TIBCO Spotfire® Statistics Services
Installation and Administration

Software Release 7.0
February 2015
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TIBCO Spotfire Statistics Services Documentation and Support Services

All TIBCO documentation is available on the TIBCO Documentation site, which can be found here:
https://docs.tibco.com

TIBCO Spotfire Statistics Services Documentation

The following documents for this product can be found in the TIBCO Documentation Library:

- TIBCO Spotfire® Statistics Services Release Notes
- TIBCO Spotfire® Statistics Services Installation and Administration Guide
- TIBCO Spotfire® Statistics Services User’s Guide
- TIBCO® Enterprise Runtime for R Package Management
- TIBCO Spotfire® Statistics Services Java API Reference
- TIBCO Spotfire® Statistics Services C# API Reference
- TIBCO Spotfire® Statistics Services URL API Reference
- TIBCO Spotfire® Statistics Services SpotfireUtils Package Reference
- TIBCO Spotfire® Statistics Services License Agreement

Product System Requirements

For a list of system requirements for this product and other TIBCO Spotfire® products, visit this site:
http://support.spotfire.com/sr.asp

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- For an overview of TIBCO Support, and information about getting started with TIBCO Support, visit this site:
  http://www.tibco.com/services/support

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  Entry to this site requires a user name and password. If you do not have a user name, you can request one.

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Administration Overview

TIBCO Spotfire® Statistics Services can be deployed as a stand-alone server against which you can run analyses in one of its engines, or it can be deployed as part of a Spotfire stack.

Spotfire Statistics Services is a light-weight, flexible server that provides a communication layer, a service layer, and TIBCO® Enterprise Runtime for R (TERR), S-PLUS, or open-source R engine pool, among other features. Spotfire Statistics Services does not include user interface features (such as the TIBCO Spotfire® S+ Workbench or the S+ GUI).

You can also use external engines, such as SAS® and MATLAB®, if you have access to the corresponding software.

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Introduction to TIBCO Spotfire Statistics Services

Learn the basic features of TIBCO Spotfire® Statistics Services, its system requirements, its architecture, and its available APIs.

Spotfire Statistics Services builds on the comprehensive library of statistical and mathematical algorithms provided by S engines (or other engines) by offering enterprise-ready features, including:

- Centralized management.
- Event logging.
- Support for integration through a variety of programming languages.
- Authentication and authorization.
- Clustering.
- Load balancing.
- The capacity for multiple nodes to handle client requests.

Users submit jobs to an engine through the server, control job execution, and retrieve results. Administrators configure and maintain a cluster or a standalone installation.

A Spotfire Statistics Services job is an arbitrary expression (script) or function, bundled with the data it is to execute upon.

Even though external engines based on SAS® or MATLAB® software can be used to provide calculations, this documentation is primarily focused on the use of S engines (that is, TIBCO Enterprise Runtime for R, open-source R, and S-PLUS). For more information on other engines, see Changing the Engine Type.

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1 SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.
2 MATLAB is a trademark or registered trademark of The MathWorks, Inc.
Server Features
This list contains some of the most important features of the TIBCO Spotfire® Statistics Services architecture:

- Simple and lightweight. Users can pass data to the server, execute code on the server, and retrieve results.
- Easy to install, configure, and maintain. The engines run as separate, restartable processes.
- Can be extended through executing a script or function written in TIBCO® Enterprise Runtime for R, open-source R, or S-PLUS, SAS or MATLAB, and submitted through Java™, C#, URL API, or S-PLUS API. In this way, the code remains separate from Spotfire Statistics Services.
- Configurable to access multiple TIBCO Enterprise Runtime for R engines, open-source R engines, S-PLUS engines, or SAS or MATLAB engines on each server. You can easily install and configure the server in a cluster. After you establish the cluster, you can install new Worker nodes as needed. Each new Worker node immediately begins processing requests from the centralized job queue.
- Version 7.0 of Spotfire Statistics Services is designed to work with either open-source R version 3.1.2.
- Provides centralized management and access. The computational resources are exposed as RESTful services. You can deploy commonly used libraries and store all execution results in a centralized location.
- Provides configurable user and permission settings. You can configure the settings so that credentials are evaluated before certain actions can be performed. Spotfire Statistics Services supports different types of data stores that can hold the user and permission information, for example a property file or an LDAP directory.
- Adheres to external standards whenever possible, which makes the server easier to use.
- Robust and flexible and this enables you to create high quality user interfaces that are tailored to your requirements.

Compatible Engines
Learn which engines you can use with Spotfire Statistics Services. Learn the engine limitations and considerations.

S Engines
You can use either TIBCO Enterprise Runtime for R, open-source R, or S-PLUS as the S engine in both standalone and cluster installations. In a standalone or an individual cluster, you must have just one engine type. For more information about maintaining, updating, or deploying S engines in the server, see Advanced Configuration on page 86 or see the section Change the Engine Type.

If you have S developers who plan to use the package RinR, which is provided with TIBCO Enterprise Runtime for R, you must configure Spotfire Statistics Services to use the TIBCO Enterprise Runtime for R engine, but you must also ensure that the open-source R engine is installed on the server (but not configured as the engine to use).

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SAS® and MATLAB® Engines
If you have a working SAS software or MATLAB installation you can use that software as the engine in both standalone and cluster installations of Spotfire Statistics Services. However, within each cluster,
you can use only one engine type. For more information, see Configuring a SAS Engine on page 74 or Configuring a MATLAB Engine on page 75.

Supporting Software
Spotfire Statistics Services is packaged in a single installer file that includes third-party products.

- Java Runtime Environment 7 Update 72.
- Apache Tomcat 7.0.57.

The following software is useful but it is not required:

- Apache Chainsaw v2 log viewer.
- Apache HTTP Server or Microsoft Internet Information Services (IIS) as a front end or load balancer.

Supported Platforms and System Requirements
Your system must meet the basic requirements to work with Spotfire Statistics Services.

Before you install Spotfire Statistics Services, verify that your system complies with the latest system requirements listed at http://support.spotfire.com/sr.asp.

Refer to the TIBCO Spotfire® Statistics Services Release Notes for changes in this version.

Server Architecture
TIBCO Spotfire® Statistics Services is a web service application that exposes a set of resources that allow a user to interact with an S engine. This section provides an overview of the components that make up the server architecture.

Processing Runtime

The processing runtime is the core set of components included in every Spotfire Statistics Services installation.

The Processing Runtime implements the functionality of the server by accepting and processing jobs (requests submitted by supported APIs), providing support for node administration and maintenance, performing event logging to provide full traceability, and retrieving job results. The S engine runs in the context of the processing runtime.

Data Access Layer

The data access layer enables communication to a job database on a database server. When a job is persisted in the job database, a user can access that job as needed.

Job Queue

The job queue handles job scheduling of jobs in the job database. Users can schedule and monitor jobs.

Periodic Cleanup

The periodic cleanup component makes sure that the necessary maintenance tasks can and do run. You can configure settings related to the preservation or deletion of job definitions and job artifacts, which are results from the execution of jobs.

Configuration Store

The configuration store is a component that manages server configuration settings. This component stores the current configuration in the spserver.properties properties file and provides JMX access to the current configuration.
Engine Pool

The engine pool component manages the S engines. Although you can run multiple S engines in an engine pool, you cannot mix engines of different types. For example, you cannot run an open-source R engine and a TIBCO® Enterprise Runtime for R engine in a single engine pool. The following image shows two clusters, each configured to run a specific engine type.

*Engine clusters configured an engine type.*

Bitness Matching

In most cases, you must match the "bitness" of your Spotfire Statistics Services installation to that of your system.

Spotfire Statistics Services supports running 32-bit and 64-bit versions of the TIBCO® Enterprise Runtime for R engine, the S-PLUS engine, or the open-source R engine. (For more information about tested versions, see [http://support.spotfire.com/sr.asp](http://support.spotfire.com/sr.asp).) The appropriate TIBCO Enterprise Runtime for R engine and S-PLUS engine both ship with Spotfire Statistics Services.

You must install the open-source R engine you want to use separately by downloading and installing it from [http://www.r-project.org](http://www.r-project.org). The bitness of the open-source R engine you use must match the bitness of the installation of Spotfire Statistics Services you are using. That is, if you use 32-bit open-source R, you must use 32-bit Spotfire Statistics Services. If you use 64-bit open-source R, you must use 64-bit Spotfire Statistics Services.

Open-source R is available under separate open source software license terms and is not part of TIBCO Enterprise Runtime for R. As such, open-source R is not within the scope of your license for TIBCO Enterprise Runtime for R. Open-source R is not supported, maintained, or warranted in any way by TIBCO Software Inc. Download and use of open-source R is solely at your own discretion and subject to the free open source license terms applicable to open-source R.

You can run 32-bit Spotfire Statistics Services on a 64-bit operating system.
Job Process Workflow

Learn how Spotfire Statistics Services processes jobs.

In a typical job process workflow:

1. A client uploads the data necessary to complete a job to the server using a WebDAV service and submits a job request to a Manager node using a web request.
2. Execution is asynchronous, and the Manager node stores the job in the job database, places it in a queue for execution, and marks the job as waiting.
3. The job ID and the status are returned to the client.

Using the job ID, a client can manage the job and view the status.

1. When the job is submitted to a Worker node, the status is changed to running.
2. When the job completes, the client is notified and, if it completed successfully, the client can retrieve the results.

If an error occurred, the status is set to either failed or done with error.

- Done with error means that an error occurred while parsing and executing the job inside the engine.
- Failed means that an unexpected internal error occurred while processing the job.

The client APIs provide for synchronous execution. The server achieves this by blocking the call until the job completion notification is received from the server. Synchronous jobs have a higher priority over asynchronous jobs.

When you deploy Spotfire Statistics Services as part of your Spotfire deployment, Spotfire Professional or Spotfire Web Player is the client sending the job request to the cluster. The Manager node passes it on to an available Worker node, and then returns the result when the job is complete.

Client APIs

TIBCO® Enterprise Runtime for R, S-PLUS, open-source R, and client developers can write applications to integrate with the server using one of the TIBCO Spotfire® Statistics Services client APIs.

Spotfire Statistics Services includes the following client APIs:

- Java™
- C#
- URL API
- S-PLUS API

The Java, C#, and S-PLUS APIs provide support for managing code packages in a server package repository. The APIs contain essentially the same functionality with the exception of differences related to special language constructs that are available only in C#, such as properties, events, and delegates. A Java developer can implement the equivalent of these interfaces in Java as getter/setter pairs, single method interfaces, and classes.

These client APIs provide a layer that shields the client application developers from the mechanics of accessing the underlying web services exposed by the server applications.

You can access some of the underlying RESTful resources in other programming languages directly by passing in the request as an HTTP request to the URL API.

Clients can support both synchronous and asynchronous method invocations. In the case of the default asynchronous invocation, the client submits the request to a server and control returns to the client code after the server adds the request to a job queue. The client code can then register a callback method that can be invoked when the server completes the execution of the job.
In the synchronous invocation case, the client submits the request to the server exactly as in the above case, but instead of returning control to the client code after the server sends an initial response, the server generates a response to the client call only upon completion of the job.

**General Client Developers**

Learn to manage the needs of the general client applications that developers provide.

TIBCO Spotfire® Statistics Services is a flexible system that developers can use to expand upon and build clients using the available programming interfaces. An immediate implication is that client developers will look to administrators for obtaining the programming interfaces and associated documentation. Spotfire Statistics Services is designed to minimize the impact on administrators by making these tools and all documentation available to remote users from the Spotfire Statistics Services landing page. You only need to provide client developers the URL to the server landing page:

http://servername:port/<service_name>

where they can obtain the tools and documentation that they need to build a client.

The links on the server landing page access the following files and directories in SPSERVER_HOME:

/docs
/ext

  CsharpAPI
  JavaAPI
  SplusAPI
  URLAPI

**S Developers Package Deployment**

Learn to manage the needs of the S developers who provide packages for TIBCO Spotfire® Statistics Services.

An S developer can expand on the available functions and libraries by creating TIBCO® Enterprise Runtime for R for Statistics Services functions, S-PLUS functions, or open-source R functions in packages for processing requests from their clients. The final output of development is a set of functions called via the Function Service, called a package, which the developer deploys to the server using one of the following tools:

- The Spotfire Statistics Services view for TIBCO Spotfire® S+ in the TIBCO Spotfire S+ Workbench.

The plugins, the Development Environment, and the spserverapi package do not support uploading or updating packages on a Spotfire Statistics Services server that has authentication enabled. If your Spotfire Statistics Services uses authentication, you should make your plugins and package repository containing the spserverapi package available on a Web Server that does not require authentication. Be sure to provide the server location to your S developers.

Spotfire Statistics Services supports only binary packages, which are pre-compiled and have a .zip extension on Windows or a .tar.gz extension on UNIX/Linux. Packages are not cross-platform compatible, so the developer must build the package specifically for each platform. In the case of open-source R binary packages, the developer must use an open-source R engine configured with the option --enable-R-shlib enabled.
Open-source R is available under separate open source software license terms and is not part of TIBCO Enterprise Runtime for R. As such, open-source R is not within the scope of your license for TIBCO Enterprise Runtime for R. Open-source R is not supported, maintained, or warranted in any way by TIBCO Software Inc. Download and use of open-source R is solely at your own discretion and subject to the free open source license terms applicable to open-source R.

S developers can use the Administration APIs to deploy, update, or remove their packages. In a clustered environment, when a package is deployed to a Manager node, the package is automatically made available to all Worker nodes in the cluster. If you want to have the package loaded when an S engine starts, you can use engine.init.expr or engine.init.file to define initialization code. In order to use engine.init.file you need to create an initialization file and specify its path in engine.init.file.

Alternatively, the client developer can add a call to `library(packagename)` in the application prior to accessing any of the package functions.

**S Package Availability on the Server**

S packages are deployed to the server by the package developer, who must decide when and how the package can be accessed by the code.

S developers can use the Administration APIs to deploy, update, or remove their packages from the server. In a clustered environment, when a package is deployed to a Manager node, the package is automatically made available to all Worker nodes in the cluster.

Every time a request is sent to the server, an available S engine starts to process the request.

You can ensure that a package is available in the running engine in one of two ways:

- **Always loaded when any S engine starts**: To ensure that a package always loads whenever any S engine starts, set the server property engine.init.expr or engine.init.file to define initialization code. (To use engine.init.file, you must create an initialization file and specify its path in engine.init.file. See the description of this server property for more information.)

  This method should be used only if needed, because loading a package every time the S engine starts can have a detrimental effect on performance.

- **Loads only when needed**: To load the package only when an application requires it, the client developer can add a call to `library(packagename)` in the application prior to accessing any of the package functions.

**Package Development References**

A list of the resources available to developers for creating and managing packages using the TIBCO Spotfire® Statistics Services engine, the S-PLUS engine or the open-source R engine.

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIBCO Spotfire® Package Management</td>
<td>Contains guidance for managing packages developed or built for the TIBCO Enterprise Runtime for R engine or downloaded from a CRAN-like repository.</td>
</tr>
<tr>
<td>TIBCO Spotfire® S+ Guide to Packages</td>
<td>Contains guidance on developing a package using S-PLUS, and then deploying it to TIBCO Spotfire® Statistics Services using API calls.</td>
</tr>
</tbody>
</table>
### Installation Types

Installation types for TIBCO Spotfire® Statistics Services include standalone and cluster.

Before you begin the Spotfire Statistics Services installation process, you must determine whether you need a standalone installation or the scalability and fail-over features offered in a cluster.

Spotfire Statistics Services is built from a basic set of reusable components as a true component-based application. From these basic components, we built a single installation file, a standard Java web application archive (WAR), for each supported platform. You can install either the Standalone or the Cluster server types. See **Cluster Deployment** on page 29 for more guidance in deciding which installation type you need.

### Standalone Installation

Learn whether the typical standalone installation of TIBCO Spotfire® Statistics Services is the right installation for your needs.

In a standalone installation, you install and configure Spotfire Statistics Services on a single computer. This installation is ideal if you expect your users to send only a small number of jobs, and those jobs do not have large data sets. See **Preparing for Installing a Standalone Service** on page 19.

**Spotfire Statistics Services with single manager server**

### Cluster Installation

Learn whether a cluster installation of TIBCO Spotfire® Statistics Services is the right installation for your needs.

In your plans for your deployment, if your requirements include the scalability, high-availability, and reliability that go beyond the benefits of a standalone installation, consider deploying Spotfire Statistics Services in a clustered environment.

You can install Spotfire Statistics Services Manager and Worker nodes on multiple computers so that they will operate together in a clustered environment. You can also configure a Manager node to fill the role of a Worker node so that it responds to administration requests and processes jobs. In this way a node can function as an entire system on a single computer or as many computers participating in a cluster.
Cluster Manager Node

You must have at least one Manager node in each cluster. When you install additional Manager or Worker nodes the configuration settings from this first Manager node is read in during the installation process.

The role of a Manager node is to expose a set of RESTful resources on the network that provide the ability to submit an expression or function for execution to an S engine, enable remote job management, and configure and manage a cluster.

The Manager node also exposes a WebDAV service for remote file management. This service allows clients to upload a data set to a server prior to job execution and then, once the job is complete, they can obtain the files generated as an output of their job execution.

The components of the Manager node are:

- **HTTP Request Handler**: Translates HTTP requests into processing runtime or cluster management component calls.
- **Processing Runtime**: Queues jobs and executes job requests.
- **WebDAV Service**: Provides server directory and file access
- **Cluster Management**: Manages all of the nodes in a cluster and distributes load between nodes.

Cluster Worker Node

The Worker node is a command-line application wrapped in a service that listens for commands from Manager nodes and processes queued jobs. A Worker node does not expose any externally accessible services other than those available through a Manager node.

The principal components of a Worker node are:

- **Processing Runtime**: Queues jobs and executes job requests.
- **Cluster Agent**: Listens for commands from the Manager node; Starts, stops, or restarts the processing runtime as needed; and returns job status change notifications.

For more information, see Cluster Deployment on page 29.
Server Stand Alone Installation

Select the TIBCO Spotfire® Statistics Services installation path that suits your needs.

For a stand-alone installation, you can install on a Windows server or a UNIX/Linux server.

If you need to deploy a cluster, see Cluster Deployment

Preparing for Installing a Standalone Service

Your computer must meet certain criteria for a TIBCO Spotfire® Statistics Services installation.

Procedure

1. Make sure that your computer meets the minimum system requirements. For more information, see http://support.spotfire.com/sr.asp.
2. Determine whether to run the service using the local system account, or to run it under a service account.
   - On Microsoft Windows®, if the service does not need to access resources on a network, you can install using the local system account.
   - On Windows, If the service must access the network for resources, you must specify a service account.
   - On Linux® or Unix®, you will have access to all resources that you normally have access to logged on as the user of the account, so you do not need to specify this option.
3. Verify that the port numbers you specify for the Main Service Port and the JMX Monitoring Port during the Spotfire Statistics Services installation are not being used by other applications on the computer.

Establishing Log On as a Service Right

On Microsoft Windows®, If you need to specify a service account, ensure that the service account has the appropriate rights.

Procedure

1. On the computer where the standalone TIBCO Spotfire® Statistics Services is to be installed, log on with a user name that is a member of the local administrators group.
2. On the taskbar, click Start > Control Panel > Administrative Tools > Local Security Policy.
3. In the Local Security Settings dialog box, under Security Settings, expand Local Policies.
4. Select User Rights Assignment, and then double click Log on as a Service.
5. In the Log on as a service Properties dialog box, click Add User or Group, and then enter the service account you will specify during installation.
6. Ensure the service account has all appropriate access permissions for any local or external resources (that is, the Spotfire Statistics Services installation directory, the domain resources, and so on).
Establishing Permissions to Write to a Directory

On LINUX, You must make sure that the user has appropriate permissions to install TIBCO Spotfire® Statistics Services.

Procedure

1. Log on as the user under which Spotfire Statistics Services is to run. This must be a valid user account. (We do not recommend using root because doing so can result in problems.)
2. Make sure that the user has permissions to write to the desired installation directory.
3. Follow the procedure in UNIX/Linux Installation.

