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Production Management

FactoryTalk® ProductionCentre

PLANT OPERATIONS
RELEASE 10.4
SERVER INSTALLATION GUIDE – JBOSS ADVANCED

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Rockwell Automation

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Read Me First

In this chapter

Audience and Expectations

This book is intended for experienced professionals who understand their company's business needs, the technical terms used, and software dependencies described in this guide. We expect the user to be experienced with administering the following applications and technologies:

- Operating systems
- Web server environments
- Application server environments

This guide fully covers FactoryTalk® ProductionCentre (called FTPC hereafter) installation, but it assumes that the supporting network equipment and software are or can be installed. This document does not provide installation instructions for related components, like Internet connections, but it does describe configuration settings required to run this software.

Organization

This book contains the following chapters and appendixes:

- **Chapter 1, "Installation Checklists"** - Provides checklists for installing FTPC in different environments.
- **Chapter 2, "Operating System Products"** - Describes the installation and configuration of the supported operating systems.
- **Chapter 3, "Third-Party Application Server Software"** - Describes installation and configuration tasks relating to JBoss.
- **Chapter 4, "Deploy FTPC"**- Provides instructions for installing and configuring FTPC.
- **Chapter 5, "Connect to a Datasource"** - Provides instructions for configuring and initializing the database through FTPC Administrator.
- **Chapter 6, "Upgrade FTPC"** - Provides steps to upgrade FTPC.
- **Appendix A, "Understanding and Implementing Security"** - Describes the roles and groups used by FTPC and the security models that use this information.
- **Appendix B, "Clustering with FTPC"** - Provides instructions for setting up and deploying a clustered environment with FTPC.
- **Appendix C, "Troubleshooting"** - Provides troubleshooting tips.
- **Appendix D, "FTPC Performance"** - Provides suggestions for improving performance.
- **Appendix E, "Using the Shop Operations HMI Client"** - Provides instructions for downloading and using the Shop Operations HMI Client with a FactoryTalk View display.

- **Appendix F, "Shop Operations Server"** - Provides instructions for installing and operating Shop Operations Server from the administrative console.

Other Information Sources

In addition to this guide, you should review the following books, articles, and help topics.

Product Installation Documentation Set

This installation guide was designed to be used with the following guides, available at the FTPC software download web site:

- *FactoryTalk ProductionCentre Supported Platforms Guide* provides a list of supported hardware and software.
- *FactoryTalk ProductionCentre Database Installation Guide* provides instructions on installing and configuring the database.

Related Documentation

The following table lists other available documents (knowledge base articles) that are related to FTPC installation and upgrades.

Topic	Title	Location
Required third-party software installation and configuration	Third-party software documentation, such as *Getting Started with JBoss*.	Oracle, JBoss, or Microsoft web site or manual
Installation issues such as: • General installation and patches • Performance • Security	Keyword: • Install • Performance • Security	FTPC online knowledge base

Solutions and Technical Support

To read knowledge base articles, contact Rockwell Automation Technical Support.

Types of User Logins

FTPC installations require the following types of user logins: an Operating System login, an FTPC Administrator login, and an FTPC login.

- **Installation (or Operating System) Login** allows the user to install and configure the operating system, JBoss, and FTPC.

The user must be added to the Administrator group on the machine where JBoss and FTPC will be installed.

IMPORTANT: **If JBoss Application Server is installed on a Linux machine, then the root user is necessary for the installation of JDK, JBoss, and FTPC.**

- **FTPC Administrator Login** allows the user to connect to, initialize, and migrate databases. Currently, the default username/password used for logging into FTPC Administrator is *admin/admin*. You can change the password in FTPC Administrator, but you cannot change the username.
- **FTPC User Login** is needed with the FTPC Custom Security Provider and allows the user to access the FTPC application through a web browser. A default administrative user is created during installation. The default username/password is *admin/admin.* Additional administrative uses are created in Process Designer by a user with the Administrator privileges who is using the FTPC Custom Security Provider. If you are using another security model, you must create the user according to those requirements.

NOTE: The default username/password used for logging into FTPC Administrator is not the same default administrative user is created during FTPC installation.

A database user with administrator privileges is also required to install and configure the databases. For information on creating this user, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Scheduling the Installation

During deployment, you must stop and start JBoss. In addition, you will change various JBoss attributes.

Before deploying and configuring FTPC, verify that no other users are using any applications or resources in JBoss. If other applications are running on the JBoss server, then perform the installation at a time when these applications will not be impacted.

Operating System Security

Rockwell Automation strongly recommends configuring security only after installing all FTPC products. If your company has strict security requirements, then review the solutions found in the FTPC knowledge base with the following search criteria:

- Product: Plant Operations

- Sub-Product: Installation
- Search Text: security

These solutions may provide information about securing your installation.

Chapter 1

Installation Checklists

In this chapter

The following installation checklists describe the workflow for the installation of FTPC in a new JBoss environment, an existing JBoss environment, or a cluster environment. For information on installing the database server, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Each step includes a page reference where you will find details and instructions about that step. Review the order and the referenced pages before you begin. Use the checklist/workflow to successfully complete the FTPC installation.

Use the checklists with *FactoryTalk ProductionCentre Supported Platforms Guide* for basic installation. For further guidance or site requirements not discussed, contact Rockwell Automation Technical Support.

New Single Application Server Checklist

The application server checklist describes the procedure for installing and configuring the software required to set up an application server that will serve an application and run transactions.

For instructions on database installation and configuration, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Table 1-1 FTPC Single Server Checklist - New

Step	Step	Page
1.	Review software and hardware requirements in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify you have the supported versions and sufficient hardware. Find the Supported Platforms Guide at the FTPC software download web site.	
2.	Make sure the database server software is installed and the required databases have been created and configured. Refer to the *FactoryTalk ProductionCentre Database Installation Guide* for instructions.	
3.	Review the Read Me First chapter, particularly: • "Other Information Sources" • "Types of User Logins" • "Scheduling the Installation" • "Operating System Security"	Pages: • 11 • 11 • 12 • 12
4.	Install the Operating system. • "Install Windows"[a] • "Install Linux"	Pages: • 24 • 24
5.	"Verify Network Connections"	Page 25
6.	"Verify Operating System Language Support"[b]	Page 25
7.	"Install the Web Browser"	Page 25
8.	"Install the Required JDK"	Page 29

Table 1-1 FTPC Single Server Checklist - New

Step	Step	Page
9.	"Stop Other HTTP Servers"	Page 30
10.	"Install the JBoss Software"	Page 30
11.	"Configure the JBoss Software"	Page 31
12.	If you will be running any Fit-For-Purpose application on FTPC: • "Configure the X-Frame-Options HTTP Response Header" • "Enable SSL for Encryption"	 Page 35 Page 36
13.	"Verify the JBoss Installation"	Page 39
14.	"Install Tomcat"	Page 41
15.	"Download the ActiveMQ Archives"	Page 43
16.	"Install and Configure ActiveMQ"	Page 43
17.	"Select and Configure the Security Model"	Page 44
18.	"Pre-Installation Preparation"	Page 50
19.	"Extract FTPC Deployment Files"	Page 50
20.	"Update the JBoss Configuration File"	Page 53
21.	"Configure Online Help and Download Files"	Page 59
22.	"Prepare the Applications"	Page 59
23.	"Obtain the Required JDBC Drivers"	Page 64
24.	"Deploy the Applications"	Page 65

[a]FAT file system is not supported.
[b]If using FTPC message object, verify the operating system provides language support.

New FTPC Client Checklist

The FTPC client checklist describes the installation and configuration procedures for the FTPC client.

