You can update this preference using the preferences manager from the command line or from within the rich client.

Recovering a corrupted database

Overview of recovery from a corrupted database

If you attempt to install Teamcenter using a database that is only partially installed, Teamcenter Environment Manager (TEM) allows you to drop all existing data before beginning a new installation.

If the Teamcenter database is corrupted beyond repair, you can alternatively **delete the database and repeat the installation using an empty database**.

Recovering from a corrupted Oracle database

1. Delete the database using Oracle Database Configuration Assistant (DBCA).
2. Create a new empty database using the appropriate DBCA template file.
3. Launch TEM and reinstall Teamcenter.

Recovering from a corrupted Microsoft SQL Server database

1. Remove the corrupted database using the Microsoft SQL Server Management Studio. Right-click the appropriate database in the tree view and choose **Delete**.

This removes the database and the associated data files.

2. Launch TEM and reinstall Teamcenter.

TEM creates a new database during installation.

24. Uninstalling Teamcenter

Uninstall the FOSS Repository

The FOSS Repository provides a central location for all third-party components used by Teamcenter. It is installed automatically in the `TC_ROOT\fosrepo` directory during Teamcenter deployment. However, when uninstalling Teamcenter (deleting the `TC_ROOT` folder), you must take care when deleting the `TC_ROOT\fosrepo` folder.

- If there is only *one* Teamcenter environment on the given machine:

Delete the FOSS Repository and the `FOSS_REPOSITORY_HOME` environment variable.

1. Delete the `%TC_ROOT%\fosrepo` and `%TC_ROOT%` directories (on Windows systems) or the `$TC_ROOT/fosrepo` and `$TC_ROOT` directories (on Linux systems).
2. Remove the `FOSS_REPOSITORY_HOME` system environment variable from the system.

Windows Systems: Delete the environment variable using standard Windows system tools.

Linux Systems:

- a. Remove the definition of `FOSS_REPOSITORY_HOME` from the `$HOME/.profile` file for the user who installed Teamcenter.
- b. Remove the definition of `FOSS_REPOSITORY_HOME` from the `$HOME/.bash_profile` file, if this file exists.
- c. Remove the definition of `FOSS_REPOSITORY_HOME` from the `$HOME/.kshrc` file, if this file exists.

- If there are *multiple* Teamcenter environments on the given machine:

Do *not* delete the FOSS Repository directory or the `FOSS_REPOSITORY_HOME` environment variable, because the single repository is used by the other installed environments.

Restoring a deleted FOSS Repository

If the FOSS Repository is mistakenly deleted, you can restore it by performing the following steps:

1. In the Teamcenter software kit, locate the `tc\fos_repository\TpcRepository.zip` file and expand its contents to the path specified by the `FOSS_REPOSITORY_HOME` variable.
2. Open the `FOSS-repository-home\bin\tpc.bat` file (on Windows systems) or `FOSS-repository-home\bin\tpc.sh` file (on Linux systems) in a text editor.

3. Replace `@CHANGE_ME_JAVA_HOME@` with the location of the Java installation. Save the changes to the file.
4. In an administrator command prompt, type the following command:

Windows Systems:

```
%FOSS_REPOSITORY_HOME%\bin\tpc.bat ImportProduct Tc-kit-
location\tc\foos_repository\TcPackage_wntx64.zip
```

Linux Systems:

```
$FOSS_REPOSITORY_HOME/bin/tpc.bat ImportProduct Tc-kit-location/tc/foos_repository/
TcPackage_wntx64.zip
```

Replace *Tc-kit-location* with the path to the Teamcenter software kit.

Uninstall Teamcenter configurations

You can remove Teamcenter configurations using Teamcenter Environment Manager (TEM). To completely uninstall a Teamcenter deployment, you must remove all configurations in the deployment.

Caution:

If you installed an application or component using Deployment Center, *do not* attempt to uninstall it using TEM. Deployment Center does not populate the uninstall information required by TEM. Uninstalling an application or component using TEM may not remove it in Deployment Center, or may cause inconsistencies in the environment in Deployment Center.

To remove a single Teamcenter configuration, use the **Remove configuration** option in the **Configuration Maintenance** panel in TEM.

To remove an entire Teamcenter deployment, perform the following steps:

1. Log on to the operating system using the user account under which you installed Teamcenter.
2. Start Teamcenter Environment Manager (TEM):
 - a. Change to the **install** directory in the Teamcenter application root directory for your Teamcenter installation.
 - b. Run the **tem.sh** script.
3. In the **Configuration Maintenance** panel, select **Perform maintenance on an existing configuration**.

4. Select the configuration to uninstall from the displayed list.

TEM removes *only* the configuration you select.

5. Proceed to the **Uninstall** panel. Select

The **Configuration Display** panel shows all configurations in the Teamcenter installation. Review the configuration details, and then click **Next**.

6. Proceed to the **Uninstall** panel. Select **Yes** to confirm that you want to remove the selected configuration.

7. If the configuration includes Teamcenter Foundation, TEM displays the **Uninstall Teamcenter Foundation** panel. Specify whether you want to remove the Teamcenter database, *TC_DATA* directory, and volume. You must enter database server credentials to remove the database.

8. Proceed to the **Confirmation** panel and click **Start** to begin the uninstallation.

TEM removes the Teamcenter configuration.

If the uninstallation is not successful, TEM stops processing when it encounters the error and displays a message indicating the location of the log file containing the error.

9. If you selected the option in TEM to remove the Teamcenter database, the database is moved to the Oracle recycle bin. To permanently remove the database, launch SQL*Plus and enter the following command:

```
PURGE RECYCLEBIN;
```

10. If you want to remove additional configurations, return to step 5.

TEM does not remove TCCS cache files (cache files generated by the FSC or FCC). After Teamcenter uninstallation, you can manually delete these cache files.

If you shared the *TC_DATA* directory, TEM may not completely remove this directory because it may be locked by sharing. To completely uninstall this directory, you must unshare it before you begin uninstallation.

Uninstall TCCS

If you installed Teamcenter client communication system (TCCS) as part of an installation of the rich client or Teamcenter Microsoft Office interfaces, uninstalling those clients automatically uninstalls TCCS from your system.

If you installed TCCS using the stand-alone installation wizard, perform the following steps to uninstall TCCS.

1. Stop the FMS client cache (FCC) process:
 - a. Change to the **bin** directory in the TCCS installation directory.
 - b. Type the following command to stop the FCC process:

```
fccstat -stop
```

2. Change to the **_uninst** directory in the TCCS installation directory.
3. Type the following command:

```
uninstaller.bin
```

This launches the TCCS uninstallation wizard. Follow the instructions in the wizard to uninstall TCCS.

4. Log off and log back on to the system to unset the **FMS_HOME** environment variable.

Uninstall database software

Uninstall your database software (Oracle or Microsoft SQL Server) according to the vendor documentation.

25. Solutions and features reference

Teamcenter solutions

Solutions are preselected groups of **features** that provide starting points for recommended Teamcenter configurations. You can add features or deselect features in the **Features** panel in Teamcenter Environment Manager (TEM). For information about a solution, point to the solution name in the list. TEM displays a description.

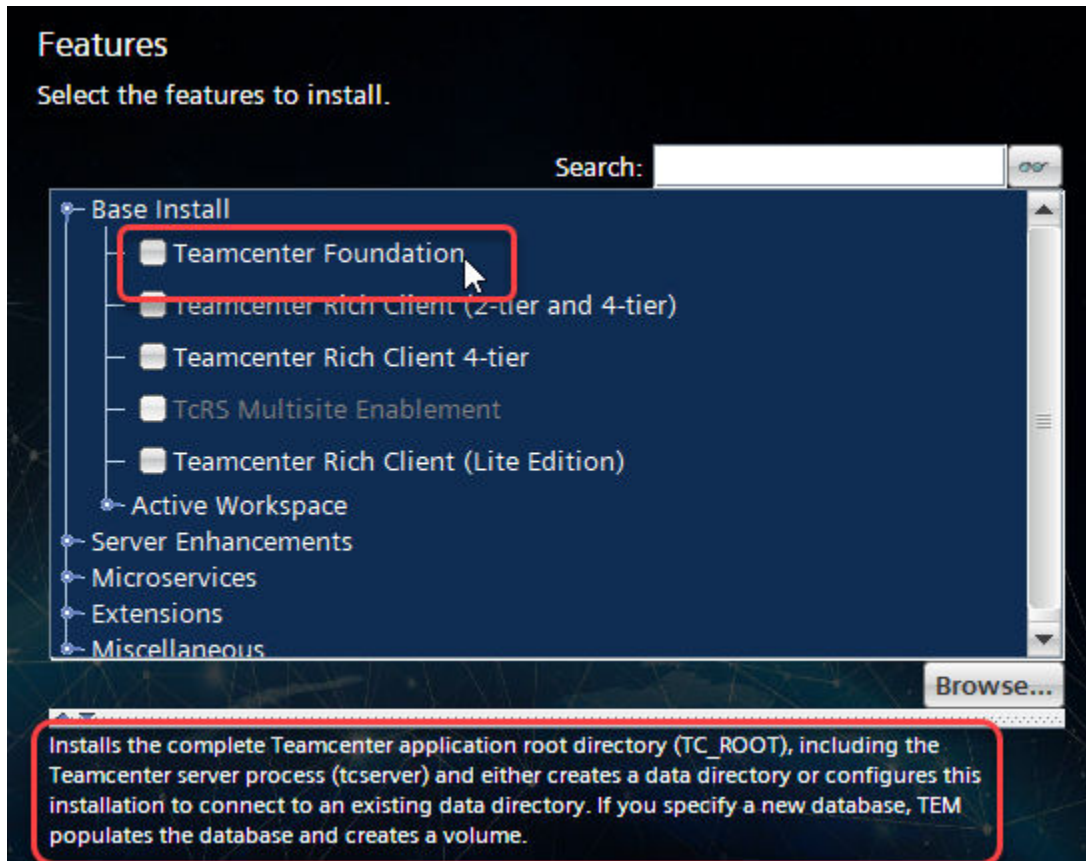
Solution	Features
Active Workspace Server Extensions	<ul style="list-style-type: none"> Teamcenter Foundation Active Workspace Active Architect Core Active Collaboration Active Content Structure Audit Authorization Active Workspace Multisite Integration Reporting Shape Search Subscription Workflow TC XML Import and Export FMS Server Cache Product Line Planning Translation Service Database Module Softlines, Hardlines and Footwear Classification Interface Vendor Management NX Part Family Classification Integration Color and Visual Appearance Management
Active Workspace Client	<ul style="list-style-type: none"> Active Workspace Client 3D Visualization Active Collaboration Client Active Workspace Visualization 2D Viewer Content Management Client DPV for Active Workspace Client Document Management Client Program Planning Reactive Logging Reporting Schedule Manager Subscription Markup Workflow Active Content Viewer Snapshot Tool Change Management PLMXML Export Import Part Manufacturing Client SLM Core Client Teamcenter Simplified Client Service Engineering Client Service Manager Client Service Planning Client Resource Manager for Active Workspace Client Service Work Instructions Client Program Change Client Program Planning Event Change Client Program Schedule Manager Client Classification Client Quality Manager Training and Qualification Client Control and Inspection Plan APQP Program Management Quality Audit Digital Thread Navigation Core Services for Manufacturing on BVR Easy Plan Active Workspace Infrastructure
Corporate Server	<ul style="list-style-type: none"> Teamcenter Foundation FMS Server Cache Translation Service Database Module Classification Interface NX Part Family Classification Integration
Volume Server	<ul style="list-style-type: none"> FMS Server Cache
Rich Client 2-tier	<ul style="list-style-type: none"> Teamcenter Rich Client 2-tier Translation Service Database Module Classification Interface

Solution	Features
Rich Client 4-tier	Teamcenter Rich Client 4-tier Translation Service Database Module Classification Interface
Rich Client (2-tier and 4-tier)	Teamcenter Rich Client (2-tier and 4-tier) Translation Service Database Module Classification Interface
Business Modeler IDE	Business Modeler IDE Standalone
Dispatcher (Dispatcher Server)	Dispatcher Server
Multisite Collaboration Proxy Server	Teamcenter Foundation Translation Service Database Module Multisite Collaboration IDSM Service Multisite Collaboration ODS Service Classification Interface

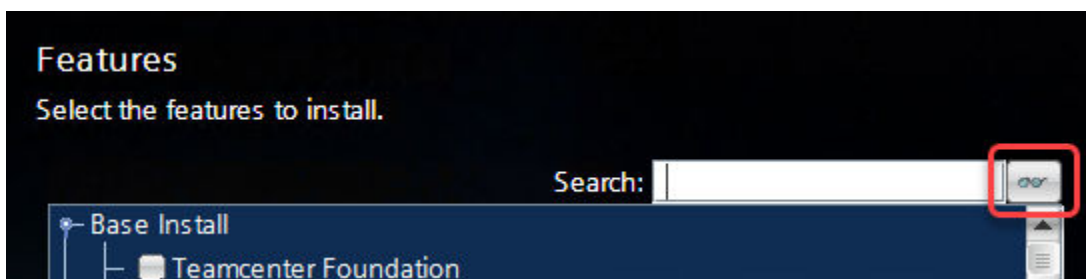
Teamcenter features

TEM provides a comprehensive list of *features* (applications and components) in the **Features** panel. Features are grouped by related applications.

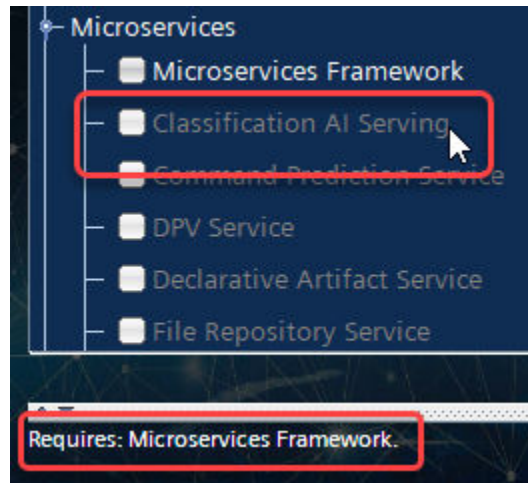
For information about a feature, such as its prerequisite features, point to the feature name in the list. TEM displays a description of the feature.



To search for a feature by name, enter a keyword in the **Search** box, then click the search button. To see the next search result, click the search button again.



Some features are disabled because they require other features. To enable a feature, select its prerequisite features. For information about prerequisite features, see the feature description.



Some features are mutually exclusive and cannot be installed in the same configuration, so selecting one disables the other.

Features are organized into the following major feature groups:

- **Base Install features**
- **Active Workspace Client features**
- **Indexing Server features**
- **Active Workspace Server Extensions features**
- **Visualization Server features**
- **Dispatcher features**
- **Server Enhancements features**
- **Microservices features**
- **Teamcenter Extensions features**
- **Miscellaneous features**

Base Install features

The following features are in the **Base Install** feature group in Teamcenter Environment Manager (TEM).

To search for a feature by name, type the name or a partial name in the search box, and then click the search icon.

Feature/Subfeature	Description
Teamcenter Foundation	<p>Installs the complete Teamcenter application root directory (<i>TC_ROOT</i>), including the Teamcenter server process (<i>tcserver</i>), and either creates a data directory for storing database-specific files or configures this installation to connect to an existing data directory.</p> <p>If you create a data directory, you also provide information about the database to use with this installation. If you specify a new database, Teamcenter Environment Manager populates the database and creates a volume.</p>

Feature/Subfeature	Description
	Installing Teamcenter Foundation is optional only when you install the following components: the Multi-Site Collaboration proxy servers, File Management System, online help, or sample files. When you install these components, Teamcenter Environment Manager creates an <code>TC_ROOT</code> directory, but populates it with only the subdirectories necessary for these components to run.
Business Modeler IDE Standalone	Installs only the Business Modeler IDE client without requiring a connection to a Teamcenter server.
Business Modeler IDE 2-tier	Installs the two-tier Business Modeler IDE client. This client connects to the Teamcenter server using TCCS.
Business Modeler IDE 4-tier	Installs the four-tier Business Modeler IDE client. This client connects to a Teamcenter server in a four-tier environment using HTTP.
Teamcenter Rich Client (2-tier and 4-tier)	<p>Installs a Teamcenter rich client that supports multiple two-tier and four-tier connections using Teamcenter client communication system (TCCS).</p> <p>This rich client differs from the two-tier rich client that connects directly to the Teamcenter server using TCCS, and from the four-tier rich client that connects directly to the Teamcenter web tier using HTTP protocol.</p> <p>This TCCS-based rich client architecture streams responses from the Teamcenter server (tcserver) to the client through a multiplexing proxy, or MUX, that is part of Teamcenter Enterprise Communication System (TECS), a Java component of the Teamcenter enterprise tier. The MUX supports four-tier communication through its internal Jetty HTTP server, which services requests from the Teamcenter web tier. The MUX communicates with the tcserver using Teamcenter Transfer Protocol (TCTP).</p>
Teamcenter Rich Client 2-tier	Installs a Teamcenter two-tier rich client that communicates with the Teamcenter corporate server using TCCS. It supports most Teamcenter features and does not require a web tier.
Teamcenter Rich Client 4-tier	<p>Installs a four-tier rich client that connects directly to the Teamcenter web tier using HTTP protocol.</p> <p>This rich client is an alternative to the newer four-tier rich client provided by the Teamcenter Rich Client (2-tier and 4-tier) feature, which communicates with the Teamcenter web tier using Teamcenter client communication system (TCCS).</p>
TcRS Multisite Enablement	<p>Select this feature to enable multisite collaboration between Teamcenter Rapid Start and Teamcenter sites for OOTB objects.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>Note:</p> <p>Multisite collaboration for OOTB objects between Teamcenter Rapid Start 12.x, and any version of Teamcenter or Teamcenter Rapid Start prior to 12.x, is not possible.</p> </div>
Teamcenter Rich Client (Lite Edition)	Installs a rich client and configures it for use with the NX Manager feature. This feature requires NX Manager for Rich Client .

Active Workspace Client features

Active Workspace client features are available in **Base Install>Active Workspace>Client** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search icon.