Installing Standalone TIBCO Spotfire Statistics Services on Windows

Follow these instructions to install a standalone version of TIBCO Spotfire® Statistics Services on a Windows machine.

Do not use this procedure if you intend to install a cluster. If you want to perform a cluster installation, see Cluster Deployment on page 29.

Procedure

1. From the Spotfire Statistics Services installation media, use an application appropriate for unpacking the installation .zip package:
   - 32-bit: TIB_sf_statsvcs_7.0.0_win_x86_32.zip.
   - 64-bit: TIB_sf_statsvcs_7.0.0_win_x86_64.zip.

Review the accompanying release notes (if you have not done so already) and run the appropriate installation executable:
   - 32-bit: TSSS_7.0.0_win_x86_32.exe.
   - 64-bit: TSSS_7.0.0_win_x86_64.exe.

In the resulting Spotfire Statistics Services installation wizard, when you complete a step, click Next to proceed to the next panel.

2. **Introduction**: We recommend closing all running programs before proceeding with the installation.

3. **License Agreement**: Read the license agreement and if you agree to the terms, select **I accept the terms of the License Agreement**.

4. **Installation Type**: Select **Standalone**. If you select **Cluster**, you should be following the instruction to install a cluster. See Cluster Deployment on page 29.

5. **Installation Path**: Either accept the default, type a path, or choose a path.
6. **Service Name**: Accept the default name (SplusServer) or type a different *service_name*.

   The *service_name* is used in several places. It is used as the name of a new directory under the path that you typed in the Installation Path panel. For example, for a 64-bit Windows installation, the service name the path is:

   \`C:\Program Files\TIBCO\statsvcs70\<service_name>\` where *service_name* is the value you supply, or the default, SplusServer.

   The name of the Windows service is **TSSS70<service_name>**. The `<service_name>` is also appended to the service display name; for example, TIBCO Spotfire Statistics Services (SplusServer). It is also included in the server URL:

   \`http://servername:port/service_name/\`

   You can install multiple instances of Spotfire Statistics Services on a single computer, but you must make sure that the *service_name* for each service is unique.

7. **Engine Type**: Select the S engine to use.

   - If you plan to use S-PLUS, select **Spotfire S+**.
     
     Spotfire S+ and TIBCO® Enterprise Runtime for R for Statistics Services are largely compatible; however, S-PLUS programmers might notice some differences in results or encounter problems running S-PLUS code using the TIBCO Enterprise Runtime for R engine. For more information, see the article **Differences Between R and Spotfire S+** in the Knowledge Base in the Spotfire Technology Network.

   - If you plan to use TIBCO Enterprise Runtime for R, accept the default.

   - If you plan to use an engine not shipped with Spotfire Statistics Services (such as open-source R, SAS®, or MATLAB®), accept the default. You can change the engine type after completing the installation. (See Configure an Open-Source R Engine, Configure a SAS® Engine, or Configure a MATLAB® Engine or more information.)

8. **Ports** (panel 1): Specify the HTTP port that is used by clients or APIs to access the service.

   a) For **Main Service Port**, either accept the default or type a port number for the service. From here, we will refer to this value as *port*, as it appears in the server URL as `http://servername:port/service_name`. For example, `http://MyServer:8080/SplusServer`.

   a) In **JMX Monitoring Port**, either accept the default or type a port number.

   Remember that the port numbers must be unique for each Spotfire Statistics Services instance on the machine.

9. **Ports** (panel 2): Select **HTTP**.

   If you plan to use a front-end proxy or load balancer, you should select AJP. For more information, see Load Balancer on page 41.

10. **Management User**: Provide the user name and password for authentication when using a JMX tool such as TIBCO Hawk or jconsole (for example). The default user name is admin. These credentials are written to a server configuration file to provide for authentication when an authorized user accesses monitoring services. The value you provide here is encrypted when it is stored in the configuration file.

    These credentials are specific to this Spotfire Statistics Services installation, and because they are stored in a server configuration file, we recommend not using your login credentials.

11. **Service URL**: This is the URL that accesses the Spotfire Statistics Services landing page. It is a concatenation of the server name, the *port*, and the *service_name*. For a standalone installation, just accept the default.
12. **Service User** (panel 1):

- If all of your resources are on your local machine, and you want to configure the Spotfire Statistics Services (service_name) to run using the credentials for the Local System account, accept the default Local System.
- If you must have access to resources on the network, select Other Account. (If you are not sure which option to select, review Preparing for Installing a Standalone Service on page 19.

a) **Service User** (panel 2): If you selected Other Account, specify the service user and password. The specified account must have permission to access resources required for Spotfire Statistics Services.

13. **Pre-Installation Summary**: Review your options, and then click Install.

The **Installing Spotfire Statistics Services (service_name)** panel appears while the server is installed and configured.

14. **Start Service**: If Start Service is selected, Spotfire Statistics Services (service_name) is started when installation completes. If you do not want the service to start at this time, clear Start Service.

If the Service User you specified in step 12 has not been granted the Log on as a service right, clear Start Service or grant the user the Log on as a service right. See Preparing for Installing a Standalone Service on page 19 for more information.

If you need to change the number of S engines configured on the server, see Changing the Engine Count on Windows on page 26. (You must stop the service to change the engine count.)

The Spotfire Statistics Services (service_name) service is set to start automatically, which means that the service starts when you reboot your computer.

15. **Install Complete**: Click Done. If you want to set some post-installation configuration options, such as changing the engine type or count, stop the service, and then restart it following your changes.

### Installing Standalone TIBCO Spotfire Statistics Services on Linux UNIX

Follow these instructions to install a standalone version of TIBCO Spotfire® Statistics Services on a Linux/UNIX machine.

Do not use this procedure if you intend to install a cluster. If you want to perform a cluster installation, see Cluster Deployment on page 29.

**Procedure**

1. From the installation media, unpack the appropriate Spotfire Statistics Services .tar.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Executable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux 32-bit</td>
<td>TIB_sf_statsvcs_7.0.0_linux24gl23_x86_32.tar</td>
</tr>
<tr>
<td>Linux 64-bit</td>
<td>TIB_sf_statsvcs_7.0.0_linux24gl23_x86_64.tar</td>
</tr>
</tbody>
</table>

2. Review the release notes (if you have not already done so), and then run .bin to install.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux 32-bit</td>
<td>TSSS_7.0.0_linux24gl23_x86_32.bin</td>
</tr>
<tr>
<td>Linux 64-bit</td>
<td>TSSS_7.0.0_linux24gl23_x86_64.bin</td>
</tr>
</tbody>
</table>

3. Follow the steps in the Spotfire Statistics Services installation wizard. (As you complete steps in the console, press ENTER to proceed to the next step.)

4. **License Agreement**: Read the license agreement and if you agree to the terms, select I accept the terms of the License Agreement.
5. **Installation Type**: Select **Standalone**.
   If you select **Cluster**, you should be following the instruction to install a cluster. See [Cluster Deployment](#) on page 29.

6. **Installation Path**: Either accept the default, type a path, or choose a path.

7. **Engine Type**: Select the S engine to use.
   - If you plan to use S-PLUS, select **Spotfire S+**.
     Spotfire S+ and TIBCO® Enterprise Runtime for R for Statistics Services are largely compatible; however, S-PLUS programmers might notice some differences in results or encounter problems running S-PLUS code using the TIBCO Enterprise Runtime for R engine. For more information, see the article *Differences Between R and Spotfire S+* in the Knowledge Base in the Spotfire Technology Network.
   - If you plan to use TIBCO Enterprise Runtime for R, accept the default.
   - If you plan to use an engine not shipped with Spotfire Statistics Services (such as open-source R, SAS®, or MATLAB®), accept the default. You can change the engine type after completing the installation. (See [Configure an Open-Source R Engine](#), [Configure a SAS® Engine](#), or [Configure a MATLAB® Engine](#) or more information.)

8. **Ports** (panel 1): Specify the HTTP port that is used by clients or APIs to access the service.
   a) For **Main Service Port**, either accept the default or type a port number for the service. From here, we will refer to this value as *port*, as it appears in the server URL as `http://servername:port/service_name`. For example, `http://MyServer:8080/SplusServer`.
   a) In **JMX Monitoring Port**, either accept the default or type a port number.
      Remember that the port numbers must be unique for each Spotfire Statistics Services instance on the machine.

9. **Ports** (panel 2): Select HTTP.
   If you plan to use a front-end proxy or load balancer, you should select AJP. For more information, see [Load Balancer](#) on page 41.

10. **Management User**: Provide the user name and password for authentication when using a JMX tool such as TIBCO Hawk or jconsole (for example). The default user name is admin. These credentials are written to a server configuration file to provide for authentication when an authorized user accesses monitoring services. The value you provide here is encrypted when it is stored in the configuration file.
    These credentials are specific to this Spotfire Statistics Services installation, and because they are stored in a server configuration file, we recommend not using your login credentials.

11. **Service URL**: This is the URL that accesses the Spotfire Statistics Services landing page. It is a concatenation of the server name, the *port*, and the *service_name*. For a standalone installation, just accept the default.

12. **Service User**: Accept the default. The service runs in the context of the user that you are using to run this installer. The specified account must have permission to access any other Spotfire Statistics Services resources. (See [Preparing for Installing a Standalone Service](#) on page 19 for more information.)

13. **Pre-Installation Summary**: Review your options, and then click **Install**.
    The **Installing Spotfire Statistics Services (service_name)** panel appears while the server is installed and configured.

14. Run the following command as root: `SPSERVER_HOME/init.d/register-service.sh`. Alternately, you can configure post-installation options before completing this step.
    On UNIX/Linux, you must configure the service to run when the computer starts by registering the init scripts with system init.
15. Manually start the service by running the following command: SPSERVER_HOME/init.d/spserver start.

Migrating your Spotfire Statistics Services Configuration and Data

Upgrading from a previous release of Spotfire Statistics Services requires a new installation. However you can retain and migrate configuration and data. We recommend shutting down the previous version service and installing the new version in a different location. After you have installed the new version, follow this guidance.

Prerequisites

Install the new version, test that the service works, and then shut down the new version’s service before completing these steps.

Procedure

1. Copy any .jar files from your endorsed directory to your new installation.
2. From the older installation, open the folder TSSS_HOME/conf and copy the appropriate configuration and data from the old installation to the new.
   
   For most configuration and data, you can migrate from the previous installation to the new one, with the cautions and exceptions listed in here.

   Important: Do not modify the following entries in the file conf/server.properties:
   1. service.id
   2. service.url

   Do not modify the following properties, unless you need to change them from the values you selected during installation.
   1. jmxremote.port
   2. jmxremote.password
   3. jmxremote.username

   If you are upgrading from a version of Spotfire Statistics Services earlier than version 6.0, do not copy the older versions of the files conf/database.properties and conf/ldap.properties. These files have changed. Specifically, do not copy the entry database.url in the file conf/database.properties from the older installation. Instead, just change the SPSERVER_SHARE location to point to the new installation.

   If you are installing a cluster, do not copy the file conf/cluster.properties.

3. Locate previous user data in TSSS_HOME/data/common and TSSS_HOME/data/users, and then copy these directories directly from the previous installation to the new installation.

   All other directories under TSSS_HOME/data contain temporary data from the previous installation and should not be copied.

What to do next

Complete any remaining configuration tasks. If no further tasks are needed, start the service.
Post-Installation Configuration

After you have finished running the TIBCO Spotfire® Statistics Services installer, you can make minor configuration adjustments.

After completing the installation, you have the option to change the engine count and (on UNIX/Linux) configure the service to start when the machine is restarted. (On Windows, the service automatically starts when you reboot the computer.)

S Engine Location

Whether you deploy a stand-alone or a cluster TIBCO Spotfire® Statistics Services installation, the S engines reside in compressed files in a location from where the server can deploy them automatically, and from where they can be easily referenced, maintained, and updated.

The engines are stored in the directory listed below, according to your installation type.

- **Stand-alone S engine directory**: `SPSERVER_HOME/data/binaries`.
- **Cluster S engine directory**: `SPSERVER_SHARE/data/binaries`.

The following table shows the compressed engine types by operating system.

<table>
<thead>
<tr>
<th>Windows®</th>
<th>UNIX®/Linux®</th>
</tr>
</thead>
<tbody>
<tr>
<td>SplusEngine.zip</td>
<td>SplusEngine.tar.gz</td>
</tr>
<tr>
<td>TERREngine.zip</td>
<td>TERREngine.tar.gz</td>
</tr>
</tbody>
</table>

Spotfire Statistics Services provides the TIBCO® Enterprise Runtime for R engine by default; you must download and maintain the open-source R engine separately. See Configuring an Open-Source R Engine for more information.

Changing the Engine Type

You can change the engine that TIBCO Spotfire® Statistics Services uses as part of your post-installation configuration.

By default, during installation, the engine type is set to TIBCO® Enterprise Runtime for R. Changing the engine type is optional. You can specify only one engine type.

Procedure

1. Browse to the directory `SPSERVER_HOME/conf` (where `SPSERVER_HOME` is your server installation directory).
2. Using a text editor, open the file `spserver.properties`. 
3. Locate the property `engine.type`, and set it to the value to use.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPLUS</td>
<td>S-PLUS engine. Provided with your Spotfire Statistics Services installation. Use this engine if developers are deploying S-PLUS packages to the service.</td>
</tr>
<tr>
<td>R</td>
<td>Open-source R engine. Use this engine if developers are deploying R packages to the service, and the packages contain R code that will not run in TIBCO Enterprise Runtime for R. Requires additional steps. See Configure an Open-Source R Engine for more information.</td>
</tr>
<tr>
<td>SAS</td>
<td>SAS® engine. Requires additional steps. See Configure a SAS Engine for more information.</td>
</tr>
<tr>
<td>MATLAB</td>
<td>MATLAB® engine. Requires additional steps. See Configure a MATLAB Engine for more information.</td>
</tr>
</tbody>
</table>

When you update or change the `engine.type` property, you must restart the server to initiate the deployment.

For clusters, when the server starts, the engine is copied from its location and deployed to each node in the cluster.

For more information about the location of the engines, see S Engine Location.

**Changing the Engine Count on Windows**

The engine count specifies the number of engines configured on the server to handle engine-related requests. For a standalone TIBCO Spotfire® Statistics Services installation, by default, the engine count is set to the number of cores on the server.

If you want your standalone installation to handle other tasks, you can change processing resources by setting the Java property `-Dengine.count`. On Windows, we use the Procrun service to add or modify Java properties.

**Procedure**

1. Browse to the directory `SPSERVER_HOME/tomcat/bin` (where `SPSERVER_HOME` is your server installation directory).
2. Open `TSSS<service_name>ws.exe`, where `service_name` is the value that you specified during installation.
3. Select the Java tab.
4. Under Java Options, add the specific Java property `-Dengine.count=val` where `val` is the desired value.
5. Start or Restart the service.
Changing the Engine Count on Linux UNIX

The engine count specifies the number of S engines configured on the server to handle engine-related requests. For a standalone TIBCO Spotfire® Statistics Services installation, by default, the engine count is set to the number of cores on the server.

Procedure

1. Browse to the directory $SPSERVER_HOME/init.d/spserver$ (where $SPSERVER_HOME$ is your server installation directory).
2. Set the value of $SPSERVER_ENGINES$ to the desired value.
3. Start or restart the service.

Simple No Configuration Installation

A simple standalone TIBCO Spotfire® Statistics Services installation requires no additional configuration.

If you install a standalone Spotfire Statistics Services on a computer that meets the minimum requirements, you require no post-installation configuration. (See http://support.spotfire.com/sr.asp for up-to-date information about system requirements.)

You can customize the configuration after installing Spotfire Statistics Services and check that it is operating normally. To verify that your installation is running normally, see Validation on page 27.

Review the service property information to determine which settings to customize. For example, by default, the configuration file requires no authentication. If you want to enable authentication, change the default value to true.

Validation

After you complete the TIBCO Spotfire® Statistics Services installation, we recommend that you validate the installation to ensure that Spotfire Statistics Services is operating normally.

To verify that Spotfire Statistics Services is operating normally, open a web browser and, in the address bar, send a request using the following URLs. These URLs exercise all services: Administration, Expression, Function, and WebDAV.

<table>
<thead>
<tr>
<th>URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://servername:port/service_name">http://servername:port/service_name</a></td>
<td>Returns the Spotfire Statistics Services landing page with links to the documentation and programming interfaces.</td>
</tr>
<tr>
<td><a href="http://servername:port/service_name/api/v8/administration/ExtendedServerInfo">http://servername:port/service_name/api/v8/administration/ExtendedServerInfo</a></td>
<td>Displays server version information useful for support purposes.</td>
</tr>
</tbody>
</table>
The `servername:port` corresponds to the Service URL you specified during installation. In some examples, we use the default `service_name`, SplusServer; however, you might have named your service something else.

The results of the third and fourth URLs in Table 2.4 should be nearly identical. Examine the resulting XML to find the value for the ResultDir element. It should look like the following:

```
<ResultsDir>
http://servername:port/<service_name>/webdav/results/966CD2713342CD35/
</ResultsDir>
```

Copy the URL from the `ResultDir` element and paste it in the address box of your browser. This URL should display a page that lists the files in the directory and you should see a 0.0 kb file named `validate.txt`. Spotfire Statistics Services is operating normally if the validation does not produce an error or result in any other unexpected behavior.

If you encounter issues, see Configure Engine Logging on page 49. For additional assistance contact http://servername:port/service_name technical support at http://www.tibco.com/services/support.
Cluster Deployment

Clustering TIBCO Spotfire® Statistics Services can offer benefits for an expanding project or organization. When you consider deploying a cluster, review the network requirements and potential points of failure as well as the benefits.

Benefits of Clusters

- **Expands to Meet Growth.** You are not required to identify a single computer that will meet growth requirements. You can start conservatively and grow the system as needed.
- **Provides Failover.** Jobs running on a failed node are marked as failed. You can resubmit these jobs without needing to bring the failed node back online.
- **Offers High-Availability.** You do not need to rely on a single computer. If a Spotfire Statistics Services node fails, other nodes continue processing jobs.
- **Offers High-Reliability.** You can identify a growing job queue easily. Adding a Spotfire Statistics Services node is a simple process. Once the service starts, the new node immediately begins processing jobs.
- **Provides Load Balancing.** Jobs are distributed among the Spotfire Statistics Services nodes to ensure optimal resource utilization.

Considerations for Clustering

- **Requires a Fast Network.** The cluster depends heavily on the network used by the systems in the cluster. Additional planning might be necessary to ensure the systems use appropriate interconnects and they are in close proximity.
- **Includes Potential Points of Failure.** The basic cluster deployment includes the following three potential points of failure:
  - Database server used for the job database.
  - File system used for the shared cluster configuration store.
  - Single point for handling incoming requests.

*Spotfire Statistics Services single-manager server with workers.*

You can eliminate these points of failure, but you might need additional planning and configuration. In the case of the job database and the shared cluster configuration store, most database servers and file systems offer solutions for failover and high availability. For the consideration of single point for handling incoming requests, you might consider using a replicated load balancer with two Manager nodes.
Cluster Configuration Requirements

In a Spotfire Statistics Services cluster, each node must share the same configuration store and job database. It is critical that the results generated by a node are accessible to other nodes and clients in the event that node is not available. To achieve this, the configuration store, job database, and the cluster storage must be centralized.

The `spserver.properties` file contains the key configuration properties for Spotfire Statistics Services. See Server Properties on page 50 for more information.

Cluster Scaling Design

As you plan a TIBCO Spotfire® Statistics Services cluster deployment, consider whether use the vertical or horizontal scaling design.

The Spotfire Statistics Services cluster is no different, conceptually, than a standalone deployment. The standalone, a single computer, processes all incoming requests. The job database manages the job queue and holds information needed during the job lifecycle. The S engines execute the jobs, and the local file system contains all of the required files, along with the configuration and any results generated during job execution.