Table 1-2 FTPC Client Checklist - New

Done?	Step	Page
1.	Review software and hardware requirements in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify you have the supported versions and sufficient hardware. Find the Supported Platforms Guide at the FTPC software download web site.	
2.	Review the Read Me First chapter, particularly: • "Other Information Sources" • "Types of User Logins" • "Scheduling the Installation" • "Operating System Security"	Pages: • 11 • 11 • 12 • 12
3.	Install the Operating system • "Install Windows"	Pages: • 24
4.	"Verify Network Connections"	Page 25
5.	"Verify Operating System Language Support"[a]	Page 25
6.	"Install the Web Browser"	Page 25

[a]If using FTPC message object, verify that the operating system provides language support.

New Clustered Application Server Checklist

The clustered application server checklist describes the procedure for installing and configuring the software required to set up an application server that will serve an application and run transactions. For instructions on database installation and configuration, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Table 1-3 FTPC Clustering Servers Checklist - New

Done?	Step	Page
1.	Review software and hardware requirements in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify you have the supported versions and sufficient hardware. Find the Supported Platforms Guide at the FTPC software download web site.	
2.	Make sure the database server software is installed and the required databases have been created and configured. Refer to the *FactoryTalk ProductionCentre Database Installation Guide* for instructions.	

Table 1-3 FTPC Clustering Servers Checklist - New

Done?	Step	Page
3.	Review the Read Me First chapter, particularly: • "Other Information Sources" • "Types of User Logins" • "Scheduling the Installation" • "Operating System Security"	Pages: • 11 • 11 • 12 • 12
4.	Install the Operating system on every cluster node. • "Install Windows" Server • "Install Linux"	Pages: • 24 • 24
5.	"Verify Network Connections" at both client and cluster node.	Page 25
6.	"Verify Operating System Language Support"[b] for each cluster node.	Page 25
7.	"Install the Web Browser" on the client machine.	Page 25
8.	"Install the Required JDK" on each cluster node.	Page 125
9.	"Stop Other HTTP Servers" on each cluster node.	Page 126
10.	"Install and Configure the JBoss Software" on the first cluster node.	Page 127
11.	"Download the ActiveMQ Archives" on the first cluster node.	Page 136
12.	"Configure the Mod_Cluster Load Balancer (Optional)"	Page 136
13.	If you will be running any Fit-For-Purpose application on FTPC, perform the following on each cluster node. • "In order to prevent a malicious third-party website from hosting a Fit-For-Purpose application in an iframe and, therefore, being able to intercept events and information being sent to that application, configure your web server to include the X-Frame-Options HTTP response header set it to one of the following:" • "Enable SSL for Encryption"	Page 143 Page 144
14.	"Verify the JBoss Installation"	Page 148
15.	"Select and Configure the Security Model" on the first cluster node.	Page 150
16.	"Extract FTPC Deployment Files" on the first cluster node.	Page 150
17.	"Obtain the Required JDBC Drivers" on the first cluster node.	Page 150
18.	"Prepare the Production Database"	Page 151
19.	"Configure Online Help and Download Files"	Page 151
20.	"Prepare the Applications"	Page 151
21.	"Deploy the Applications" for the first cluster node.	Page 157

Table 1-3 FTPC Clustering Servers Checklist - New

Done?	Step	Page
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23.	"Configure Additional Nodes" after the first node is running.	Page 163

[a]FAT file system is not supported.
[b]If using an FTPC message object, verify the operating system provides language support.

Upgrade Single Application Server Checklist

The FTPC application server upgrade checklist describes the procedure for installation on the supported RDBMS and operating system combinations.

For instructions on database installation and configuration, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Table 1-4 FTPC Application Server Checklist - Upgrade

Done?	Step	Page
1.	Review software and hardware requirements in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify you have the supported versions and sufficient hardware. Find the Supported Platforms Guide at the FTPC software download web site.	
2.	Update the required third-party software if necessary.	
3.	"Pre-Upgrade Preparation"	Page 78
4.	"Extract FTPC Deployment Files"	Page 81
5.	"Configure Online Help and Download Files"	Page 81
6.	"Prepare the Applications"	Page 82
7.	"Deploy the Applications"	Page 85
8.	"Upgrade FTPC Administrator"	Page 86
9.	"Additional Upgrade Activities"	Page 87

Upgrade Clustered Application Server Checklist

The clustered application server checklist describes the procedure for upgrading and configuring the software required to set up an application server that will serve an application and run transactions. For instructions on database installation and

configuration, refer to the *FactoryTalk ProductionCentre Database Installation Guide*.

Table 1-5 FTPC Clustered Application Server Checklist - Upgrade

Done?	Step	Page
1.	Review software and hardware requirements in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify you have the supported versions and sufficient hardware. Find the Supported Platforms Guide at the FTPC software download web site.	
2.	Update the required third-party software if necessary.	
3.	"Pre-Upgrade Preparation" on the first cluster node.	Page 78
4.	"Extract FTPC Deployment Files" on the first cluster node.	Page 81
5.	"Configure Online Help and Download Files" on a node that will be running Tomcat.	Page 81
6.	"Prepare the Applications",	Page 82
7.	"Deploy the Applications", copying the new FTPC EAR file to each node's deployment folder.	Page 85
8.	"Upgrade FTPC Administrator" on the node that FTPC Administrator will be running from.	Page 86
9.	"Additional Upgrade Activities" after the first node is running.	Page 87

Chapter 2

Operating System Products

In this chapter

Install Windows

See the *FTPC Supported Platforms Guide* for a list of specific Windows, Windows Server, and Windows service pack versions supported on the FTPC application server and clients.

NOTE: If you will be launching FTPC applications (i.e., Process Designer or Shop Operations) using Java Web Start, make sure your client machine has a Java version higher than 1.5 installed and that the JAVA_HOME environment variable is defined.

For application server installations, the NTFS file system must be used. Client machines can use any file system.

If JBoss and FTPC will be installed on a new machine, then a Windows administrator should follow the Microsoft documentation to install the operating system. The default installation selections support FTPC.

If your company has strict security requirements, then review the solutions found at the FTPC knowledge base with the following search criteria:

- Product: FactoryTalk ProductionCentre
- Sub-Product: Installation
- Search Text: security

These solutions may provide information about securing your installation. Rockwell Automation also recommends configuring security after installing FTPC products.

Install Linux

FTPC supports deploying the FTPC applications on a Linux machine through a Windows client machine. A Linux administrator should follow the Linux documentation to install the operating system on a machine where you will install the JBoss Application Server software. The default installation selections support FTPC.

NOTE: If you are on Linux 7.0, update the software before installing any FTPC products. by going to Applications > System Tools > Software Update. Select all your software and update them. This operation will take a few minutes depending on your hardware and network conditions.

IMPORTANT: **If you install JBoss Application Server on a Linux machine, you must also have a Windows client machine. FTPC Administrator, Process Designer, and Shop Operations must be deployed and configured from a Windows machine. FTPC Administrator, Process Designer, and Shop Operations, should run from the Windows client machine as well. If you have specific security requirements, FTPC recommends configuring your security after installing FTPC products.**

Verify Network Connections

The JBoss and FTPC machines and any FTPC clients must be connected over the network using TCP/IP. See Microsoft Windows documentation for information about network setup and configuration.

If you are setting up a cluster environment, make sure that client machine can link to the server or every cluster node.