Feature	Description
Active Workspace Gateway	Installs the Active Workspace Gateway , a web application framework that resides between the Active Workspace client application and your browser. The Gateway communicates with

Feature	Description
	the Teamcenter server, the File Repository, and the volume server, and routes incoming requests for static and dynamic content to the appropriate services handling those requests.
Active Workspace Client	Selecting this feature builds the Active Workspace client.
3D Visualization	Adds 3D visualization to the Active Workspace client.
Access Manager Client	Adds support for managing Access Rule definitions in Active Workspace.
Active Collaboration Client	Adds workflow capabilities of Active Collaboration to the client interface. If you are installing this feature in the Client, you must install the Active Collaboration Server Extensions feature in the corporate server.
Active Workspace Assistant Client	Installs client components of the Assistant, a guided navigation tool for Active Workspace. It predicts the next likely actions a user will perform based on the user's history, group, and role, and presents suggested actions in the Assistant panel. This feature requires the Active Workspace Assistant server extension feature on the Teamcenter server.
Active Workspace Visualization 2D Viewer	Adds the 2D Viewer to the Universal Viewer in Active Workspace. Requires the Visualization Server .
Assignment Matrix Active Workspace Client	Assignment Matrix is a mechanism to pre-define Assignee(s) for combinations of Assignment Type and Target property values.
Audit Client	Adds Audit Manager features to the Active Workspace client. For more information, see <i>Audit Manager</i> in the Teamcenter help collection.
Content Management Client	Adds Content Management support to Active Workspace.
DPV for Active Workspace Client	Adds Dimensional Planning and Validation functionality to the client interface.
Document Management Client	Installs Document Management support for the Active Workspace client.
Electronic Design Automation	Adds Electronic Design Automation (EDA) support in the Active Workspace client.
Google Online Viewer Client	Installs the Google Online Viewer, which enables Google Online features within Active Workspace, such as viewing and editing Microsoft Office documents without the need for Microsoft Office applications.
IP Management Active Workspace	Provides a product lifecycle management solution for semiconductor manufacturers to manage IP data using Teamcenter.
Initiative Lifecycle Management - CPG Reference Implementation Active Workspace Client	Installs Initiative Lifecycle Management (ILM) support for the Active Workspace client, with objects and processes specific to the Consumer Packaged Goods industry. For more information, see <i>Initiative Lifecycle Management — CPG Reference Implementation</i> .
Initiative Planning Active Workspace	This feature provides capability to create, discover and realize an Idea leading to the creation of project. It also provides capability to create and manage campaigns. For more information, see <i>Initiative Planning</i> .
Logical Object	Allows users to access logical object data in the client interface.
Marine Integration	Installs client-side support for Marine Integration in Active Workspace. This functionality supports lifecycle management of electrical equipment and cables that connecting them, provided by various electrical design tools. The feature enables creation of BOM structures for electrical equipments and cables.
Multisite Integration	Enables certain Multi-Site Collaboration capabilities in Active Workspace. Users can publish objects for access by remote sites, check in and check out objects, and receive and update objects from remote sites. Administrators can use the Multi-Site Dashboard to monitor the

Feature	Description
	Multi-Site federation, viewing related issues through charts, graphs, and detailed object reports.
NX Logical for Active Workspace Client	This feature configures the Teamcenter installation to support logical model for the NX diagramming application in Active Workspace. This feature allows users to view and navigate diagramming sheets and logical model content in the Active Workspace client.
Office Online Viewer Client	Installs the Office Online Viewer Client that enables you to edit Microsoft Office documents within Active Workspace. This feature requires Microsoft Office Online to be installed in your environment.
Order Management	Installs Order Management support for the Active Workspace client. Order Management manages the lifecycle of an order from inquiry to sales order. A customer inquires about products, a sales person responds with the offer containing configurable products. Once the offer is accepted by the customer, a sales order is created that refers to the configurable products.
Product Configurator	Adds Product Configurator features to the Active Workspace client. Product Configurator enables you to formally introduce and manage variability across your product suite. For more information, see <i>Product Configurator</i> in the Teamcenter help collection.
Program Planning	Enables the Program Management capability in Active Workspace. This feature provides the ability to manage business investments, from planning to execution, in terms of time, reuse, volume, cost targets, and weight targets. If you are installing this feature, you should also install the Program Planning feature under Server Extensions .
Reactive Logging	Installs valuable troubleshooting tools that enable you to record a problem in a log file to share with the Teamcenter administrator. By default, reactive logging provides the user with the log file location and machine information. To configure this behavior, set the following preferences: TC_reactive_logging_notification_list Notifies administrator regarding log ZIP file. TC_reactive_logging_file_download Displays message to the user with a link to the downloaded file in Active Workspace.
Reporting	Adds the ability to view report templates, generate reports based on selected criteria, style sheets, or both, and view them in HTML, Excel, or raw XML formats in the client. If you are installing this feature in the Client, you must install the Reporting Server Extensions feature in the corporate server. Additionally, to allow for asynchronous report generation, install the AsyncService translator in the Dispatcher Server.
Schedule Manager	Enables Schedule Manager capabilities in Active Workspace. If you are installing this feature, you must also install the Schedule Manager feature under Server Extensions on the corporate server.
Stock Material	Adds stock material management features for the Active Workspace client. Many parts are made from stock materials such as bar stock, tubing stock and sheet stock. This feature enables you to manage stock materials in Teamcenter, performing actions like creating libraries of stock materials and assigning stock materials to parts. For more information, see <i>Aerospace and Defense Solution</i> in the Teamcenter help collection.
Subscription	Allows users to manage subscriptions and notifications in the client.

Feature	Description
	If you are installing this feature in the Client, you must install the Subscription feature under Server Extensions in the corporate server.
Teamcenter Share Collaboration client for Active Workspace	Installs support for the Teamcenter Share collaboration in the Active Workspace client. Teamcenter Share is a cloud application that allows you to share and collaborate on project files with your partners, team members, and manufacturers. In this browser-based collaboration, you can develop new products and designs, then share your projects with customers for approval or manufacturers for production. Teamcenter Share controls and secures file access, and maintains history of file sharing and exchange. For more information about Teamcenter Share collaboration, see <i>Teamcenter Share collaboration in Active Workspace</i> .
Work Package Management	Installs work package management, which helps designers to create and maintain a work package as a revisable collection of CAD files and documentation. To install this feature, you must install the Work Package Management feature for both server and client features for Active Workspace.
Rules of Credit Active Workspace	Adds Rules of Credit functionalities to Active Workspace client.
3D Clearance	Adds 3D clearance analysis and the 3D Clearance toolbar to Lifecycle Visualization.
Contract Data Management	Installs Contract Data Management, which helps contractors manage the creation, review, and delivery of contracts. A <i>contract</i> is a structured procurement document that lists milestones and schedule dates. If you are installing this feature, you must also install the Contract Data Management Server Extensions feature on the server and the Contract Data Management feature under Enterprise Knowledge Foundation .
Initiative Lifecycle Management (ILM) Active Workspace Client	Installs support for Initiative Lifecycle Management (ILM) in the Active Workspace client. This solution unifies business processes from ideation to production. This includes management of campaigns, ideas, programs, and projects. ILM leverages program planning capabilities and combines those with process groups that distribute work to participants. For more information, see <i>Initiative Lifecycle Management</i> in the Active Workspace documentation.
Markup	Enables markup capabilities in the client interface.
Product Configurator Hosting	Enables Product Configurator in Active Workspace in hosted mode for non-Active Workspace clients.
Workflow	For users to access Inbox components and workflow functionality in the Client interface, this feature must be installed. If you are installing this feature, you must also install the Workflow feature under Server Extensions on the corporate server.
Master Document Register and Transmittals (MDR&T)	Adds Master Document Register and Transmittals functionalities to Active workspace Client.
Active Content	Adds structure search functionality to the client interface. If you are installing this feature in the Client, you must install the Active Content Structure Server Extensions feature in the corporate server.
Digital Signatures	Adds digital signatures functionality to the client interface. Before selecting this feature, see the additional setup requirements for digital signatures in <i>Active Workspace Customization</i> . If you are installing this feature in the Client, you must install the Digital Signatures Server Server Extensions feature in the corporate server.
Linked Data Framework	Provides a framework to link a Teamcenter business objects with an artifact of a remote linked data enabled system. It enables rendering the remote system's delegated UIs in Active Workspace.

Feature	Description
	If you are installing this feature, you should also install the Linked Data Framework feature under Server Extensions .
Viewer Snapshot Tool	Installs the viewer snapshot tool for 3D visualization in Active Workspace.
4th Generation Design	Allows users to view, navigate, and configure collaborative designs and their content in the Client. If you are installing this feature in the Client, you must also install the 4th Generation Design Server Extensions feature, the Active Content Structure Server Extension feature, and the 4th Generation Design (under Advanced PLM Services) feature on the corporate server. In addition to the Active Workspace Client feature, requires the Active Content Client feature.
Advanced Multi-Schema Exchanger	Adds the capability to create mapping rules to transform data when it is transferred between Teamcenter sites using different schemas. You can create mapping rules for the item types in your source schema or for subsets of item types in the schema as defined by schema subsets attached to Briefcase files. See the <i>PLM XML/TC XML Export Import Administration</i> guide for more information about creating, validating, and attaching mapping rules.
Assembly BOM	Installs all required dependencies and configurations for enabling Assembly EBOM with Design BOM Alignment automation for EBOM Level I and II products.
Briefcase Browser	Enables the Briefcase file preview and comparison features in the Active Workspace client.
Briefcase Export and Import	Enables the ability to collaborate with online and offline sites by importing and exporting Teamcenter data packaged in Briefcase files. Other sites can optionally update the Teamcenter objects and return the data to the originating site. Also enables the ability to extract data from one Teamcenter environment to copy to another using bulk loading tools.
Change Management	Adds the ability to work with Change Management objects in the client. If you are installing this feature in the Client, you must install the Extensions→Enterprise Knowledge Foundation→Change Management feature in the corporate server.
Easy Plan - Opcenter Integration Client	Installs the Easy Plan - Opcenter Integration Client.
Finish Management	Installs Finish Management support for Active Workspace. A <i>finish</i> represents a finishing process on a part. It may be used to improve appearance, adhesion, corrosion resistance, tarnish resistance, chemical resistance, wear resistance, and remove burrs and so on. For more information, see <i>Aerospace and Defense Solution</i> in the Teamcenter help collection.
Hazard and Risk Analysis	Enables support of Hazard and Risk Analysis of system of models and functions.
Integrated Manufacturing BOM Client	Installs support for integrated BOM management.
MCAD Integration	In addition to the Active Workspace Client feature, requires the Active Content Client feature.
Material Management	Enables Active Workspace users to: <ul style="list-style-type: none"> • Associate a material revision with a vendor part or an item revision. • Associate a substance with a material revision. • View the material/substance dashboard. <p>If you install this feature, you should also install the Material Management feature (under Server Extensions) on the corporate server.</p>

Feature	Description
Medical Device Foundation	Installs Active Workspace client support for product development processes for medical device manufacturers. This feature assists in ensuring compliance with regulatory guidelines, accelerating innovation in development, and reducing costs.
NX Integration for Active Workspace	Enables users to access NX integration functionality from the client interface. If you are installing this feature, you should also install the NX for Active Workspace feature (under Server Extensions) on the corporate server.
PLMXML Export Import	Enables the ability to share data with organizations not using Teamcenter or for use with third-party applications. You can use PLM XML to share Teamcenter objects such as items, datasets, BOMs, forms, and folders.
Part Manufacturing Client	Adds part manufacturing support in the Active Workspace client.
Partitions for Structure	Installs client support for partitions and partition schemes for structures.
Product Configurator Extension for Easy Plan	Adds support for Product Configurator in Easy Plan. Product Configurator allows you to enable definitions for variant formulas on operations. Please see the Product Configurator (Administrator) documentation for installation details. By default, Easy Plan uses classic variants.
Product Master Automation	Installs product master automation for the Active Workspace client.
Requirements Management	Allows users to author a requirement structure in the Content tab of the client. In addition to the Active Workspace Client feature, requires the Active Content feature. If you are installing this feature in the Client, you must install the Requirements Management and Systems Engineering features under Server Extensions on the corporate server. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This feature is required to enable the Export to Excel button in Active Workspace.</p> </div>
SLM Core Client	Provides core Service Lifecycle Management functionality for Active Workspace.
Solution Variant Support for Active Workspace	Adds Product Configurator capabilities for Active Content Structure, such as creating and managing solution variant structures for configurable generic assemblies.
Supplier Foundation	This is a base solution for all the supplier solutions that will be developed for Teamcenter X.
Supplier Program Planning	This is a program planning solution for supplier solutions that will be developed for Teamcenter X.
Teamcenter Simplified Client	Provides a simplified experience of Teamcenter for small- and medium-sized business customers. User Experience (UX) redundancies and outlying commands are removed. This allows users to quickly work on designs, documents and parts within their organization without additional configuration.
Vendor Management	Allows Active Workspace users to: <ul style="list-style-type: none"> • Associate vendors with vendor parts. • Associate vendor parts with commercial part revisions. <p>If you are installing this feature, you should also install the Vendor Management feature under (Server Extensions) on the corporate server.</p>
Active Workspace Weight And Balance Management	Enables interaction with Weight and Balance Management in the Active Workspace client. This supports functionality such as specifying weight and balance attributes for parts or

Feature	Description
	assemblies, and performing their rollup. For more information, see <i>Structure Management — Deployment and Administration</i> .
Aerospace and Defense Foundation	<p>Adds the Aerospace and Defense Foundation feature to the Active Workspace client.</p> <p>This feature is not selectable unless the following features are also selected:</p> <p>If you are installing this feature in the Client, you must install the Aerospace and Defense Foundation Server Extension feature in the corporate server and the following Active Workspace Client features:</p> <ul style="list-style-type: none"> • Workflow • Active Collaboration • Active Content • Vendor Management
Capital Asset Lifecycle Management	Adds management of plant data for the Active Workspace client.
Embedded Software Management	Adds Embedded Software Solutions functionality, which allows you to represent embedded software artifacts using Active Workspace.
Enterprise Service BOM Client	Adds support to facilitate the creation of physical structure from collaborative product EBOM object.
Functional Safety	Enables Teamcenter to conduct functional safety analysis on system models using HARA and FMEDA.
Next Generation Planning Client	Adds Next Generation Planning (NGP) support to Active Workspace.
Non-Functional Change Management	Allows users to make non-functional changes in their parts. Non-functional changes are changes which do not affect the fit, form, or function of the part.
PDX Export	Installs support for exporting data as a PDX package. This package can be viewed by PDX viewer applications or used by other systems that support the PDX data format. You can also create a PDX package using a workflow process by specifying the workflow handler provided for PDX packages.
Service Engineering Client	Provides service engineering support for Service Lifecycle Management in the Active Workspace client.
Service Manager Client	Provides client-side support for Service Manager, which allows users to view disposition and utilization history of physical parts.
Service Planning Client	Provides the Active Workspace searching and BOM (Bill of Materials) extensions necessary to support the SLM Service Planning in an Active Workspace environment.
Substance Compliance	Installs support for Substance Compliance in Active Workspace.
Supplier Connect	Active Workspace Supplier Connect client.
Easy Plan – Classification Client	Adds support for Classification data in Easy Plan.
Electronic Work Instructions Client	Installs the Electronic Work Instructions Client workspace in your environment.
Medical Device Submissions for Active Workspace	Provides support for performing end-to-end medical device label authoring, object-based content management, Unique Device Identifier (UDI) data management and submissions for medical industry customers.
Resource Manager for Active Workspace Client	<p>Adds Manufacturing Resource Library support for the Active Workspace client.</p> <p>For information about using Manufacturing Resource Library, see the Teamcenter help library.</p>
Retail Footwear and Apparel	Installs client components of the Retail Footwear and Apparel solution, which manages products in the retail industry.

Feature	Description
Semiconductor Foundation Active Workspace	Provides support for semiconductor manufacturers to manage their semiconductor design and manufacturing data using Teamcenter.
Service Work Instructions Client	This feature provides the functionality to build and view the Service Lifecycle Management (SLM) Service Work Instructions for Active Workspace. This content represents extensions necessary to support Service Work Instructions in an Active Workspace environment.
Substance Compliance-IMDS Integration	<p>Installs support for the Teamcenter Substance Compliance-IMDS Integration in Active Workspace.</p> <p>Substance compliance checks whether the parts used in your company products conform to environmental regulations. International Material Data System (IMDS) is a third-party system for exchanging material and substance information with suppliers. Automotive companies use IMDS to collaborate with suppliers for material and substance declaration information. Teamcenter is integrated with IMDS to send material data sheet (MDS) requests to IMDS and to download the MDSs, uploaded by suppliers, from IMDS to Teamcenter.</p> <p>This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.</p>
Supplier Collaboration	<p>Installs support for Supplier Collaboration in Active Workspace. Teamcenter Supplier Collaboration is a framework that helps companies manage their supply chains.</p> <p>This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.</p>
EWI Offline Client	Installs EWI offline kits and EWI offline rendering services necessary for rendering offline electronic work instructions.
Easy Plan - Process Planning for ETO Client	<p>Installs client support for the Engineering to Order (ETO) workspace in your environment.</p> <p>This feature allows end users to author work instructions at the process station level.</p>
Machine Builder	Installs support for the Machine Builder solution in Active Workspace. This solution provides a single-source data management system focused on the engineering, manufacturing and product life BOM. This solution is designed to enable industrial machinery customers to move from CAD data management to engineering process management, integrating requirements management, project management, and change management.
Process Planning for BTO/BTS/CTO	Installs support for the Process Planning workspace for build-to-order (BTO) or build-to-stock (BTS), or configure-to-order (CTO) in your environment.
Easy Plan - Electronics Client	<p>Installs client support for the Easy Plan Electronics Process Planner workspace in your environment.</p> <p>Electronics engineers use Production Process Planning for the systems integration of the electronics process planning tasks of Easy Plan and those of Valor Process Preparation Software. The systems integration is available as a dedicated, optional feature of Production Process Planning.</p>
MDR&T and IPP&E Interface	<p>Provides an interface between Master Document Register and Transmittal (MDR&T) and Integrated Program Planning and Execution (IPP&E).</p> <p>The <i>Master Document Register</i> (MDR) is an agreed list of deliverables in the form of documents that are associated with a contract between an owner/operator (o/o) and an engineering, procurement and construction (EPC). The process of exchanging information and submitting these deliverable documents to external stakeholders namely, the customers, vendors, or external parties is termed as the <i>Transmittal</i> process.</p> <p>Integrated Program Planning and Execution (IPP&E) allows project planning that integrates cost, schedule, risk and technical requirements in a fully planned, resourced, and budgeted program. It allows configuration control not only of products but also of the project plan. It also communicates the status of requirements to users.</p>

Feature	Description
Supplier Change Management	The base solution for all the supplier solutions that will be developed for Teamcenter X.
Component Manufacturer Active Workspace	Provides a specialized user interface in the Active Workspace client for component supplier customers that simplifies management of projects and programs.
Active Admin	Features to support active admin capabilities.
	Preference Management Adds preference management to the active admin workspace.
CAE Simulation Management	Features to support management of computer-aided engineering (CAE) data.
	Simulation Process Management In addition to the Active Workspace Client feature, requires the Active Content Client feature. If you are installing this feature, you must also install the Simulation Process Management Server Extensions feature on the corporate server.
	Extended Simulation Process Management Extends Simulation Process Management capabilities in Active Workspace.
	Simulation Process Management with Git Integration Configures the Teamcenter installation to support the MBSE Git Integration data model and functionalities in Simulation workflows.
	Simulation Process Management with Measurable Attribute for Active Workspace Configures the Teamcenter installation to support Measurable Attribute and Target Management data models and functionality in Simulation workflows.
	Simulation Process Management with Parameter Management Provides support for Parameter Management data model and functionalities in Simulation workflows.
Integrated Program Planning and Execution	Integrated Program Planning and Execution (IPP&E) client features. The IPP&E solution allows project planning that integrates cost, schedule, risk and technical requirements in a fully planned, resourced, and budgeted program. It allows configuration control, not only of products, but also of the project plan. It also communicates the status of requirements to users.
	IPP&E Contract Data Management Extension Adds Contract Data Management support to IPP&E.
	Organization Breakdown Structure Adds Organization Breakdown Structure (OBS) support to IPP&E.
	IPP&E Foundation Provides essential functionality for Integrated Program Planning and Execution in Active Workspace.