Vertical Scaling

The simple design of Spotfire Statistics Services allows vertical scaling. That is, you can provide more capacity by upgrading hardware on the standalone computer. For example, adding processors, memory, or storage could increase overall computing power or allow the system to support more users.

In many cases, vertically scaling Spotfire Statistics Services is a reasonable choice and certainly has its benefits. For example, you need to maintain only a single computer. The drawback to this approach is that it usually requires careful initial planning to find a computer that will meet growth requirements. In addition, a single computer generally indicates a single point of failure.

Horizontal Scaling

To address issues of growth requirements and scalability, as well as those of single point of failure, Spotfire Statistics Services supports horizontal scaling. In other words, increasing capacity does not require modifications to a single computer. Rather, it only requires installing the software on additional computers that work together. This is the basis for the SSS cluster.

Manager Nodes

To implement a TIBCO Spotfire® Statistics Services cluster, you configure Manager nodes and Worker nodes.

A Spotfire Statistics Services Manager node is dedicated to handling all incoming requests. You must have at least one Manager node per cluster. After you establish the first Manager node, you can add
one or more Worker nodes at any time, because the cluster uses a centralized storage location for the configuration store.

A dedicated Spotfire Statistics Services Manager node that handles all incoming requests introduces a single point of failure. We recommend, for failover purposes, that you configure an additional Manager node. However, when you have more than one Manager node in your cluster, you must also install a load balancer. A load balancer can ensure failover and distribute incoming requests between two Manager nodes. The nodes share the responsibilities of queuing jobs and forwarding results back to the load balancer. The load balancer sends the results to clients.

*Spotfire Statistics Services ultimate cluster deployment with failover.*

**Cluster Installation Checklist**

Before you establish the TIBCO Spotfire® Statistics Services cluster, confirm that you meet all of the requirements for a successful deployment.

- Verify that a computer meets the Spotfire Statistics Services minimum requirements to use as the first Manager node in your cluster.
- Verify that the port numbers to specify for the Main Service Port and the JMX Monitoring Port during the Spotfire Statistics Services installation are not being used by other applications on the computer.
- If you use Multicast for messaging, ensure that the combination of the Cluster Multicast Group Address and Cluster Multicast Discovery Port, specified during installation, is unique for each Spotfire Statistics Services cluster in your organization.
- If you use JMS messaging, ensure that the Cluster Messaging Port is not being used by other applications.
- If you plan to use a native Web server as a proxy or load balancer, identify the server name and the port it uses to service requests. You use this information to construct the Service URL during installation.
- Identify an adequate database server for the jobs database. Spotfire Statistics Services includes an H2 database as the default. We recommend at least a gigabit connection and that the database server is within close proximity with Spotfire Statistics Services nodes.
  
  Because the jobs database represents a potential single point of failure, you might consider replicating the database server or deploying a database server cluster.

  - Ensure that you have the JDBC driver for connecting to the job database server. For more information, see Configuring the JDBC Driver on page 80.
  - Identify the file server to be used for the centralized configuration store. We recommend a modern file server that has a gigabit connection and close proximity between it and the Spotfire Statistics Services nodes.
  
  Because the file server is a potential single point of failure, you might consider implementing a clustered file server.
Cluster File Share

A TIBCO Spotfire® Statistics Services cluster must have a file share established prior to the cluster installation.

On the file server, create and share a directory to use as the centralized configuration store. Each node in the cluster must have both read and write access to this directory.

Make a note of this path because you will need this path when you install the Manager and Worker nodes.

Installing the First Manager Node on Windows

Establish your TIBCO Spotfire® Statistics Services cluster by installing the first Manager node.

Prerequisites

To add a Manager or Worker node, you must use the same version of the installer that you used to install the first Manager node in the cluster.

Procedure

1. Log on with a user name that is a member of the local administrators group.
2. From the Spotfire Statistics Services installation media, use an application appropriate for unpacking the installation .zip package:
   - 32-bit: TIB_sf_statsvcs_7.0.0_win_x86_32.zip.
   - 64-bit: TIB_sf_statsvcs_7.0.0_win_x86_64.zip.
3. Review the accompanying release notes (if you have not done so already) and run the appropriate installation executable:
   - 32-bit: TSSS_7.0.0_win_x86_32.exe.
   - 64-bit: TSSS_7.0.0_win_x86_64.exe.
4. Follow the procedure Running the Installer. When you complete a step in the Spotfire Statistics Services 7.0 installation wizard, click Next to proceed to the next panel.

Installing the First Manager Node on UNIX Linux

Establish your TIBCO Spotfire® Statistics Services cluster by installing the first Manager node.

Prerequisites

To add a Manager or Worker node, you must use the same version of the installer that you used to install the first Manager node in the cluster.

Procedure

1. Log on as the user under which Spotfire Statistics Services will run. This must be a valid user account. (We do not recommend using root, because doing so can result in problems.)
2. Make sure that the user has permissions to write to the desired installation directory.
3. From the installation media, unpack the appropriate Spotfire Statistics Services .tar.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Executable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux 32-bit</td>
<td>TIB_sf_statsvcs_7.0.0_linux24gl23_x86_32.tar</td>
</tr>
<tr>
<td>Linux 64-bit</td>
<td>TIB_sf_statsvcs_7.0.0_linux24gl23_x86_64.tar</td>
</tr>
</tbody>
</table>

4. Review the release notes (if you have not already done so), and then run .bin to install.

<table>
<thead>
<tr>
<th>Option</th>
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<td>Linux 64-bit</td>
<td>TSSS_7.0.0_linux24gl23_x86_64.bin</td>
</tr>
</tbody>
</table>

5. Follow the procedure Running the Installer. During the installation, when you complete a step in the console press ENTER to proceed to the next step.

**Running the Installer**

This procedure walks you through running the TIBCO Spotfire® Statistics Services installer as you add the first node in a new cluster.

**Procedure**

1. **License Agreement**: Read the license agreement and if you agree to the terms, select I accept the terms of the License Agreement.
2. **Installation type**: Select Cluster: Manager Node.
3. **Installation Path**: Either accept the default, type a path, or choose a path.
4. **Cluster Share**: Type or choose a path that is available to all computers in the cluster. It can be a local or a network path.
5. **Service Name**: Accept the default name (SplusServer) or type a different service_name.

You can install multiple instances of Spotfire Statistics Services on a single computer with the following conditions:
- The service name for each service must be unique.
- They cannot share the same home directory or cluster share directory.

The service_name is used in several places. It is used as the name of a new directory under the path that you typed in the Installation Path panel. For example, if you accept the default service name, in 64-bit Windows, the path is C:\Program Files\TIBCO\statsvcs70\<service_name>.

- On Windows computers, the name of the Windows service is TSSS70<service_name>. The <service_name> is also appended to the service display name; for example, http://servername:port/(SplusServer).
- On UNIX/Linux computers, this string is used when you register the init script.
6. **Engine Type**: Select the S engine to use.

   - If you plan to use S-PLUS, select **Spotfire S+**.
     
     Spotfire S+ and TIBCO® Enterprise Runtime for R for Statistics Services are largely compatible; however, S-PLUS programmers might notice some differences in results or encounter problems running S-PLUS code using the TIBCO Enterprise Runtime for R engine. For more information, see the article *Differences Between R and Spotfire S+* in the Knowledge Base in the Spotfire Technology Network.

   - If you plan to use TIBCO Enterprise Runtime for R, accept the default.

   - If you plan to use an engine not shipped with Spotfire Statistics Services (such as open-source R, SAS®, or MATLAB®), accept the default. You can change the engine type after completing the installation. (See *Configure an Open-Source R Engine*, *Configure a SAS® Engine*, or *Configure a MATLAB® Engine* or more information.)

7. **Ports** (Panel 1): For the **Main Service Port**, either accept the default or type a port number for the service. For the **JMX Monitoring Port**, either accept the default or type a port number.

   The port numbers must be unique for each Spotfire Statistics Services instance on the computer.

8. **Ports** (Panel 2): If you plan to use a front-end proxy or load balancer, select AJP; otherwise, select HTTP.

9. **Ports** (Panel 3): Select the communication method to use.

   - **Multicast** protocol communicates by sending short packets (datagrams), which can be received by all the nodes listening on a specific Multicast address and port. This protocol uses Java built-in support for object serialization to serialize and deserialize the messages sent using this protocol. This protocol provides a simple messaging bus that allows all nodes to stay in sync and distribute the workload with a very low overhead. However, the Multicast protocol uses UDP to transmit messages, and UDP packets can be dropped by switches and firewalls. To minimize packet loss, we recommend you use Multicast only if all the nodes of the cluster are physically located on the same subnet. Multicast protocol cannot be used for cloud computing.

   - **Messaging (JMS)** is a very reliable messaging protocol, but it requires more resources from both manager and worker nodes to provide support for cluster messaging. You must specify JMS Messaging if your server is running on a cloud. Otherwise, you should choose this protocol only if Multicast is unavailable or unreliable in a given networking context.

     Spotfire Statistics Services has its own built-in JMS support and does not require a separate JMS server product. Note that you cannot alter or substitute embedded JMS service that is based on Apache Active MQ.

10. **Ports** (Panel 4):

    - If you chose Multicast, for **Cluster Multicast Discovery Port**, either accept the default or type a port number. For **Cluster Multicast Group Address**, either accept the default or type an Multicast IP address.

      The combination of the Multicast IP address and port must be unique for each Spotfire Statistics Services cluster in your organization.

    - If you chose Messaging (JMS), for **Cluster Messaging Port**, either accept the default or type a port number.

11. **Service URL**: Provide the URL for your load balancer. If you are not using a load balancer, accept the default.
12. **Management User**: (Manager nodes only.) Provide the user name and password for authentication when using a JMX tool such as TIBCO Hawk or jconsole (for example). The default user name is admin. These credentials are written to a server configuration file to provide secure job monitoring. The credentials provided for this management node are used cluster-wide. These credentials are specific to this Spotfire Statistics Services cluster installation, and because they are stored in a server configuration file, we highly recommend not using your login credentials.

13. **Service User**:

- On Windows computers, to configure Spotfire Statistics Services, type the credentials for the service account.
- On UNIX/Linux, the service runs in the context of the user that you are using to run this installer.

For both Windows and UNIX/Linux, the specified account must have read/write access to SPSERVER_SHARE, as well as permission to access any other Spotfire Statistics Services resources.

14. **Pre-Installation Summary**: Review your selected options, and then click Install or press ENTER. The Installing TIBCO Spotfire Statistics Services<service_name> panel appears while the server is installed and configured.

15. **Install Complete**: Click Done or press ENTER.

If you encounter issues with the installation, you should review the installation log file at SPSERVER_HOME/Install_SplusServer.log.

---

**Migrating your Spotfire Statistics Services Configuration and Data**

Upgrading from a previous release of Spotfire Statistics Services requires a new installation. However you can retain and migrate configuration and data.

We recommend shutting down the previous version service and installing the new version in a different location. After you have installed the new version, follow this guidance.

**Prerequisites**

Install the new version, test that the service works, and then shut down the new version’s service before completing these steps.

**Procedure**

1. Copy any .jar files from your endorsed directory to your new installation.
2. From the older installation, open the folder `TSSS_HOME/conf` and copy the appropriate configuration and data from the old installation to the new.

For most configuration and data, you can migrate from the previous installation to the new one, with the cautions and exceptions listed in here.

**Important:** Do not modify the following entries in the file `conf/server.properties`:
- `service.id`
- `service.url`

Do not modify the following properties, unless you need to change them from the values you selected during installation.
- `jmxremote.port`
- `jmxremote.password`
- `jmxremote.username`

If you are upgrading from a version of Spotfire Statistics Services earlier than version 6.0, do not copy the older versions of the files `conf/database.properties` and `conf/ldap.properties`. These files have changed. Specifically, do not copy the entry `database.url` in the file `conf/database.properties` from the older installation. Instead, just change the `SPSERVER_SHARE` location to point to the new installation.

If you are installing a cluster, do not copy the file `conf/cluster.properties`.

3. Locate previous user data in `TSSS_HOME/data/common` and `TSSS_HOME/data/users`, and then copy these directories directly from the previous installation to the new installation.

   All other directories under `TSSS_HOME/data` contain temporary data from the previous installation and should not be copied.

**What to do next**

Complete any remaining configuration tasks. If no further tasks are needed, start the service.

**Post-Installation Configuration Settings**

On both Windows and UNIX/Linux, you must make a few configuration adjustments, as well as configure the job database.

Immediately after you finish your installation of a TIBCO Spotfire® Statistics Services cluster, you should make additional configuration changes, first depending on your operating system, and then to set up the job database.

After reviewing and changing any post-installation settings, your first Manager node configuration is complete. All subsequent Worker nodes use the same configuration. You can further customize the configuration (for example, enable authentication). See Server Properties on page 50.

**Granting Service Access**

On Windows computers, you must grant **Log on as a service** to the service account that you specified when you installed the Manager node.

**Procedure**

1. On the task bar, click **Start > Control Panel > Administrative Tools > Local Security Policy**.
2. In the **Local Security Settings** dialog box, under **Security Settings**, expand **Local Policies**, select **User Rights Assignment**, and then double click **Log on as a service**.
3. In the **Log on as a service Properties** dialog box, click **Add User or Group**, and then enter the service account you specified in step 12 of **Running the Installer** on page 33.

**Register Init Scripts**

On UNIX/Linux, make additional TIBCO Spotfire® Statistics Services post-installation configuration changes for a successful cluster installation.

To configure the service to run when the computer starts, you must register the init scripts with system init by running the following command as root:

```bash
SPSERVER_HOME/init.d/register-service.sh
```

**Set the Job Database**

After your successful cluster installation of TIBCO Spotfire® Statistics Services, configure the job database.

By default, the cluster jobs database is configured to use the H2 database type, and the installation prepopulates the JDBC connection string for your environment. See `database.url` on page 82 for more information about the default.

If you are using the H2 database implementation in a cluster, you must configure it. If you start the H2 cluster manager node without first configuring the H2 database cluster options, no errors are reported; however, the server will not work correctly.

You can change the default configuration of the jobs database on a database server by setting the properties and configuring the options. See **Job Database Requirements** on page 79.

**Change the Engine Type in a Cluster**

The TIBCO Enterprise Runtime for R engine and the S-PLUS engine are maintained and deployed automatically by the server. The compressed file containing the engine resides in the `SPSERVER_SHARE/ data/binaries` directory, where it can be referenced and updated easily.

The following table shows the compressed engine types by operating system.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SPLUS</td>
<td>S-PLUS Engine. Provided with your Spotfire Statistics Services installation. Use this engine if developers are deploying S-PLUS packages to the service.</td>
</tr>
<tr>
<td>R</td>
<td>Open-source R engine. Use this engine if developers are deploying R packages to the service, and the packages contain R code that will not run in TIBCO Enterprise Runtime for R. Requires additional steps. See Configuring an Open-Source R Engine for more information. In Spotfire Statistics Services version 7.0, open-source R version version 3.1.2 IS configurable.</td>
</tr>
<tr>
<td>SAS</td>
<td>SAS® engine. Requires additional steps. See Configuring a SAS Engine for more information.</td>
</tr>
<tr>
<td>MATLAB</td>
<td>MATLAB® engine. Requires additional steps. See Configuring a MATLAB Engine for more information.</td>
</tr>
</tbody>
</table>

By default, engine.type is set to TIBCO Enterprise Runtime for R. To specify a different engine type, set the engine.type property in the file SPSERVER_SHARE/conf/spserver.properties.

You must specify only one engine type per cluster.

See Server Properties for more information about setting properties.

When the server starts, the engine is unpacked and copied from its location in the SPSERVER_SHARE/data/binaries directory, and then deployed to each node in the cluster. If you update or change the engine.type property, you must restart the server to initiate the deployment.

Specify Engine Count for the Manager Node

The engine count is the number of engines configured on TIBCO Spotfire® Statistics Services to handle engine-related requests.

When you install a Manager node, this value is set to zero. If you want your Manager node to be able to process jobs, you can assign processing resources by setting the -Dengine.count Java runtime system property. You should always leave at least one processor free for administrative tasks in the Manager node.

When you install a Worker node, the engine count is set to the number of cores in the server.

To specify the engine count on Windows, Using Procrun, set -Dengine.count to the desired value. See Monitor the Service on page 87 for more information.

To specify the engine count on UNIX/Linux, in SPSERVER_SHARE/init.d/spserver, modify the value of SPSERVER_ENGINES.

Start and Validate the Service

After you have completed the TIBCO Spotfire® Statistics Services installation the post-installation configuration steps, you are ready to start the service.

Start the service on the first Manager node.

- For Windows installations, see Starting the Service on Microsoft Windows on page 84 for details.
- for UNIX/Linux installations, see Starting the Service on UNIX Linux on page 85 for details.
Validate the Installation

You should validate the Spotfire Statistics Services installation to make sure that it is working properly. See Validation on page 27 for more information.

On Windows, if you want to validate your Manager node before you install Worker nodes, you can set the -Dengine.count Java property to at least 1 using the Procrun application; although it is possible to get a partial validation without setting the engine.count. See Monitor the Service on page 87.

Add Nodes

When you finish installing and verifying the first TIBCO Spotfire® Statistics Services Manager node, the settings and configuration for the cluster are complete. Now, you can add additional Manager and/or Worker nodes.

The same settings are used when you install an additional Manager node or when you add a Worker node to the cluster. To provide failover capability and to minimize downtime we recommend that you use more than one Manager node in your cluster and set up a front-end proxy or load balancer.

If you want to add a Manager or Worker node, you must use the same version of the installer that you used to install the first Manager node in the cluster.

Installing an Additional Node on Windows

Complete these tasks to add a Manager or Worker node to a Microsoft® Windows installation of a TIBCO Spotfire® Statistics Services cluster.

Procedure

1. Log on with a user name that is a member of the local administrators group.
2. Spotfire Statistics Services requires that you to designate an account for running the service. You must verify that the designated service user account has been granted Log on as a service rights before starting the service. To grant a user Log on as a service rights, follow the steps in Establishing Log On as a Service Right on page 19.
3. You must use the same installer file that you used in the To install the initial Manager node procedure. From the Spotfire Statistics Services installation media, run the appropriate installation executable:
   - 32-bit: TSSS_7.0.0_win_x86_32.exe.
   - 64-bit: TSSS_7.0.0_win_x86_64.exe.
4. License Agreement: Read the license agreement and if you agree to the terms, select I accept the terms of the License Agreement.
5. Installation Type: Select the node type.
   - Cluster: Manager Node
   - Cluster: Worker Node
6. Installation Path: Either accept the default, type a path, or choose a path.
7. Cluster Share: Type or choose the path that you defined for your cluster file share (Cluster File Share on page 32). If you are adding a Worker node to an existing cluster, provide the same Cluster Share Path you specified for the Manager node.
8. Service user:

- Windows: To configure the Spotfire Statistics Services (service_name), type the credentials for the service account and then click **Next**.
- UNIX/Linux: The service runs in the context of the user that you are using to run this installer.

For both Windows and UNIX/Linux, this account must have read/write access to SFSERVER_SHARE as well as permission to access any other Spotfire Statistics Services resources.

All nodes in the cluster must use the same credentials. In Windows, you must use the same service account and in UNIX/Linux, you must run the installer under the same account on each node.

9. **Pre-Installation Summary**: Review your selected options, and then click Install or press **ENTER**. The Installing TIBCO Spotfire Statistics Services<service_name> panel appears while the server is installed and configured.

10. **Start Service**: Click **Next** or press **ENTER**. If you selected **Start Service**, Spotfire Statistics Services (service_name) is started when installation completes. If you do not want the service to start at this time, clear **Start Service**.

    If the Service User has not been granted the Log on as a service right, clear **Start Service** or grant the user the Log on as a service right.

On Windows computers, the Spotfire Statistics Services(service_name) service is set to start automatically, which means that the service starts when you reboot your computer.

11. **Install Complete**: Click **Done** or press **ENTER**.

    If you encounter issues with the installation, you should review the installation log file at 
    SFSERVER_HOME/Install_SplusServer.log.