Linux System

You should check the hosts file in the /etc/ directory carefully to verify that an entry exists for the IP address used by the administrator. For example:

```
127.0.0.1 localhost
<jboss_server_ip> <jboss_server_host_name>
```

Verify Operating System Language Support

If you are planning to use the Process Designer **Message object** to localize your applications, you must have operating system locale support on the JBoss machine and all the clients. Verify that you have the operating system support for the language in the message object. After installing FTPC, see the Process Designer Online Help for more information about setting your locale and display language.

Install the Web Browser

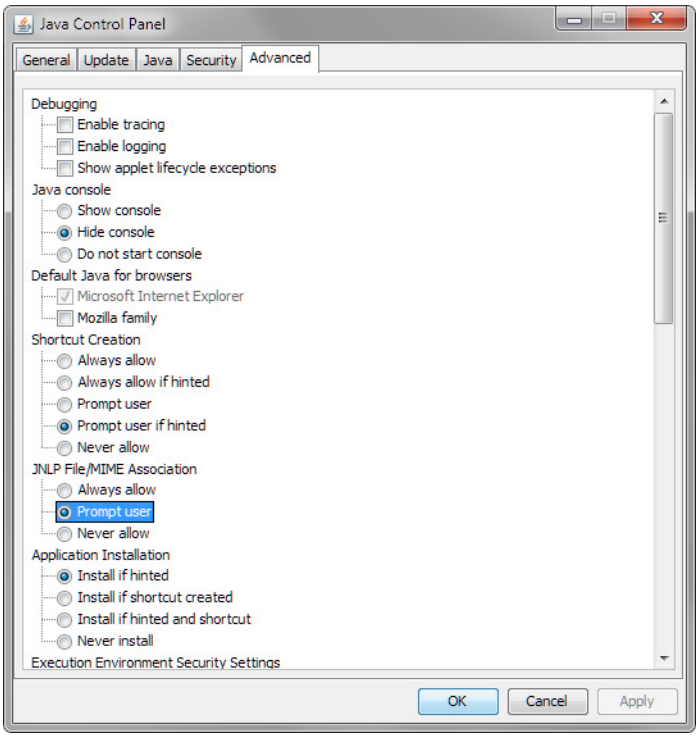
FTPC supports Internet Explorer, Google Chrome and Edge on Windows 10. For more information about the exact versions that FTPC supports, please review the *FactoryTalk ProductionCentre Supported Platforms Guide*.

TIP: From the Java Control Panel, you can enable Java content for your browser and configure security levels.

Configure the Java JNLP Setting

In order to launch the FTPC applications, set your Java JNLP setting to at least **Prompt User** (Control Panel > Java > Advanced Tab > "JNLP File/MIME Association).

Figure 2-1: JNLP File/MIME Association Setting



Chapter 3

Third-Party Application Server Software

In this chapter

Install the Required JDK

To run and configure FTPC application components, you must have a JDK installed on your application server machine. Refer to the *FactoryTalk ProductionCentre Supported Platforms Guide* for the supported JDK versions. When installing the JDK, ensure that the installation directory does not contain any spaces. For all other options, accept the defaults. If prompted, restart your machine after the installation.

Once the JDK is installed, you must add the directory to the JAVA_HOME environment variable. To add the directory, perform the following:

Windows

1. From the Start menu, select Settings > Control Panel > System.
2. Select the Advanced tab.
3. Click [Environment Variable].
4. Perform one of the following:
   - If a JAVA_HOME variable already exists, change the value to the JDK installation directory, such as C:\jdk1.8.0_<*version*>.
   - If a JAVA_HOME variable does not exist, add the variable and set the value to the JDK installation directory, such as C:\jdk1.8.0_<*version*>.
5. Click [OK] to set the value and return to the Advanced tab, and then click [OK] to close the dialog.

Linux

NOTE: These instructions assume that you are using a bash shell. If you are using another type, you should consult your administrator for details to set up the JAVA_HOME variable.

---

1. Log in to the Linux machine as the root user.
2. Install the required JDK, accepting all defaults.
3. If you are using a bash shell to start the JBoss server, open a shell and enter:

   ```
   #vi /root/.bashrc
   ```

4. Add the following lines to this file. If the entry already exists, find and modify it as follows.

   ```
   export JAVA_HOME=<java_install_directory>
   export PATH=$JAVA_HOME/bin:$PATH
   ```

5. Save and exit from the editor.

6. From the open shell, enter:

```
#source /root/.bashrc
```

7. Enter the following from the command line to verify that the correct Java version is available:

```
java -version
```

The resulting version should be the version of JDK you just installed. If not, there may be errors in your code. Check your work and try again.

Stop Other HTTP Servers

Before you can install JBoss server on the machine, you should stop any other web servers. If IIS, Apache, or any other HTTP Server is started, it may interfere with the installation.

To stop the servers:

Windows

1. Select Start > Settings > Control Panel > Administrative Tools > Services.
2. If the World Wide Web Publishing Service is running, stop the service.
3. Set the Startup Type to *Manual*
4. Stop any other HTTP servers or applications using port 80, and set the Startup Type to *Manual*.
5. Click [OK].
6. Close the window.

Linux

1. Open a shell and enter the following command, taking special notice of the related port, such as 80, 8080, etc.:

```
#netstat -lnp
```

2. Enter the following command:

```
/etc/init.d/process name stop
```

Install the JBoss Software

For detailed JBoss installation instructions, refer to the JBoss documentation. For information on supported JBoss versions, refer to the *FactoryTalk ProductionCentre Supported Platforms Guide*.

IMPORTANT: **A JBoss administrator should perform the JBoss installation and configuration. Make sure that only authorized users can make changes to your JBoss configuration files. Please see your JBoss documentation for recommendations on file permission security.**

To install JBoss, perform the following steps:

1. Download the JBoss EAP ZIP file from the Red Hat website.
2. Create a folder on your application server machine where you would like to extract JBoss to or select an existing folder to use. The directory path should not contain any spaces.
3. Extract all the files in the JBoss ZIP package into the designated directory.
4. Download the JBoss EAP patch file from the Red Hat website.
5. Launch JBoss.
6. Run the following commands from JBOSS_HOME:

   - **Unix-based systems**:

   ```
   bin/jboss-cli.sh
   [disconnected /] connect
   [standalone@localhost:9999 /] patch apply /[path to jboss-eap-<version>-patch.zip]
   [standalone@localhost:9999 /] shutdown --restart=true
   ```

   - **Windows-based systems**:

   ```
   bin\jboss-cli.bat
   [disconnected /] connect
   [standalone@localhost:9999 /] patch apply [path to jboss-eap-<version>-patch.zip]
   [standalone@localhost:9999 /] shutdown --restart=true
   ```

   The commands can also be combined into a single line, as shown in the following example:

   ```
   jboss-cli.bat -c --commands="connect,patch apply [path to jboss-eap-<version>-patch.zip] --override-all,shutdown --restart=true"
   ```

For more information on installing JBoss, refer to the *JBoss Enterprise Application Platform Installation Guide*.

Configure the JBoss Software

After the JBoss files are unzipped, you must configure several files to run FTPC. Perform the steps in the following sections to prepare the application server machine.

NOTE: In the following sections, <*JBoss_install*> is the installation directory of the JBoss server. Configuration changes are made to the /all directory, which is the configuration choice when users start JBoss.

Define the ProductionCentreRealm

Add the ProductionCentreRealm to your JBoss configuration file.

1. Open standalone-full.xml in a text editor. This file is located at <*JBoss_home*>\standalone\configuration.
2. Add the ProductionCentreRealm under <security-realms> as follows:

```
<security-realm name="ProductionCentreRealm">
  <authentication>
     <jaas name="ProductionCentre"/>
  </authentication>
</security-realm>
```

3. Save and close your file.

Define the Transaction Timeout

Define the transaction timeout in your JBoss configuration file.