Feature		Description
	Work Breakdown Structure	Adds Work Breakdown Structure (WBS) support to IPP&E.
Program Planning Execution Client		Program Planning Execution features for the Active Workspace client.
	Change Management Schedule Manager Client	<p>Allows interaction between Schedule Manager and Change Management in Active Workspace. It allows Active Workspace users to relate schedules and change objects.</p> <p>If you are installing this feature in the Client, you must install the Change Management Schedule Manager Server Extension feature in the corporate server and the following Active Workspace Client features:</p> <ul style="list-style-type: none"> • Schedule Manager • Workflow • Change Management
	Program Change Client	<p>Allows interaction between Program Planning Event Change and Change Management in Active Workspace. It allows Active Workspace users to relate programs, projects, and subprojects to change objects.</p> <p>If you are installing this feature in the Client, you must install the Program Change Server Extension feature in the corporate server and select the following Active Workspace Client features:</p> <ul style="list-style-type: none"> • Program Planning • Workflow • Change Management
	Program Planning Event Change Client	<p>If you are installing this feature in the Client, you must install the Program Planning Event Change Server Extension feature in the corporate server and select the following Active Workspace Client features:</p> <ul style="list-style-type: none"> • Program Planning • Workflow • Change Management • Program Change Client
	Program Schedule Manager Client	<p>If you are installing this feature in the Client, you must install the Program Change Server Extension feature in the corporate server and select the following Active Workspace Client features:</p> <ul style="list-style-type: none"> • Program Planning • Schedule Manager • Workflow

Feature		Description
		<ul style="list-style-type: none"> • Change Management • Program Change Client • Program Planning Event Change Client
Reuse and Standardization		Features to support Reuse and Standardization in the Active Workspace client.
	Classification Client	Allows users to access Classification data in the client interface.
	Teamcenter Classification Collector (earlier called Library Management)	Installs the client component required to view classification libraries. Classification libraries contain subsets of a classification hierarchy pertinent to a particular role, project, or use case.
Teamcenter Quality		Features to support Teamcenter Quality.
	Quality Manager	Adds Quality Manager to the Active Workspace client. For more information, see <i>Quality</i> in the Active Workspace help.
	Reminder and Escalation Management	The Reminder and Escalation Management provides mechanism to process notifications and escalation capability based on criteria defined for Teamcenter Business objects which helps to track progress of defined task. This is generic solution and can be used by any application to remind the due tasks at right time and also set up escalations at desired level if it is getting delayed.
	Training and Qualification Client	Adds client support for training and qualification actions in Active Workspace.
	Quality Action Management Client	Adds support for quality actions in the Active Workspace client. For more information, see <i>Quality</i> in the Active Workspace help.
	Failure Mode Effect and Analysis (FMEA) Client	Adds support for Failure Mode Effect Analysis (FMEA) standards to the Active Workspace client. For more information, see <i>Quality</i> in the Active Workspace help.
	Quality Issue Management and Problem Solving	Adds Issue Manager and Problem Solving support for the Active Workspace client.
	Control and Inspection Plan Client	Installs support for control and inspection planning in the Active Workspace client. Control and inspection planning allows you to manage critical characteristics of Failure Mode Effect Analysis (FMEA) and create a control plan that generates bill of process (BOP) elements.
	APQP Program Management	Adds support for Quality Project Management (APQP) methodology in the Active Workspace client. For more information, see <i>Quality Project Management</i> .
	Quality Audit	Adds support for quality auditing in the Active Workspace client. For more information, see <i>Quality</i> in the Active Workspace help.

Feature		Description
	Supplier Quality Management	Provides support for Supplier Quality Management in the Active Workspace client. This application enables you to perform Supplier Quality management operations with applications like Vendor Management, Advance Product Quality Planning, and Quality Issue Management and Problem Solving. Supplier Quality Management is used to evaluate vendor performance based on quality issues and problem solving processes initiated for supplied materials or parts. It can also assess a vendor using a quality checklist.
Model-Based Systems Engineering		Features to support Model-Based Systems Engineering in the Active Workspace client.
	Digital Thread Navigation	Adds Digital Thread Navigation capabilities to Model-Based Systems Engineering.
	Parameter Management	Adds parameter management to Active Workspace.
	System Lifecycle Manager	Installs client support for the System Lifecycle Manager solution, with provides system modeling functionalities such as the following: <ul style="list-style-type: none"> • Tool neutral object-based information model • Model interface management • Branching, versioning and merging • Model reuse (ID card, Library) • Architecture visualization and reviews • Multi-domain toolset interoperability • Integrated change management
	Teamcenter Test Management Active Workspace	Adds test management support to Model-Based Systems Engineering (MBSE).
	Physical Verification Management Active Workspace	Adds support for inspections and physical tests in the Active Workspace client.
Active Architect		Features to support Active Architect for Active Workspace.
	UI Builder	Installs UI Builder components of active architect. UI Builder adds new declarative pages to the global navigation toolbar in Active Workspace, including: <ul style="list-style-type: none"> • Command builder • Panel builder
Consumer Packaged Goods		Features to support Consumer Packaged Goods in the Active Workspace client.
	Formulation & Material Management	Enables Teamcenter to create Material Management objects like Component Specification, Parameter and substance.
	Brand Management	Installs the Brand Management template for Consumer Packaged Goods.
	Packaging and Artwork	Installs packaging and artwork functionality for Consumer Packaged Goods.
	Specification Management	Installs Specification Manager functionality for Consumer Packaged Goods.

Feature		Description
	Consumer Product Management Active Workspace	Installs consumer product management functionality for Consumer Packaged Goods.
MBSE Integrations		Model Management applications for the Active Workspace interface.
	MBSE Services Active Workspace Client	Installs services to support the MBSE Integration Gateway in Active Workspace.

Indexing Server features

Indexing server features are available in the **Base Install>Active Workspace>Indexing Server** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search icon.

Feature/ Subfeature	Description
Search Engine	Installs the Solr enterprise search platform. The search engine stores indexed Teamcenter data for global search in Active Workspace. Selected product data is indexed in Solr, an open source search platform from Apache. The master product data is not stored in Solr. It is always loaded from Teamcenter.
Indexer	Installs a four-tier SOA client that exports Teamcenter data for merging into Solr. The indexer manages overall indexing processes. TcFTSIndexer manages the initial indexing for object data. You can then schedule synchronization to run periodically for subsequent updates to object data or structure data indexes. TcFTSIndexer indexes external and Teamcenter objects into Solr. It connects to the server manager to query and extract Teamcenter data to be indexed into Solr.

Active Workspace Server Extensions features

Active Workspace Server Extensions features are available in the **Base Install>Active Workspace>Server Extensions** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature	Description
Active Workspace	Adds binaries to <i>TC_ROOT</i> and data model changes to the database and <i>TC_DATA</i> . It adds the Active Workspace (aw3_template.xml) template to the database.
Rules of Credit	Adds functionalities related to Rules of credit. Rules of Credit is a mechanism to pre-define various progress values for Deliverables in a quantitative way, which can help to capture and report the progress of Deliverables at a given time.

Feature	Description
Active Architect Core	Installs core capabilities of Active Architect.
Active Collaboration	<p>Allows users to communicate between themselves using Active Workspace.</p> <p>Adds the Active Collaboration (ac0activecollaboration_template.xml) template to the database.</p> <p>If you are installing this feature, you should also install the Active Collaboration feature (under Client) when building the Client web application.</p>
Active Content Structure	<p>If you plan to index structure data, you must install this feature. It provides functionality and data model extensions necessary for indexing structure data. It adds the Active Content Structure (activeworkspacebom_template.xml) template to the database.</p> <p>If you are installing this feature, you should also install the Active Content feature (under Client) when building the Client web application.</p>
Advanced PLM Services Core	Adds Advanced PLM Services capabilities to 4th Generation Design in Active Workspace.
Active Workspace Assistant	<p>Installs server support for the Assistant, a guided navigation tool for Active Workspace. It predicts the next likely actions a user will perform based on the user's history, group, and role, and presents suggested actions in the Assistant panel. This feature requires the Command Prediction Service microservice and a database for the microservice to store data for the Assistant. TEM prompts you for the necessary database creation values during installation.</p> <p>To enable client support for the Assistant, install the Active Workspace Assistant client feature.</p>
Active Workspace Document Management	Adds support for document management in Active Workspace.
Audit	<p>Adds Audit Manager capabilities to Active Workspace.</p> <p>For more information, see <i>Audit Manager</i> in the Teamcenter help collection.</p>
Authorization Active Workspace	Adds Active Workspace authorization components.
Data Exchange Transaction Monitor	Installs an Active Workspace tool that lets you view records of Teamcenter data shared between sites. Transactions monitored include those made using Multi-Site tools (such as data_share, data_sync, rich client remote export/import, and Active Workspace share/retrieve) and data exchange tools such as Briefcase import/export. For more information, see <i>Teamcenter Administration</i> .
Digital Signatures	<p>Adds digital signatures functionality to the server. It does not add a database template.</p> <p>Before selecting this feature, see the additional setup requirements for digital signatures.</p> <p>If you are installing this feature, you should also install the Digital Signatures feature (under Client) when building the Client web application.</p>
Google Online Viewer	Installs server support for the Google Online Viewer, which enables Google Online features within Active Workspace, such as viewing and editing Microsoft Office documents without the need for Microsoft Office applications.
In-Context Change	Adds in-context change support to Active Workspace.
Multisite Integration	Adds multisite reporting that enables administrators to identify underlying data issues before multisite import or export.
Office Online Viewer	Installs viewer support for Microsoft Office Online documents.
Order Management	Installs Order Management support for Active Workspace. Order Management manages the lifecycle of an order from inquiry to sales order. A customer inquires about products, a sales person responds with the offer containing configurable products. Once the offer is accepted by the customer, a sales order is created that refers to the configurable products.

Feature	Description
Program Planning	<p>Enables the Program Management capability in Active Workspace. This feature provides the ability to manage business investments, from planning to execution, in terms of time, reuse, volume, cost targets, and weight targets.</p> <p>This feature adds the Program Planning for Active Workspace (<code>pgp0awprgplanning_template.xml</code>) template to the database.</p> <p>This feature is not selectable unless the Program Planning Infrastructure feature (under Extensions) is also selected.</p> <p>If you are installing this feature, you should also install the Program Planning Client feature (under Client) when building the Client web application.</p>
Reporting	<p>Provides the ability to view report templates, generate reports based on selected criteria, style sheets, or both, and view them in HTML, Excel, or raw XML formats. It adds the Reporting for Active Workspace (<code>rb0reportingaw_template.xml</code>) template to the database.</p> <p>If you are installing this feature, you should also install the Reporting feature (under Client) when building the Client web application.</p> <p>Additionally, to allow for asynchronous report generation, install the AsyncService translator in the Dispatcher Server.</p>
Rules of Credit Active Workspace	Active workspace template for Rule of Credit functionalities.
Schedule Manager	<p>Enables Schedule Manager capabilities in Active Workspace.</p> <p>It adds the Schedule Manager for Active Workspace (<code>saw1projectmanagementaw_template.xml</code>) template to the database.</p> <p>If you are installing this feature, you must also install the Schedule Manager feature (under Client) when building the Client web application.</p>
Shape Search	<p>Provides the binaries and data model extensions for the shape search functionality. It adds the Shape Search for Active Workspace (<code>shapesearch_template.xml</code>) template to the database. To use shape search, Geolus must be installed and configured.</p> <p>If you are installing this feature, you should also install the Shape Search feature (under Client) when building the Client web application.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note:</p> <p>Apache Tomcat and a supported Java runtime environment are required to run Geolus shape search. See Support Center for software versions certified with Teamcenter.</p> </div>
Stock Material	<p>Adds stock material management to Active Workspace.</p> <p>Many parts are made from stock materials such as bar stock, tubing stock and sheet stock. This features enables you to manage stock materials in Teamcenter, performing actions like creating libraries of stock materials and assigning stock materials to parts.</p> <p>For more information, see <i>Aerospace and Defense Solution</i> in the Teamcenter help collection.</p>
Subscription	<p>Allows users to manage subscriptions and notifications. It adds the Subscription (<code>sub0subscription_template.xml</code>) template to the database.</p> <p>If you are installing this feature, you must also install the Subscription feature (under Client) when building the Client web application.</p>
Teamcenter Share Collaboration Active Workspace	<p>Installs support for the Teamcenter Share collaboration in Active Workspace. Teamcenter Share is a cloud application that allows you to share and collaborate on project files with your partners, team members, and manufacturers. In this browser-based collaboration, you can develop new products and designs, then share your projects with customers for approval or manufacturers for</p>

Feature	Description
	production. Teamcenter Share controls and secures file access, and maintains history of file sharing and exchange. For more information about Teamcenter Share collaboration, see <i>Teamcenter Share collaboration in Active Workspace</i> .
Work Package Management	<p>Adds work package management to Active Workspace.</p> <p>A work package or package is a collection of CAD files and documentation that an outsourcing partner uses for building, testing, or maintaining a component or subassembly of a larger product. Teamcenter helps to create and maintain the package as a revisable collection or a container of product information and to use in a variety of contexts.</p> <p>For more information, see <i>Aerospace and Defense Solution</i> in the Teamcenter help collection.</p>
Access Manager	Adds the capability to manage access rule definitions in Active Workspace.
Active Workspace Requirements and Systems Engineering	Adds support for Requirements and Systems Engineering to Active Workspace.
Concurrent Modeling	Adds concurrent modeling support in Active Workspace. Concurrent modeling allows you to manage models from supported 1D modeling tools in Teamcenter, using the Teamcenter MBSE Integration Gateway MBSE framework.
Contract Data Management	<p>Installs Contract Data Management, which helps contractors manage the creation, review, and delivery of contracts. A <i>contract</i> is a structured procurement document that lists milestones and schedule dates.</p> <p>To enable this feature to work in Active Workspace, select the Contract Data Management feature under Enterprise Knowledge Foundation.</p>
Core Services for Manufacturing on BVR	Installs the manufacturing core for the BOM view revisions (BVR) data model and adds the mbc0mfgbvrcore_template.xml template.
DPV Active Workspace	Installs the database configuration for DPV in Active Workspace. This feature requires corresponding Teamcenter f features.
EDA Server Support for Active Workspace	<p>Adds support for Electronic Design Automation (EDA) to Active Workspace.</p> <p>For information about installing EDA, see the EDA documentation on Support Center.</p>
IP Management Active Workspace	Provides a product lifecycle management solution for semiconductor manufacturers to manage IP data using Teamcenter.
Initiative Planning Active Workspace	This feature provides capability to create, discover and realize an Idea leading to the creation of project. It also provides capability to create and manage campaigns. For more information, see <i>Initiative Planning</i> in the Active Workspace documentation.
Material Management	<p>Enables Active Workspace users to:</p> <ul style="list-style-type: none"> • Associate a material revision with a vendor part or an item revision. • Associate a substance with a material revision. • View the Material/Substance Dashboard. <p>This feature adds the Material Management for Active Workspace (mtw0materialmgmtaw_template.xml) template to the database.</p> <p>This feature is not selectable unless the Material Management feature (under Extensions>Enterprise Knowledge Foundation) and Active Content Structure (under Server Extensions) are also selected.</p>

Feature	Description
	If you install this feature, you should also install the Material Management feature (under Client) when building the Client web application.
Part Manufacturing Active Workspace	Adds Part Manufacturing support to Active Workspace.
Supplier Foundation	Supplier Foundation is the base template used by supplier solutions such as PLM for Component Manufacturers, Automotive Supplier and so on. It cannot be installed by itself.
Teamcenter Integration for IP Management Active Workspace	This feature is a Catalyst for Semiconductor industry. It provides PLM solution for Semiconductor customers to manage their IP data using Teamcenter.
Vendor Management	<p>Allows Active Workspace users to:</p> <ul style="list-style-type: none"> • Associate vendors with vendor parts. • Associate vendor parts with commercial part revisions. <p>This feature adds the Vendor Management for Active Workspace (<code>vm1vendormanagementaw_template.xml</code>) template to the database.</p> <p>This feature is not selectable unless the Active Content Structure feature and the Vendor Management feature (under Extensions>Supplier Relationship Management) are selected.</p> <p>If you are installing this feature, you should also install the Vendor Management feature (under Client) when building the Client web application.</p>
Visualization Extension	<p>This feature is required to launch the Teamcenter lifecycle visualization standalone application viewer from the Client interface.</p> <p>This feature enables Active Workspace 3D viewer functionality. It adds the Active Workspace Visualization (<code>awv0activeworkspacevis_template.xml</code>) template to the database.</p> <p>You must install this feature if you install the Visualization Server Manager feature (under Visualization Server) when building the Client web application.</p> <p>The Visualization Extension feature is not selectable unless the Active Content Structure feature is also selected.</p>
Workflow	<p>Workflow does not add a template to the database.</p> <p>If you are installing this feature, you must also install the Workflow feature when building the Client web application.</p> <p>For users to access Inbox components and workflow functionality in the Client interface, Workflow must be installed on the corporate server and Workflow must be installed in the Client web application.</p>
Easy Plan Change Management	Adds change management capabilities in Easy Plan. For more information, see the <i>Easy Plan</i> documentation.
Easy Plan Graphics	<p>Adds support for graphics capabilities used in the Work Instructions Authoring workspace.</p> <p>This feature is automatically selected when you select the Easy Plan Work Instructions Authoring option in the Features panel.</p>
Electronic Work Instructions	Installs the server side of Electronic Work Instructions in your environment.
Finish Management	<p>Installs Finish Management support for Active Workspace. A <i>finish</i> represents a finishing process on a part. It may be used to improve appearance, adhesion, corrosion resistance, tarnish resistance, chemical resistance, wear resistance, and remove burrs and so on.</p> <p>For more information, see <i>Aerospace and Defense Solution</i> in the Teamcenter help collection.</p>