---

**Installing an Additional Node on UNIX Linux**

Complete these tasks to add a Manager or Worker node to a UNIX or Linux installation of a TIBCO Spotfire® Statistics Services cluster.

**Procedure**

1. Log on as the user under which Spotfire Statistics Services will run. You should make sure to use the same user account to install all the nodes in your cluster.

2. Make sure that the user has permissions to write to the desired installation directory.

3. You must use the same installer file that you used in the procedure To install the initial Manager node. From the Spotfire Statistics Services installation media, run the appropriate installation executable:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux 32-bit</td>
<td>TSSS_7.0.0_linux24gl23_x86_32.bin</td>
</tr>
<tr>
<td>Linux 64-bit</td>
<td>TSSS_7.0.0_linux24gl23_x86_64.bin</td>
</tr>
</tbody>
</table>

4. **License Agreement**: Read the license agreement and if you agree to the terms, select **I accept the terms of the License Agreement**.

5. Installation Type: Select the node type.

   - **Cluster**: Manager Node
   - **Cluster**: Worker Node
6. **Installation Path**: Either accept the default, type a path, or choose a path.

7. **Cluster Share**: Type or choose the path that you defined for your cluster file share (Cluster File Share on page 32). If you are adding a Worker node to an existing cluster, provide the same Cluster Share Path you specified for the Manager node.

8. **Service user**:
   - Windows: To configure the Spotfire Statistics Services (service_name), type the credentials for the service account and then click **Next**.
   - UNIX/Linux: The service runs in the context of the user that you are using to run this installer.

   For both Windows and UNIX/Linux, this account must have read/write access to SSERVER_SHARE as well as permission to access any other Spotfire Statistics Services resources.

   All nodes in the cluster must use the same credentials. In Windows, you must use the same service account and in UNIX/Linux, you must run the installer under the same account on each node.

9. **Pre-Installation Summary**: Review your selected options, and then click Install or press **ENTER**. The Installing TIBCO Spotfire Statistics Services<service_name> panel appears while the server is installed and configured.

10. **Start Service**: Click **Next** or press **ENTER**.
    If you selected **Start Service**, Spotfire Statistics Services (service_name) is started when installation completes. If you do not want the service to start at this time, clear **Start Service**.

    If the Service User has not been granted the Log on as a service right, clear **Start Service** or grant the user the Log on as a service right.

11. **Install Complete**: Click **Done** or press **ENTER**.

    If you encounter issues with the installation, you should review the installation log file at SSERVER_HOME/Install_SplusServer.log.

12. To configure the service to run when the computer starts, you must register the init scripts with system init by running the following command as root:

    SSERVER_HOME/init.d/register-service.sh

---

**Validate Nodes**

You can use the TIBCO Spotfire® Statistics Services URL API to verify the nodes in the cluster.

Open a browser, and in the address text box, type:

http://servername:port/service_name/api/v8/nodes

It takes a few minutes after a node is started for it to appear in the XML returned from this URL API call.

The service URL that you use for validation is http://servername:port/<service_name>, where servername depends on whether you set up a load balancer.

- If you did set up a load balancer, you must use the servername and port from the load balancer.
- If you did not install a load balancer, you can use the servername and port of the first manager node.

**Load Balancer**

Use a load balancer with your TIBCO Spotfire® Statistics Services cluster deployment to distribute job requests equally, or if you have multiple Manager nodes.

To distribute job requests equally to all the Manager nodes, use a load balancer. A load balancer can be configured with any Spotfire Statistics Services cluster but if your cluster has more than one Manager node, you must install and configure a load balancer. The load balancer that you select for your
environment depends on how much traffic you expect and the sophistication that you require in the load balancing algorithms.

You can use a load balancing solution based on Apache HTTP Server, which supports AJP (apache JServ Protocol), with the mod_jk module enabled.

**Prerequisites**

To set up load balancing using Apache HTTP Server, you will need the following:

- A computer with Apache HTTP Server and the mod_jk module installed. You can download these from the following locations:
  - mod_jk module:
- At least one Spotfire Statistics Services Manager node must be installed and configured.

**Cluster Node Protocol Configuration**

During the installation of the first Manager node in your Spotfire Statistics Services cluster, while planning for a load balancer, you would have selected the AJP protocol so that the cluster can communicate with a load balancer. No other changes are required on the Spotfire Statistics Services nodes. (After you install the Manager node, you can modify settings by editing SPSERVER_SHARE/tomcat/conf/server.xml. For more information, see the Apache Tomcat documentation.)

If, during installation, you selected HTTP and now you want to configure a load balancer, you must modify all of the Manager nodes to use AJP. For more information, see Changing the Protocol or Port on page 73.

**Configuring the Load Balancer**

You must configure the load balancer so that it can find and communicate with the TIBCO Spotfire® Statistics Services cluster.

**Procedure**

1. Install an Apache HTTP Server.
2. Install the mod_jk module. For more detailed instructions on adding modules to Apache HTTP Server, see the Apache HTTP Server documentation.
3. Edit the `workers.properties` file to add the following properties and values. This file is usually located in the Apache HTTP Server configuration directory. If this file is not present, you must create it and then add the settings.

```
# Define worker list
# (All workers with additional exposed applications
# must also be added here, and do not forget to add
# the corresponding JkMount option in mod_jk.conf!)
worker.list=jkstatus, loadbalancer
# Example: the /admin application on worker1 should
# be exposed through the load balancer
# worker.list=jkstatus, loadbalancer, worker1

# Set status
worker.jkstatus.type=status

# Set properties for the load balancer
worker.loadbalancer.type=lb
worker.loadbalancer.balance_workers=worker1, worker2

# Set properties for worker1 (ajp13)
worker.worker1.type=ajp13
worker.worker1.host=[Managernode1_name]
worker.worker1.port=[Managernode1_port]
worker.worker1.max_packet_size=65536
worker.worker1.lbfactor=1

# Set properties for worker2 (ajp13)
worker.worker2.type=ajp13
worker.worker2.host=[Managernode2_name]
worker.worker2.port=[Managernode2_port]
worker.worker2.max_packet_size=65536
worker.worker2.lbfactor=1
```

You must change `[Managernode1_name]` to the hostname or IP address of the first Manager node, and `[Managernode2_name]` to the name of your second Manager node. In every instance of the `worker.workern.port` property, you must specify the port number that you set as the Main Service Port when you installed the first Manager node. If you want to add an additional Manager node, copy the Set properties for worker section and modify the values as needed.

4. Add the following lines to the `mod_jk.conf` file. If the file is not present, you must create the file and then add the settings.

```
# Load the mod_jk module
LoadModule jk_module modules/mod_jk.so

# Load the workers configuration
JkWorkersFile conf/workers.properties

# The mod_jk module’s log file
JkLogFile logs/mod_jk.log

# The mod_jk module’s log level
# (trace, debug, info, warn, error)
JkLogLevel info

# Let the load balancer worker handle all requests
# to the TSS web applications
JkMount /<service_name> loadbalancer
JkMount /<service_name>/ loadbalancer
# replace <service_name> with the name of
# your server instance.

# Define Apache environment variables to be
# exported by mod_jk to Tomcat web applications
JkEnvVar REMOTE_USER
JkEnvVar SSL_CLIENT_CERT
#JkEnvVar SSL_CLIENT_CERT_CHAIN
#JkEnvVar SSL_CLIENT_S_DN
#JkEnvVar SSL_CLIENT_S_DN_CN
```
5. The Apache HTTP Server configuration must include `mod_jk.conf`. For example, if `mod_jk.conf` is in the same directory as the Apache HTTP Server configuration, `httpd.conf`, add `Include conf/mod_jk.conf`.

6. Restart the Apache HTTP Server. Check for any errors that were generated when the system started.

7. Open a web browser and, in the address bar, send a request for the nodes in the cluster by using `http://servername:port/<service_name>/api/v8/nodes`, where `servername:port` corresponds to the load balancer name and port. Scan the XML for `nodeType="Manager"` and make sure that all of your Manager nodes are in the list.

### Restricting the Load Balancer

For increased security, you can configure the load balancer to authenticate when it communicates with TIBCO Spotfire® Statistics Services.

You can restrict access to the load balancer by setting up an AJP Connector secret keyword for the load balancers to use to authenticate with the Manager nodes. This is a secret keyword that the load balancers and Manager nodes all know.

#### Procedure

1. Add the keyword to all the Manager nodes.

2. In the `SPSERVER_SHARE/tomcat/conf/server.xml` file, find the section specifying `Service name = "Catalina"`, and in that section, find the Connector configuration:
   ```xml
   <Connector port="8009" protocol="AJP/1.3" packetSize="65536"/>
   ```

3. Add the keyword definition
   ```xml
   <Connector port="8009"
   protocol="AJP/1.3"
   packetSize="65536"
   request.useSecret="true"
   request.secret="SecretKeyword" />
   ```

4. Add the keyword to the `worker.properties` file on the load balancer computer.

5. Above the properties for individual workers, add a keyword that all the nodes will use:
   ```bash
   # Enable secret keyword
   worker.loadbalancer.secret="SecretKeyword"
   ```

   Now Spotfire Statistics Services accepts only AJP connections from load balancers that know the secret keyword.

### Automate Cluster Installations

If you want to install TIBCO Spotfire® Statistics Services on several computers, you can perform a silent Spotfire Statistics Services installation by providing a response file to the installer. You can use this approach to automate Spotfire Statistics Services installations.

There are two methods for creating a response file for automated cluster installations.

- Create a valid response file by automatically recording the responses that you select or type when you run the installation wizard, and then use it in subsequent installations.
- To create a response file based on the Response File template. We recommend this method.
Recording and Running a Response File

To create a valid TIBCO Spotfire® Statistics Services response file manually, you can set a switch to automatically record the responses that you select or type when you run the installation wizard. Then you can use another switch to perform a silent installation.

Procedure

1. To capture your responses in a response file, execute the Spotfire Statistics Services installation file name at the command line with the -r switch followed by a full path to the destination of the response file. For example, to create a response file for the Windows 64-bit installer you would type the following command:
   TSSS_7.0.0_win_x86_64.exe-r c:\foo.txt

2. To perform a silent installation, execute the Spotfire Statistics Services installation file with the -f switch followed by the path to a valid response file. For example, to execute a silent installation on a Windows 64-bit computer, you would type the following command:
   TSSS_7.0.0_win_x86_64.exe-f c:\foo.txt

For more information, refer to the FLEXERA SOFTWARE InstallAnywhere Users Guide (http://www.flexerasoftware.com/).

Response File Template

You can create a valid TIBCO Spotfire® Statistics Services response file for automating cluster installations by basing it on the response file template.

The following printout is a template of a valid Spotfire Statistics Services response file.

```
#########################################################
# Install_SplusServer.properties
# TIBCO Spotfire Statistics Services
# Automated installation properties file
#
# To use this file with Install_SplusServer,
# issue the following command:
#
# Install_SplusServer -f Install_SplusServer.properties
#
# Provide a full path to the installer and the file.
#########################################################

#INSTALLER_UI: Set to silent for automated install
INSTALLER_UI=silent

#CHosen_INSTALL_SET: Install set options are:
#Solo, Manager, or Worker.
CHosen_INSTALL_SET=Solo

#USER_INSTALL_DIR: Enter the installation path
USER_INSTALL_DIR=/opt/TIBCO/statsvcs70

#SERVICE_NAME: The name of the service instance you
#are installing. The installation is placed into a #subdirectory of
#USER_INSTALL_DIR with this name.
SERVICE_NAME=</service_name>

#SERVICE_URL: Specify the main URL used to access
#this server.
#Note: This may differ from the default when requests
#come through a load balancer such as Apache HTTP Server
#or Microsoft IIS.
SERVICE_URL=http://servername:port/service_name

#SERVICE_USER: Specify the user account that you want to
```
#run the service under.
#On Windows, this should be in the format DOMAIN\USERNAME.
#To account for the format of Java properties files you
#must escape the backslashes.
# On Windows this is LocalSystem
# On UNIX this is the user account that is running
# the installer).
#SERVICE_PASSWORD: On Windows, enter the SERVICE_USER
#password.
SERVICE_USER=
SERVICE_PASSWORD=

#SERVICE_USER: Specify the username of the management user
#for JMX.
#JMX_PASSWORD: Specify the password of the management
#user for JMX.
JMX_USER=admin
JMX_PASSWORD=

#START_*_SERVICE: To start Spotfire Statistics Services
#after installation, specify 'true', 'false' not to start
#the service.
START_TOMCAT_SERVICE=true

#CLUSTER_METHOD: Specify the method that cluster nodes
#should use to communicate among themselves. This should
#be either 'multicast' or 'jms'.
#Only consulted if the "Cluster" feature is used.
CLUSTER_METHOD=multicast

#PORT_*: Specify the ports required for Spotfire Statistics
#Services.
#Note: If you are installing a Manager or Worker node,
#the values you set here are overridden by values that
#you specify in the shared cluster storage directory in
#the CLUSTER_DIR parameter.
PORT_SPSERVER=8080
PORT_JMX=9004
PORT_MULTICAST=5000
PORT_MULTICAST_GROUPADDR=224.0.0.224
PORT_JMS=61616

#TOMCAT_CONNECTOR: Specify either HTTP/1.1 or AJP to
#define the Tomcat connection protocol to place into
#the server.xml in the embedded Tomcat server.
#The value that you specify is placed directly
#into the protocol attribute of the Connector
#element of USER_INSTALL_DIR/tomcat/conf/server.xml.
TOMCAT_CONNECTOR=HTTP/1.1

#CLUSTER_DIR: Specify the path to a directory that
#contains the shared cluster storage directory for
#this cluster. This setting is only consulted if you
#specify Manager or Worker in CHOSEN_INSTALL_SET.
CLUSTER_DIR=/path/to/cluster/share

The Response File specifies properties and values that provide the details for the installation.
Service Configuration and Properties

After installing TIBCO Spotfire® Statistics Services, you can configure it for your particular deployment needs.

In planning your configuration, you should familiarize yourself with the installation folders and files, set the properties for your installation needs, and identify the service and engine log files. You can also configure the service for LDAP authentication, or change the analytic engine.

Simple No Configuration Installation

A simple standalone TIBCO Spotfire® Statistics Services installation requires no additional configuration.

If you install a standalone Spotfire Statistics Services on a computer that meets the minimum requirements, you require no post-installation configuration. (See http://support.spotfire.com/sr.asp for up-to-date information about system requirements.)

You can customize the configuration after installing Spotfire Statistics Services and check that it is operating normally. To verify that your installation is running normally, see Validation on page 27.

Review the service property information to determine which settings to customize. For example, by default, the configuration file requires no authentication. If you want to enable authentication, change the default value to true.

TIBCO Spotfire Statistics Services Data Files

You might be called on to manage data files associated with TIBCO Spotfire® Statistics Services.

These data files are located in SSERVER_HOME/data/ (in the case of a stand-alone) or in SSERVER_SHARE/data/ (in the case of a cluster).

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>appdata</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>artifacts</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>binaries</td>
<td>Contains the compressed directories for the engines available to use with Spotfire Statistics Services. Used only for updating S-PLUS or TIBCO® Enterprise Runtime for R engines, or adding or updating an open-source R engine.</td>
</tr>
<tr>
<td>common</td>
<td>Contains the common persistent data that is shared with all users, as specified by calling the function spserver.file(user.name=&quot;&quot;). For more information, see the TIBCO Spotfire® Statistics Services User’s Guide, Chapter 5, Managing Transient and Persistent Data.</td>
</tr>
<tr>
<td>packages</td>
<td>For internal use. Contains any uploaded S language packages. Created only when a package is uploaded</td>
</tr>
<tr>
<td>requests</td>
<td>For internal use. Contains data objects sent via a request to the server. Created only when a request containing a data object is submitted to the server. (Simple validation tests do not cause this directory to be created.)</td>
</tr>
<tr>
<td>results</td>
<td>For internal use. Contains job results. Specified in the function spserver.results.file(). This directory is managed by the server and automatically cleaned up.</td>
</tr>
<tr>
<td>sessions</td>
<td>For internal use. Contains temporary session data. This directory is managed by the server and automatically cleaned up.</td>
</tr>
</tbody>
</table>
Directory | Description
---|---
spserver | For internal use. Contains the functions used by the server engine processes.
users | Contains user-specific persistent data. Specified by spserver.file(user.name="<user>.

### Configuration and Log Files

The **conf** and **tomcat** directories of your TIBCO Spotfire® Statistics Services installation contain configuration and log files you can use to manage and review the your Spotfire Statistics Services installation. In most cases, you should not have to change property settings.

#### Configuration and Log Directories

<table>
<thead>
<tr>
<th>Directory and File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>conf/database.properties</td>
<td>Contains database properties.</td>
</tr>
<tr>
<td>conf/ldap.properties</td>
<td>Contains LDAP properties.</td>
</tr>
<tr>
<td>conf/log4j.properties</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>conf/spsserver.properties</td>
<td>Contains the server properties</td>
</tr>
<tr>
<td>conf/users.properties</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/conf/catalina.policy</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/conf/catalina.properties</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/conf/context.xml</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/logging.properties</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/conf/server.xml</td>
<td>Contains the setting for Tomcat's HTTP port. You can change the port number in this file after installation, if necessary.</td>
</tr>
<tr>
<td>tomcat/conf/tomcat-users.xml</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/conf/web.xml</td>
<td>For internal use only.</td>
</tr>
<tr>
<td>tomcat/logs/SplusServer.log</td>
<td>The main server log. Useful for troubleshooting.</td>
</tr>
<tr>
<td>tomcat/bin</td>
<td>Contains the Procrun executables.</td>
</tr>
</tbody>
</table>

### Configure Service Logging

The TIBCO Spotfire® Statistics Services service generates logs containing information you can use to troubleshoot. You can set logging to different levels.

SpotfireStatistics Services uses log4j ([http://logging.apache.org/log4j](http://logging.apache.org/log4j)) as the primary logging mechanism for the service. The log files roll over, but by default only three are kept. (This default is configurable).
Other log files in SPSERVER_HOME/tomcat/logs occasionally generate SpotfireStatistics Services-related information but, in general, most information is written to SplusServer.log

The log levels provided by SpotfireStatistics Services are the standard log4j levels. In the case of Spotfire Statistics Services, these levels can be interpreted as follows:

<table>
<thead>
<tr>
<th>Log Threshold</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUG</td>
<td>Messages for troubleshooting/debugging purposes.</td>
</tr>
<tr>
<td>INFO</td>
<td>Messages indicating the server is healthy and active.</td>
</tr>
<tr>
<td>WARN</td>
<td>Messages indicating a potential issue.</td>
</tr>
<tr>
<td>ERROR</td>
<td>Messages indicating an issue has occurred.</td>
</tr>
<tr>
<td>FATAL</td>
<td>Messages indicating a catastrophic event has occurred.</td>
</tr>
</tbody>
</table>

**Log Levels**

The root logger is set to DEBUG by default. The default appender for the SplusServer.log file is labeled ROLLFILE. It has a default value of INFO for the logging threshold. To change this to DEBUG, for example, update the threshold to DEBUG:

```
log4j.appender.ROLLFILE.Threshold=DEBUG
```

For your convenience, the log4j.properties file includes brief documentation for the ROLLFILE appender and other commented-out appenders.

If you need assistance setting up one of these appenders, contact Spotfire support.

For information on engine logging, see Configure Engine Logging on page 49.

**On-the-Fly Logging**

You can modify the properties for logging, and TIBCO Spotfire® Statistics Services applies the changes without having to be restarted.

You can modify all properties in the log4j.properties file and Spotfire Statistics Services will apply the changes on the fly. The server checks the file for changes every 10 seconds. If the file has changed, the server automatically begins using the updated configuration. The properties file is located at SPSERVER_HOME/conf for a standalone installation or SPSERVER_SHARE/conf on a cluster.

**Configure Engine Logging**

The TIBCO Spotfire® Statistics Services engine generates a log containing information for troubleshooting. Each job receives its own log file with information pertaining to that job.