1. Open standalone-full.xml in a text editor. This file is located at <*JBoss_home*>\standalone\configuration.
2. Locate the following subsystem:

```
<subsystem xmlns="urn:jboss:domain:transactions:3.0">
```

3. Add the following line to the subsystem:

```
<subsystem xmlns="urn:jboss:domain:transactions:3.0">
    ....
    <coordinator-environment default-timeout="600"/>
</subsystem>
```

4. Save and close your file.

Configure the JBOSS_HOME Variable

Windows

1. From the Start menu, select Settings > Control Panel > System.
2. Select the Advanced tab.
3. Click [Environment Variable].

4. Perform one of the following:
   - If a JBOSS_HOME variable already exists, change the value to the JBoss installation directory, such as C:\jboss-eap-7.x.
   - If a JBOSS_HOME variable does not exist, add the variable and set the value to the JBoss installation directory, such as C:\jboss-eap-7.x.
5. Click [OK] to set the value and return to the Advanced tab, and then click [OK] to close the dialog.

Linux

1. Open a shell and enter the following:

   ```
   #vi /root/.bashrc
   ```

2. Add the following lines to the bashrc file. If the entry already exists, find and modify it.

   ```
   export JBOSS_HOME=<JBoss_install>
   export PATH=$JBOSS_HOME/bin:$PATH
   ```

3. Save and exit from the vi editor.
4. Open a shell and enter the following:

   ```
   #source /root/.bashrc
   ```

5. Verify the JBoss installation.

Configure Explicit Binding to a Network Interface (Optional)

If the machine where you installed JBoss contains more than one network interface, you can configure JBoss to explicitly bind to one network interface when you start JBoss. To do so, start JBoss at the command line with the -b option to specify the IP address of the network interface to bind to. For example, if you are starting JBoss from the command line in Windows, run:

```
<JBoss_install>\bin\standalone.bat -c standalone-full.xml -b
192.100.100.1
```

where <*JBoss_install*> is the directory where you unzipped the JBoss files and **-b** sets the binding address.

Create a JBoss Administrative User

Make sure you have a JBoss administrative user named *admin* defined.

1. Launch a command prompt with administrative privileges.
2. Navigate to <*JBoss_install*>\bin, where *JBoss_install* is the file directory of your JBoss installation.
3. Run add-user.bat.
4. Select “a” to create a Management User.

5. Define the user name as *admin*.
6. Define a password, and then confirm the password.
7. When asked to define the groups of the user, leave this blank. Respond to any remaining prompts as needed.
8. Enter "yes" on the final confirmation prompt. The user name and password will be used for the --user and --pwd inputs for the RegisterServer command.

Define Client Logging Level

To define client logging levels, perform the following steps.

1. Navigate to <*Client_home*>\<*hostname*>\ProductionCentre\logs where:
   - <*Client_home*> is the FTPC client home. This is C:\.FTPC by default. See "Define the Download Location (Optional)" on page 63 for instructions on defining the client home.
   - <*hostname*> is the name of your application server machine.
2. Open the log.config file and locate and define the following line:

   ```
   PlantOpsClientLogLevel=<logging_level>
   ```

   when this variable is defined it restricts the logging information that is recorded in the PlantOpsClient log.

   The default is set at SEVERE.

   TIP: Common levels that are used to filter log messages include **ALL**, **SEVERE**, and **INFO**.

3. Save and close log.config.

Remove the MetaspaceSize Parameters

Remove the JBoss server's MetaspaceSize parameters by performing the following steps:

1. In <*JBoss_install*>\bin, open the standalone.conf.bat file in a text editor.
2. Search for the following line:

   ```
   set "JAVA_OPTS=-Xms1G -Xmx1G -XX:MetaspaceSize=96M -
   XX:MaxMetaspaceSize=256m"
   ```

3. Delete the MetaspaceSize parameters so that the line now looks like the following:

   ```
   set "JAVA_OPTS=-Xms1G -Xmx1G
   ```

4. Save and close your file.

Fit-For-Purpose Configurations

The sections described here are only required if you will be running any Fit-For-Purpose applications (e.g., Modular Framework, Production Management, etc.) on FTPC.

Configure the X-Frame-Options HTTP Response Header

In order to prevent a malicious third-party website from hosting a Fit-For-Purpose application in an iframe and, therefore, being able to intercept events and information being sent to that application, configure your web server to include the X-Frame-Options HTTP response header set it to one of the following:

- **NONE**: the Fit-For-Purpose application cannot be hosted in an iframe.
- **SAMEORIGIN**. an application can be developed on the same web server that hosts a Fit-For-Purpose application in an iframe. Use this option if you want to include an MES application in addition to other applications in a wrapper application. This is the recommendation.

1. Open your JBoss standalone-full.xml file located at <*JBoss_install*>\jboss\standalone\configuration.
2. Locate the Undertow subsystem.

```
<subsystem xmlns="urn:jboss:domain:undertow:3.1">
```

3. In the filters tag, add a new response-header tag as follows:

```
<filters>
  <response-header name="x-frame-options-header" header-
name="X-Frame-Options" header-value="SAMEORIGIN"/>
  ...
</filters>
```

4. In the server tag's host tag, add a new filter-ref tag as follows:

```
<server name="default-server">
  ...
  <host name="default-host" alias="localhost">
    ...
    <filter-ref name="x-frame-options-header"/>
  </host>
</server>
```

5. Save and close your file.

Enable SSL for Encryption

Perform the steps outlined in these sections to enable Secure Sockets Layer (SSL) for data encryption.

The purpose of these instructions is to set up SSL in a way that will force FTPCApps to be used over SSL but will not affect the operation of FTPC remote clients (e.g., Shop Operations, Shop Operations Server, and Process Designer).

Create the Required Security Components

To enable SSL, you need to create keystores, a self-signed certificate, and trustores. The following steps show how to complete this process with a self-signed certificate. You will want to consider using a certificate issued from a trusted certificate authority.

1. Open a command window and go to <*JBoss_home*>\standalone\configuration

   ```
   cd $JBOSS_HOME\standalone\configuration
   ```

2. Create a private/public key pair with the keytool:

   ```
   %JAVA_HOME%\bin\keytool -genkeypair -alias jboss-ssl -keyalg
   RSA -keystore server.keystore -storetype JKS -validity 1095


   Enter keystore password: yourpassword
   What is your first and last name? First Last
   What is the name of your organizational unit? XYZ Unit
   What is the name of your organization? Company Inc
   What is the name of your City or Locality? My City
   What is the name of your State or Province? XX
   What is the two-letter country code for this unit? US
   …[no]: Enter yes to confirm
   Enter a key password for <jboss-ssl>: Press RETURN to use the
   same keystore password.
   ```

   This creates the server.keystore file that contains the newly-generated public and private key pair.

Configure the JBoss Configuration File

After your SSL components have been created, update your JBoss standalone-full.xml file located at <*JBoss_install*>\jboss\standalone\configuration.

1. Make a copy of your original standalone-full.xml file and rename the copy standalone-full-ssl.xml.
2. Open standalone-full-ssl.xml in a text editor.