Feature	Description
Product Configurator	<p>Adds Product Configurator functionality for Active Workspace. Product Configurator enables you to formally introduce and manage variability across your product suite.</p> <p>For more information, see <i>Product Configurator</i> in the Teamcenter help collection.</p>
Requirements Management	<p>Allows users to author a requirement structure in the Content tab of the Client. Adds the Active Workspace Requirements Management (arm0activeworkspacereqmgmt_template.xml) template to the database.</p> <p>This feature is not available with Teamcenter Rapid Start.</p> <p>The Requirements Management feature is not selectable unless the Active Content Structure feature is also selected.</p> <p>If you are installing this feature, you must also install:</p> <ul style="list-style-type: none"> • Server Extensions>Workflow • Extensions>Systems Engineering and Requirements Management>Requirements Management feature on the corporate server. • Requirements Management feature when building the Client web application.
Retail Footwear and Apparel	<p>Installs the Retail Footwear and Apparel solution. Retail Footwear and Apparel helps manage products in the retail industry, enabling collaboration with the vendors and manufacturers. See the Retail Footwear and Apparel documentation for more information.</p>
Substance Compliance	<p>Installs support for Substance Compliance, which checks if the parts used in your company products conform to environmental regulations. Teamcenter helps verify if the products are environmentally compliant by checking the material and substance information for in-house parts and supplier parts used in the products.</p>
Supplier Collaboration	<p>Installs the Supplier Collaboration solution.</p> <p>Teamcenter Supplier Collaboration is a framework that helps companies manage their supply chains.</p> <p>This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.</p>
Teamcenter Manufacturing Access	<p>Adds support for Teamcenter Manufacturing Access to Active Workspace.</p> <p>Teamcenter Manufacturing Access provides solutions for various manufacturing planning tasks and business processes. It is designed as a cross-industry tool; use it in any environments where Process Simulate is used.</p> <p>For more information about Teamcenter Manufacturing Access, see Easy Plan help.</p>
4th Generation Foundation	<p>Installs 4th Generation Design (4GD) functionality for the Teamcenter server. 4GD allows users of NX CAD or Lifecycle Visualization to cooperate in real time during the design cycle of a product.</p> <p>This feature requires corresponding Teamcenter features.</p>
Capital Asset Lifecycle Management AW	<p>Adds management of plant data to Active Workspace.</p>
EWI Offline Export Utility	<p>Installs the offline export service necessary to export electronic work instructions for offline mode.</p>
Embedded Software Management for Active Workspace	<p>Installs embedded software management capabilities for Active Workspace.</p>
Manufacturing 4G Core	<p>Installs the interface between Next Generation Planning (NGP) and Teamcenter, and adds the mac0mfgapscore_template.xml template.</p>

Feature	Description
Manufacturing BOM Manager - Common	Adds Multi-BOM Manager support to Active Workspace. Multi-BOM Manager enables you to link and assign content across representations for different lifecycle stages or uses for a product. For information about using this feature, see <i>Mutli-BOM Manager</i> in the Teamcenter help library.
Medical Device Foundation	Installs Active Workspace server extensions to support product development processes for medical device manufacturers. This feature assists in ensuring compliance with regulatory guidelines, accelerating innovation in development, and reducing costs.
Product Configurator Extension for Easy Plan	Adds support for Product Configurator in Easy Plan. Product Configurator allows you to enable definitions for variant formulas on operations. Please see the Product Configurator (Administrator) documentation for installation details. By default, Easy Plan uses classic variants.
Product Configurator Support for Active Content Structure	Installs capabilities related to solution variants in Active Workspace.
Requirements Management - Quality Module	Adds Teamcenter Quality functions to Requirements Management.
Substance Compliance-IMDS Integration	Installs support for the Teamcenter Substance Compliance-IMDS Integration . Substance compliance checks whether the parts used in your company products conform to environmental regulations. International Material Data System (IMDS) is a third-party system for exchanging material and substance information with suppliers. Automotive companies use IMDS to collaborate with suppliers for material and substance declaration information. Teamcenter is integrated with IMDS to send material data sheet (MDS) requests to IMDS and to download the MDSs, uploaded by suppliers, from IMDS to Teamcenter. This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.
4th Generation Design	Allows users to view, navigate, and configure collaborative designs and their content in the Client. It adds the 4th Generation Foundation (fgd0aw4gfoundation_template.xml) and 4th Generation Design (fgd0aw4gdesign_template.xml) templates to the database. The 4th Generation Design feature is not selectable unless the Active Content Structure feature (under Server Extensions) and the 4th Generation Design feature (under Extensions>Advanced PLM Services) are also selected. If you are installing this feature, you must also install the 4th Generation Design feature when building the Client web application.
4th Generation Process Planning	Adds Advanced PLM Services capabilities to 4th Generation Design in Active Workspace.
Initiative Lifecycle Management (ILM) Active Workspace	Installs support for Initiative Lifecycle Management (ILM) in Active Workspace. This solution unifies business processes from ideation to production. This includes management of campaigns, ideas, programs, and projects. ILM leverages program planning capabilities and combines those with process groups that distribute work to participants. For more information, see <i>Initiative Lifecycle Management</i> in the Active Workspace documentation.
Machine Builder	Installs support for the Machine Builder solution in Active Workspace. This solution provides a single-source data management system focused on the engineering, manufacturing and product life BOM. This solution is designed to enable industrial machinery customers to move from CAD data management to engineering process management, integrating requirements management, project management, and change management.
Manufacturing BOM Manager	Adds Multi-BOM Manager support to Active Workspace. Multi-BOM Manager enables you to link and assign content across representations for different lifecycle stages or uses for a product.

Feature	Description
	For information about using this feature, see <i>Mutli-BOM Manager</i> in the Teamcenter documentation.
Master Document Register and Transmittals	Adds functionalities related to MDR&T. Master Document Register and Transmittals enables streamlined communication and tracking of documents across all stages in the industry.
Medical Device Submissions for Active Workspace	Provides support for performing end-to-end medical device label authoring, object-based content management, Unique Device Identifier (UDI) data management and submissions for medical industry customers.
Partitions for Structure	The Partitions for Structure feature is required to get the partitions that are in turn required to organize the contents of a product structure.
Process Planning for BTO/BTS/CTO	Installs the Process Planning workspace for build-to-order (BTO) or build-to-stock (BTS), or configure-to-order (CTO) in your environment. Adds these templates to the database: <ul style="list-style-type: none"> • Manufacturing core for BVR/Data Model (mbc0mfgbvrcore_template.xml) • Process Planning Change Management/Data Model (epc0mfgbvrmaturity_template.xml) • Process Planning Line Balancing/Data Model (elb0linebalancing_template.xml) • Process Planning Time Analysis/Data Model (ept0timeanalysis_template.xml)
Process planning and work instructions authoring for ETO	Installs support for the Engineering to Order (ETO) workspace in your environment. This feature allows end users to author work instructions at the process station level.
Easy Plan - Opcenter Integration	Installs the Easy Plan - Opcenter Integration.
Easy Plan for Teamcenter X	This feature adds support for Easy Plan in Teamcenter X, which is a cloud software-as-a-service (SaaS) delivery option for Easy Plan.
Electronics Process Planner	Installs the Easy Plan Electronics Process Planner workspace in your environment. Electronics engineers use Production Process Planning for the systems integration of the electronics process planning tasks of Easy Plan and those of Valor Process Preparation Software. The systems integration is available as a dedicated, optional feature of Production Process Planning. Adds these templates to the database: <ul style="list-style-type: none"> • Manufacturing core for BVR/Data Model (mbc0mfgbvrcore_template.xml) • Production Process Planning Change Management/Data Model (epc0mfgbvrmaturity_template.xml) • Production Process Planning Line Balancing/Data Model (elb0linebalancing_template.xml) • Production Process Planning Time Analysis/Data Model (ept0timeanalysis_template.xml)
Initiative Lifecycle Management - CPG Reference Implementation Active Workspace	Initiative Lifecycle Management (ILM) support for Active Workspace with objects and processes specific to the Consumer Packaged Goods industry. For more information, see <i>Initiative Lifecycle Management — CPG Reference Implementation</i> .

Feature	Description
Initiative Lifecycle Management Overlay for Semiconductor Solution	Adds support for program planning and idea management for semiconductor manufacturers.
Manufacturing Change Management	Adds Change Management capabilities to Manufacturing Process Management.
Manufacturing Resource Manager (MRL)	Enables Manufacturing Resource Library functionality in Active Workspace, allowing users to create, search, and manage resources needed for Manufacturing processes. For information about using Manufacturing Resource Library, see the Teamcenter help library.
Master Document Register and Transmittals (MDR&T) Active Workspace	Active workspace template for MDR&T functionalities.
Semiconductor Foundation Active Workspace	Provides a product lifecycle management solution for semiconductor manufacturers to manage semiconductor design and manufacturing data using Teamcenter.
MDR&T and IPP&E Interface	An interface between MDR&T and IPP&E.
Change Management	Adds support for Change Management in Active Workspace. This feature requires corresponding Teamcenter Change Management features.
Next Generation Planning Client	Adds Next Generation Planning (NGP) support to Active Workspace. Next Generation Planning is the 4G based solution for manufacturing planning. It is suitable for industries where the product being produced is very large, the number of products being built is small and the production build starts before final design is complete and continuously changes. It supports the main business processes like initial/conceptual and detailed manufacturing planning, and change management.
Component Manufacturer Active Workspace	Provides features for component supplier in Teamcenter X that enable you to simplify the user experience for specific user roles, and more easily manage projects and programs. This application can help all stakeholders in the engineering process manage engineering data as well as project data in a simple and synchronized manner.
Active Admin	Features to support Active Admin capabilities.
Active Admin Core	Installs essential support for the active admin workspace.
Active Workspace User Management	Adds support for user management in Active Workspace.
Preference Management	Adds server support for preference management in Active Admin. Preference management features in the active admin workspace are added by the corresponding Active Workspace client feature.
Viewer Administration	Adds viewer administration to the Active Admin workspace in Active Workspace.
Active Architect	Features to support Active Architect capabilities.
Client Configuration	Adds client configuration to the Active Admin workspace in Active Workspace.
Logical Object	Adds logical objectsupport to the Active Admin workspace in Active Workspace.
TC XML Import and Export	Configures Active Workspace to exchange data between different systems. This feature allows the user to run Advanced Multi-Schema Exchanger for schema mapping.
XRT Editor	Adds XRT Editor to the Active Admin workspace in Active Workspace.
Aerospace and Defense	Aerospace and Defense features. These allow Active Workspace users to:

Feature	Description
	<ul style="list-style-type: none"> • Create and view parts list: technical documents, parts, drawings, and designs. • Work with notes: create standard notes and custom notes and attach them to technical documents, parts, drawings, and designs. • Work with Aerospace and Defense-related changes: create, edit, and search change requests, change notices, and deviation requests in alignment with the out-of-the-box Change Management functionality.
Aerospace and Defense Foundation	<p>Adds the Aerospace and Defense Foundation Active Workspace (<code>ads1awadsfoundation_template.xml</code>) template to the database. This feature is not selectable unless the following features are also selected:</p> <ul style="list-style-type: none"> • Teamcenter Change Management • Teamcenter Change Management (for Active Workspace) • Active Workspace Indexing Engine under Active Workspace>Indexing Server • Active Workspace Indexer under Active Workspace>Indexing Server • Active Workspace under Active Workspace>Server Extensions • Active Content Structure under Active Workspace>Server Extensions • Vendor Management under Active Workspace>Server Extensions • Aerospace and Defense Foundation under Active Workspace>Server Extensions>Aerospace and Defense • Aerospace and Defense Foundation under Active Workspace>Client • Active Workspace Client under Active Workspace>Client • Aerospace and Defense Change Management under Active Workspace>Client
Aerospace and Defense Change Management	<p>Installs the change management functionality for the Aerospace and Defense Foundation feature. This feature requires corresponding Teamcenter features.</p>
CAE Simulation Management	<p>Features to support management of computer-aided engineering (CAE) data.</p>
Simulation Process Management	<p>Allows Active Workspace users to author Simulation structures in Active Workspace.</p> <p>It adds the Simulation Process Management Server (<code>cae1caeaws_template.xml</code>) template to the database.</p> <p>The Simulation Process Management feature is not selectable unless the Active Content Structure feature and the Simulation Process Management feature (under Extensions) are also selected.</p> <p>If you are installing this feature, you must also install the Simulation Process Management Client feature when building the Client web application.</p>
Extended Simulation Process Management	<p>Add extended Simulation Process and Data Management capabilities to Active Workspace.</p>
Simulation Process Management with Git Integration	<p>Configures the Teamcenter installation to support the MBSE Git Integration data model and functionalities in Simulation workflows.</p>
Simulation Process Management with Measurable Attribute for Active Workspace	<p>Configures the Teamcenter installation to support Measurable Attribute and Target Management data models and functionality in Simulation workflows.</p>
Simulation Process Management	<p>Supports parameter management data model and functionality in Simulation workflows.</p>

Feature	Description
with Parameter Management	
Integrated Program Planning and Execution	Integrated Program Planning and Execution (IPP&E) server extensions features. The IPP&E solution allows project planning that integrates cost, schedule, risk and technical requirements in a fully planned, resourced, and budgeted program. It allows configuration control, not only of products, but also of the project plan. It also communicates the status of requirements to users.
Organization Breakdown Structure	Adds Organization Breakdown Structure (OBS) support to IPP&E.
Work Breakdown Structure	Adds support for authoring Work Breakdown Structure (WBS) hierarchy in Active Workspace from top to bottom. For information about defining work breakdowns, see <i>Schedule Manager</i> in the Teamcenter help library.
IPP&E Foundation	Provides essential functionality for Integrated Program Planning and Execution in Active Workspace.
IPP&E Contract Data Management Extension	Adds Contract Data Management support to IPP&E.
MRO	Service Lifecycle Management features for Active Workspace.
MRO Core	Installs the PhysicalPart business object used to designate physical instances of parts for Service Lifecycle Management.
Service Work Instructions	Adds support for work instructions to Service Lifecycle Management in Active Workspace.
As-Built for Active Workspace	Provides searching and BOM extensions necessary to support MRO As-Built capabilities. This feature is not available with Teamcenter Rapid Start. In addition to the Active Workspace feature, this feature requires: <ul style="list-style-type: none"> • Extensions>Maintenance Repair and Overhaul>As-Built Management Adds these templates to the database: <ul style="list-style-type: none"> • MRO Core, Active Workspace BOM Interface (smr1mrocoreaw_template.xml) • As-Built (sab1asbuiltaw_template.xml)Program Planning Execution
As-Maintained	Installs the As-Maintained feature to support the As-Maintained physical structure management for Service Manager.
Service Engineering	Provides service engineering support for Service Lifecycle Management.
Service Planning in Active Workspace	Provides the searching and BOM (Bill of Materials) extensions necessary to support the SLM Service Planning in an Active Workspace environment.
Transaction Processing	Installs transaction processing functionality for Service Request Manager.
Service Processing	Installs service processing functionality for Service Request Manager.
Service Event	Provides searching and BOM extensions necessary to support MRO Service Event Management capabilities. This feature is not available with Teamcenter Rapid Start. In addition to the Active Workspace feature, this feature requires:

Feature	Description
	<ul style="list-style-type: none"> • Base Install>Active Workspace>Server Extensions>MRO>As-Maintained • Extensions>Maintenance Repair and Overhaul>As-Maintained Management • Extensions>Maintenance Repair and Overhaul>Service Event Management <p>Adds these templates to the database:</p> <ul style="list-style-type: none"> • Transaction Processing, Active Workspace BOM Interface (stp1transactionprocessingaw_template.xml) • Service Processing, BOM Interface (spr1serviceprocessingaw_template.xml) • Service Event (sem1serviceeventmgmtaw_template.xml)
Service Forecasting	<p>Installs service forecasting capability for Service Request Manager.</p> <p>This feature requires corresponding Teamcenter features.</p>
Service Planning and Service Processing Alignment	<p>Installs the Service Planning functionality for Service Processing in Active Workspace.</p>
Program Planning Execution	<p>Program Planning Execution features for Active Workspace</p>
Program Change	<p>Allows interaction between Program Planning Event Change and Change Management in Active Workspace. It allows Active Workspace users to relate programs, projects, and subprojects to change objects.</p> <p>This feature adds the Program Change (pch0pchinterface_template.xml) template to the database.</p> <p>This feature is not selectable unless these features are also selected:</p> <ul style="list-style-type: none"> • Change Management under Extensions>Enterprise Knowledge Foundation • Program Planning under Server Extensions • Program Planning Infrastructure under Extensions <p>If you are installing this feature, you should also install the Program Change Client feature (under Client→Program Planning Execution Client) when building the Client web application.</p>
Program Planning Event Change	<p>Allows interaction between Program Planning Schedule Manager and Program Change Interface in Active Workspace. It allows users to relate events to change objects.</p> <p>This feature adds the Program Planning Event Change (pec0ppeventchange_template.xml) template to the database.</p> <p>This feature is not selectable unless these features are also selected:</p> <ul style="list-style-type: none"> • Extensions>Enterprise Knowledge Foundation>Change Management • Extensions>Program Planning Infrastructure

Feature	Description
	<ul style="list-style-type: none"> • Server Extensions>Program Planning • Server Extensions>Program Change
Program Schedule Manager	<p>Allows interaction between Schedule Manager and Program Planning in Active Workspace. It allows users to create plan level items to schedules and supports automatic generation of schedules within a program.</p> <p>This features adds the Program Schedule Manager (psi0ppsminterface_template.xml) template to the database.</p> <p>This feature is not selectable unless these features are also selected:</p> <ul style="list-style-type: none"> • Extensions>Enterprise Knowledge Foundation>Change Management • Extensions>Program Planning Infrastructure • Server Extensions>Program Planning • Server Extensions>Schedule Manager • Server Extensions>Program Change • Server Extensions>Program Planning Event Change
Change Management Schedule Manager	<p>Allows interaction between Schedule Manager and Change Management in Active Workspace. It allows users to relate schedules and change objects.</p> <p>This feature adds the Change Management Schedule Manager (csi1cmsmawinterface_template.xml) template to the database.</p> <p>This feature is not selectable unless these features are also selected:</p> <ul style="list-style-type: none"> • Extensions>Enterprise Knowledge Foundation>Change Management • Server Extensions>Schedule Manager
Reuse and Standardization	Features to support Reuse and Standardization in Active Workspace.
Classification Server	Allows users to access Classification data in the client interface.
Classification AI	<p>Installs the Classification artificial intelligence (AI) engine, which provides assistance in navigating to desired classes.Classification</p> <p>After being trained on a database, the engine receives object metadata from the Teamcenter server and returns the probabilities for potential classes. You can specify which classes are displayed in the user interface based on these probabilities.</p>
Presentation Layer - Next Generation Classification Server	Installs the Next Generation Classification foundation feature. This option installs the presentation layer for classification standard taxonomy and for library management.
Teamcenter Classification Collector Server (earlier called Library)	Enables indexing for Library Management business objects. The Library Management Server feature is not selectable unless the Library Management feature (under Extensions>Reuse and Standardization) is also selected.