**Engine Log File**

You can use the information in the engine.log file to troubleshoot issues related to the engine. The file contains information about the engine process life cycle, such as loading of libraries, establishing communication with the server, and details of the job execution inside the engine, which include all the messages sent and received by the engine process, the actual code executed, arguments passed, and other details.

The engine.log is located in the results directory of each specific job. To review the log file for a job, find the link in the ResultsDir property for that job. For example:

```
<ResultsDir>
http://localhost:8966/<service_name>/webdav/results/9C347CC9BF333EEF/
</ResultsDir>
```

While you cannot change the logging level provided by the default engine.log, you can create a log4j engine logging file with configurable settings.
Creating a log4j Engine Logging File

The default TIBCO Spotfire® Statistics Services engine log file can be configured to provide a logging level different from the default level (which is DEBUG). If the default level of logging displayed in engine.log is not the level you need, you can create a file to use for configuring engine logging.

Procedure

1. Create a file named engine-log4j.properties.
2. Provide in the file a basic configuration, such as the following:

```
#Loggers.
log4j.logger.com.insightful.splusserver.engine=DEBUG
```

The engine's log configuration file does not include appender information (unlike the log4j.properties file). It need only include a directive for package-level logging. To disable most logging, set the configuration value as follows:

```
#Loggers.
log4j.logger.com.insightful.splusserver.engine=INFO
```

The INFO log option results in only exceptional cases being logged. In most cases, such a setting produces a zero-length engine.log file for each job.

3. Save the file in the folder SPSERVER_HOME/conf (for a standalone installation) or SPSERVER_SHARE/conf (for a cluster installation).

Result

You can use this file in the future to set the logging level to one of the four available levels:

<table>
<thead>
<tr>
<th>Log Threshold</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUG</td>
<td>Messages for troubleshooting/debugging purposes.</td>
</tr>
<tr>
<td>INFO</td>
<td>Messages indicating the server is healthy and active.</td>
</tr>
<tr>
<td>WARN</td>
<td>Messages indicating a potential issue.</td>
</tr>
<tr>
<td>ERROR</td>
<td>Messages indicating an issue has occurred.</td>
</tr>
<tr>
<td>FATAL</td>
<td>Messages indicating a catastrophic event has occurred.</td>
</tr>
</tbody>
</table>

If you change the logging level in the engine-log4j.properties file, you must restart the service to force the change to take effect.

Server Properties

The server configuration properties for TIBCO Spotfire® Statistics Services are contained in the file spserver.properties. We use the standard Java properties file conventions to define each server property.

Database properties are separate from the server configuration, therefore they are stored in the file database.properties. For more information about the startup time property file database.properties, see Database Properties.

- In a cluster installation, the file spserver.properties is stored in the conf directory under SPSERVER_SHARE. When you install a new node in a cluster, provide this location so that all the nodes in the cluster have the same values.
- In a standalone installation, the file is stored in the conf directory under SPSERVER_HOME.

In a default installation, the full path to the spserver.properties file is:
Not every server property documented in the reference is included in the default version of `spserver.properties`. To include a property listed below in your configuration, manually insert the property into your `spserver.properties` file.

You must restart the Spotfire Statistics Services service to pick up any changes that you make in the `spserver.properties` file. When you restart the Spotfire Statistics Services service, the server resumes processing queued jobs. However, because restarting the Spotfire Statistics Services service also stops the pool of S engines, any job that has not completed is marked as failed. To prevent this, we recommend that you wait until all jobs have completed before you restart the service. Alternatively, you can resubmit failed jobs after restarting the service. For more information about the jobs function, see the URL API documentation, available from the Spotfire Statistics Services landing page.

### authentication.required

Set `authentication.required` to `true` to require remote clients to authenticate when they access TIBCO Spotfire® Statistics Services.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>authentication.required</td>
<td>false</td>
<td>This option requires additional planning and setup if set to <code>true</code>. The default is false. See <a href="#">Determine Authentication Setting</a> on page 60 for more information.</td>
</tr>
</tbody>
</table>

### cluster.jms.port

Set `cluster.jms.port` to the port number to use for cluster communication.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster.jms.port</td>
<td>3308</td>
<td>Use this setting in cases where you cannot use Multicast IP addressing. You must specify a JMS port number to use for cluster communication if you use cloud computing to implement your TIBCO Spotfire® Statistics Services cluster.</td>
</tr>
</tbody>
</table>

Details

To use the `cluster.jms.port` property you must:

- Enable clustering by setting `isclustered=true`.
- Make sure that the `cluster.multicast.group.address` property does not contain a value. If it does contain a value, cluster communication will use Multicast IP instead of JMS.
cluster.multicast.group.address

Set `cluster.multicast.group.address` to specify the Multicast IP group address that TIBCO Spotfire® Statistics Services should use for cluster communication.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cluster.multicast.group.address</code></td>
<td>224.0.0.224</td>
<td>This property specifies the Multicast IP group address to use for cluster communication. To use this property you must enable clustering by setting <code>isclustered=true</code>.</td>
</tr>
</tbody>
</table>

Details

The combination of `cluster.multicast.group.address` and `cluster.multicast.port` must be unique for each Spotfire Statistics Services cluster on your local area network. To ensure uniqueness, we recommend that you specify a unique port number.

cluster.multicast.port

Set `cluster.multicast.port` to specify the Multicast port number to use for cluster communication.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cluster.multicast.port</code></td>
<td>5000</td>
<td>To use this property you must enable clustering by setting <code>isclustered=true</code>.</td>
</tr>
</tbody>
</table>

Details

The combination of `cluster.multicast.group.address` and `cluster.multicast.port` must be unique for each TIBCO Spotfire® Statistics Services cluster on your local area network. To ensure uniqueness, we recommend that you specify a unique port number.

db.cleanup.run.interval.minutes

Set `db.cleanup.run.interval.minutes` to the interval for monitoring and cleaning up the TIBCO Spotfire® Statistics Services job queue.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>db.cleanup.run.interval.minutes</code></td>
<td>0</td>
<td>This value, set to minutes, specifies how much time should elapse before the job queue is cleaned up. This property works in combination with <code>db.cleanup.time.to.live.days</code>. The default value of 0 specifies that the Spotfire Statistics Services job queue database should grow indefinitely.</td>
</tr>
</tbody>
</table>

Details

Alternatively, you can manage the job queue using the `delete` function included with the URL API. (See the Help for the URL API, available from the server landing page.)

This property might be necessary to automate the process. For example, this property might be useful in a Spotfire Statistics Services cluster or if your group generates thousands of requests. The optimal value usually depends on the rate of incoming requests and the amount of time the server has been active.
**db.cleanup.time.to.live.days**

The property `db.cleanup.time.to.live.days` indicates whether an entry in the job queue is old enough to delete when the scheduled cleanup runs.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>db.cleanup.time.to.live.days</td>
<td>7</td>
<td>Set the number of days to elapse before a job in the TIBCO Spotfire® Statistics Services job database is considered old enough to delete when the scheduled cleanup runs. The optimal value usually depends on the rate of incoming requests and the amount of time the server has been active. By default, this is set to 7 days.</td>
</tr>
</tbody>
</table>

**email.from**

Set the `email.from` property to the email address to use in the `from` field for TIBCO Spotfire® Statistics Services job notifications.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>email.from</td>
<td><a href="mailto:notification@service_name.com">notification@service_name.com</a></td>
<td>The value you set for this property populates the <code>from</code> field for job notifications.</td>
</tr>
</tbody>
</table>

**email.host**

Set the `email.host` property to the host to use for sending notification emails.

<table>
<thead>
<tr>
<th>Property Type</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>email.host</td>
<td>na</td>
<td>This property specializes the email host name to use for sending notification emails from TIBCO Spotfire® Statistics Services. The default is blank.</td>
</tr>
</tbody>
</table>

**email.reply.to**

Set the `email.reply.to` property to the email address to use in the `reply to` field for TIBCO Spotfire® Statistics Services job notifications.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>email.reply.to</td>
<td><a href="mailto:notification@service_name.com">notification@service_name.com</a></td>
<td>Set this property to the email address for replies to job notifications. This value populates the <code>reply to</code> field.</td>
</tr>
</tbody>
</table>

**engine.appdata.dir**

Set the `engine.appdata.directory` to identify the directory used for storing TIBCO Enterprise Runtime for R, open-source R, or S-PLUS packages installed to TIBCO Spotfire® Statistics Services via `pkgutils`.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.appdata.dir</td>
<td>na</td>
<td>The <code>engine.appdata.dir</code> specifies the directory where TIBCO Enterprise Runtime for R, open-source R, or S-PLUS packages are installed using the <code>pkgutils</code> utility function. For more</td>
</tr>
</tbody>
</table>
### Description

Information about adding packages to the server, see S Package Availability on the Server on page 16. The default is blank.

### Details

The **S_USER_APPDATA_DIR** environment variable is set to this value when the processing runtime creates the S engine process. If this property is not provided, or if it is an empty string, Spotfire Statistics Services uses the default directory **SPSERVER_HOME/data/appdata**. If the installation is a cluster, or if you configured the **SPSERVER_SHARE/spserver.share** property, then the directory is set to **SPSERVER_SHARE/data/appdata**.

### engine.init.expr

Provide to **engine.init.expr** any S, SAS, or MATLAB code to run when the engine first starts in TIBCO Spotfire® Statistics Services.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.init.expr</td>
<td>na</td>
<td>The default for <strong>engine.init.expr</strong> is blank. The value for <strong>engine.init.expr</strong> can be either S code (S-PLUS, Open-source R, or TIBCO® Enterprise Runtime for R), or SAS or MATLAB code. This value can be used to provide initialization code for the engine the server uses. For example, it can specify S language commands to be executed when an S engine is started.</td>
</tr>
</tbody>
</table>

### Details

Separate multiple commands using semicolons. Any special XML characters (like quotation marks) must be changed to the appropriate XML character sequence (like `&quote;`) if they are specified in this file.

Commands in **engine.init.expr** are always issued before any commands in the file defined by **engine.init.file**.

### engine.init.file

Set **engine.init.file** to the full path to a file containing initialization commands.

<table>
<thead>
<tr>
<th>Property Type</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.init.file</td>
<td>na</td>
<td>By default, this property is blank. If you provide this file, it should be the full path to a file containing the initialization commands. The commands in the file specified by <strong>engine.init.file</strong> are either S-PLUS, open-source R, or TIBCO® Enterprise Runtime for R, or in a SAS or MATLAB script, depending on the server engine type. The file specified by <strong>engine.init.file</strong> is processed after any expressions defined by <strong>engine.init.expr</strong>.</td>
</tr>
</tbody>
</table>
**engine.java.options**

Set `engine.java.options` to specify the Java runtime options used when the S engine process is created.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.java.options</td>
<td>na</td>
<td>engine.java.options specify the Java runtime options used when the S engine process is created.</td>
</tr>
</tbody>
</table>

**Details**

For example, setting this property to "-Xmx600m -Xss2000k" sets the Java maximum memory heap size to 600MB and the maximum thread stack size to 2000KB (these limits are normally 400MB and 1280KB). There are other Java runtime options to set the initial Java heap size or raise the limit on the Java stack size. These are documented in Sun's documentation on the Java application launcher.

**engine.max.elapsed.seconds**

Set `engine.max.elapsed.seconds` to the maximum number of seconds since the engine was started before it is restarted.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.max.elapsed.seconds</td>
<td>0</td>
<td>Use this property to set the maximum number of seconds since the engine was last started to when it should be restarted. The default of 0 indicates no limit.</td>
</tr>
</tbody>
</table>

**Details**

Use the default value for this property, unless you understand the stateful nature of the S-PLUS engine, the TIBCO® Enterprise Runtime for R, and the open-source R engine, and you accept the possible problems that can occur when reusing S engines for multiple requests.

**engine.max.requests**

The property `engine.max.requests` specifies the maximum number of requests the engine processes before it is restarted.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.max.requests</td>
<td>0</td>
<td>Use this property to set the maximum number of requests the engine processes before it should be restarted. The default of 0 indicates no limit.</td>
</tr>
</tbody>
</table>

**Details**

Use the default value for this property, unless you understand the stateful nature of the S-PLUS engine, the TIBCO® Enterprise Runtime for R engine, and the open-source R engine, and you accept the possible problems that can occur when reusing S engines for multiple requests.
**engine.type**

Set the property `engine.type` to the statistical engine you want to use.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.type</td>
<td>TERR</td>
<td>Set this property to the statistical engine you want to use.</td>
</tr>
</tbody>
</table>

**Details**

The engine type can be TERR (the TIBCO® Enterprise Runtime for R engine), S-PLUS, opens-source R, SAS or MATLAB. If you want to use an open-source R engine, a SAS engine, or a MATLAB engine, you must complete additional steps.

- For more information on open-source R, see Configuring an Open-Source R Engine on page 73.
- For a SAS engine see Configuring a SAS Engine on page 74
- For MATLAB see Configuring a MATLAB Engine on page 75

The S engines are maintained and deployed automatically by the server. If you update or change the `engine.type` property, you must restart the server to initiate the deployment.

**engine.verbose.log**

Set the `engine.verbose.log` to `true` if you want to produce verbose log files.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine.verbose.log</td>
<td>false</td>
<td>This property determines whether the engine produces verbose logs. By default, it does not.</td>
</tr>
</tbody>
</table>

**Details**

If the value of this property is `true`, the S engines produce verbose log files. In addition, the `engine.max.requests` property is set to 1 automatically, so that each S engine is shut down after each request. (This property is applicable only for TIBCO Spotfire® Statistics Services engines.)

**isclustered**

Set `isclustered` to `true` to enable the server as a node in a TIBCO Spotfire® Statistics Services cluster.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>isclustered</td>
<td>false</td>
<td>This property is false for a standalone server installation, and true for a node in a cluster.</td>
</tr>
</tbody>
</table>

**Details**

If you set this value to `true`, you must conduct additional planning and perform additional steps. You must also configure either Multicast IP addressing or JMS settings for node-to-node communication.

- To configure Multicast IP addressing you must specify values for the `cluster.multicast.group.address` and `cluster.multicast.port` properties.
- To configure for cloud computing, you must specify a value in the `cluster.jms.port` property, and you must make sure that the `cluster.multicast.group.address` property contains no value.

For more information, see Cluster Installation on page 17 and Configuring a Non-Default Database on page 79.
jmxremote.enabled

Set `jmxremote.enabled` to `true` to enable remote server monitoring and management using JMX.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jmxremote.enabled</td>
<td>true</td>
<td>If you are using JMX for remote server monitoring and management, accept the default value of <code>true</code>.</td>
</tr>
</tbody>
</table>

jmxremote.password

Set during installation, the value for `jmxremote.password` identifies the password to use with the username to access JMX remote monitoring and management.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jmxremote.password</td>
<td>(set during installation)</td>
<td>This property identifies the password to use with the username for JMX remote monitoring.</td>
</tr>
</tbody>
</table>

jmxremote.port

Set `jmxremote.port` to indicate which port JMX should use for remote monitoring and management.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jmxremote.port</td>
<td>9004</td>
<td>The value of <code>jmxremote.port</code> is set to 9004 by default during installation, and specifies the port that JMX uses for remote monitoring and management. If this port is used, change the value to an available port.</td>
</tr>
</tbody>
</table>

job.list.xslt.enabled

Set `job.list.xslt.enabled` to `true` if you are using a style sheet to display the results of calls to the TIBCO Spotfire® Statistics Services Administration Service function `jobs`.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>job.list.xslt.enabled</td>
<td>true</td>
<td>If you use a style sheet to display the results of calls to the Administration Service function <code>jobs</code>, set this property value to <code>true</code>. Otherwise, set it to <code>false</code>. (The style sheet makes the job output easier to read than the raw XML output.)</td>
</tr>
</tbody>
</table>

max.jobs.to.return

Set `max.jobs.to.return` to specify the number of jobs to display as a result of a call to the TIBCO Spotfire® Statistics Services URL API.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.jobs.to.return</td>
<td>1000</td>
<td>This property specifies the maximum number of jobs to display as a result of a call to the URL API function <code>jobs</code>.</td>
</tr>
</tbody>
</table>

Details

You can learn more about the URL API functions in its help, available from the Spotfire Statistics Services landing page.
**notification.delay.time**

Set the value of `notification.delay.time` to the notification time, in milliseconds.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>notification.delay.time</code></td>
<td>5000</td>
<td>This property specifies the value of the notification time, in milliseconds.</td>
</tr>
</tbody>
</table>

**notification.max.times**

Set `notification.max.times` to the number of times TIBCO Spotfire® Statistics Services should attempt to send a notification to the client.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>notification.max.times</code></td>
<td>10</td>
<td>This property specifies the number of times Spotfire Statistics Services tries to send a notification to a client.</td>
</tr>
</tbody>
</table>

**service.id**

The property `service.id` distinguishes TIBCO Spotfire® Statistics Services instances on your local area network. Do not change this value.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>service.id</code></td>
<td><code>service_name::&lt;GUID&gt;</code></td>
<td>The property <code>service.id</code> identifies Spotfire Statistics Services instances (standalone or cluster) to your local area network.</td>
</tr>
</tbody>
</table>

Details

The default value for the property `service.id` is `service_name::<GUID>`, where the `service_name` is the value you specified at installation and `<GUID>` is a globally unique identifier. For example, the default installation would produce a service ID similar to `statsvcs::32f2c569-8cd2-4f62-926d-ed13a2af9472`. Do not change this value.

**service.url**

The value for the property `service.url` is the base URL of a standalone or clustered installation of TIBCO Spotfire® Statistics Services.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>service.url</code></td>
<td><code>http://servername:port/service_name</code></td>
<td>This setting is the base URL of a standalone or a clustered installation of Spotfire Statistics Services. It is this URL that clients use to access the landing page for Spotfire Statistics Services.</td>
</tr>
</tbody>
</table>

Details

The URL identified by `service.url` is composed of the server name and port number specified in the installation, and of the service name, which is also specified in the installation. You should not change the value for `service.url`. 
**webdav.cleanup.run.interval.minutes**

Set the value of `webdav.cleanup.run.interval.minutes` to the interval to use for monitoring transient data to be cleaned out of the TIBCO Spotfire® Statistics Services WebDAV root directory.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>webdav.cleanup.run.interval.minutes</code></td>
<td>10</td>
<td>This property specifies the interval used for monitoring transient data that needs to be cleaned out of the WebDAV root directory.</td>
</tr>
</tbody>
</table>

**Details**

In a standalone installation, the WebDAV root directory is `SPSERVER_HOME/data` and in a cluster, it is `SPSERVER_SHARE/data`. This property works in combination with `webdav.cleanup.time.to.live.minutes`.

The optimal value usually depends on the rate of incoming requests.

On the UNIX/Linux platform, a directory can have no more than 32000 subdirectories. If you are in an environment where many requests are generated in a short period, more result subdirectories will be created than are eligible for cleanup. If the maximum number of subdirectories is reached, Spotfire Statistics Services cannot process additional requests. In this situation, you should estimate maximum throughput and adjust this value and the `webdav.cleanup.time.to.live.minutes` value so that subdirectories are removed more often.

When you change this value, you should carefully monitor the performance of your computer.

**webdav.cleanup.time.to.live.minutes**

Set `webdav.cleanup.time.to.live.minutes` to indicate when any file is old enough to delete when cleanup runs.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>webdav.cleanup.time.to.live.minutes</code></td>
<td>1440</td>
<td>This property indicates when a file is old enough to delete when cleanup runs.</td>
</tr>
</tbody>
</table>

**Details**

The optimal value for `webdav.cleanup.time.to.live.minutes` usually depends on the rate of incoming requests.

On UNIX/Linux platforms, a directory can have no more than 32000 subdirectories. If you are in an environment where many requests are generated in a short period, more result subdirectories will be created than are eligible for cleanup. If the maximum number of subdirectories is reached, TIBCO Spotfire® Statistics Services cannot process additional requests. In this situation, you should estimate maximum throughput and adjust this value and the `webdav.cleanup.run.interval.minutes` value so that subdirectories are removed more often.