3. Add a keystore and truststore to the ProductionCentreRealm by changing the following:

```
<security-realm name="ProductionCentreRealm">
  <authentication>
     <jaas name="ProductionCentre"/>
  </authentication>
</security-realm>
```

to the following:

```
<security-realm name="ProductionCentreRealm">
   <server-identities>
      <ssl>
         <keystore path="server.keystore" relative-
to="jboss.server.config.dir" keystore-
password="yourpassword"/>
      </ssl>
   </server-identities>
   <authentication>
      <truststore path="server.truststore" relative-
to="jboss.server.config.dir" keystore-
password="yourpassword"/>
      <jaas name="ProductionCentre"/>
   </authentication>
</security-realm>
```

4. If security-domain for jmx-console is configured, change the configuration for the security-domain to use the *Remoting* and *RealmDirect* login modules:

```
<security-domain name="jmx-console" cache-type="default">
   <authentication>
      <login-module code="Remoting" flag="optional">
         <module-option name="password-stacking"
value="useFirstPass"/>
      </login-module>
      <login-module code="RealmDirect" flag="required">
         <module-option name="password-stacking"
value="useFirstPass"/>
      </login-module>
   </authentication>
</security-domain>
```

5. Configure UnderTow to have an https-listener and to redirect HTTP access to /FTPCApps to the HTTPS URL:

```
<subsystem xmlns="urn:jboss:domain:undertow:3.1">
   <buffer-cache name="default"/>
   <server name="default-server">
      <http-listener name="default" redirect-socket="https"
socket-binding="http"/>
      <https-listener name="https" verify-
client="NOT_REQUESTED" security-realm="ProductionCentreRealm"
socket-binding="https"/>
   <host name="default-host" alias="localhost">
      <location name="/" handler="welcome-content"/>
          ...
        <filter-ref name="http-to-https"
predicate="equals(%p,8080) and path-prefix['/FTPCApps']"/>
   </host>
      ...
   <filters>
      ...
      <rewrite name="http-to-https" redirect="true"
target="https://%A:8443%U"/>
   </filters>
</subsystem>
```

6. Save and close your file.

Enforce Security Version

In order to disallow any attempts by TLS/SSL to negotiate down to a version prior to 1.1, please perform the instructions outlined in the following Red Hat solution: https://access.redhat.com/solutions/1364853

Enable Debug Logging (Optional)

To enable SSL debug logging, perform the following steps.

1. Open the standalone.conf file located at <*JBoss_install*>\jboss\bin.
2. Add the following line:

```
JAVA_OPTS="$JAVA_OPTS -Djavax.net.debug=ssl:handshake"
```

3. Save and close your file.
4. Open the standalone-full-ssl.xml file located at <*JBoss_install*>\jboss\standalone\configuration.

5. Add the following lines to enable TRACE level logging.

```
<logger category="org.jboss.as.domain.management.security">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.remoting">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.sasl">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.as.security">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.security">
   <level name="TRACE"/>
</logger>
<logger category="org.undertow">
   <level name="TRACE"/>
</logger>
```

6. Save and close your file.

Verify the JBoss Installation

Windows

To verify that JBoss was installed properly:

1. Select Start > Run.
2. In the Open dialog, enter `cmd`, and then click [OK].
3. Enter the following in one line at the command prompt to start the JBoss Server:

   ```
   <JBoss_install>\bin\standalone.bat -c standalone-full.xml -b
   x.x.x.x
   ```

   where <*JBoss_install*> is the directory where you unzipped the JBoss files and x.x.x.x is the binding address.

4. Access the JBoss home page at http://<*Machine_Name*>:<*Port*>, where <*Machine_Name*> is the name of the application server machine where FTPC will be deployed and <*Port*> is the HTTP port, such as 8080.

   If JBoss was successfully installed and started, you should see the JBoss home page.

IMPORTANT: **If you have enabled SSL according to the instructions in "Enable SSL for Encryption" on page 36, start JBoss by running the following command line:**

<*JBoss_install*>\bin\standalone.bat -c standalone-full-ssl.xml -b 0.0.0.0

If SSL debug logging has been enabled, run the following:

<*JBoss_install*>\bin\standalone.bat -c standalone-full-ssl.xml -b 0.0.0.0 -Djavax.net.debug=ssl:handshake

Linux

1. Log in to the Linux machine as the root user.
2. Enter the following at the command prompt to start the JBoss Server:

   ```
   <JBoss_install>/bin/./standalone.sh -c standalone-full.xml -b x.x.x.x
   ```

   where <*JBoss_install*> is the directory where you unzipped the JBoss files and x.x.x.x is the binding address.

NOTE: If you have already run JBoss, you must restart it.

3. Access the JBoss home page at http://<*Machine_Name*>:<*Port*>, where <*Machine_Name*> is the name of the application server machine where FTPC will be deployed and <*Port*> is the HTTP port, such as 8080.

IMPORTANT: **If you have enabled SSL according to the instructions in "Enable SSL for Encryption" on page 36, start JBoss by running the following command line:**

<*JBoss_install*>/bin/./standalone.sh -c standalone-full-ssl.xml -b x.x.x.x

If SSL debug logging has been enabled, run the following:

<*JBoss_install*>/bin/./standalone.sh -c standalone-full-ssl.xml -b x.x.x.x -Djavax.net.debug=ssl:handshake

Install Tomcat

Tomcat is required for the following functions:

- It is the server for the online help files.
- It is the server for FTPC Administrator.
- It is the server for additional downloadable files that are accessed from the FTPC downloads page, such as Shop Operations Server. For more information about Shop Operations Server, see "Shop Operations Server" on page 191.

IMPORTANT: **If Tomcat is installed on the same machine as the application server, the default port (8080) must be changed to prevent a port conflict. We recommend installing Tomcat on a different machine, especially if you are planning on setting up a cluster environment.**

The Tomcat installer is available at www.apache.org. Follow the Tomcat documentation to install Tomcat. Refer to the *FactoryTalk ProductionCentre Supported Platforms Guide* for the supported Tomcat and operating system versions.

To install Tomcat, perform the following steps:

1. Download the Tomcat ZIP file.
   - Download the **64-bit version** if you are running on Windows.
   - Download the **64-bit version** if you are running on Linux.
2. Create a folder on the machine where you would like to install Tomcat, or select an existing folder to use. The directory path cannot contain any spaces. Note this location as you will need it for future reference.
3. Extract all the files from the Tomcat zip package into the designated directory.

Configure the Heap Memory Size (Optional)

To configure Tomcat's heap memory size, perform the following steps:

1. In Windows Explorer, navigate to the <*Tomcat_install*>\bin directory. This is the location you configured in "Install Tomcat" on page 41.
2. Run tomcat<*version*>.exe.
3. Select the Java tab and enter Initial memory pool and Maximum memory pool values. The Maximum memory pool should not exceed the physical memory on the server.

NOTE: Depending on the needs of your application, you may need to increase the size of the Initial Memory and Maximum Memory pools.

4. Select Start > Settings > Control Panel > Administrative Tools > Services.
5. Stop, then restart the Tomcat service.

IMPORTANT: If you restart JBoss for any reason after Tomcat has been started, you must restart Tomcat.

Configure the Session Timeout (Optional)

To increase Tomcat's default session timeout to a value larger than the default 30 minutes, perform the following steps:

1. In Windows Explorer, navigate to the <*Tomcat_install*>\conf directory.
2. Open the web.xml file and look for the <session-timeout> element.
3. Change the element to a value larger that 30.
4. Stop, and then restart the Tomcat service.

Configure the Maximum File Size (Optional)

To configure Tomcat's maximum file size, perform the following steps:

1. In Windows Explorer, navigate to the <*Tomcat_install*>\webapps\manager\WEB-INF directory.
2. Open the web.xml file and look for the <max-file-size> element.
3. Save and close the web.xml file.
4. Stop, and then restart the Tomcat service.