Feature	Description
Management Server)	
Teamcenter Integration for FORAN	Adds support for FORAN integration with Teamcenter. This feature allows users to publish marine product models from the FORAN desktop application.
FORAN Integration for Active Workspace	Configures the Teamcenter installation to allow users to view and navigate FORAN product model in the Active Workspace client.
Teamcenter Integration for NX	Features that support the integration of Teamcenter with NX.
NX Logical for Active Workspace	This feature configures the Teamcenter installation to support logical model for the NX diagramming application in Active Workspace. This feature allows users to view and navigate diagramming sheets and logical model content in the Active Workspace client.
NX Staged Models for Active Workspace	This feature adds support to Active Workspace for stage model application for NX. This feature allows users to publish manufacturing process steps of a design part to Teamcenter from the NX desktop application.
NX for Active Workspace	<p>Enables users to access NX integration functionality from the client interface. It adds the NX for Active Workspace (awn0nx_template.xml) template to the database.</p> <p>This feature is not selectable unless the NX Foundation feature (under Extensions>Teamcenter Integration for NX) is also selected.</p> <p>If you are installing this feature, you should also install the NX Integration feature (under Client) when building the Client web application.</p>
NX MBSE for Active Workspace	Adds the NX Integration for Model-Based Systems Engineering.
NX P & ID Active Workspace	<p>Exposes NX P & ID in Active Workspace so that users can view, navigate, and configure sheets and their content.</p> <p>This feature adds the NX P & ID Active Workspace (npx1pidaws_template.xml) template to the database.</p> <p>This feature is not selectable unless these features are also selected:</p> <ul style="list-style-type: none"> • NX Foundation under Extensions>Teamcenter Integration for NX • Active Content Structure under Server Extensions • 4th Generation Design BOM Management under Extensions>BOM Management • MDCConnectivity under Extensions>Advanced PLM Services • System Modeling under Extensions>Advanced PLM Services • Diagramming under Extensions>Advanced PLM Services • NX Piping and Instrument Diagram (P&ID) Design under Extensions>Teamcenter Integration for NX • Systems Engineering under Server Extensions <p>If you are installing this feature, you should also install the NX Integration feature (under Client) when building the Client web application.</p>

Feature	Description
Teamcenter Quality data model	Features to support Teamcenter Quality.
Quality Action Management data model	Adds support for quality actions to Active Workspace. This feature is mandatory for all Teamcenter Quality solutions. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Escalation Management Translator	Adds support for escalation workflows for quality actions. These allow responsible users or quality managers to receive alerts or e-mail notifications to remind them of their quality actions prior to the due date, thereby avoiding unnecessary delays or escalations. Additionally, escalation workflows can be initiated for quality actions that are not in the required state by the due date. To install the Escalation Management Translator , choose Base Install > Active Workspace > Server Extension > Teamcenter Quality data model > Escalation Management Translator . To select Escalation Management Translator , ensure that you select Quality Action Management and Dispatcher features
Quality Manager data model	Adds support for Quality Manager to Active Workspace. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Failure Mode Effect Analysis (FMEA) data model	Adds support for Failure Mode Effect Analysis (FMEA) to Teamcenter Quality. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
APQP Program Management data model	Adds support for Quality Project Management (APQP) methodology to Teamcenter Quality. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Control and Inspection Plan	Adds support for Control Plan to Teamcenter Quality. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Training and Qualification	Adds training and qualification actions to the Teamcenter Quality module, which allows you to create and manage qualifications, qualification profiles, qualification records, and related objects.
Quality Issue Management and Problem Solving data model	Adds support for Issue Manager and Problem Solving to Active Workspace. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Quality Audit	Enables capturing the status of quality actions in audit logs. A Teamcenter administrator logged into Active Workspace can view these event logs and navigate to specific quality actions.
Quality Issue Management and Problem Solving search	Adds the ability to search for Problem Solving objects in Active Workspace.
Quality Management for Life Sciences Industry	Provides support for quality management for the Life Sciences industry. This application enables you to perform Quality Management related operations like nonconformance management and Corrective and Preventive Actions (CAPA) Management.
Audit and Assessment Translator	Processes quality audit logsquality audit logs for analysis.
Supplier Quality Management	Provides support for Supplier Quality Management. This application enables you to perform Supplier Quality management operations with applications like Vendor Management, Advance Product Quality Planning, and Quality Issue Management and Problem Solving. Supplier Quality Management is used to evaluate vendor performance based on quality issues and problem solving

Feature	Description
	processes initiated for supplied materials or parts. It can also assess a vendor using a quality checklist.
Model-Based Systems Engineering	Features to support Model-Based Systems Engineering in Active Workspace.
Physical Verification Management Active Workspace Extension	Adds support for verification management in Active Workspace.
LMS System Synthesis Modeling	Installs the System Synthesis artifacts such as model template and core architecture in Active Workspace.
Measurable Attributes and Targets	<p>Configures Active Workspace to interact with Measurable Attributes and Targets, providing functionality such as retrieving the associated measurable attributes from a parent object or parent line.</p> <p>This feature adds the Measurable Attributes and Targets for Active Workspace (att1attrtargetmgmtaw_template.xml) template to the database.</p> <p>This feature is not available with Teamcenter Rapid Start.</p> <p>In addition to the Active Workspace feature, this feature requires:</p> <ul style="list-style-type: none"> • Extensions→Model-Based Systems Engineering→Verification and Validation Planning and Reporting <p>Selecting this feature automatically selects these features in the same feature group:</p> <p style="text-align: center;">Measurable Attributes and Targets Attribute and Parameter Base Definitions</p> <ul style="list-style-type: none"> • Base Install→Active Workspace→Server Extensions→Systems Engineering • Base Install→Active Workspace→Server Extensions→Model-Based Systems Engineering→Verification and Validation Planning and Reporting <p>Selecting this feature automatically selects the Measurable Attributes and Targets feature in the same feature group.</p> <p>If you are installing this feature, you must also install the Measurable Attributes and Targets Client feature in the Client web application.</p>
Systems Engineering	<p>Installs the Systems Engineering application, which provides capabilities such as functional modeling and budgets.</p> <p>This feature requires the Teamcenter Foundation feature and also a rich client or a two-tier Business Modeler IDE client.</p>
Digital Thread Navigation	<p>Adds Digital Thread Navigation capabilities to Model-Based Systems Engineering and adds the relationshipviewer_template.xml template to the database.</p> <p>If you are installing this feature, you should also install the Active Workspace>Client>Model-Based Systems Engineering>Digital Thread Navigation feature for the Active Workspace client.</p>

Feature	Description
Parameter Management Active Workspace	Adds parameter management support to Active Workspace.
System Lifecycle Management	<p>Installs the System Lifecycle Manager solution, with provides system modeling functionalities such as the following:</p> <ul style="list-style-type: none"> • Tool neutral object-based information model • Model interface management • Branching, versioning and merging • Model reuse (ID card, Library) • Architecture visualization and reviews • Xcelerator multi-domain toolset interoperability • Integrated change management
Teamcenter Test Management Active Workspace	Adds test management support to Model-Based Systems Engineering (MBSE).
Physical Verification Management Active Workspace	Adds support for inspections and physical tests.
Active Workspace Linked Data Framework Services	Features to support Linked Data Framework Services in Active Workspace.
LDF Foundation	<p>Provides a framework to link Teamcenter business objects with an artifact of a remote linked data enabled system. It enables rendering the remote system's delegated user interfaces in Active Workspace.</p> <p>This feature adds the Linked data Framework for Active Workspace (ldf0ldfaws_template.xml) template to the database.</p> <p>This feature is not selectable unless the Linked Data Framework Support Infrastructure feature (under Extensions>Platform Extensibility>Linked Data Services) is also selected.</p> <p>If you install this feature, you should also install the Linked Data Framework feature (under Client) when building the Client web application.</p>
Active Workspace LDF Change Management Integration	Installs the Change Management integration module of Linked Data Services (LIS). The feature requires corresponding Teamcenter features.
Active Workspace LDF Embedded Software Management Integration	<p>Installs the Embedded Software Management integration module of Linked Data Services (LIS).</p> <p>For more information, see <i>Integrating Applications Using Linked Data Framework</i> in the Teamcenter help collection.</p>
Active Workspace LDF Requirements Management Integration	<p>Installs the Requirements Management integration module of Linked Data Services (LIS).</p> <p>This feature requires corresponding Teamcenter features.</p>
LDF Polarion Types Integration	<p>Installs Polarion data types for Linked Data Services (LIS) integration in Active Workspace.</p> <p>This feature requires corresponding Teamcenter features.</p>
Consumer Packaged Goods	<p>Features to support CPG in Active Workspace.</p> <p>For more information, see <i>Getting Started with CPG</i> in the Teamcenter help collection.</p>

Feature	Description
Brand Management	Installs the Brand Management template for CPG. For more information, see <i>Getting Started with CPG</i> in the Teamcenter help collection.
Packaging and Artwork	Installs packaging and artwork functionality for CPG. For more information, see <i>Getting Started with CPG</i> in the Teamcenter help collection.
Specification Management	Installs specification management functionality for CPG. For more information, see <i>Getting Started with CPG</i> in the Teamcenter help collection.
Consumer Product Management Active Workspace	Installs consumer product management functionality for CPG. For more information, see <i>Getting Started with CPG</i> in the Teamcenter help collection.
MBSE Integrations	Features to support Model-based system engineering in Active Workspace.
UML SysML Modeling Active Workspace Interface	Installs server support for managing Unified Modeling Language (UML) and Systems Modeling Language (SysML) models in Active Workspace.
Systems Modeling IntegrationActive Workspace	Installs support for the System Modeling Integration in Active Workspace.

Visualization Server features

Visualization Server features are available in the **Base Install>Active Workspace>Visualization Server** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Visualization Server Pool Assigner	Installs the Visualization Server Pool Assigner (VPA) , which manages Visualization Server Managers and routes users to an available VSM to open 3D documents.
Visualization Data Server	Installs the Visualization Data Server (VDS) , which improves Visualization performance by caching visualization data close to the Visualization Server Manager. The Visualization Data Server is required for using MMV feature in Active Workspace.
Visualization Server Manager	Installs the Visualization Server Manager (VSM) , which starts and stops rendering processes as needed and streams visualization data to the Active Workspace client. The Visualization Server Manager is required for any use of the 3D viewer or the 2D viewer part of the universal viewer in Active Workspace.

Dispatcher features

Dispatcher features are available in the **Base Install>Active Workspace>Dispatcher** feature group in TEM. These features require you install the Dispatcher server and client.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Client	Dispatcher client features.
Retail Color Image Dispatcher	Installs Dispatcher support for the Retail Footwear and Apparel solution.
Retail Techpack Dispatcher	Installs Dispatcher support for the retail techpack for the Retail Footwear and Apparel solution.
Translators	Dispatcher server translators.
Active Content Structure Translator	Installs the Active Content Structure translator for indexing structure data. Install this translator if you use Dispatcher-based indexing for structure data. This feature must be installed in the same environment as the Dispatcher server.
Retail Color Image Translator	Installs the retail color image translator for the Retail Footwear and Apparel solution.
Retail Techpack Translator	Installs the retail techpack translator for the Retail Footwear and Apparel solution.

Server Enhancements features

Server Enhancements features are available in the **Server Enhancements** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Server Manager	Installs the process that manages the pool of Teamcenter server processes. This option is applicable only when you are deploying the web tier. This feature requires Teamcenter Foundation and FMS Server Cache features. For a smaller site, you can install the server manager and Teamcenter servers on the same host as the web tier application. For deployment options for larger sites, you can install the server manager on a separate host.
Sample files	Installs sample source code for customizing Teamcenter and generating reports. This component is optional. You can install the sample files individually; you need not install any other components.
Teamcenter Management Console	Installs Teamcenter Management Console, an SSL-secured console for managing and monitoring server-side components such as the Java EE server manager and Java EE web tier. The console's tabbed interface resembles a web application server console. Teamcenter administrators can use the console to access multiple Teamcenter management features from a single page.
Teamcenter Security Services	Configures Security Services for Teamcenter. These services eliminate prompts for logon credentials when users switch Teamcenter products within a user session. Prerequisite: Installation and configuration of Security Services. Required information: <ul style="list-style-type: none"> Application ID for this instance of Teamcenter in the Security Services application registry.

Feature/Subfeature	Description
	<ul style="list-style-type: none"> Complete URL of the Security Services logon Service web application. Complete URL of the Security Services Identity Service web application.
Database Daemons	Optional database support services.
Action Manager Service	<p>Monitors the database for the creation of action objects and dispatches events that have a specific execution time and events the Subscription Manager daemon fails to process.</p> <p>Installing the Action Manager service is required to enable the rich client Subscription Administration application.</p>
Subscription Manager Service	<p>Monitors the database event queue for the creation of subscription event objects.</p> <p>Installing the Subscription Manager service is required to enable the rich client Subscription Administration application.</p> <p>To subscribe, right-click an item and choose Subscribe. To modify your subscription settings, right-click an item and choose Subscription Manager.</p>
Teamcenter Revision Configuration Accelerator Service	Installs the Revision Configuration Accelerator Service service, which improves revision configuration performance
Teamcenter Task Manager Service	<p>Checks user inboxes for tasks that have passed due dates, notifies the delegated recipients, and marks those tasks as late.</p> <p>Installing the Task Monitor service is required to enable notification of late tasks.</p>
Tessellation Manager Service	<p>Tessellates UGMASTER and UGALTREP datasets to the JT (DirectModel) dataset and attaches the JT dataset back to the item revision and UGMASTER and UGALTREP dataset.</p> <p>Installing the Tessellation service is required to create the tessellated representations in Repeatable Digital Validation (RDV) that enable users of the Design Context application to quickly visualize components in context. The tessellated representations are created during the workflow release process, ensuring that JT files of the DirectModel datasets are updated as the NX files are released.</p>
Workflow Remote Inbox Service	This service syncs the data between two sites to enable working with remote inboxes.
Teamcenter Shared Metadata Cache Service	Installs the Shared Metadata Cache Service.
File Management	File management features.
FMS Server Cache	<p>Installs the File Management System FSC server and file caches. You must install an FSC server on each host that runs a server manager and on each host that is to provide volume services.</p> <p>You can optionally choose to install the FSC as a configuration server or a performance cache server.</p>
Hierarchical Storage Management (HSM)	Adds support for third-party hierarchical storage management software.
Teamcenter Web Tier	Features to support the Teamcenter .NET web tier.
ASP .NET State Service	Installs the middle tier processes that communicate with Teamcenter server processes.
Web Tier for .NET	Installs the middle tier processes that communicate with Teamcenter server processes.

Microservices features

Microservices features are available in the **Microservices** feature group in TEM.

These features require **installation of Microservice Framework**.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature	Description
Microservices Framework	Installs the Microservices Framework .
Advanced Multi-Schema Exchanger Service	Installs the Advanced Multi-Schema service, which supports creation of mapping rules to transform data when it is transferred between Teamcenter sites using different schemas. This service is used by the Advanced Multi-Schema Exchanger, which allows you to create mapping rules for the item types in your source schema or for subsets of item types in the schema as defined by schema subsets attached to Briefcase files. See the <i>PLM XML/TC XML Export Import Administration</i> guide for more information about creating, validating, and attaching mapping rules.
Classification AI Serving	Installs the classification AI microservice that connects the Active Workspace Gateway to the classification AI engine, which provides artificial intelligence (AI) to recommend the class in which to classify new objects.
Command Prediction Service	Installs the Command Prediction Service, which manages data for the Active Workspace Assistant and a database for the microservice to store data for the Active Workspace Assistant. TEM prompts you for the necessary database creation values during installation.
DPV Service	Creation and authoring of BOP (Bill of Process) and BOR (Bill of Resource) structures in the Active Workspace client, perform operations like "Send Plant ID" and submit the inspection data to ETL (Extract Translate and Load) application.
Declarative Artifact Service	Installs the microservice that stores your changes to the declarative definitions of Active Workspace. The Declarative Artifact Service allows you to easily create new declarative definitions by automatically creating new files, and also make changes to existing declarative definitions without changing their original source code.
File Repository Service	Installs the File Repository microservice, which facilitates transfer of Active Workspace client content from the File Repository to Active Workspace client hosts through the Active Workspace Gateway.
NX X Data Import Microservice	This microservice is required to support the import of NX part files into Teamcenter X through a drag and drop interface in Active Workspace.
Requirements Management Compare Service	Installs the microservice that provides compare capability for Requirements Manager.
Requirements Management Export Service	Installs the microservice that provides export capability for Requirements Manager.
Requirements Management Import Service	Installs the microservice that provides import capability for Requirements Manager.
TCM Vis - Easy Plan Service	Installs the Teamcenter Manufacturing Easy Plan application microservice for visualization, which interacts with Teamcenter and pulls structure information for the selected line.

Feature	Description
TCM Vis - Visualization Service	Installs the Teamcenter Manufacturing Visualization microservice which provides the core 3D visualization functionality, retrieves 3D models directly from Teamcenter, and manages a cache to improve access speed for frequently accessed models.
Teamcenter GraphQL Service	Installs the Teamcenter GraphQL microservice, which processes client queries passed from the Active Workspace Gateway to the File Repository.
Teamcenter Share Microservice	Installs the Teamcenter Share microservice, which enables the Teamcenter Share collaboration in Active Workspace. Teamcenter Share is a cloud application that allows you to share and collaborate on project files with your partners, team members, and manufacturers. In this browser-based file storage, you can develop new products and designs, then share your projects with customers for approval or manufacturers for production. Teamcenter Share controls and secures file access, and maintains history of file sharing and exchange. For more information about Teamcenter Share collaboration, see <i>Teamcenter Share collaboration in Active Workspace</i> .
Teamcenter Sysmlv2 Microservice	Installs the microservice that supports management of UML or SysML models in Teamcenter.
iModel Viewer Service	Provides viewing capability for iModel data.
Teamcenter Google Online Microservice	Provides interaction between the Google Online Viewer and the Teamcenter server.
Teamcenter Office Online Microservice	Provides the capability to use the Microsoft Office Online Server features that allows users to edit and view documents within Active Workspace instead of using the desktop version of the Microsoft Office applications.
OData Microservice	Installs the microservice that supports the Teamcenter OData API Framework.