When you change this value, you should carefully monitor the performance of your computer.
xml.version

This property sets the version of XML that TIBCO Spotfire® Statistics Services uses. Do not change.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xml.version</td>
<td>1.0</td>
<td>The value of this property sets the XML version for the internal Spotfire Statistics Services settings. Do not change this setting.</td>
</tr>
</tbody>
</table>

Authentication in TIBCO Spotfire Statistics Services

TIBCO Spotfire® Statistics Services uses user properties, Active Directory (AD), or LDAP to authenticate users. Whether Spotfire Statistics Services checks for credentials depends on the authentication property settings.

Determine Authentication Setting

TIBCO Spotfire® Statistics Services uses user properties, Active Directory (AD), or LDAP to authenticate users. Whether Spotfire Statistics Services checks for credentials depends on the authentication property settings.

The files controlling enabling authentication are the properties files server.properties, users.properties and ldap.properties.

- In a cluster, the properties files (such as ldap.properties) are stored in the conf directory under SPSERVER_SHARE.
- In a standalone installation, the properties files are stored in the conf directory under SPSERVER_HOME.

In the file spserver.properties, enable authentication globally by setting the authentication.required property to true. (It is set to false by default.)

The simplest form of user authentication for Spotfire Statistics Services is an in-memory authentication list, controlled by the file users.properties. If authentication is enabled, this file is always checked first, before LDAP or Active Directory is checked. If neither LDAP nor Active Directory is specified, Spotfire Statistics Services checks this file for the user login ID and role. Users for this form of authentication can have access as the roles ROLE_USER, ROLE_ADMIN, or both.

For more sophisticated systems, user credentials for login authentication, e-mail access, and other such activities requiring user access are verified against either the Active Directory or the LDAP provider. To establish authentication with one of these systems, you must set the following properties in the file ldap.properties, according to your organization’s requirements.

- If you are using Active Directory for authentication, set the property activeDirectory.enabled to true. (It is set to false by default.)
- If you are using LDAP for authentication, set the property ldap.enabled to true. (It is set to false by default.)

If you enable authentication on the server, and then set these properties to false, the user.properties authentication is used.

If you enable authentication on the server, set either of these properties to true, and then configure the appropriate service correctly, the authentication process accesses the enabled service, and the server searches the database.

If you set either of these properties to true, but if the corresponding service (that is Active Directory or LDAP) is not configured correctly (for example, because the ldap.host property in the ldap.properties file is empty), the authentication process fails silently, and it appears as if the user credentials are wrong. Check the log file for more information. (See Configure Engine Logging on page 49.)
**Active Directory Properties**

You can use Active Directory (AD) to authenticate users for TIBCO Spotfire® Statistics Services. The AD configuration properties are contained in the file `ldap.properties`. Set these properties if you intend to use AD to authenticate users.

The file `ldap.properties` also contains the properties used for both Active Directory and LDAP authentication. If you intend to use Active Directory rather than LDAP, be sure to set `activeDirectory.enabled` to `true` and `ldap.enabled` to `false`.

- In a cluster, the properties files (such as `ldap.properties`) are stored in the conf directory under `SPSERVER_SHARE`.
- In a standalone installation, the properties files are stored in the conf directory under `SPSERVER_HOME`.

**activeDirectory.enabled**

The property `activeDirectory.enabled` indicates whether TIBCO Spotfire® Statistics Services uses Active Directory to authenticate users.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>activeDirectory.enabled</code></td>
<td>If this property is set to <code>true</code>, and <code>ldap.enabled</code> is set to <code>false</code>, Active Directory is used to authenticate users. If you want to use LDAP for authentication, set <code>active.Directory.enabled</code> to <code>false</code>. If you set this property to <code>true</code>, you need only set property values for <code>ldap.domain</code> and <code>ldap.host</code>. The default is <code>false</code>.</td>
</tr>
</tbody>
</table>

**Example**

```
activeDirectory.enabled=true
```

**ldap.domain**

The property `ldap.domain` identifies the domain within which to search for Active Directory users.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.domain</code></td>
<td>Use this property only for Active Directory authentication. This property contains the complete domain name where searches for Active Directory users is kept. For example, <code>usa.mycompany.com</code> is a complete domain name. The default is <code>example.com</code>, which exists to just demonstrate the format.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.domain=mycompany.com
```

**ldap.host**

The property `ldap.host` identifies the host name of the Active Directory server or the LDAP server.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.host</code></td>
<td>This property contains the host name of the LDAP or Active Directory server. (Set this property whether you are using LDAP or Active Directory.)</td>
</tr>
</tbody>
</table>
The LDAP URL

This image shows the construction of the LDAP URL, which is constructed of the properties you define. (You need not supply the characters depicted in red; they are not included in the property definitions.)

Example

```plaintext
ldap.host=myauthserver
```

LDAP Authentication Implementation

As currently implemented for TIBCO Spotfire® Statistics Services, LDAP authentication has two steps.

1. Lookup/search using Distinguished Name (DN) patterns runs if at least one of the corresponding properties `ldap.group0` through `ldap.group9` are defined.

   The search pattern is defined as
   
   ```plaintext
   (ldap.accountNameAttr={0}, ldap.groupX)
   ```

   where `{0}` is a username placeholder and `X` is a respective group number. If the specified user is found and authenticated in this first step, step two is omitted.

2. This step is performed if the specified user is not found in the first step. It allows for more complex search scenarios.

   The property `ldap.searchBase` defines the context name in which to search, which is relative to the root DN (that is, the property `ldap.path`). This step has two options:

   - Use a standard/default filter.
   - Use a custom filter.

   The default filter is assembled based on the property `ldap.accountNameAttr={0}`.

   However, if the property `ldap.customSearchFilter` is defined, it is used in place of the default filter. The `ldap.customSearchFilter` property should contain a placeholder `{0}` for a username.

LDAP Properties

You can use LDAP to authenticate users for TIBCO Spotfire® Statistics Services. The LDAP configuration properties are contained in the file `ldap.properties`. Set these properties if you intend to use LDAP to authenticate users.

The file `ldap.properties` also contains the properties used for Active Directory and LDAP authentication. If you intend to use LDAP rather than Active Directory, be sure to set `activeDirectory.enabled` to `false` and `ldap.enabled` to `true`.

- In a cluster, the properties files (such as `ldap.properties`) are stored in the conf directory under `SPSERVER_SHARE`.
- In a standalone installation, the properties files are stored in the conf directory under `SPSERVER_HOME`. 
Spotfire Statistics Services implements LDAP authentication. LDAP authorization is not implemented at this time.

**ldap.accountNameAttr**

The property `ldap.accountNameAttr` identifies the user.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.accountNameAttr</td>
<td>This property identifies the user. The value represents a placeholder (for example, <code>uid</code> or <code>sAMAccountName</code>); the actual value depends on the particular authentication. The default is <code>sAMAccountName</code>.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.accountNameAttr=uid
```

**ldap.basedn**

The property `ldap.basedn` specifies the LDAP base distinguished name (DN), or the top level of the LDAP directory tree.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.basedn</td>
<td>This property specifies the top level of the LDAP directory tree (the base distinguished name (DN) is the group search base; for example <code>OU=groups</code>). (OU specifies Organizational Unit.) You can leave this blank. The default is <code>OU\=All Users</code>.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.basedn=OU\=All Users
```

**ldap.customSearchFilter**

The property `ldap.customSearchFilter` defines a filter for searching across the user database.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.customSearchFilter</td>
<td>If this property is defined, it is used in place of the default filter. It should have a placeholder <code>{0}</code> for the username. If this property is defined, then a filter-based LDAP user search is performed using the <code>ldap.searchBase</code> property value and the custom search filter in the LDAP context (the host definition). If the custom search is not defined, the search is performed using the variable <code>ldap.accountNameAttr={0}</code>). The default is blank.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.customSearchFilter={0}
```
ldap.enabled

The property `ldap.enabled`, when set to `true`, indicates that LDAP is used as the authentication source.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.enabled</td>
<td>This property must be set to <code>true</code> if you have an LDAP server and you want to use it for authentication. If you have an Active Directory server, and you want to use it for authentication, set this property to <code>false</code>. The default is <code>false</code>.</td>
</tr>
</tbody>
</table>

Example

```
ldap.enabled=true
```

ldap.groupMemberAttr

The property `ldap.groupMemberAttr` specifies the pattern for the user search.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.groupMemberAttr</td>
<td>This property specifies the pattern to be used for the user search. That is, it defines the Group Search Filter attribute. The default is <code>sAMAccountName</code>.</td>
</tr>
</tbody>
</table>

Example

```
ldap.groupMemberAttr=sAMAccountName
```

ldap.groupRoleAttr

The property `ldap.groupRoleAttr` specifies the ID of the attribute that contains the role name for a group.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.groupRoleAttr</td>
<td>This property specifies the ID of the attribute that contains the role name for a group. The default is <code>OU</code> (Organizational Unit) or <code>cn</code> (Common Name). The default is <code>OU</code>.</td>
</tr>
</tbody>
</table>

Example

```
ldap.groupRoleAttr=OU
```

ldap.groupnum

The `ldap.group#` property specifies the group number(s) that the user can be in. (# specifies a number 0 through 9.)

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.group#</td>
<td>This property specifies the groups (where # is a number 0 through 9) that a user can be in. These groups must be properly formatted, because invalid formats can cause any user search filtering to be skipped.</td>
</tr>
</tbody>
</table>
**ldap.host**

The property `ldap.host` identifies the host name of the Active Directory server or the LDAP server.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.host</code></td>
<td>This property contains the host name of the LDAP or Active Directory server. (Set this property whether you are using LDAP or Active Directory.)</td>
</tr>
</tbody>
</table>

**The LDAP URL**

This image shows the construction of the LDAP URL, which is constructed of the properties you define. (You need not supply the characters depicted in red; they are not included in the property definitions.)

For Active Directory servers, you need only specify the `ldap.host` property.

**Example**

```
ldap.host=myauthserver
```

**ldap.manager.anonymous**

The property `ldap.manager.anonymous` allows for anonymous read-only access of the LDAP database.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.manager.anonymous</code></td>
<td>Setting this property to <code>true</code> allows anonymous read-only access to the LDAP database. When set to <code>true</code>, the server directs the authentication mechanism to attempt to authenticate users (if authentication is required), using an anonymous mechanism. The default is <code>false</code>. If anonymous access is enabled using this property, the value for <code>ldap.manager.cn</code> user does not need a valid value for <code>ldap.manager.pass</code>.</td>
</tr>
</tbody>
</table>

Some LDAP servers might not support this option; they require additional configuration to allow anonymous read-only access.
**ldap.manager.cn**

The property `ldap.manager.cn` specifies the name of the manager user.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.manager.cn</code></td>
<td>This property specifies the Common Name (cn) of the manager user. It is used only for the LDAP connection. Set the user distinguished name (DN) for accessing an authenticated LDAP server. (The example builds the entire DN.)</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.manager.cn=CN=TestUser,OU=TestAccounts,OU=All Users Other,dc=company,dc=com
```

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Example</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN</td>
<td>Common Name</td>
<td>TestUser</td>
<td>Can be a generic name and a specific user's name, such as John Smith</td>
</tr>
<tr>
<td>OU</td>
<td>Organizational Unit</td>
<td>Test Accounts, All Users Other</td>
<td>Indicates the organization units where CN is located</td>
</tr>
<tr>
<td>dc</td>
<td>Domain Component</td>
<td>company, com</td>
<td>Builds the domain name (company.com)</td>
</tr>
</tbody>
</table>

**ldap.manager.pass**

The property `ldap.manager.pass` contains the password for manager access.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.manager.pass</code></td>
<td>This property contains encrypted password for manager access. If an unencrypted password is provided, the first time TIBCO Spotfire® Statistics Services starts, it encrypts the password and writes the encrypted result to this property.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.manager.pass=3DES(ZFeEJWgSE6ctm3nkDycsgh\=\=)
```
ldap.path

The property `ldap.path` specifies the path to the LDAP directory.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.path</code></td>
<td>This property specifies the path to the LDAP directory. This is part of the URL used to construct the path to the server. Used to construct the LDAP address. The default is <code>dc=company,dc=com</code>.</td>
</tr>
</tbody>
</table>

The LDAP URL

This image shows the construction of the LDAP URL, which is constructed of the properties you define. (You need not supply the characters depicted in red; they are not included in the property definitions.)

Example

```
ldap.path=dc=myldap,dc=mycompany,dc=com
```

dc, or domain component, builds the path as `myldap.mycompany.com`

ldap.port

The property `ldap.port` specifies the port over which the LDAP service is provided.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.port</code></td>
<td>This property specifies the port over which LDAP service is provided. For LDAP, the default port is 389 (the default). For LDAPS, the default port is 636.</td>
</tr>
</tbody>
</table>

The LDAP URL

This image shows the construction of the LDAP URL, which is constructed of the properties you define. (You need not supply the characters depicted in red; they are not included in the property definitions.)

Example

```
ldap.port=389
```
ldap.protocol

The `ldap.protocol` property specifies whether to use LDAP or LDAPS.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.protocol</code></td>
<td>This property specifies whether to use LDAP or LDAPS. LDAPS uses SSL connections instead of plain (that is, unprotected) connections. The default is <code>ldap</code>.</td>
</tr>
</tbody>
</table>

The LDAP URL

This image shows the construction of the LDAP URL, which is constructed of the properties you define. (You need not supply the characters depicted in red; they are not included in the property definitions.)

For Active Directory servers, you need only specify the `ldap.host` property.

**Example**

```
ldap.protocol=ldap
```

ldap.searchBase

The property `ldap.searchBase` specifies the location in a directory from which to start the search for a user.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.searchBase</code></td>
<td>This property specifies the location in a directory from which to start the search for a user. This property is typically left blank, but it can be used to define a more specific domain name. The default is <code>OU=All Users</code></td>
</tr>
</tbody>
</table>

**Example**

```
ldap.searchBase=OU=All Users
```

ldap.searchSubTree

If the property `ldap.searchSubTree` is set to `true`, it searches across the entire subtree.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ldap.searchSubTree</code></td>
<td>If this property is set to <code>true</code>, searches across the entire subtree (given the context) are performed. If it is set to <code>false</code>, then searches are performed only on the level identified by the context, which means that the configuration must be exact. The default is <code>true</code>.</td>
</tr>
</tbody>
</table>

**Example**

```
ldap.searchSubTree=true
```
Configuring LDAPS

If you are using an SSL connection, you can configure TIBCO Spotfire® Statistics Services to use LDAPS.

Procedure

1. Obtain the LDAP server’s CA certificate. For example, if you were using a Windows Server 2008 domain controller that is also acting as the CA, you can obtain the root certificate by issuing the following command at the Command Prompt.
   ```
certutil -ca.cert ca.cer
   ```
2. On the Spotfire Statistics Services server, import the certificate. For example, using the example above with the `ca.cer` file, you would issue the following commands from the `SPSERVER_HOME` directory, at the server’s Command Prompt:
   ```
   keytool -import -alias dc -keystore C:\(keystore_dir)\keystore.jks -file C:\(path_to)\ca.cer -trustcacerts
   keytool -import -alias dc -keystore C:\(keystore_dir)\cacerts.jks -file C:\(path_to)\ca.cer -trustcacerts
   ```
   where `(keystore_dir)` is the path where you want to import and register the trusted certificate and `(path_to)` is the directory where you have copied `ca.cer`.
   These two commands generate the files `keystore.jks` and `cacerts.jks`. When you issue the commands, specify passwords for the files. Make a note of the passwords you use, because you will need them in the next step.
3. For the Apache Tomcat JVM, set the Java options pointing to the keystore and truststore files created in the previous step.
   On Windows, do this by opening `SPSERVER_HOME\tomcat\bin\<service_name>.exe`, selecting the Java tab, and then adding the following properties under Java Options.
   ```
   -Djavax.net.ssl.keyStore=C:\some\directory\keystore.jks
   -Djavax.net.ssl.keyStorePassword=somesecret
   -Djavax.net.ssl.trustStore=C:\(keystore_dir)\cacerts.jks
   -Djavax.net.ssl.trustStorePassword=somesecret
   ```
   On UNIX/Linux, add these properties to the appropriate location in the startup script.
4. Modify `SPSERVER_HOME/conf/ldap.properties`, to change the following properties.
   ```
   ldap.protocol=ldaps
   ldap.port=636
   ```
5. Restart the Spotfire Statistics Services service.

SSL Configuration

If you need to configure a secure socket layer (SSL) for a stand-alone installation or a single-Manager cluster installation of TIBCO Spotfire® Statistics Services, you can follow Apache Tomcat documented processes.

In the case of the single Manager node cluster with no load balancer, you do not need to perform this configuration on Worker nodes. If you have a load balancer, you must consult your load balancer documentation concerning SSL configuration.

For detailed information and procedures on configuring SSL with Apache Tomcat, follow the procedures in the SSL Configuration HOW-TO on the Apache Tomcat Web site.


You can use this information to configure SSL with Spotfire Statistics Services. If you are using a default installation, you can set `SPSERVER_HOME/jre` as `JAVA_HOME` and use the Apache Tomcat configuration file, `server.xml`, located in `SPSERVER_HOME/tomcat/conf`.
After you have configured SSL, you must modify the properties in the `spserver.properties` configuration file at `SPSERVER_HOME/conf/` (for a standalone installation) or in `SPSERVER_HOME/conf` (if you installed a cluster with only one Manager node and no load balancer). In most cases, you need to update the `service.url` property only. For example, the following non-default `service.url` assignment indicates that Spotfire Statistics Services is using an SSL Connector on port 8443:

```
service.url=https://servername:8443/<service_name>/
```

Server Environment Properties

When TIBCO Spotfire® Statistics Services starts, it establishes the environment by checking for the existence certain Java properties. These Java properties are specified during Spotfire Statistics Services installation.

<table>
<thead>
<tr>
<th>Java Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>spserver.share</code></td>
<td>Path to the centralized configuration and shared storage area for a Spotfire Statistics Services cluster. In a standalone installation, the default value is set to the base installation directory.</td>
</tr>
<tr>
<td><code>spserver.home</code></td>
<td>Path to the base installation directory of Spotfire Statistics Services. The default values are:</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Windows® 64-bit: <code>C:\Program Files\TIBCO\statsvcs70\&lt;service_name&gt;</code></td>
</tr>
<tr>
<td></td>
<td>• Microsoft Windows 32-bit: <code>C:\Program Files(x86)\TIBCO\statsvcs70\&lt;service_name&gt;</code></td>
</tr>
<tr>
<td></td>
<td>• UNIX/Linux: <code>/opt/TIBCO/statsvcs70</code></td>
</tr>
<tr>
<td><code>spserver.shome</code></td>
<td>Path to the installation for the S-PLUS engine. The default values are:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Windows</strong>: 64-bit <code>C:\Program Files\TIBCO\statsvcs70\&lt;service_name&gt;\engines\splus</code></td>
</tr>
<tr>
<td></td>
<td>• 32-bit <code>C:\Program Files(x86)\TIBCO\statsvcs70\&lt;service_name&gt;\engines\splus</code></td>
</tr>
<tr>
<td></td>
<td>• UNIX/Linux: <code>/opt/TIBCO/statsvcs70/engines/splus</code></td>
</tr>
<tr>
<td><code>spserver.rhome</code></td>
<td>Path to the installation for the R engine. For more information, see Configuring an Open-Source R Engine on page 73.</td>
</tr>
<tr>
<td><code>spserver.sashome</code></td>
<td>Path to the installation for the SAS engine. For more information, see Configuring a SAS Engine on page 74.</td>
</tr>
<tr>
<td><code>spserver.matlabhome</code></td>
<td>Path to the installation for the MATLAB engine. For more information, see Configuring a MATLAB Engine on page 75.</td>
</tr>
</tbody>
</table>

In most cases, the values set by the installer should be sufficient; however, you can customize these values. If you want to modify the values on a Windows computer, see Using Procrun to Modify a Java Property on page 88. On UNIX/Linux computers, you can modify the values by editing the `SPSERVER_HOME/init.d/spserver` file. You can modify the values for any of the properties and the next time you restart the service your changes will appear. We recommend that you make a backup of the file before you make any modifications.