Configure the JAVA_HOME Variable

IMPORTANT: Tomcat's JAVA_HOME must point to a 64-bit JDK directory if running on Windows or a 64-bit JDK directory if running on Linux.

If you will be running more than one application that uses a JRE or JDK on the application server, it is highly recommended that you set the JAVA_HOME variable for each Tomcat instance separately. To do this:

1. Navigate to the <*Tomcat_install*>\bin directory.
2. In a text editor, open the startup.bat file.
3. Enter script that defines the JAVA_HOME variable for this Tomcat instance. For example:

```
@title=Starting Servers
set ADVANTAGE_HOME=c:\Program Files\Rockwell Software\
```

```
Advantage
set JAVA_HOME=%ADVANTAGE_HOME%\j2sdk
set CATALINA_HOME=%ADVANTAGE_HOME%\tomcat\bin\startup.bat
%ADVANTAGE_HOME%\tomcat\bin\startup.bat
```

4. Stop, and then restart the Tomcat service.

Download the ActiveMQ Archives

The ActiveMQ-<*version*>.rar file contains the ActiveMQ <*version*> archives required for deploying ActiveMQ on JBoss as a module

1. Download the activemq-rar-<*version*>.rar file from the following URL:

   http://repo1.maven.org/maven2/org/apache/activemq/activemq-rar/<*version*>/

2. Create this path: <*JBoss_Install*>\modules\system\layers\base\org\apache\activemq\main
3. Change the extension of the ActiveMQ-<*version*>.rar file to .zip (i.e., ActiveMQ-<*version*>.zip).
4. Extract the contents of the ActiveMQ-<*version*>.zip file to <*JBoss_Install*>\modules\system\layers\base\org\apache\activemq\main.

Install and Configure ActiveMQ

ActiveMQ is required to run FTPC Administrator as well as the following features configured in FTPC Administrator:

- **Keyed Object Change Event Broadcasting (Enabled by default)**: when enabled, the middletier will broadcast an event to all clients using the Distributed Event infrastructure each time a top-level buildtime object (i.e., any object that can be created and configured in Process Designer) has been saved or deleted.
- **Server-Side Distributed Event Broadcasting (Disabled by default)**: when enabled, state change events are automatically broadcast to all registered listeners using an ActiveMQ topic. This feature is performed on the server side, allowing other applications (for example, Quality Management) to also listen for state change events.
- **Client-Side Distributed Event Broadcasting (Disabled by default)**: when enabled, state change events are automatically broadcast to all registered listeners using an ActiveMQ topic. This feature is performed on the client side, which does not allow other applications (for example, Quality Management) to also listen for state change events.

ActiveMQ can be downloaded from the Apache website or unzipped from the FTPC advanced ZIP file. For details on installing ActiveMQ, please refer to the official Apache ActiveMQ documentation. ActiveMQ does not need to be installed on the same system as FTPC Administrator or your application servers.

Once you have ActiveMQ installed, define the JMS connection information for your registered Production database using FTPC Administrator. (Please see the *FactoryTalk ProductionCentre Administrator User's Guide* for instructions.) Once the connection information is defined, please restart all applications servers connected to the registered database.

Select and Configure the Security Model

If you are not going to use the default FTPC security, you should choose and configure an alternate security model supported by the application server software. See Appendix A, "Understanding and Implementing Security" for more information about using FTPC security. See the appropriate JBoss documentation for information about the supported security models and instructions about setting them up.

If you will use the FTPC default security, the procedure for installing and configuring that capability appears later in this document.

Run JBoss as a Service

JBoss can be configured to run as a service in both Windows and Linux. Perform the instructions in this section for the relevant operating system.

TIP: For more information about running JBoss as a service, please refer to https://access.redhat.com/documentation/en-us/red_hat_jboss_enterprise_application_platform/7.0/html/installation_guide/configuring_jboss_eap_to_run_as_a_service.

Windows

IMPORTANT: If you choose to start JBoss server as a service, the user who starts the server must have administrator privileges on the computer where JBoss is being started.

To run JBoss as a service on Windows, perform the following steps.

1. Open the modules.zip file located at <*FTPC_install*>, where <*FTPC_install*> is the location where you extracted the FTPC ZIP file. Extract the contents of

modules.zip to <*JBoss_install*>, where <*JBoss_install*> is the directory where you unzipped the JBoss files.

2. Navigate to the <*JBoss_install*>\modules\native\sbin directory and open the service.bat file in a text editor. Add the following line at the top of the file:

   ```
   set JAVA_HOME=<JAVA_HOME>
   ```

   Where <*JAVA_HOME*> is the directory where you installed the JDK.

NOTE: Set the JAVA_HOME property to the appropriate paths for your system configuration.

---

3. Locate the following variable names:
   - SHORTNAME: This is the name of the JBoss service that will appear in the Services control panel.
   - DISPLAYNAME: This is the JBoss service display name as it will appear in the Services control panel.
   - DESCRIPTION: This is the description of the JBoss service that will appear in the Services control panel.

   Set their values as required for your system. For example:

   ```
   set SHORTNAME="JBossEAP7.0.6"
   set DISPLAYNAME="JBossEAP7.0.6"
   set DESCRIPTION="JBoss Enterprise Application Platform 7.0.6"
   ```

4. Save your work and close the file.
5. Navigate to <*JBoss_install*>\modules\native\sbin and run the following command to register JBoss as a service:

   ```
   service.bat install
   ```

6. (Optional) To start JBoss as a service from the command line, open a command window and enter the following command:

   ```
   net start JBossServiceName
   ```

   To stop JBoss as a service:

   ```
   net stop JBossServiceName
   ```

Linux

To run JBoss as a service on Linux, perform the following steps.

1. Navigate to the <*JBoss_install*>/bin/init.d directory and open the jboss-eap.conf file with a text editor.

2. Customize the start-up options in the jboss-eap.conf file. Locate or create the following lines and specify the correct values:

```
JBOSS_HOME=<JBoss_install>
JBOSS_USER=root
JBOSS_CONFIG=standalone-full.xml
JBOSS_OPTS="-b x.x.x.x"
```

   Where <*JBoss_install*> is your JBoss directory and x.x.x.x is the binding address. Once the correct values have been specified, save and close the file.

3. Using a text editor, open the jboss-eap-rhel.sh file located in the same directory.

   a. Locate the following text:

```
if [ -z "$JBOSS_CONFIG" ]; then
  JBOSS_CONFIG=standalone.xml
```

   b. Edit the second line to use standalone-full.xml:

```
JBOSS_CONFIG=standalone-full.xml
```

4. Open a command line interface.

5. Copy jboss-eap.conf to the /etc/default directory. To do this from the command line interface, enter the following lines:

```
[user@ host init.d]# sudo cp jboss-eap.conf /etc/default
```

6. Copy jboss-eap-rhel.conf from <*JBoss_install*>/bin/init.d to the /etc/init.d directory. Enter the following:

```
[user@ host init.d]# sudo cp jboss-eap-rhel.sh /etc/init.d
```

7. Add the new jboss-eap-rhel.sh service to a list of automatically started services. Enter the following on one line:

```
[user@ host init.d]# sudo chkconfig --add jboss-eap-rhel.sh
```

8. Modify execution permissions for the JBoss service. Enter the following statements, each on one line:

```
[user@ host init.d]# sudo chmod 755 /etc/init.d/jboss-eap-
rhel.sh
[user@ host init.d]# sudo chmod 755 <JBoss_install>/bin/
standalone.sh
```

9. Test the service by starting and stopping it.

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   To start the service:

```
[user@ host bin]# sudo service jboss-eap-rhel.sh start
```

   To stop the service:

```
[user@ host bin]# sudo service jboss-eap-rhel.sh stop
```

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To start the service:

```
[user@ host bin]# sudo service jboss-eap-rhel start
```

To stop the service:

```
[user@ host bin]# sudo service jboss-eap-rhel stop
```

If everything has gone correctly, you should get a green [OK]. If you instead get an error, check the error logs and make sure the paths in the configuration file are correct.