Teamcenter Extensions features

Teamcenter Extensions features extend Teamcenter server and client functionality. These features are available in the **Extensions** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
4D Planning	Installs the 4D Planning feature. <i>4D Planning</i> is the capability to add a time component to process planning to simulate and visualize construction over an extended period of time.
APS Configured Search Framework	Installs the search framework for Advanced PLM Services.
Advanced PLM Services Core Template	Installs the core functionality for Advanced PLM Services.
Assignment Matrix	Adds support for Assignment Matrix to Teamcenter
CAD Lite	Provides out-of-the-box CAD integrations for CAD users.
CFIHOS Standard	Adds support for the Capital Facilities Information HandOver Specification (CFIHOS) standard. CFIHOS offers practical standardized specifications for information handover that work for anyone involved in making, operating, maintaining or decommissioning industrial facilities, and everyone in the information supply chain - operators, contractors and equipment manufacturers and suppliers.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Campaign Management	Integrates campaign management with brand development and program planning. Similar to how a program orchestrates projects, a campaign orchestrates ideas and information about audience and goals. It also includes a high-level description of planned resources and budget and can identify one or multiple windows of opportunity that act as a reference for the windows of opportunity targeted by the ideas. For more information about campaign management, see <i>Initiative Planning</i> in the Active Workspace documentation.
Composite Part Laminate Definitions	Installs support for composite part laminate definitions. This enables visualization of plies for composite part definition outside of authoring tools, with particular emphasis on change visualization to intuitively manage part changes.
Configurable Validation	Installs support for creating custom validation applications to manage the validation results in a Teamcenter database. For more information about this functionality, see <i>Product Data Validation</i> .
Content Migration Manager	Installs the Content Migration Manager feature. For more information about this feature, see the <i>Content Migration Manager and NX Migration User's Guide</i> provided with the Content Migration Manager software media.
Embedded Software Management	Installs Embedded Software Management support for the Teamcenter server.
Engineering Views	Installs the Engineering view for the Teamcenter rich client.
Google Viewer Integration	Installs the Google Viewer Integration, which enables Google Online features within Teamcenter, such as viewing and editing Microsoft Office documents without the need for Microsoft Office applications.
Hazard and Risk Assessment	Installs support for hazard and risk analysis of system models and functions.
IP Management	Provides product lifecycle management for semiconductor manufacturers to manage IP data using Teamcenter.
Idea Management	Installs idea management, which provides the capability to create, discover and realize an Idea leading to the creation of project. Ideas are researched during the <i>capture</i> phase and are used during the <i>discovery</i> phase to define a product, set goals and objectives, identify trends, record customer profiles, and make projections. An accepted idea results in the start of a new project. For more information about idea management, see <i>Initiative Planning</i> in the Active Workspace documentation.
Order Management	Installs Order Management, which manages the lifecycle of an order from inquiry to sales order. A customer inquires about products, a sales person responds with the offer containing configurable products. Once the offer is accepted by the customer, a sales order is created that refers to the configurable products.
Product Line Planning	Installs Product Line Planning. Product Line Planning facilitates development of a collection of products by outlining product assortment goals. The purpose of such assortment planning is to identify an assortment that maximizes sales or gross margin within constraints such as limited budget, space, vendors, and others.
Program Planning Infrastructure	Installs Program Planning support for the rich client. For more information about this feature, see <i>Active Workspace Installation</i> in the Active Workspace help.
Sample Document Management	Installs the sample template for Document Management.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Substances of Concern in Products	Identifies products that contain hazardous substances above 0.1% weight of the product, which are required to be reported to the European Chemical Agency (ECHA) Substances of Concern in Products (SCIP) database for products.
Symbolica Integration	Installs the Teamcenter integration to Symbolica software. Symbolica is a Siemens Digital Industries Software product that allows you to visually create and perform complex mathematical equations. The Symbolica integration enables you to create, save, and revise Symbolica files within Teamcenter. These files can also be referenced by NX part files stored within Teamcenter. Symbolica software can be downloaded from Support Center.
Teamcenter Share Collaboration	Installs support for the Teamcenter Share collaboration in Teamcenter. Teamcenter Share is a cloud application that allows you to share and collaborate on project files with your partners, team members, and manufacturers. In this browser-based collaboration, you can develop new products and designs, then share your projects with customers for approval or manufacturers for production. Teamcenter Share controls and secures file access, and maintains history of file sharing and exchange. For more information about Teamcenter Share collaboration, see Active Workspace documentation.
Teamcenter Integration for Intosite	Installs the Teamcenter integration with Siemens Intosite.
Test Manager	Installs the application model used to manage assembly tests for virtual assessment processes in Automotive Edition and Aerospace and Defense.
Translation Service Database Module	Installs the database module for the Dispatcher Server.
Weld Management	Installs the template that manages NX welding features in Teamcenter.
Enterprise Recipe Management	Installs integrated recipe authoring capabilities that help pharmaceutical, CPG, or similar industries to track the development process of a product.
Advanced PLM Services for Applications	Installs basic functionality for Advanced PLM Services applications.
Assignment Matrix Active Workspace	Adds support for Assignment Matrix in Active Workspace.
Build Conditions	Installs build condition support for Product Configurator, a feature that enables you to formally introduce and manage variability across your product suite.
Data Discovery Services	Enables the indexer administration data model and services.
Easy Plan Active Workspace Infrastructure	Adds support for Easy Plan solutions to Active Workspace. For more information, see the <i>Easy Plan</i> documentation.
Initiative Planning	This feature provides capability to create, discover and realize an Idea leading to the creation of project. It also provides capability to create and manage campaigns. For more information, see <i>Initiative Planning</i> in the Active Workspace documentation.
Machine Builder	Installs support for the Machine Builder solution, which provides a single-source data management system focused on the engineering, manufacturing and product life BOM. This solution is designed to enable industrial machinery customers to move from CAD data management to engineering process management, integrating requirements management, project management, and change management.
Medical Device Foundation	Installs server and rich client extensions to support product development processes for medical device manufacturers. This feature assists in ensuring compliance with regulatory guidelines, accelerating innovation in development, and reducing costs.
Object Data Services	Adds support for the OData framework for Teamcenter.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Reminder and Escalation Management	The Reminder and Escalation Management provides mechanism to process notifications and escalation capability based on criteria defined for Teamcenter Business objects which helps to track progress of defined task. This is generic solution and can be used by any application to remind the due tasks at right time and also set up escalations at desired level if it is getting delayed.
Softlines, Hardlines and Footwear	Adds capabilities to support the Softlines, Hardlines, and Footwear industries. It is an add-on solution to help users manage the various needs of the retail industry.
Teamcenter Integration for IP Management	Provides a solution to integrate Teamcenter with external IP management applications. The application helps import IP data and its metadata from external application into Teamcenter. It also adds the capability to share a bill of IP from Teamcenter to an external application.
Teamcenter SLM Integration for Service Execution	Adds Service Execution actions for Teamcenter Service Lifecycle Management (SLM).
Teamcenter Simplified	Provides a simplified experience of Teamcenter for small- and medium-sized business customers. User Experience (UX) redundancies and outlying commands are removed. This allows users to quickly work on designs, documents and parts within their organization without additional configuration.
Advanced BOM Rollup	Installs a base/foundation template to perform rollup of properties such as weight and balance, cost, sustainability indicators and other business critical KPIs.
Advanced PLM Services for Realization	Installs realization support for existing items, item revisions, BOM views or BOM view revisions into collaborative designs.
Aspect Infrastructure Support	Adds aspect infrastructure support for Automation Designer.
CAD Lite Active Workspace	Provides out-of-the-box CAD integrations for CAD users.
Change Management 4th Generation Interface	Installs Change Management support for 4th Generation Design.
Color Appearance Active Workspace	Provides the ability to define standard color attributes in Active Workspace.
Content Management Active Workspace	Adds Content Management support to Active Workspace.
Design BOM Alignment Automation	Provides the capability to generate the design or BOM data from an existing BOM or design data from Active Workspace. Given a source BOM, a user can generate a target BOM. The source and target BOM could be an engineering BOM or design BOM. For more information, see <i>Design and BOM Alignment — Deployment and Administration</i> .
Dimensional Planning and Validation Multi Field Key	Installs multifield key functionality in Dimensional Planning and Validation.
Engineering Views Active Workspace	Installs the Engineering view for the Teamcenter rich client.
Initiative Lifecycle Management (ILM)	Installs support for Initiative Lifecycle Management (ILM), which unifies business processes from ideation to production. This includes management of campaigns, ideas, programs, and projects. ILM leverages program planning capabilities and combines those with process groups that distribute work to participants. For more information, see <i>Initiative Lifecycle Management</i> in the Active Workspace documentation.
Integrated Materials Management for Additive Manufacturing	Installs Integrated Material Management (IMM) for Additive Manufacturing (AM), which manages raw materials and final materials for Additive Manufacturing. This feature enables NX users to search and assign materials to parts based on material parameters. It also enables selecting the printer, post-operation, and available corresponding

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	raw materials. For more information about Additive Manufacturing and NX, see <i>Manufacturing Process Planner</i> .
Product Configurator	Installs Product Configurator, a feature that enables you to formally introduce and manage variability across your product suite.
Product Specification Management	Enables Teamcenter with additional occurrence attributes to support Product Design specification management for EBOM.
Teamcenter Integration for Supplyframe	Enables integration with Supplyframe for BOM management.
Volume Planning	Installs volume planning for Teamcenter. This feature adds the cfp0featureplanning template.
Advanced PLM Services for Partitioning	Installs support for creating partitions in collaborative designs.
Change Management Configurator Interface	Installs Change Management support for Product Configurator.
Change Management Realization Interface	Adds realization capability to Change ManagerChange Manager. <i>Realization</i> is the process of representing data from one product design (the source) into another product design (the target).
Initiative Lifecycle Management - CPG Reference Implementation	Installs Initiative Lifecycle Management (ILM) with objects and processes specific to the Consumer Packaged Goods industry. For more information, see <i>Initiative Lifecycle Management —CPG Reference Implementation</i> in the Active Workspace documentation.
Initiative Lifecycle Management Overlay for Semiconductor Solution	Supports project planning and idea management for the semiconductor industry.
Medical Device Submissions	Provides support for performing end-to-end medical device label authoring, object-based content management, Unique Device Identifier (UDI) data management and submissions for medical industry customers.
Product Configurator Feature Planning	Adds feature planning support to Product Configurator, a feature that enables you to formally introduce and manage variability across your product suite.
Product Configurator Support for Structure Manager	Provides the ability to use the Product Configurator variants to configure product structures in Structure Manager. This feature requires Product Configurator .
Teamcenter SLM Integration for Service Execution, Active Workspace BOM Interface	Adds Service Execution actions for Teamcenter Service Lifecycle Management (SLM) to Active Workspace.
Weight and Balance Management	Enables interaction with Weight and Balance Management. This supports functionality such as specifying weight and balance attributes for parts or assemblies, and performing their rollup.
Active Workspace Weight and Balance Management	Enables interaction with Weight and Balance Management in the Active Workspace client. This supports functionality such as specifying weight and balance attributes for parts or assemblies, and performing their rollup. For more information, see <i>Structure Management —Deployment and Administration</i> .
Capital Asset Lifecycle Management	Installs the core components of Capital Asset Lifecycle Management (CALM)

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	The CALM solution aggregates plant data authored in various design tools into Teamcenter to build a digital twin of a capital facility or plant. For more information about the CALM solution, see the Active Workspace documentation.
Configurator Partition Interface	Installs the Configurator Partition Interface, which provides the Partition Variability View for Product Configurator.
Partitions for Structure	Installs server support for partitions and partition schemes for structures.
Service Partition	Adds service-specific partition capabilities.
Supplier Program Planning	Program planning solution for supplier solutions that will be developed for Teamcenter X.
Teamcenter Integration for Label Management Systems	Provides integration of Teamcenter with Label Management Systems for Medical Devices.
4th Generation Target Management (Deprecated)	Installs target management support for 4th Generation Design.
Classification Presentation Layer L10N	This feature configures the Teamcenter installation to support localization for Classification Presentation Layer elements.
Functional Hazard Analysis	Configures the Teamcenter installation to support Functional Hazard Analysis of system models and functions. This application requires Systems Engineering and other additional applications.
Functional Safety Analysis for Semiconductor Devices	
Marine Integration	Installs support for Marine Integration in Active Workspace. This functionality supports lifecycle management of electrical equipment and cables that connecting them, provided by various electrical design tools. The feature enables creation of BOM structures for electrical equipment and cables.
NX Validation Contract for Active Workspace	Configures the Teamcenter installation to interact and share data between Active Workspace Validation Contract and NX.
Semiconductor Foundation	Provides a product lifecycle management solution for semiconductor manufacturers to manage semiconductor design and manufacturing data using Teamcenter.
Supplier Program Security	Allows application of standard Teamcenter Project Security to Program Planning objects.
Automation Designer	This feature provides the data model and server functionality for Automation Designer. For more information, see the Line Designer documentation available with NX.
Change Management 4th Generation Product Master Interface	Adds support for 4th Generation Product Master objects to be managed by Change Management. With this feature, 4th Generation Product Master objects may be related to change objects like Problem Items, Impacted Items, or Solution Items.
Partitioned Design Guidelines	Configures Teamcenter to provide the association between option families from configurator with partitions. This feature provides guidelines about the available and unavailable option families for the partitions.
Assembly BOM	Installs all required dependencies and configurations for enabling Assembly EBOM with Design BOM Alignment automation for EBOM Level I and II products.
Non-Functional Change Management	Allows users to make non-functional changes in their parts. Non-functional changes are changes which do not affect the fit, form, or function of the part.
Supplier Change Management	The base solution for all the supplier solutions that will be developed for Teamcenter X.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Enterprise Service BOM	This feature provides the extension of formal BOM management capabilities of Enterprise BOM in Service Lifecycle Management
Integrated Manufacturing BOM	Installs the integrated BOM manufacturing capabilities.
Process Planning for Component Manufacturing	Adds Manufacturing Process Planner support for component manufacturing.
Teamcenter Lite for Component Manufacturer	Installs a lightweight version of the solution to support component manufacturing.
Teamcenter Office Online Connection	Installs Microsoft Office Online client integration.
Integrated Program Planning and Execution (IPP&E)	Features to support Integrated Program Planning and Execution (IPP&E).
IPP&E Aurora Integration	Adds the Aurora Integration for Integrated Program Planning and Execution (IPP&E). This integration enables you to generate three special schedules: the best-case schedule, the worst-case schedule, and the most-likely schedule. You can compare the original schedule with any of these schedules and then perform a <i>what if</i> analysis to provide an assessment of the original schedule for a bid.
Organization Breakdown Structure Foundation	Adds support for creating Organizational Breakdown Structures. An Organizational Breakdown Structure (OBS) is a hierarchical representation of a functional organization. Individual functional organizations are called OBS Elements.
Advance PLM Services	4th Generation Design features.
4th Generation Design	Installs 4th Generation Design (4GD) functionality for the Teamcenter server. 4GD allows users of NX CAD or Lifecycle Visualization to cooperate in real time during the design cycle of a product.
MDConnectivity	Installs support for multidisciplinary (MD) objects. This enables management of files from piping and instrumentation diagram/drawing (P&ID) applications in Teamcenter.
System Modeling	Installs the system modeling template for multidisciplinary (MD) objects.
4GD Change Detection Service	Installs the change detection service for 4th Generation Design functionality for Issue Manager. This feature requires Teamcenter Foundation and 4th Generation Design .
Change Management 4th Generation Design Interface	Installs 4th Generation Design functionality for Change Manager. This feature requires Teamcenter Foundation and Change Management .
Diagramming	Installs the diagramming template for multidisciplinary (MD) objects.
4th Generation Design Issue Management	Installs 4th Generation Design functionality for Issue Manager. This feature requires Teamcenter Foundation and 4th Generation Design .
Aerospace and Defense	Aerospace and Defense features.
Aerospace and Defense Foundation	Installs Aerospace and Defense functionality for the Teamcenter server. This feature requires Teamcenter Foundation and Vendor Management .
Aerospace and Defense Change Management	Installs the change management functionality for the Aerospace and Defense Foundation feature. This feature requires Teamcenter Foundation and Aerospace and Defense Foundation .
Aerospace and Defense Foundation Training	Installs the Aerospace and Defense Foundation training program for the Aerospace and Defense Foundation feature. This feature requires Teamcenter Foundation , Vendor Management , and Aerospace and Defense Foundation .
Automotive	Teamcenter Automotive Edition and additional supporting features.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Teamcenter Automotive Edition	Installs the optional Teamcenter Automotive Edition application.
GM Overlay	Installs the Teamcenter Automotive Edition GM Overlay application. Installing GM Overlay requires that you also install Teamcenter Automotive Edition .
Configure AutoCAD Integration for GM Overlay	Configures AutoCAD Integration/AutoCAD Manager to operate in a Teamcenter Automotive Edition GM Overlay environment. Choose this option only when you add GM Overlay to a Teamcenter environment that includes AutoCAD Integration. If you attempt to include this configuration before installing GM Overlay and the standard AutoCAD Integration, the install fails. Both GM Overlay and the base AutoCAD integration must be installed and functioning before you choose this option. Requires Teamcenter Foundation and GM Overlay .
GM Customization for DPV	Installs GM-specific LOVs and GRM rules for Dimensional Planning and Validation (DPV). For more information, see <i>Deploying Dimensional Planning and Validation</i> in DPV help.
Wire Harness Configuration in GM Overlay	Configures wire harness configuration for a Teamcenter Automotive Edition GM Overlay environment. Requires Teamcenter Foundation , Wire Harness Configuration , Teamcenter Automotive Edition , and GM Overlay .
GM PAD/TWP Customization	Installs additional GM data types for PAD/TWP Customization. This feature requires Teamcenter Foundation , GM Overlay , Customization for eM-Server Integration , and PAD/TWP Customization .
BOM Management	Features that support Product Master Management.
Product Master Automation	Provides the capability to generate the design or BOM data from an existing BOM or design data from Active Workspace. Given a source BOM, a user can generate a target BOM. The source and target BOM could be an engineering BOM or design BOM. For more information, see <i>Design and BOM Alignment — Deployment and Administration</i> .
4th Generation Product Master	Provides formal BOM management capabilities. It supports features like release of a formal bill of materials by Engineering, alignment of CAD designs with formal BOM to enable digital mockup (DMU), operations release of formal BOM to manufacturing plants, Engineering and operations solve requests including order solves and forecast order solves.
Product Master Manager (PMM)	Product Master Manager features.
Change Management Color BOM Interface	Provides support for color BOM objects to be managed by Change Manager. With this feature, color rule objects can be related to change item revision objects as problem, impacted, and solution objects.
CAE Simulation Management	Features to support Computer-Aided Engineering (CAE) Simulation Management in Teamcenter.
Simulation Process Management	Installs Simulation Process and Data Management, a packaged solution that provides unique simulation process and data management capabilities for CAE engineers and CAE analysts performing analysis work.
Extended Simulation Process Management	Installs extended capabilities of Simulation Process and Data Management.
Product Configurator for Simulation Process Management	Adds Simulation Process and Data Management actions to Product Configurator. Product Configurator enables you to formally introduce and manage variability across your product suite.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Consumer Packaged Goods	Features to support Consumer Packaged Goods.
Consumer Products and Retail Foundation	Installs the Consumer Products and Retail Foundation template, which supports datasets that are used to integrate Teamcenter with external graphics design tools.
Finished Product Management	Installs the Finished Product Management functionality for Consumer Packaged Goods.
Specification Manager	Installs the Specification Manager feature.
Brand Management	Installs the Brand Management template for Consumer Packaged Goods.
CPG Materials	Installs Consumer Packaged Goods objects such as raw materials, formulated materials, and so on.
Packaging and Artwork	Installs packaging and artwork functionality for Consumer Packaged Goods.
Consumer Product Management	Installs consumer product management functionality for Consumer Packaged Goods.
Finished Product Management to CPG Materials Bridge	Provides a bridge between finished products and Consumer Packaged Goods materials.
Packaging and Artwork to Finished Product Management Bridge	Provides a bridge between Packaging and Artwork and Finished Product Management for Consumer Packaged Goods.
Formulation & Material Management	Enables Teamcenter to create Material Management objects like Component Specification, Parameter and substance.
Content and Document Management	Content and document management features.
Acrobat/Reader Plugin	Installs the Teamcenter plug-in for Adobe Acrobat and Adobe Acrobat Reader. This solution is optional.
Content Management Base	Installs the data model for Content Management.
Content Management DITA	Enables management of documentation for the DITA standard in Content Management.
Content Management S1000D	Enables management of documentation for the S1000D standard in Content Management.
Content Management S1000D 4.X/5.X	Enables management of documentation for the S1000D standard in Content Management.
EDA Client	
ECAD Design Integrations	Manages the Electronic CAD designs within Teamcenter using EDA Gateway application.
Mentor PADS	Installs the Mentor Graphics PADS integration with the EDA client. Separate installation of Mentor Graphics PADS is required.
Mentor PADS Professional	Installs the Mentor PADS Professional integration with the EDA client. Separate installation of Mentor PADS Professional is required.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Mentor Xpedition Designer and Layout	Installs the Mentor Xpedition Designer and Layout integration with the EDA client. Separate installation of Mentor Xpedition Designer and Layout is required.
Mentor Xpedition EDM Design	Installs the Mentor Xpedition EDM Design with the EDA client. Separate installation of Mentor Xpedition EDM Design is required.
Teamcenter Gateway for EDA Design	Installs Teamcenter Gateway for EDA Design.
EDA Translation	Allows converting a PCB or schematic design into the Teamcenter Visualization ECAD format. Though EDA translation is also packaged within EDA standalone client, this feature enables deploying EDA translation to be integrated in other environments like Teamcenter Dispatcher.
EDA Translation Win32	Allows converting a PCB or schematic design into the Teamcenter Visualization ECAD format for Windows 32 bit. Though EDA translation is also packaged within EDA standalone client, this feature enables deploying EDA translation to be integrated in other environments like Teamcenter Dispatcher.
ECAD Library Integrations	Manages the library data of ECAD tools such as EDM and Allegro in Teamcenter.
Mentor PADS Library	Installs the Mentor PADS Library integration. Separate installation of Mentor PADS is required.
Mentor PADS Library Win32	Installs the Mentor PADS Library integration for Windows 32 bit. Separate installation of Mentor PADS is required.
Mentor Xpedition EDM Library	Installs the Mentor Xpedition EDM Library integration. Separate installation of Mentor Xpedition EDM Library is required.
Teamcenter Gateway for EDA Library Win32	Installs Teamcenter Gateway for EDA Library to integrate ECAD part metadata databases to Teamcenter for Windows 32 bit.
Teamcenter Gateway for EDA Library	Installs Teamcenter Gateway for EDA Library to integrate ECAD part metadata databases to Teamcenter.
Engineering Process Management	Engineering Process Management features.
Spatial Search	Installs Spatial Search capabilities of the cacheless search engine. This feature requires Dispatcher Server . Cacheless search is installed with Teamcenter Foundation, but its capabilities must be enabled through TEM.
Bounding box generation from JT (Requires Dispatcher Server)	Enables generation of bounding box data from JT files, providing secondary data for the cacheless search engine. This feature requires Dispatcher Server . Also, during Teamcenter installation, you must install the Spatial Search translator (JtToBboxAndTso). Cacheless search is installed with Teamcenter Foundation, but its capabilities must be enabled through TEM.
Trueshape generation from JT (Requires Dispatcher Server)	Enables generation of Trueshape data from JT files, providing secondary data for the cacheless search engine. This feature requires Dispatcher Server . Also, during Teamcenter installation, you must install the Spatial Search translator (JtToBboxAndTso).