In some cases, you might find it necessary to override the Java properties temporarily without altering the values set by the installer. You can do this by setting any one of the environment variables.

Each environment variable is equivalent to its corresponding Java property except the environment variable takes precedence. For example, if you want to override the value that the installer set for
spserver.shome, you can specify the SPSERVER_SHOME environment variable as in the following example:

SPSERVER_SHOME=/path/to/alternate/splus.

We recommend that you avoid using environment variables because when you mix environment variables and Java properties it can be confusing when you need to troubleshoot your installation. If you do need to verify your environment, you can review the Spotfire Statistics Services log for text indicating the values used to establish the environment, these settings are added to the log file soon after startup. See Configure Engine Logging on page 49 for more information.

**WebDAV Security Configuration**

If you want to control the roles that use the webdav path in the TIBCO Spotfire® Statistics Services installation, create a file called webdav.security.config and set properties to manage that control.

The file `webdav.security.config` is used to configure the roles that are required for using the `/webdav/` path within the Tomcat container (that is, `http://server/<server_name>/webdav`, where `server` is the server name.). The file contains a specific format for providing access. The settings are similar to the following two options.

- `/webdav/.*=ROLE_USER,ROLE_ADMIN`
- `/webdav/directoryA/=ROLE_USER,ROLE_ADMIN`

If you do not create the file and specify a different configuration, the first example is used as the default.

The syntax for your configuration must be exactly as demonstrated above. That is, `/directory/regexp` (on the left) equals (=) the comma-delimited role definition(s) on the right.

**Remote Monitoring and Management with JMX**

You can monitor TIBCO Spotfire® Statistics Services using TIBCO Hawk or any other Java Management Extensions (JMX) -compliant monitoring tool, like JConsole, which is a part of the Java SDK.

When you install Spotfire Statistics Services, Remote Monitoring and Management is enabled by default. During installation, you are prompted for a required user name (by default, `admin`) and password. These credentials are specific to this standalone server installation or to the entire cluster. We recommend against using your login/domain credentials.

You must access the JMX server from your chosen monitoring tool using the following URL:

```
service:jmx:rmi:///jndi/rmi://[SERVER_NAME]:[JMX_PORT]/jmxrmi
```

Using remote management and monitoring through JMX, you can restart Manager or Worker nodes, view and edit the server configuration, perform job and package management, and manage nodes in a cluster. If, after installation, you can use the spserver.properties settings to change JMX options to enable or disable remote monitoring and management, change the JMX port number, or change the JMX username or password.

Enabling or Disabling Remote Monitoring and Management with JMX

Use the techniques described in this topic to manage remote monitoring with JMX in a TIBCO Spotfire® Statistics Services installation.

**Procedure**

1. Open the `spserver.properties` file from the following location
   - **Cluster**: SPSERVER_SHARE/conf
   - **Standalone**: SPSERVER_HOME/conf
2. Set the `jmxremote.enabled` value:
   - `true` to enable remote monitoring and management.
   - `false` to disable remote monitoring and management.
3. Restart the Spotfire Statistics Services service.
   After changing the server properties, you must restart the Spotfire Statistics Services service for the changes to take effect. In the case of a cluster, you must restart the Spotfire Statistics Services service on each node.

Changing the Username or Password for Remote Monitoring and Management

You can change the JMX username or password by changing a TIBCO Spotfire® Statistics Services property.

**Procedure**

1. Open the `spserver.properties` file from the following location
   - **Cluster**: SPSERVER_SHARE/conf
   - **Standalone**: SPSERVER_HOME/conf
2. Edit the following server properties to set the new username and password values:
   - `jmxremote.username=[JMX_USERNAME]`
   - `jmxremote.password=[JMX_PASSWORD]` (encrypted on first startup)
3. Restart the Spotfire Statistics Services service.
   After changing the server properties, you must restart the Spotfire Statistics Services service for the changes to take effect. In the case of a cluster, you must restart the Spotfire Statistics Services service on each node.

Modifying the JMX Port Number

You can change the JMX port number by changing a TIBCO Spotfire® Statistics Services property.

**Procedure**

1. Open the `spserver.properties` file from the following location
   - **Cluster**: SPSERVER_SHARE/conf
   - **Standalone**: SPSERVER_HOME/conf
2. Edit the `jmxremote.port` value to be the port number that you want to use.
3. Restart the Spotfire Statistics Services service. After changing the server properties, you must restart the Spotfire Statistics Services service for the changes to take effect. In the case of a cluster, you must restart the Spotfire Statistics Services service on each node.

**Changing the Protocol or Port**

You can change either the protocol or the port provided when TIBCO Spotfire® Statistics Services was installed.

**Procedure**

1. Edit `SPSERVER_HOME/tomcat/conf/server.xml` to modify the values for protocol or port. For example, the default installation includes the following.

   ```xml
   ```

   Possible values for protocol are `Http11NioProtocol` or `AJP/1.3`. If you are not using a native Web Server as a proxy or load balancer, you must specify `Http11NioProtocol`.

2. If you modify the port, you must change the `service.url` property in the `spserver.properties` configuration file to reflect the new value. See `service.url` on page 58 for more information.

3. Restart the Spotfire Statistics Services service.

**Configuring an Open-Source R Engine**

To use an open-source R engine with TIBCO Spotfire® Statistics Services, rather than the engines provided with the installation (that is, the default TIBCO Enterprise Runtime for R for Spotfire engine, or the S-PLUS engine), you must perform additional configuration steps.

Spotfire Statistics Services version 7.0 works with both open-source R version 2.15 and version 3.1.2.

Open-source R is available under separate open source software license terms and is not part of TIBCO Enterprise Runtime for R. As such, open-source R is not within the scope of your license for TIBCO Enterprise Runtime for R. Open-source R is not supported, maintained, or warranted in any way by TIBCO Software Inc. Download and use of open-source R is solely at your own discretion and subject to the free open source license terms applicable to open-source R.

**Procedure**

1. Open the `spserver.properties` file from the following location:

   - **Cluster**: `SPSERVER_SHARE/conf`
   - **Standalone**: `SPSERVER_HOME/conf`

2. Set the property `engine.type=R`.

You can download open-source R from [http://www.r-project.org/](http://www.r-project.org/).

   If you plan to build open-source R from source, it must be configured with the option `--enable-R-shlib`. If you are downloading a distribution, this option was likely included in the build process.

   You must match the bit version of open-source R with the installation of Spotfire Statistics Services. 32-bit open-source R works only with a 32-bit installation of Spotfire Statistics Services. You can run both on a 64-bit operating system.

4. Install the rJava package.
   a) Start an open-source R desktop session.
   b) In the open-source R Console, type `install.packages("rJava", install_path)` where `install_path` is the path to your Spotfire Statistics Services installation’s library path. For example, it might be `C:/Program Files/R/R-3.1.2/library`.

   If you do not supply a path for this argument, you might encounter problems using rJava.

   c) Select a CRAN mirror, and then open-source R installs the rJava package.
   d) Validate the rJava installation in the R console by running the following command: `library(rJava)`

5. Perform the following to include the path to the open-source R installation

<table>
<thead>
<tr>
<th>Environment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Add <code>-Dspserver.rhome=path/to/R</code> to the Java options for the service. For more information, see Procrun.</td>
</tr>
<tr>
<td>UNIX/Linux</td>
<td>Edit <code>SPSERVER_HOME/init.d/spserver</code> to specify <code>SPERVER_RHOME=path/to/R</code>.</td>
</tr>
</tbody>
</table>


### Configuring a SAS Engine

To use SAS® software as the TIBCO Spotfire® Statistics Services engine, you must perform additional configuration steps for each Spotfire Statistics Services installation.

#### Prerequisites

The SAS software must be installed on the same machine as the server. For cluster installations, SAS software must be installed on every machine where a server node is run. The only part of the SAS software that Spotfire Statistics Services requires is Base SAS. Other SAS software packages are not required, but they can be installed on the machine.

For more information about tested versions, see the Spotfire Statistics Services System Requirements section of the support web site at [http://support.spotfire.com/sr.asp](http://support.spotfire.com/sr.asp).

On Microsoft Windows®, Spotfire Statistics Services normally would run as a Windows service. The properties window for a service contains a Log On tab, specifying how the service process should be executed; either Log in as/Local System account, or Log in as/This account. Use Log in as/This account for the service if the time to start up a SAS software task needs to be minimized.

#### Procedure

1. Edit the `spserver.properties` file to set `engine.type=SAS`.

The properties file is located at `SPSERVER_HOME/conf` for a standalone installation or `SPSERVER_SHARE/conf` on a cluster. For more information, see `engine.type`. 
2. Set the following property to identify the path to the SAS software installation:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Windows®</td>
<td>Add -Dspserver.sashome=/path/to/SAS to the Java options for the service. For more information, see Procrun.</td>
</tr>
<tr>
<td>UNIX/Linux</td>
<td>Edit SPSERVER_HOME/init.d/spserver to specify SPSERVER_SASHOME=/path/to/SAS.</td>
</tr>
</tbody>
</table>

*SASHOME must be set not to the SAS installation, but to the location of the SAS executable (sas.exe).*


4. Test Spotfire Statistics Services with SAS software operations by sending a simple SAS script to a Web browser. For example, use the following script (assuming the server is accessed via the URL http://myserver:8966/server_name).

```
http://myserver:8966/server_name/api/v8/expression
/eval?cmd=DATA out;DO x=1 to 3;y=x*100;rnum = UNIFORM(-1);OUTPUT;END;RUN;
```

If Spotfire Statistics Services is running correctly, it should return XML for a data frame with three rows and three columns.

It should also return text giving the SAS software log for the script, listing the SAS code executed, execution time, and errors, as well as any text produced by the SAS PRINT procedure.

### Configuring a MATLAB Engine

To use MATLAB® software as a TIBCO Spotfire® Statistics Services engine, you must perform additional configuration steps for each Spotfire Statistics Services installation.

**Prerequisites**

MATLAB must be installed on the same machine as the server. For cluster installations, MATLAB must be installed on every machine where a server node is run. Spotfire Statistics Services has been tested on machines with MATLAB installed as an **Individual - Standalone Named User**. The only part of MATLAB that Spotfire Statistics Services requires is basic MATLAB. Other MATLAB toolkits are not required, but they can be installed on the machine.

For more information about tested versions, see the Spotfire Statistics Services System Requirements section of the support web site at [http://support.spotfire.com/sr.asp](http://support.spotfire.com/sr.asp).

On Microsoft Windows®, Spotfire Statistics Services normally would run as a Windows service. The properties window for a service contains a Log On tab specifying how the service process should be executed; either **Log in as/Local System account**, or **Log in as/This account**. When using Spotfire Statistics Services with MATLAB, you must use the **Log in as/This account** option for MATLAB to detect the appropriate user license.

**Procedure**

1. Edit the spserver.properties file to set engine.type=MATLAB.

   The properties file is located at SPSERVER_HOME/conf for a standalone installation or SPSERVER_SHARE/conf on a cluster. For more information, see engine.type
2. Set the following property to identify the path to the MATLAB installation:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Windows</td>
<td>Add <code>-Dpserver.matlabhome=/path/to/MATLAB</code> to the Java options for the service. For more information, see Procrun.</td>
</tr>
<tr>
<td>UNIX/Linux</td>
<td>Edit <code>SPSERVER_HOME/init.d/spserver</code> to specify <code>SPSERVER_MATLABHOME=/path/to/MATLAB</code>.</td>
</tr>
</tbody>
</table>


4. Test Spotfire Statistics Services with MATLAB by sending a simple MATLAB script to a Web browser. For example, use the following script (assuming the server is accessed via the URL `http://myserver:8966/server_name`).

```matlab
http://myserver:8966/server_name/api/v8/expression/eval?cmd=
struct('x',transpose(1:3),'y',100*transpose(1:3),'rnum',randn(3,1))
```

If the server is running correctly, it should return XML for a data frame with three rows and three columns. It should also return text giving the MATLAB text output for the script.

Configuring TIBCO Spotfire to use TIBCO Spotfire Statistics Services

If statisticians in your company develop and use data functions, or if they use the predictive analytics tools in TIBCO Spotfire®, and if they run these analyses through TIBCO Spotfire® Statistics Services, you must provide the service URL to the TIBCO Spotfire® Server administrator.

If you are the licensed Spotfire administrator, you can configure this option.

If you are the administrator for TIBCO Spotfire® Web Player, remember that it does not include an statistical engine. Rather, it relies on the engine configured in Spotfire Statistics Services and specified in Spotfire Professional application, as described below.

**Prerequisites**

- You must have installed, configured, and validated Spotfire Statistics Services, you must know which statistical engine the service uses, and have you must know the service URL.
- You must have access to a computer on which Spotfire Professional is installed.
- You must have administrative privileges for Spotfire.

**Procedure**

1. Log in to Spotfire Professional using administrator credentials.
2. Click **Tools > Administration Manager**.
3. Select the main **Preferences** tab.
4. Select the group for which you want to set the URL, and then select the secondary **Preferences** tab.
5. Scroll through the preferences until you find **TIBCO Spotfire Statistics Services**. Expand this option and select **Statistics Services**. The right pane displays the default URLs for all engine types.
6. Select the engine for which you want to set the URL, and then click **Edit**.

![Select Engine](image)

7. In the resulting box, type the URL for Spotfire Statistics Services. Include the service name. For example, `http://MyServer:8080/TERRServer`.

8. Inform the Spotfire Professional users that you have set the default URL.

### Engine Affinity

To improve performance on a multi-CPU Microsoft Windows® computer running multiple engines at a time, TIBCO Spotfire® Statistics Services manages the affinity of engine processes by assigning each process to a particular CPU, rather than moving engine assignments over time. This design is configurable for cases where the default behavior is not desirable.

By default, the engine affinities are assigned from any of the available CPUs. Thus, if you are running Spotfire Statistics Services with four engines on an eight-processor computer, the default settings would probably assign engine affinities to the first four CPUs.

However, this behavior can cause a problem if you want to run multiple copies of on a single multi-CPU machine: for example, if you want one server with S-PLUS engines, and another server with R engines on the same machine. If the two independent servers assign engine affinities to the same CPUs, you could end up with some CPUs running multiple engines, and other CPUs left idle.

To address this situation, you can control which CPUs are used for assigning engine affinities by setting the Java property `engine.affinity`. This property is set using Procrun. (See [Monitor the Service](#).)

The value of the `engine.affinity` lists the CPU numbers that are available for assigning engine affinity (starting from one).
Examples

For the settings in the following table, assume that the server computer has eight CPUs.

<table>
<thead>
<tr>
<th>Java Property Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Dengine.affinity=</td>
<td>Use CPUs 1,2,3,4,5,6,7,8 for affinity. If the value is blank, the default is to use all CPUs.</td>
</tr>
<tr>
<td>-Dengine.affinity=1,2,3</td>
<td>use CPUs 1,2,3.</td>
</tr>
<tr>
<td>-Dengine.affinity=1-3</td>
<td>an alternative to specify using CPUs 1,2,3.</td>
</tr>
<tr>
<td>-Dengine.affinity=1,3,6-20</td>
<td>Use CPUs 1,3,6,7,8 (numbers greater than the number of CPUs are ignored).</td>
</tr>
<tr>
<td>-Dengine.affinity=1-999</td>
<td>an alternative to specify all CPUs.</td>
</tr>
<tr>
<td>-Dengine.affinity=0</td>
<td>disable assigning engine affinity</td>
</tr>
</tbody>
</table>

Suppose that you want to run two servers on a computer with eight CPUs.

In this case, the first server could be set up with the following:

-Dengine.count=4
-Dengine.affinity=1-4

The second server could be set up with the following:

-Dengine.count=4
-Dengine.affinity=5-8

With these properties, the engines from the two servers would run on totally different sets of CPUs.

Usually, you would want to define -Dengine.affinity to specify as many CPUs as the server has engines, but it is not necessary. For example, if you specify the following on an eight-CPU machine, then two engines run on each of the first two CPUs.

-Dengine.count=4
-Dengine.affinity=1-2

Database Configuration

Select the type of database you intend to use and configure it for TIBCO Spotfire® Statistics Services.

After you have configured your Spotfire Statistics Services installation, indicate whether you are using the default or the non-default database, and then install and configure the JDBC driver for the database. Check to make sure you have set all appropriate properties for the database in the properties file.

Job Database Requirements

By default, TIBCO Spotfire® Statistics Services relies on H2 database implementation to maintain the job queue.

- The standalone installation configures H2 in the in-process mode. This installation option requires no additional configuration, and simply works out of the box.
- The cluster installation configures H2 in the server mode. This installation option requires minor post-installation configuration.

When H2 is running in a Spotfire Statistics Services cluster (that is, in server mode), one of the managed servers is configured to run a true JDBC-compliant database, which is used by all other nodes in the cluster.

H2 provides no failover capability for a Spotfire Statistics Services cluster.

Optionally, you can use an enterprise-class database server. Spotfire Statistics Services works with the following supported enterprise-class database servers:

- Oracle (10g or later).
- Microsoft SQL Server (2005 or later).
- MySQL (5.0.89 or later).

Configure the H2 Database Server

Configure an H2 database to use as the TIBCO Spotfire® Statistics Services job queue database.

Configuring an H2 database requires that you set only the port number and password only in the database properties described in the database properties options. There are no configuration files in the database where you need to match these settings, as there are for databases such as MYSQL and ORACLE. You need only set or change the port number and/or the password in the server’s database.properties file.

Configuring a Non-Default Database

If you are using a database other than H2, you must provide additional configuration.

If you are using the default H2 database with a stand-alone TIBCO Spotfire® Statistics Services, you can disregard this information. See Configure the H2 Database Server on page 79.

Procedure

1. Create a dedicated database to use with Spotfire Statistics Services.
2. In the new database, run the script we provide to create the tables and triggers for Spotfire Statistics Services.
   Scripts for the supported database servers are located in SPSERVER_HOME/db_scripts.
3. You must grant all privileges to the user account that you will use to connect to the database from Spotfire Statistics Services.
Configuring the JDBC Driver

You must make sure that the JDBC driver for your database server is available in your environment.

Procedure

1. Obtain the JDBC driver for your database server. For more information, see the documentation for your database server.
2. Copy the JDBC driver to the following directory:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>SPSERVER_SHARE/endorsed</td>
</tr>
<tr>
<td>Standalone</td>
<td>SPSERVER_HOME/endorsed</td>
</tr>
</tbody>
</table>

3. Restart the service. (For cluster configurations, you must restart the service for each node.)

Database Properties

The database configuration properties for TIBCO Spotfire® Statistics Services are contained in the file database.properties. We use the standard Java properties file conventions to define each database property.

If you are using the H2 database implementation in a standalone installation, you can disregard setting properties. The default implementation works as is and requires no configuration.

If you are using the H2 database implementation in a cluster, you must configure it.

- In a cluster installation, the file database.properties is stored in the conf directory under SPSERVER_SHARE. When you install a new node in a cluster, provide this location so that all the nodes in the cluster can find the centralized configuration.
- In a standalone installation, the file is stored in the conf directory under SPSERVER_HOME.

In a default installation, the full path to the database.properties file is:

<table>
<thead>
<tr>
<th>32-bit Windows</th>
<th>C:\Program Files(x86)\TIBCO\statsvcs70&lt;service_name&gt;\conf</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-bit Windows</td>
<td>C:\Program Files\TIBCO\statsvcs70&lt;service_name&gt;\conf</td>
</tr>
<tr>
<td>UNIX/Linux</td>
<td>/opt/TIBCO/statsvcs70/conf</td>
</tr>
</tbody>
</table>

You must restart the Spotfire Statistics Services service to include any changes that you make in the database.properties file.

When you restart the Spotfire Statistics Services service, the server resumes processing queued jobs. However, because restarting the Spotfire Statistics Services service also stops the pool of S engines, any job that has not completed is marked as failed. To prevent this, we recommend that you wait until all jobs have completed before you restart the service. Alternatively, you can resubmit failed jobs after restarting the service.