10. To add the service to a list of services that automatically start, issue the following command:

```
[user@ host init.d]# sudo chkconfig jboss-eap-rhel.sh on
```

JBoss starts automatically when the Red Hat Enterprise Linux reaches its default run-level, and stops automatically when the operating system goes through its shutdown routine.

Unregister the JBoss Service

To unregister the JBoss service you just created, perform the following steps:

For Windows:

1. Stop the JBoss service.
2. Navigate to <*JBoss_install*>\modules\native\sbin and run the following command.

```
service.bat uninstall
```

For Linux:

1. Stop the JBoss service.
2. Remove JBoss EAP from the list of services by running the following command:

```
sudo chkconfig --del jboss-eap-rhel.sh
```

3. Delete the service configuration file and start up script by running the following commands:

```
sudo rm /etc/init.d/jboss-eap-rhel.sh
sudo rm/etc/default/jboss-eap.conf
```

Chapter 4

Deploy FTPC

In this chapter

This chapter covers the steps for installing FTPC in a non-clustered environment.

TIP: In the following steps, <*JBoss_install*> is the installation directory of the JBoss server.

If you are upgrading to a newer version of FTPC, see "Upgrade FTPC" on page 77.

Pre-Installation Preparation

If you are using an Oracle database, the following privileges are required for the Oracle user.

- ALTER PROCEDURE
- CONNECT
- CREATE INDEX
- CREATE PROCEDURE
- CREATE TABLE
- CREATE TRIGGER
- CREATE VIEW
- EXECUTE PROCEDURE
- RESOURCE
- UNLIMITED TABLESPACE

For details, please refer to the *FactoryTalk ProductionCentre Database Installation Guide.*

Extract FTPC Deployment Files

The FTPC advanced self-extracting installer contains all of the deployment files for FTPC and is available from the FTPC download site.

NOTE: The following steps should be performed on a Windows client machine even if JBoss application server has been installed on a Linux machine.

To extract the FTPC deployment files, perform the following steps:

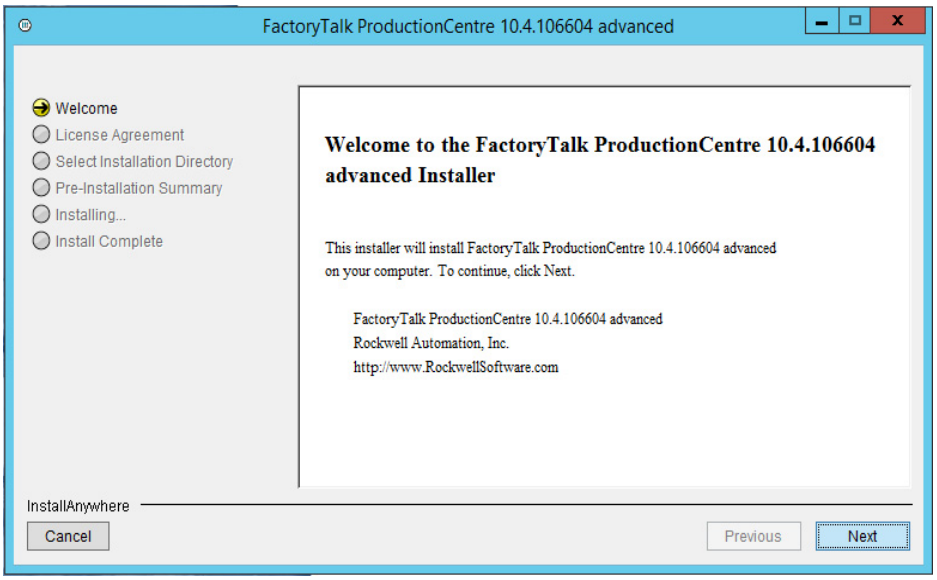
1. Log in to Windows as the Installation Administrator.
2. Navigate to the directory containing the FTPC advanced installer.

3. Right-click on sw-ProductionCentre-Plant Operations Server-<*version number*>-<*build number*>-JBossADV.exe and select *Run as administrator.*

IMPORTANT: No other users should be accessing JBoss during the deployment process. JBoss must be stopped and restarted during the FTPC deployment and configuration.

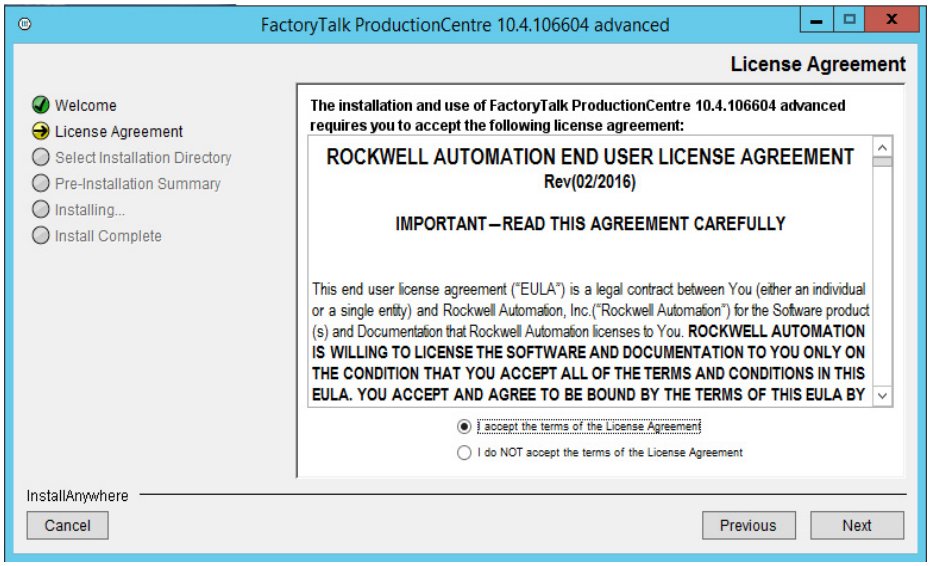
4. On the welcome screen, click [Next].

Figure 4-1: Welcome Screen



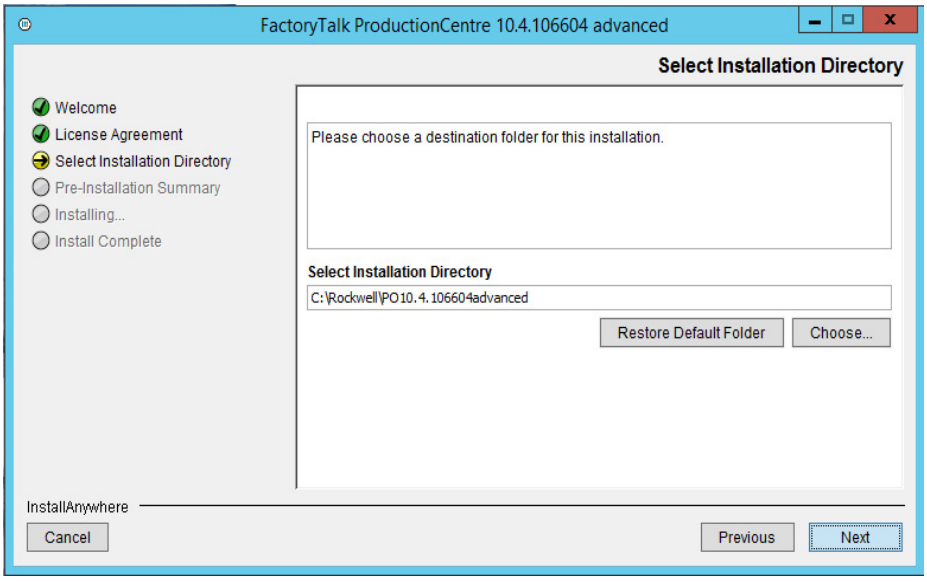
5. On the License Agreement screen, accept the license agreement, and then click [Next].