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	Cacheless search is installed with Teamcenter Foundation, but its capabilities must be enabled through TEM.
Bounding Box generation from NX	Enables generation of bounding box data when saving NX files, providing secondary data for the cacheless search engine. Cacheless search is installed with Teamcenter Foundation, but its capabilities must be enabled through TEM.
Enterprise Knowledge Foundation	Enterprise Knowledge Foundation features.
Remote Workflow	Configures linking between Teamcenter sites for remote workflow operations. This option is applicable only when you are deploying the four-tier architecture. Prerequisites: <ul style="list-style-type: none"> • Remote Workflow components must be separately installed and configured. • The web tier application, including the optional Remote Workflow parameters, must be installed and configured. Required information: <ul style="list-style-type: none"> • Host name and port number of the Java servlet running the Teamcenter Application Registry. • The host name and port number of the host running a web tier application. • If you are linking to Teamcenter portfolio, program and project management, the chooser servlet name.
Teamcenter Client for Microsoft Office	Installs the Teamcenter Client for Microsoft Office.
Change Management	Provides a flexible change management framework that integrates with other Teamcenter products. If you install this feature, you may need to set the HiddenPerspectives preference in the rich client.
Contract Data Management	Installs Contract Data Management, which allows you to manage, initiate review processes, and monitor correspondence for procurement documents, such as design information, drawings, status reports, purchase orders, and so on.
Dispatcher Client for Rich Client	Installs Dispatcher Client for the rich client. This feature requires Teamcenter Rich Client 2-tier or Teamcenter Rich Client 4-tier .
Finish Management	Installs Finish Management for Teamcenter. A <i>finish</i> represents a finishing process on a part. It may be used to improve appearance, adhesion, corrosion resistance, tarnish resistance, chemical resistance, wear resistance, and remove burrs and so on.
Materials Management	Installs the Materials Management solution, which stores approved material and substance information imported from a third-party database (for example, Granta, IMDS) into a material library in the Teamcenter database.
Stock Material	Installs the Stock Material feature for Teamcenter.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
		Many parts are made from stock materials such as bar stock, tubing stock and sheet stock. This feature enables you to manage stock materials in Teamcenter, performing actions like creating libraries of stock materials and assigning stock materials to parts.
	Work Package Management	Enables management of work packages in Teamcenter. <i>Work packages or packages</i> are typically collections of CAD files and documentation that outsourcing partners require to build, test or maintain components or subassemblies of larger products. Packages serve as revisable collections of product information that can be used in a variety of contexts.
	Change and Schedule Management Interface	Installs support for using Change Management with Schedule Management.
	Issue Management	Installs Issue Manager, which allows you to track problems, or issues, with products by managing the review, approval, and implementation of issues.
	Render Document for Rich Client	Provides Render Management capabilities for the rich client. This feature requires Dispatcher Client for Rich Client .
	Dispatcher Server	Installs the following Dispatcher Server components: scheduler, module and administration client.
	Penetration Request Management	Installs the penetration request management feature. This feature requires the Change Management and Issue Management features and also Teamcenter Foundation or a rich client.
	Dispatcher Client (4-tier)	Installs an integration of the Dispatcher Server and Teamcenter for the four-tier rich client that enables users to translate Teamcenter data files to various visualization formats for viewing in Teamcenter. This feature requires Teamcenter Foundation .
	Dispatcher Client (2-tier)	Installs an integration of the Dispatcher Server and Teamcenter for the two-tier rich client that enables users to translate Teamcenter data files to various visualization formats for viewing in Teamcenter. This feature requires Teamcenter Foundation .
Lifecycle Visualization		Features to support Lifecycle Visualization.
	Teamcenter Visualization (Embedded) for Rich Client	Installs the embedded viewer for the rich client. This feature requires Teamcenter Rich Client 2-tier or Teamcenter Rich Client 4-tier .
	Teamcenter Visualization (Standalone) for Rich Client	Installs standalone application viewer for the rich client. This feature requires Teamcenter Rich Client 2-tier or Teamcenter Rich Client 4-tier .
Localization		Features that support localization of Teamcenter.
	Classification L10N	Installs the classification localization template, which enables localization in the Classification environment.
MBSE Integrations		Features that integrate Model-Based Systems Engineering MBSE with software like MATLAB, Simulink, and others.
	Client	Model Management applications for Teamcenter clients.
	Simulink Integration	Installs support for Simulink models in Active Workspace.
	System Modeling	Installs the capability to support and manage UML and SysML modeling in Teamcenter.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	Integration	
	Teamcenter Behavior Modeling for Rich Client	Adds support for behavior modeling in the Teamcenter rich client.
	Teamcenter MATLAB for Rich Client	Installs the rich client integration with MATLAB Simulink.
	MBSE Services Client	Installs client support for MBSE Integration Gateway services.
	Software Management Client	Installs the client components to support software management for MBSE.
	Server	Model Management components for Teamcenter servers.
	Branch Data Organization	Installs branch data organization capabilities for the MBSE Integration Gateway.
	Common Integration Framework	Installs the common framework for the MBSE Integration Gateway.
	Gateway for Modeling	Installs concurrent modeling capabilities for the MBSE Integration Gateway.
	Branching and Versioning Foundation	Adds support for branching and versioning in Teamcenter.
	Simulink Integration	Installs support for Simulink models in Active Workspace.
	Teamcenter Polarion Direct Integration	Installs support for managing artifacts created by the Polarion application.
	UML SysML Modeling	Installs server support for managing Unified Modeling Language (UML) and Systems Modeling Language (SysML) models in Teamcenter.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	Systems Synthesis Modeling	Installs the System Synthesis artifacts such as model template and core architecture.
	MBSE Services	Installs services to support the MBSE Integration Gateway.
	Capital Marine Integration	Installs the Capital Marine integration for MBSE.
	Software Management	Enables ALM and build systems like Jenkins to automate publishing of software project build artifacts such as binaries, configurations, parametrization, reports, and so on, to Teamcenter. It captures build details and related information to manage and maintain traceability of hardware and software products in Teamcenter.
	Integration for Cameo	Installs support for managing artifacts created by the Cameo application for UML and SysML modeling. This includes support for managing the Cameo model directly in Teamcenter.
	Integration for IBM Rhapsody	Installs support for managing artifacts created by the Rhapsody application for UML and SysML modeling. This includes support for managing the Rhapsody model directly in Teamcenter.
	Integration for System Modeling Workbench	Installs support for System Modeling Workbench objects such as Capella Model and SysML Model.
	MADe Integration	Installs support for managing reliability, availability, maintainability, and safety analysis data created in the MADe tool from PHM Technology.
Maintenance Repair and Overhaul		Maintenance Repair and Overhaul features.
	MRO Core	Installs the PhysicalPart business object used to designate physical instances of parts for Service Lifecycle Management.
	As-Built Management	Installs the As-Built template for Teamcenter service lifecycle management.
	As-Maintained Management	Installs the As-Maintained feature to support the As-Maintained physical structure management for Service Manager.
	Service Planning	Installs the Service Planner application that supports service planning capabilities within Teamcenter. Service Planner requires a separate license and is installed as an optional overlay to standard Teamcenter.
	As-Built and As-Maintained Alignment	Enables interoperability of data created by the As-Built Management and As-Maintained Management features of Service Manager.
	Transaction Processing	Installs transaction processing functionality for Service Request Manager.
	Service Processing	Installs the optional MRO Service Processing Solution to support Service Process Management.
	Service Event Management	Installs Service Event Management to support service process management for Teamcenter service lifecycle management.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	Service Planning and Service Processing Alignment	Installs the Service Planning functionality for Service Processing.
	Service Request Processing (Requires Change Management)	Installs the Service Planning and Service Processing Alignment module to support using discrepancies in Service Planner.
	Service Scheduler	Installs Service Scheduler, which supports scheduling within Teamcenter. Service Scheduler lets companies define, schedule, and implement services for their products. Service Scheduler is a separately licensed application that is installed as an optional overlay on top of standard Teamcenter and Service Manager.
	Next Generation Service Planning	Enables Next Generation Service Planning capabilities. With this feature, the Service Planner is able to create Service Requirements and the subsequent capabilities.
	MRO Automated Scheduling 1.0	MRO Automated Scheduling features.
	Service Forecasting	Installs the Service Forecasting plug-in to Service Scheduler.
	Service Automated Scheduling	Installs the Service Automated Scheduling plug-in to Service Scheduler.
Manufacturing Process Management		Teamcenter manufacturing process management features.
	Advance Planner	Installs Advance Planner, which configures Teamcenter installation to scope and report data during pre-planning activities to determine the plant in which a vehicle will be built. This feature will assist in determining cost and plant space needed within Line Designer.
	Composites Process Planning	Installs Composites Process Planning, which leverages the benefits of Manufacturing Process Management BOM and BOP to plan and manufacture composite parts.
	Customization for eM-Server Integration	Installs additional data types for Tecnomatix server integration customization.
	Logistic Process Planning	Installs the logistic process planning feature for Manufacturing Process Planner.
	MTM Data Card	Installs the Methods Time Measurement (MTM) data card system for Manufacturing.
	Manufacturing Foundation	Installs core functionality of Manufacturing Process Management.
	Work Instructions	Installs the work instructions feature for Manufacturing Process Planner.
	Customization for Process Simulate Integration	Installs additional data types for Process Simulate Integration Customization.
	Database Configuration for DPV	Installs the database configuration for Dimensional Planning and Validation (DPV). This feature requires Teamcenter Foundation and Customization for eM-Server Integration. For more information, see <i>Deploying Dimensional Planning and Validation</i> in DPV help.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Manufacturing Characteristics Information	Installs additional data types for Manufacturing Characteristics Information.
eBOP Reports Customization	Installs additional data types for eBOP Reports Customization. This feature requires Teamcenter Foundation and Customization for eM-Server Integration .
PAD/TWP Customization	Installs additional data types for PAD/TWP Customization. This feature requires Teamcenter Foundation and Customization for eM-Server Integration .
Manufacturing core using APS	Installs Manufacturing support with Advanced PLM Services.
Manufacturing support for 4th Generation Design	Installs additional data types required to work with 4th Generation Design (4GD) objects in Manufacturing Process Planner.
Mechatronics Process Management	Features to support Mechatronics Process Management.
EDA for Business Modeler IDE	Integrates Teamcenter EDA with the Business Modeler IDE. For information about installing EDA, see the EDA help under Teamcenter→Electronic Design Automation (EDA) .
EMPS - Foundation	Installs electronic design and manufacturing types to support ECAD translation and PCB design collaboration using Teamcenter embedded viewer.
ESM Base	Installs ESS base types and updates preferences. Without these, ESS operations do not work from any interface (rich client, custom utilities, and other clients).
SCM ClearCase for Foundation	Installs ClearCase types and sets Teamcenter preferences to enable the integration between Teamcenter and the IBM ClearCase software configuration management (SCM) tool. For more information about ClearCase integration, see Embedded Software Solutions.
Calibration and Configuration Data Management	Installs the Calibration and Configuration Data Management (CCDM) feature for Embedded Software Solutions, which allows you to manage the calibration and configuration-related parameter data of embedded systems. CCDM allows you to define, create, view, update, and delete parameter data, and to group related parameter definitions together and associate parameter values to a project.
EDA Server Support	Installs the dataset types and transfer modes required to support Teamcenter EDA, the application that integrates ECAD applications with Teamcenter. For information about installing EDA, see the EDA help under Teamcenter→Electronic Design Automation (EDA) .
ESM Processor	Installs ESS processor types and updates preferences. Without these, ESS operations do not work from any interface (rich client, custom utilities, and other clients).
ESM Software	Installs ESS software types and updates preferences. Without these, ESS operations do not work from any interface (rich client, custom utilities, and other clients).
Electrical and Wire Harness Configuration	Installs Teamcenter schema support for wire harnesses.
Embedded Software Design Data Management	Installs Embedded Software Design Data Management for Embedded Software Solutions.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
ECAD Part Library Management	Installs ECAD part types to support ECAD part library management. This feature requires Teamcenter Foundation, Vendor Management, and EDA Server Support.
Embedded Software Design Data Management with SCM Clear Case Integration	Enables management of Embedded Software Design data in the SCM Clear Case integration.
Multi-Disciplinary Associations	Installs multidisciplinary (MD) associations in Teamcenter. Multidisciplinary (MD) objects help facilitate collaboration between various disciplines during the product design phase.
Model-Based Systems Engineering	Features that support Model-Based Systems Engineering. For more information about these features, see <i>Model-Based Systems Engineering</i> in the Active Workspace help.
Systems Engineering Base	Installs data model for the Systems Engineering application, which provides capabilities such as functional modeling and budgets. This feature requires the Teamcenter Foundation feature and also a rich client or a two-tier Business Modeler IDE client.
Attribute and Parameter Base Definitions	Installs attribute and parameter definitions for Product Planning. For more information about this feature, see the topics about domain engineering in <i>Model-Based Systems Engineering</i> in the Active Workspace help.
Parameter Management	Adds parameter management capabilities to Model-Based Systems Engineering.
Systems Engineering	Installs the Systems Engineering application, which provides capabilities such as functional modeling and budgets. This feature requires the Teamcenter Foundation feature and also a rich client or a two-tier Business Modeler IDE client.
Test and Verification Management	Installs support for test management in Teamcenter. Test management (or <i>verification management</i>) is part of verification and validation, which are similar but distinct processes of Model-Based Systems Engineering (MBSE). It is used to check that a product or system meets requirements and specifications established to fulfill its intended purpose.
Enterprise Architecture Modeling	Enables Enterprise Architecture Models modeled using Unified Architecture Framework (UAF) to be saved in Teamcenter. It provides data model supporting Unified Architecture Framework.
Physical Verification Management	Installs support for verification request management. For more information about this feature, see the topics about verifying system models in <i>Model-Based Systems Engineering</i> in the Active Workspace help.
Characteristics Management	Installs Characteristics Management which supports Teamcenter Characteristics Digital Thread.
Part Manufacturing	Part Manufacturing features.
Part Manufacturing Shopfloor Integration	Installs the Part Manufacturing Shopfloor integration for Part Manufacturing.
NX Fixed Plane Additive	Installs the NX Fixed Plane Additive Manufacturing Integration, which enables importing of Additive Manufacturing printer files into datasets under fixed plane Additive Manufacturing activities.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	Manufacturing Integration	
	NX Machining Line Planner Integration	Installs the Machining Line Planner Integration for NX.
Platform Extensibility		Platform extensibility features.
	Enterprise Integration	Installs the Teamcenter Integration Framework integration with Teamcenter Enterprise.
	PMM Integration	Installs the Teamcenter Integration Framework integration with Product Master Manager.
	Substance Compliance Integration	Installs the Teamcenter Integration Framework with Teamcenter Substance Compliance.
	Supplier Collaboration Integration	Installs the Supplier Collaboration Integration to Teamcenter. This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.
Integration Framework		Teamcenter Integration Framework features.
	Integration Framework Core	Installs the Teamcenter Integration Framework.
Global Services		Global Services features.
	Global Services Preferences	Installs preferences for Global Services.
	Multisite Collaboration IDSM Service	Installs the distributed services manager (IDSM) required to replicate data between multiple Teamcenter sites, enabling the exchange of data objects with other Teamcenter databases over a wide area network (WAN).
	Multisite Collaboration ODS Service	Installs the object directory service (ODS) required to replicate data between multiple Teamcenter sites, enabling the exchange of data objects with other Teamcenter databases over a wide area network (WAN).
	Catia Non BOM	Installs the CATIA Non BOM feature.
	ERP Connect	Installs the ERP Connect Toolkit interface that integrates Teamcenter with other Enterprise Resource Planning (ERP)-supported applications, such as BAAN.
Linked Data Framework Services		Linked Data Framework Services features.
	Java EE Based Linked Data Web Services	Installs web services that allow other lifecycle tools to use Teamcenter services like change management. This feature builds the OSLC WAR file and installs the Linked Data Services (LIS) core service.
	LDF Foundation	Installs the linked data framework for Linked Data Services . This feature enables linking external applications to Active Workspace.