To monitor job status, use the jobs function. For more information about the jobs function, see the URL API documentation, available from the Spotfire Statistics Services landing page.
database.maxActive

This property specifies the number of active connections to a TIBCO Spotfire® Statistics Services job queue.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.maxActive</td>
<td>1</td>
<td>Set the maximum number of active connections that can be allocated at the same time. The default is 1. You can set to a negative value to specify no limit.</td>
</tr>
</tbody>
</table>

database.maxIdle

This property indicates the maximum number of connections to the TIBCO Spotfire® Statistics Services that can remain idle in the pool without extra connections being destroyed.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.maxIdle</td>
<td>1</td>
<td>The maximum number of connections that can remain idle in the pool, without extra ones being destroyed. If database.maxIdle is set too low on heavily-loaded systems, you might see connections being closed and new connections opened almost immediately. This is a result of the active threads momentarily closing connections faster than connections are opened, causing the number of idle connections to rise above database.maxIdle. For heavily-loaded systems, the best value for database.maxIdle can vary, but the default is a good starting point. The default is 1. You can set to a negative value to specify no limit.</td>
</tr>
</tbody>
</table>

database.type

This property indicates the type of database you intend to use for managing the TIBCO Spotfire® Statistics Services job queue.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
</table>
| database.type     | H2            | Set the database server for managing the Spotfire Statistics Services job queue. The default, an in-process H2DB database (h2) requires no configuration for a stand-alone installation. (If you have a cluster, it requires configuration.) Other database options that you can configure to manage the job queue include:  
  - Oracle (ORACLE)  
  - Microsoft SQL (MSSQL)  
  - MySQL (MYSQL) |
database.url

This property specifies the JDBC connection string for accessing the TIBCO Spotfire® Statistics Services job database.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.url</td>
<td>Can be blank for a standalone only. Upon first server start, the value is populated with the path to the embedded database. See Details for cluster default.</td>
<td>Contains a JDBC connection string for accessing the Spotfire Statistics Services job queue database. The string you enter depends on the value you set in the database.type property.</td>
</tr>
</tbody>
</table>

Details

If you use the default H2 as the database type in a cluster, the installation prepopulates with the following pattern to build the JDBC connection string for your environment:

```
jdbc:h2:tcp://<manager_node>:<dbport>/<spserver.cluster.share>/h2/db
```

where

- `<manager_node>` is the host name of the primary manager node running the database instance (that is, the manager node to run the database).
- `<dbport>` is the port number to use (by default, 9092 but you can specify any open port)
  
  The port you specify is the actual port used by the server, so be sure it is available.
- `<spserver.cluster.share>` is the location of the SPSERVER_SHARE for the specified manager node.
  - On Microsoft Windows®, for H2, this share requires 4 preceding backslashes, as follows:
    `\\hostname/path/to/share/h2/db`
  - On UNIX/Linux, for H2, this share appears as follows:
    `/path/to/share`
- The subdirectory h2 is created by the installer.
- db is used to create the first part of the filenames of the database files.
Examples

- H2 database in a Windows cluster:
  
  database.url=jdbc:h2:tcp://myserver:9999/\\\hostname/path/to/share/h2/db

- H2 in a UNIX/Linux cluster, set up as nfs share:
  
  database.url=jdbc:h2:tcp://path/to/share/h2/db

- Oracle database pattern:
  
  database.url=jdbc:oracle:thin:@//<db_servername>:<db_serverport>:<SID>

- MSSQL database pattern:
  
  database.url=jdbc:sqlserver://<db_servername>:<db_serverport>;databaseName=<database_name>

- MYSQL database pattern:
  
  database.url=jdbc:mysql://<db_servername>:<db_serverport> />
  <database_name>

For more information on JDBC connection strings, refer to the documentation for your database server.

database.username

This property specifies the user who has all privileges to the job queue database.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.username</td>
<td>sa</td>
<td>This property specifies the user with GRANT ALL privileges on the job queue database. Its setting depends on database.type. Do not modify the default value if you use database.type=H2.</td>
</tr>
</tbody>
</table>

database.password

This property specifies the password for the user specified by database.username.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Default Value</th>
<th>Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.password</td>
<td>3DES{encrypted_password}</td>
<td>Sets the password for the user identified by database.username. Its value depends on the database.type.</td>
</tr>
</tbody>
</table>

Details

The password is encrypted using 3DES encryption. You do not need to encrypt the passwords manually before placing them in the configuration file. When the server is started, any unencrypted password is automatically replaced with an encrypted password and written back to the configuration file.

If you need to change the password, just replace the existing value 3DES{encrypted_password} with the new, unencrypted password.

If you use the default database.type=H2, but in cluster mode, a value is required. The cluster must be down when you change the password. For H2, defining this value actually sets the password.
Service Administration

After the installation and configuration are complete, and the service is up and running, you might be called on to perform certain standard or specialized administration tasks such as:

- Stopping and restarting the service
- Uninstalling the server.
- Deleting protected packages.
- Apply special configuration for database connections.
- Troubleshoot the service or the engine.

Stopping the Service on Microsoft Windows

Occasionally, you must stop TIBCO Spotfire® Statistics Services.

The display name for the service is Spotfire Statistics Services(service_name) where service_name is the value you specified during installation. The default is SplusServer.

Procedure

1. Click Start > Control Panel > Administrative Tools, and then select Services
2. In the Service Manager console, right-click Spotfire Statistics Services, and then click Stop.

Result

The service is stopped for maintenance, upgrade, or other necessary tasks.

What to do next

Remember to restart the service or, if you restart the server, ensure that it restarting automatically.

Starting the Service on Microsoft Windows

Occasionally, you must start TIBCO Spotfire® Statistics Services, although by default the service starts automatically.

The display name for the service is TIBCO Spotfire Statistics Services(service_name) where service_name is the value you specified during installation. The default is SplusServer.

Procedure

1. Click Start > Control Panel > Administrative Tools, and then select Services.
2. In the Service Manager console, right-click TIBCO Spotfire Statistics Services, and then click Start.

Result

The service is running and ready to be used.

If you encounter issues, see the service dedicated log file, SplusServer.log, located in SPSERVER_HOME/tomcat/logs (for standalone installations) or SPSERVER_HOME/worker/logs (for Worker nodes)
Uninstalling the Server from Windows

Follow the steps to remove TIBCO Spotfire® Statistics Services from your computer.

Prerequisites

Back up the SPSERVER_HOME/data directory.

Procedure

1. Click Start > Control Panel, and then double-click Add or Remove Programs.
2. In Currently installed programs, select TIBCO Spotfire Statistics Services(service_name), and then click Remove.
   If you are prompted to confirm the removal of the program, click Yes.

Configuring the Service to run at Start Up on UNIX Linux

You can configure the TIBCO Spotfire® Statistics Services installation to run when the service starts by registering the init scripts with system init.

Procedure

1. Log in as root.
2. Type the following command:
   SPSERVER_HOME/init.d/register-service.sh
   When the machine starts, the service will run.

Starting the Service on UNIX Linux

Occasionally, you must start TIBCO Spotfire® Statistics Services on your UNIX or Linux machine.

The user who performs this task must own the entire Spotfire Statistics Services installation. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME

Procedure

1. Open a terminal and log in with the user account that will be used to run Spotfire Statistics Services.
2. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME:
   SPSERVER_HOME=/opt/TIBCO/statsvcs70/<server_name>
   $SPSERVER_HOME/init.d/spserver start
   The service should start and be ready to use.

Stopping the Service on UNIX Linux

Occasionally, you must stop TIBCO Spotfire® Statistics Services on your UNIX or Linux machine.

The user who performs this task must own the entire Spotfire Statistics Services installation. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME

Procedure

1. Open a terminal and log in with the user account that will be used to stop Spotfire Statistics Services.
2. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME:
   $SPSERVER_HOME/init.d/spserver stop
   The service should stop and be ready to stop.
Procedure

1. Open a terminal and log in with the user account that will be used to run Spotfire Statistics Services.
2. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME:
   
   ```bash
   SPSERVER_HOME=/opt/TIBCO/statsvcs70/<server_name>
   $SPSERVER_HOME/init.d/spserver stop
   
   The service is stopped for maintenance, upgrade, or other necessary tasks.
   ```

What to do next

Remember to restart the service or, if you restart the server, ensure that it is configured to restart automatically.

Restarting the Service on UNIX Linux

If the TIBCO Spotfire® Statistics Services service is stopped, you must restart it manually, unless you have configured it to start automatically after restarting the machine.

The user who performs this task must own the entire Spotfire Statistics Services installation. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME.

Procedure

1. Open a terminal and log in with the user account that will be used to run Spotfire Statistics Services.
2. When the system is ready, issue the following commands in a terminal with the appropriate value for SPSERVER_HOME:
   
   ```bash
   SPSERVER_HOME=/opt/TIBCO/statsvcs70/<server_name>
   $SPSERVER_HOME/init.d/spserver restart
   
   The service should start and be ready to use.
   ```

   If you encounter issues, see the service dedicated log file, SplusServer.log, located in SPSERVER_HOME/tomcat/logs (for standalone installations) or SPSERVER_HOME/worker/logs (for Worker nodes).

Uninstalling the Server from UNIX Linux

Follow the steps to remove TIBCO Spotfire® Statistics Services from your computer.

Procedure

1. If you registered the service to start at boot, you should unregister the service by running the following command as root:
   
   ```bash
   SPSERVER_HOME/init.d/unregister-service.sh
   ```
2. Run SPSERVER_HOME/Uninstall_SplusServer/Uninstall_SplusServer
3. Manually remove the installation directory.
Deleting Protected Packages

Follow these rules to delete a protected package from the server.

Procedure

1. From your Java Development Kit installation, start the Java Monitoring & Management Console by executing `jconsole`.
   The JConsole application opens.
2. In the JConsole: New Connection dialog box, select Remote Process, and type your server name and the JMX port. For example, `servername:9004`, and then click Connect.
   You are connected to the server via this remote process.
3. In the JConsole, click the MBeans tab.
   The MBeans tab is available.
4. Expand tibco, packageRepository, Operations, and then select deleteProtectedPackage.
   The Operation invocation area is available.
5. In the Operation invocation area, type the name of the protected package, and then click deleteProtectedPackage.
   The protected package is deleted.

If you do not have access to the JConsole application included in JDK, it is possible—but not recommended—to manually delete the file from the packages/Protected directory.

If you use this method, after you remove the package you should restart the service for all of the nodes in the cluster.

Monitor the Service

Discover the tools you can use to monitor TIBCO Spotfire® Statistics Services.

JMX

The default installation of Spotfire Statistics Services enables remote monitoring and administration via JMX on port 9004. If you use a JMX-compliant monitoring tool such as TIBCO Hawk or JConsole, you can monitor the server’s health and status, edit the configuration, and manage the job queue of Spotfire Statistics Services, all remotely.

Procrun

On Windows, we use the Procrun service and monitor applications for all node types.

Procrun is Windows only. To monitor or modify settings on UNIX/Linux, you must edit `SPSERVER_HOME/init.d/spserver`.

We use the service application, Prunsrv, to automate updating and modifying the service configuration. For example, we automate setting the service to run as a specified user and changing a Java property through this service application. You can start the monitor application, Prunmgr, to change settings interactively.

If you decide that you want to automate a change, you can use the service application to automate, at the command line, any change that you can make through the monitor application.

The Procrun service application is `TSSS<servername>.exe` and the monitor application is `TSSS<service_name>w.exe`, where `<service_name>` is the service name that you specify during installation. For example, the default service name is SplusServer and yields `TSSSSplusServer.exe` and `TSSSSplusServerw.exe`.
The respective locations are:

- Standalone/Manager: SPSERVER_HOME\tomcat\bin
- Worker: SPSERVER_HOME\worker\bin

For more information on using Procrun, see http://commons.apache.org/daemon/procrun.html.

Using Procrun to Modify a Java Property

On Windows, you can add or modify a Java property using Procrun.

Procedure

1. Open TSSS<service_name>w.exe, where service_name is the value that you specified during installation.
2. Select the Java tab.
3. Under Java Options, add the specific Java property. Examples of properties and values that you could set include:
   - -Dengine.count=4
   - -Dspserver.rhome=/path/to/r

Configure the Package for Teradata Aster Database

TIBCO Spotfire® provides a connector to a Teradata® database. TIBCO Spotfire® Statistics Services also includes an out-of-the-box data function example for using the Teradata Aster database for analytic processing with data stores. For developers who want to create and use data functions for the Teradata® Aster Database, Spotfire Statistics Services includes the TIBCO® Enterprise Runtime for R package AsterDB.

The AsterDB package requires special configuration, and the same package configuration must be used by all clients, whether they are using it via Spotfire Professional to develop data functions, or whether they are accessing it on Spotfire Statistics Services via TIBCO Spotfire® Web Player. For these reasons, the AsterDB package is included with Spotfire Statistics Services instead of TIBCO Enterprise Runtime for R.

The AsterDB package also requires Java 6 or higher, with the JVM, installed on the developer’s machine, and that JAVA_HOME be set to that installation location.

If your users want to run the Aster Data Function examples in Spotfire, you must have installed on your Aster Database the nPath Map Reduce application, as well as have the Aster-provided bank.web.clicks database table loaded.

As Spotfire Statistics Services Administrator, you can install and configure the package, and then redeploy the configured package to TIBCO Spotfire® Server (for distribution to Spotfire Professional users developing data functions) and to Spotfire Statistics Services clusters (accessed by TIBCO Spotfire® Web Player users).

Before you follow the steps to complete these tasks, make sure you have the required information about the Aster Database (including its host, its port, its name, its username, and its password.)

Configuring the AsterDB Package

For TIBCO Spotfire® Data Function developers to be able to use the TIBCO® Enterprise Runtime for R AsterDB package, you must follow the installation and configuration steps to make it available to the
TIBCO Enterprise Runtime for R engine on TIBCO Spotfire® Statistics Services, and to deploy it to use with Spotfire Data Functions.

**Procedure**

1. Run TIBCO Enterprise Runtime for R engine console as administrator.
   In the Spotfire Statistics Services installation, you can find the engine in TSSS_HOME/engines/Terr/bin directory. Right-click TERR.exe and select **Run as administrator**.
   (The function `install.packages()` must write to the TIBCO Enterprise Runtime for R installation directory, and if TIBCO Enterprise Runtime for R is installed under C:\Program Files, administrator access is required.)

2. From within the TIBCO Enterprise Runtime for R console, download and install the package from the Spotfire Statistics Services repository by running the following function:
   a) `install.packages("AsterDB", repos="http://yourserver:port# /service_name/update/TERR")`.
   b) Quit the TIBCO Enterprise Runtime for R console by typing `q()` at the command prompt.

3. Browse to the Teradata® Web site, and then locate and download the Aster JDBC driver ("noarch-aster-jdbc-driver.jar").

4. Copy this driver to TSSS_HOME/engines/Terr/library/AsterDB/java.

5. Make sure JAVA_HOME is set (for example, C:\Program Files\Java\jre6). (AsterDB requires the terrJava package, which requires this environment variable to be set.)

6. Run the TIBCO Enterprise Runtime for R engine console again, and then load the package:
   `library(AsterDB)`.
   You should see the following:

7. Test that the library loaded successfully using the TIBCO Enterprise Runtime for R command prompt, type `?aster.connect`.
   A browser window should open and display the help topic for this AsterDB function.

8. Configure your database settings.
   a) In TIBCO Enterprise Runtime for R, call the function
      `encryptString("AsterDatabasePassword")` where AsterDatabasePassword is the unencrypted password to your Aster database. The encrypted string for this password is returned.
   b) Copy this encrypted string to your clipboard.
   c) Browse to the TSSS_HOME/engines/Terr/library/AsterDB directory, and using a text editor, open and edit the file DatabaseConfig.dcf.
      1. Set the alias property to the value data function developers should use to refer to this database configuration from the first argument of the TIBCO Enterprise Runtime for R function `aster.connect()`. (Be sure to give this alias to the data function developers writing code to call that function.)
      2. Set the password property value by pasting the encrypted password you copied.

You can specify multiple Aster databases in this configuration file by copying and pasting the entire block (separated by a blank line), specifying a unique alias for each, and supplying the appropriate encrypted password for each.

See the Aster Database documentation for more information.
9. Test the AsterDB package by repeating steps 6 and 7, using one of the examples in the help file for `aster.connect()`.

10. Now that you have the AsterDB package configured correctly, you can deploy it to a Spotfire Statistics Services cluster, and you can deploy it to your Spotfire servers, to be distributed to Spotfire Professional users. See the document TIBCO Spotfire® Package Management (available on the Spotfire Statistics Services landing page) for detailed information about performing these tasks.

**Troubleshoot the Service**

When you encounter specific problems with the service, find the answers.

If you encounter problems with TIBCO Spotfire® Statistics Services, register for a support account at http://spotfire.tibco.com/support.

The release notes (relnotes.pdf), available from both the server landing page and on the installation media, contain a list of known issues in the version at the time of release.

**MySQL Dropped Connections**

This known issue is a characteristic of MySQL when it is left idle for a given period of time.

If you use MySQL as the job database you may experience dropped connections if TIBCO Spotfire® Statistics Services is idle for more than eight hours. As a result, the first request after the time-out occurs will fail. However, the failed request automatically re-establishes the connection and subsequent requests succeed.

To work around this issue, we recommend that you change the MySQL server `wait_timeout` environment variable. As an alternative, you can edit the `spserver.properties` file to modify the `database.url` value by appending `?autoReconnect=true` to the server URL. For more information on the `wait_timeout` or `autoReconnect` properties, see your MySQL Reference Manual.

**Troubleshoot R Engine Failures**

When you encounter problems with jobs running, and you are using the open-source engine, you should check to make sure that the rJava package is installed and working correctly.

Packages are not cross-platform compatible. The package developer must build the package specifically for each platform. In the case of open-source R binary packages, the developer must use an open-source R engine configured with the option `--enable-R-shlib` enabled.

Open-source R is available under separate open source software license terms and is not part of TIBCO Enterprise Runtime for R. As such, open-source R is not within the scope of your license for TIBCO Enterprise Runtime for R. Open-source R is not supported, maintained, or warranted in any way by TIBCO Software Inc. Download and use of open-source R is solely at your own discretion and subject to the free open source license terms applicable to open-source R.

If your open-source R jobs fail, and your log or error messages indicate that it cannot find the rJava package, you can check the following conditions:

**On Windows**

Make sure the rJava package is not installed in the `user` directory. When you call `install.packages`, you must provide the installation path, as recommended in Configuring an Open-Source R Engine on page 73.

In open-source R, you can run the following commands to discover if rJava is installed, where it is installed, and if it is installed correctly:

```r
.find.package("rJava")
.system.file("jri", package="rJava")
```
On UNIX/LINUX

When you try to install rJava using `install.packages()`, you might get the following error if your Java environment for R is not properly configured:

```bash
md64 -L/usr/local/lib64 -L/usr/java/packages/lib/amd64 -L/usr/lib64 -L/lib64 -L/usr/lib -L/lib -ljvm'
```

configure: error: Java Development Kit (JDK) is missing or not registered in R

Make sure R is configured with full Java support (including the JDK). Run the following command as root to add Java support to R:

```bash
R CMD javareconf
```

If you do not have root privileges, run the following command to set all Java-related variables, and then install rJava.

```bash
R CMD javareconf.
```

If you see the following error

```bash
ERROR: configuration failed for package "rJava"
* removing "/usr/local/lib64/R/library/rJava"
"/tmp/RtmpkNWoW5/downloaded_packages"
```

Updating HTML index of packages in `.Library`

Warning message:

```bash
In install.packages("rJava") :
installation of package 'rJava' had non-zero exit status
```

Run the following command:

```bash
env JAVA_HOME=/usr/java/jdk1.7.0_72 ./R CMD javareconf
```

Where `JAVA_HOME` is set to the path to the installed JDK.