Feature/Subfeature		Description
Teamcenter Office Online		Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	LDF Change Management Integration	Installs the Change Management integration module of Linked Data Services (LIS).
	LDF Requirements Management Integration	Installs the Requirements Management integration module of Linked Data Services (LIS).
	LDF Server Support	Installs server support for the Linked Data Services (LIS) framework. This includes the data model for LIS
	LDF Embedded Software Management Integration	Installs the Embedded Software Management integration module of Linked Data Services (LIS).
Portfolio, Program and Project Management		Portfolio, Program and Project Management features.
	Workflow to Scheduling Integration	Allows workflow to send updates to the related tasks in a schedule. This feature requires a four-tier installation and Dispatcher to be installed/configured. This feature requires Teamcenter Foundation . You must create the proxy user account (projproxy) before you install the Workflow to Scheduling Integration.
Product Support Data Management		Product supportability analysis sample data features available in Teamcenter.
	Logistics Control Number Management Active Workspace Client	Enables the capability to author LCN in Active Workspace.
	Part Provisioning and Cataloguing Active Workspace Client	Enables capturing the provisioning and cataloguing requirements in Active Workspace.
	Support Equipment and Tools Management	Enables the capabilities to define the Support/Test Equipment and Tools requirements based on the GEIA STD.
	Support Equipment and Tools Management Active Workspace Client	Enables the capabilities to define the Support/Test Equipment and Tools requirements based on the GEIA STD in Active Workspace.
	Part Provisioning and Cataloguing Interface with LCN Management	Enables the capability to author LCN and provisioning data in Active Workspace. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of provisioning and cataloguing.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Active Workspace Client	
Logistics Control Number Management	Enables the capability to author LCN.
Part Provisioning and Cataloguing	Enables capturing the provisioning and cataloguing requirements.
Part Provisioning and Cataloguing Interface with LCN Management	Enables the capability to author LCN and provisioning data. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of provisioning and cataloguing.
Maintenance Task Analysis	Enables Maintenance Task Analysis.
Operations and Maintenance Requirements Management	Contains all the business objects and rules defined for the LSA (Logistic Support Analysis) of the product.
Operations and Maintenance Requirements Management Active Workspace Client	Contains all the business objects and rules defined for the LSA (Logistic Support Analysis) of the product in Active Workspace.
Reliability Analysis and Data Management	Enables the capability to author the reliability analysis of the data. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of reliability.
Reliability Analysis and Data Management Active Workspace Client	Enables the capability to author the reliability analysis of the data in Active Workspace. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of reliability.
Transportability Analysis and Data Management	Captures the transportability engineering requirements for an end item and critical sections and subcomponents in its shipping configuration.
Transportability Analysis and Data Management Active Workspace Client	Captures the transportability engineering requirements for an end item and critical sections and subcomponents in its shipping configuration in Active Workspace.
Unit Under Test Management	Enables the capability to capture the Unit Under Test Requirements (GEIA U Entities).
Maintenance Task Analysis Active Workspace Client	Enables Maintenance Task Analysis in Active Workspace.
Maintenance Task Analysis Interface with LCN Management	Enables Maintenance Task Analysis with LCN Management.
Reliability Analysis Interface with LCN Management	Enables the capability to author LCN and the reliability analysis of the data. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of reliability.

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Reliability Analysis Interface with LCN Management Active Workspace Client	Enables the capability to author LCN and the reliability analysis of the data in Active Workspace. This increases efficiency of maintenance and reduces the cost of providing support by preplanning all aspects of reliability.
Transportability Analysis Interface with LCN Management	Enables the capability to author LCN and the transportability engineering requirements for a product.
Transportability Analysis Interface with LCN Management Active Workspace Client	Enables the capability to author LCN and the transportability engineering requirements for a product in Active Workspace.
Unit Under Test Management Active Workspace Client	Enables the capability to capture the Unit Under Test Requirements (GEIA U Entities) in Active Workspace.
Maintenance Task Analysis Interface with LCN Management Active Workspace Client	This feature provides Maintenance Task Analysis with LCN Management in Active Workspace.
Reporting and Analytics	Features to support Teamcenter Reporting and Analytics.
Teamcenter for Reporting and Analytics	Installs the Teamcenter Reporting and Analytics (TcRA) integration. TcRA is a standalone reporting application that introduces a new folder in Report Builder called TcRA Reports , which contains reports created with TcRA.
Dashboard	Installs the Teamcenter Reporting and Analytics dashboard interface.
Reuse and Standardization	Reuse and Standardization features.
Classification Interface	Installs the Classification interface for Reuse and Standardization.
Presentation Layer - Next Generation Classification Foundation	Installs the Next Generation Classification foundation feature for Library Management.
Advanced Classification	Installs advanced capabilities for the Classification interface.
Teamcenter Classification Collector (earlier called Library Management)	<p>Installs a data model and functionality for Library Management that supports creating and configuring multiple libraries to meet the reuse needs of business processes and targeted sets of users. Library Management leverages Classification and includes a rules-based search capability for enforcing technical constraints in the context of a design process (known as Specifications, which is a distinct and separate feature from Specification Manager used to support the Consumer Packaged Goods industry).</p> <p>The lbrmanager command line utility is also included with this feature.</p> <p>Deploying the Library Management feature automatically deploys the following prerequisite features:</p> <ul style="list-style-type: none"> • Advanced PLM Services for Applications • Advanced PLM Services for Partitioning • Advanced PLM Services for Realization • Next Generation Classification foundation

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
Supplier Relationship Management	Supplier Relationship Management features.
SRM Integration	Installs the Supplier Relationship Management integration for data exchange.
Vendor Management	Installs the optional Vendor Management solution.
Substance Compliance	Installs support for Substance Compliance , which checks if the parts used in your company products conform to environmental regulations. Teamcenter helps verify if the products are environmentally compliant by checking the material and substance information for in-house parts and supplier parts used in the products.
Supplier Collaboration	Installs the Supplier Collaboration solution. Teamcenter Supplier Collaboration is a framework that helps companies manage their supply chains. This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.
Substance Compliance IMDS (International Material Data System)	Installs support for the Teamcenter Substance Compliance-IMDS Integration . Substance compliance checks whether the parts used in your company products conform to environmental regulations. International Material Data System (IMDS) is a third-party system for exchanging material and substance information with suppliers. Automotive companies use IMDS to collaborate with suppliers for material and substance declaration information. Teamcenter is integrated with IMDS to send material data sheet (MDS) requests to IMDS and to download the MDSs, uploaded by suppliers, from IMDS to Teamcenter. This feature is deprecated and will be removed in a future version of Teamcenter. It is not available to install in a new Teamcenter configuration.
Systems Engineering and Requirements Management	Features that support Systems Engineering and Requirements Management.
Teamcenter Extensions for Microsoft Office	Installs Teamcenter Extensions for Microsoft Office.
Requirements Management for Rich Client	Installs the Requirements Management functionality for Systems Engineering and Requirements Management.
Teamcenter Integration for FORAN	Adds support for FORAN integration with Teamcenter. This feature allows users to publish marine product models from the FORAN desktop application.
FORAN Foundation	Base feature for FORAN integration.
Teamcenter Integration for I-deas	Teamcenter Integration for I-deas features.
Teamcenter Integration for I-deas - Database Extensions	Installs data model for Teamcenter integration for I-deas.
Teamcenter Integration for NX	Teamcenter Integration for NX features.
NX Part Family Classification Integration	Installs core functionality of Teamcenter Integration for NX . This feature requires a local installation of NX. Teamcenter Integration for NX is a data management tool used with NX. When you use NX with this integration, Teamcenter runs at the same time as a separate process,

Feature/Subfeature	Description
Teamcenter Office Online	Installs the Teamcenter integration to Microsoft Office Online, which allows users to edit and view documents within Active Workspace instead of using Microsoft Office desktop applications.
	enabling NX and Teamcenter to communicate so you can create, store, and access your NX data within a Teamcenter database. For information about using Teamcenter Integration for NX, see <i>Teamcenter Integration for NX</i> in the NX help.
NX Multi-User Notifications	This feature configures the Teamcenter installation to enable multi-user design notifications microservice for NX. This feature allows users to publish and receive design activity notifications from the NX desktop application.
Electrical Cable Route Management	Configures the Teamcenter installation to manage the physical cable route for an electrical solution. This enables authoring of physical cables using the NX routed system designer application.
NX Foundation	Installs default data types and loads template NX data to support Teamcenter Integration for NX , the Teamcenter integration with Siemens Digital Industries Software NX.
NX Logical	Installs logical data model for Teamcenter Integration for NX.
NX Rich Client Integration	Installs Teamcenter Integration for NX for the rich client. This feature requires Teamcenter Rich Client 2-tier or Teamcenter Rich Client 4-tier .
NX Change Management	Installs Change Management support for Teamcenter Integration for NX. For information about using Teamcenter Integration for NX, see <i>Teamcenter Integration for NX</i> in the NX help.
NX Staged Models	This feature configures the Teamcenter installation to support stage model application for NX. This feature allows users to publish manufacturing process steps of a design part to Teamcenter from the NX desktop application.
NX 4th Generation Design	Installs 4th Generation Design (4GD) support for Teamcenter Integration for NX. 4GD allows users of NX CAD or Lifecycle Visualization to cooperate in real time during the design cycle of a product.
NX Piping and Instrumentation Diagram (P&ID) Design	Installs support for managing NX piping and instrumentation diagram/drawing (P&ID) files in Teamcenter. Teamcenter supports P&ID files as part of its support for multi-disciplinary (MD) objects. NX Piping and Instrumentation Diagram (P&ID) Design is not supported with Teamcenter Rapid Start. This feature is only available in Teamcenter.
Teamcenter Quality platform	Features to support Teamcenter Quality functionality.
Quality Base	Adds Teamcenter Quality support to Teamcenter. For more information, see <i>Teamcenter Quality</i> in the Active Workspace help.
Control and Inspection Plan Data Model	Installs support for control and inspection planning. This feature allows you to manage critical characteristics of Failure Mode Effect Analysis (FMEA) and create a control plan that generates bill of process (BOP) elements.
Quality Issue Management and Problem Solving base	Installs Issue Manager capabilities for Teamcenter Quality.

Battery features

Battery features available in Teamcenter. These features are available in the **Battery** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Experiment Management for Battery	Enables customers to understand the battery product and process. This shortens the time to characterize the product in experimental measurement.
Battery Foundation Active Workspace Client	Installs a collaborative platform with a battery-specific data model and workflows providing a single source of product, project, and process data.

Miscellaneous features

Miscellaneous features provide additional capabilities to Teamcenter. These features are available in the **Miscellaneous** feature group in TEM.

To search for a feature by name, type the name or a partial name in the search box, and then click the search button.

Feature/Subfeature	Description
Color and Visual Appearance Management	<p>This feature provides appearance parameters such as color, gloss, and texture along with a color specification. The combination of color, gloss, and texture with the color specification is called a <i>visual appearance</i>. Once a visual appearance is defined, it can be associated with objects such as parts in the BOM system.</p> <p>This feature is automatically selected when you select Color BOM for Product Master Management.</p>
LOGISTICS for Rich Client	Installs the logistics feature for the rich client.
Product Variants	Installs product variant support for Mechatronics Process Management . This feature is required by Calibration and Configuration Data Management
Color Explosion Rule Management	<p>This feature which provides a common infrastructure support for definition of Color Rule and its behavior. Color Rules can be associated with one or more visual appearances and variant conditions. They are revisable and participate in workflows. These rules can interact with systems such as Product Master Manager to author color parts and usages automatically when invoked. This feature may be further used associate a design object's color and variant condition.</p> <p>This feature is automatically selected when you select Color BOM for Product Master Management.</p>

26. Web tier context parameters

The following tables describe web tier context parameters provided by Teamcenter web tier solutions.

Web tier required parameters

Parameter	Description
General parameters	
TcLocale	<p>Locale of the Teamcenter server for localization of web tier messages. This locale must match the locale of the Teamcenter server.</p> <p>For example, if Teamcenter server is running in the Russian locale, specify ru_RU for this parameter.</p>
Max_Capacity	<p>Specifies the maximum number of concurrent connections to Teamcenter servers the server pool maintains.</p> <p>The default value of 500 connections may be too low to prevent performance slowdowns when running Websphere as a middle tier server. To avoid performance slowdowns and possible connection errors, increase the number of available connects by setting max_capacity to a value greater than 500.</p> <p>This parameter applies to web application deployment on WebLogic, JBoss, and Oracle Application Server. For other application servers, the maximum pool size must be set using the application server console.</p>
Server_Manager_URIs	<p>Specifies a list of server manager URIs, separated by semicolons. For example:</p> <p style="text-align: center;">http://hostA:8086/PoolA;http://hostB:8086/PoolB</p>
LogVolumeName	<p>Name of the log volume.</p>
LogVolumeLocation	<p>Log volume location, the root directory under which log files are created. The default location logs represent a child folder beneath the default root directory of the target application server instance. This location varies depending on the application server vendor.</p>

Parameter	Description
	If the path you enter contains backslash characters (\) as path delimiters, use double backslash characters (\\) to represent single backslash characters.
DEPLOYABLE-FILE-NAME	Name of the deployable file you are creating for the web tier application. The name is configurable; Web Application Manager adds the file extension.

Security Services parameters

Parameter	Description
IS_SSO_ENABLED	Specifies whether Security Services is enabled for this instance of Teamcenter.
SSO_APPLICATION_ID	<p>Application ID assigned to this instance of Teamcenter in the Security Services application registry. This information is required only when you are configuring the optional Security Services.</p> <p>This ID is determined when Security Services is installed and configured.</p>
SSO_logon_SERVICE_URL	<p>Complete URL of the Security Services logon Service web application. This information is required only when you configure the optional Security Services.</p> <p>This URL is determined when Security Services is installed and configured.</p>
SSO_SERVICE_URL	<p>Complete URL of the Security Services Identity Service web application. This information is required only when you configure the optional Security Services.</p> <p>This URL is determined when Security Services is installed and configured.</p>

Web tier optional parameters

Parameter	Description
	General parameters
webmaster	E-mail address of the administrator to whom questions and comments about this application are addressed.
staticResourceClientCacheExpiryTime	<p>Maximum time in seconds that a client can use a locally cached static content (for example, images or JavaScript) before requesting a fresh copy from the server.</p> <p>Setting this value too low causes the client to unnecessarily request content. Setting this value too high risks stale content. Typical values range from several hours to one day.</p> <p>Setting the value to 0 is valid and causes the client to always ask for static content.</p> <p>The default value is 28800 seconds (8 hours).</p>
compressResponse	<p>Specifies whether a response to the client can be compressed if the requesting client supports it.</p> <p>Compressing the response typically yields faster response time to the client but requires additional processing in the web container.</p> <p>Set this parameter value based on trial and error for your instance of the server, bandwidth, and client access environment.</p> <p>The default value is true.</p>
cacheCompressedStaticResourceOnServer	<p>Specifies whether responses for static resources are cached on the server. This parameter is used only when the compressResponse parameter is set to true.</p> <p>If the value is set to true, compressed responses for static resources are cached on the server, memory permitting.</p> <p>If the value is set to false, the compression occurs each time the client requests a static resource.</p> <p>The default value is true.</p>
responseCompressionThreshold	Threshold in bytes beyond which the server should compress responses sent back to the client.

Parameter	Description
calculateResponseTime	<p>Typically compressing smaller responses does not yield much compression - so all responses equal to or smaller than this value will be sent to the client uncompressed.</p> <p>Setting the value to 0 is valid and causes the server to compress every response sent to the client (assuming other parameters permit compression).</p> <p>The default value is 500 bytes. Change this value only if absolutely required.</p> <p>Specifies whether the group of response time filters are on (by setting to true) or off (by setting to false).</p> <p>These filters are used for instrumentation purposes (for example, the average time spent in processing a request from a rich client).</p> <p>The response time filters should remain turned off unless you are collecting statistics.</p> <p>The default value is false.</p>

27. Required RPM package managers

If you use the visualization server manager (VSM) on a Linux machine, make sure the following required RPM package managers are available on the machine.

SUSE Linux:

```
fontconfig-2.11.1-7.1.x86_64
glibc-2.31-150300.46.1.x86_64
glibc-32bit-2.22-15.3.x86_64
libbz2-1-1.0.6-29.2.x86_64
libexpat1-2.1.0-21.3.1.x86_64
libexpat-devel-2.1.0-21.3.1.x86_64
libfreetype6-2.6.3-7.15.1.x86_64
libgcc_s1-8.2.1+r264010-1.3.3.x86_64
libGLU1-9.0.0-18.1.x86_64
libICE6-1.0.8-12.1.x86_64
libjpeg8-8.1.2-31.7.4.x86_64
libpng16-16-1.6.8-14.1.x86_64
libSM6-1.2.2-3.59.x86_64
libstdc++6-8.2.1+r264010-1.3.3.x86_64
libstdc++6-12.2.1+git416-150000.1.7.1.x86_64
libuuid1-2.29.2-7.14.x86_64
libX11-6-1.6.2-12.5.1.x86_64
libXau6-1.0.8-4.58.x86_64
libxcb1-1.10-4.3.1.x86_64
libXext6-1.3.2-4.3.1.x86_64
libXft2-2.3.1-9.32.x86_64
libXm4-2.3.4-4.15.x86_64
libXmu6-1.1.2-3.60.x86_64
libXp6-1.0.2-3.58.x86_64
libXrender1-0.9.8-7.1.x86_64
libXt6-1.1.4-3.59.x86_64
libz1-1.2.11-1.27.x86_64
Mesa-libGL1-18.0.2-6.28.x86_64
```

Note:

On SUSE Linux, the `/usr/lib64/libGLdispatch.so.0` file is not owned by any package.

Also, the `/usr/lib64/libGLX.so.0` file is not owned by any package.

RedHat Linux:

```
bzip2-libs-1.0.6-13.el7.x86_64
expat-2.1.0-10.el7_3.x86_64
expat-devel-2.1.0-10.el7_3.x86_64
```

fontconfig-2.13.0-4.3.el7.x86_64
freetype-2.8-12.el7.x86_64
glibc-2.28-225.el8.x86_64
libgcc-4.8.5-36.el7.x86_64
libglvnd-1.0.1-0.8.git5baa1e5.el7.x86_64
libglvnd-glx-1.0.1-0.8.git5baa1e5.el7.x86_64
libICE-1.0.9-9.el7.x86_64
libjpeg-turbo-1.2.90-6.el7.x86_64
libpng-1.5.13-7.el7_2.x86_64
libSM-1.2.2-2.el7.x86_64
libstdc++-4.8.5-36.el7.x86_64
libstdc++-8.5.0-18.el8.x86_64
libuuid-2.23.2-59.el7.x86_64
libX11-1.6.5-2.el7.x86_64
libXau-1.0.8-2.1.el7.x86_64
libxcb-1.13-1.el7.x86_64
libXext-1.3.3-3.el7.x86_64
libXft-2.3.2-2.el7.x86_64
libXmu-1.1.2-2.el7.x86_64
libXp-1.0.2-2.1.el7.x86_64
libXrender-0.9.10-1.el7.x86_64
libXt-1.1.5-3.el7.x86_64
mesa-libGLU-9.0.0-4.el7.x86_64
motif-2.3.4-14.el7_5.x86_64
zlib-1.2.7-18.el7.x86_64