Figure 4-2: License Agreement



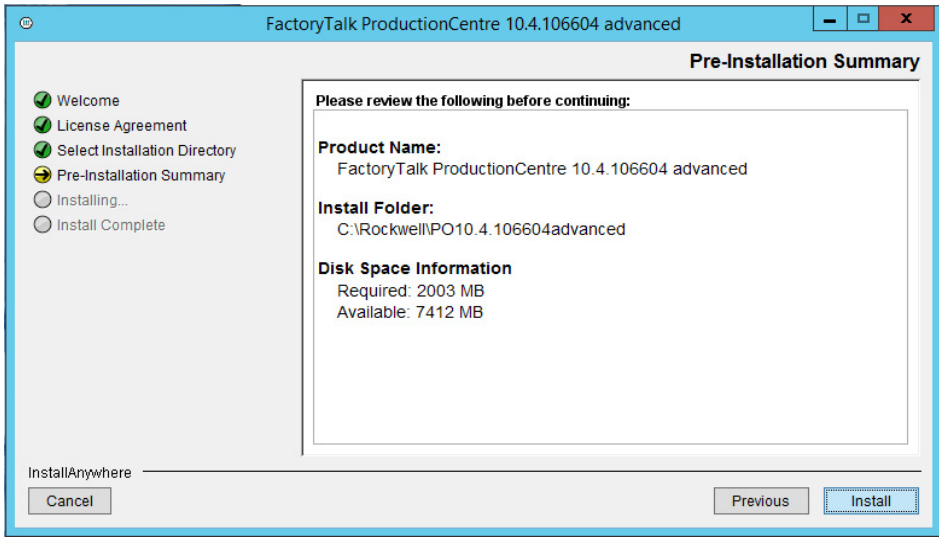
6. On the Select Installation Directory screen, accept the default location (C:\Rockwell\PO<*version*>.<*build*>advanced) or browse to a new location. Click [Next] once the directory has been specified.

Figure 4-3: Installation Directory



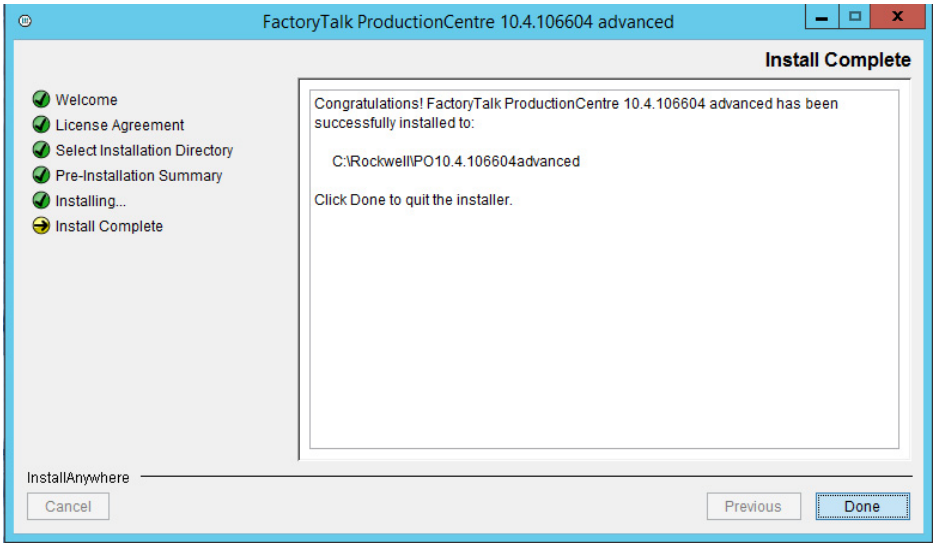
7. On the Pre-Installation Summary screen, click [Install] to start the installation. The installation process may take several minutes to complete.

Figure 4-4: Database Information



8. On the Installation Successful screen, click [Done].

Figure 4-5: Installation Successful



Once completed, the installation directory will contain the following files and folders:

- **jre**: this folder contains the Java Runtime Environment.
- **sw-ProductionCentre-Plant Operations Server-JBossADV**: this folder contains the extracted FTPC deployment files.

> **IMPORTANT: The directory path to this folder will be referred to as <*FTPC_install*> throughout the rest of this document.**

- **Uninstall**: this folder contains the uninstallation files.

Update the JBoss Configuration File

Perform the following steps to configure the JBoss standalone-full.xml file located at <*JBoss_install*>\standalone\configuration. Use this file to configure the following:

- Default Logging Priority Value (optional)
- Datasources
- User Authentication Window (optional)
- ActiveMQ resource adapter
- Security

Restart your application server after making the changes to the standalone-full.xml file.

TIP: A template standalone-full.xml file is provided for you at <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV\jbossSampleConfigTemplates. This template provides TODO comments that indicate a section that requires you to provide some configuration information. Do one of the following:

- If you have minimal or no JBoss customization, copy the template standalone-full.xml file into <*JBoss_install*>\standalone\configuration to overwrite the existing file. Then update the file with whatever JBoss customization you previously had before performing the steps in this section.

- If you have a lot of JBoss customization, compare your standalone-full.xml file with the provided template standalone-full.xml file and copy anything that appears in the template standalone-full.xml file into your standalone-full.xml file. Then search for the TODO comments in the template standalone-full.xml file and use them as a guide to make the required FTPC configurations outlined in this section in your existing standalone-full.xml file.

Configure the Default Logging Priority Value (Optional)

By default, the JBoss log file is set to INFO. To change this, search for *TODO: To change the default Logging Priority Value* and change the level name to your desired level (WARN, ERROR, etc.).

```
<subsystem xmlns="urn:jboss:domain:logging:3.0">
<console-handler name="CONSOLE">
<level name="INFO"/>
```

Configure Datasources

To define your datasources:

1. Search for the line *TODO: Define your database information.*
2. Find the section for your database type and uncomment it. The section for a SQL Server database is uncommented by default.
3. Search for the following place holders and replace them with your connection information:
   - **SQL Server**:
     - <*host*>: the hostname of the database server.

       TIP: For SQL Server database mirroring, replace <*host*> with the principle server hostname, mirror server hostname, and witness server hostname, separated by commas.

     - <*DatabaseName*>: the database name.

- **Oracle**:
  - <*host*>: the hostname of the database server.
  - <*SID*>: the Oracle System ID.
- **Oracle RAC**:
  - <*Scan_IP1*>: the Single Client Access Name (SCAN) of the first database server, <*Scan_IP2*>: the SCAN of the second database server, and so on.
  - <*port1*>: the port for the first database server (1521 is the default), <*port2*>: the port for the second database server, and so on.
  - <*service*>: the name of the service.

4. Search for *TODO: Define your Transaction Isolation setting* and make sure your transaction setting is set to READ COMMITTED. If the setting does not exist, add the following line:

```
<transaction-isolation>TRANSACTION_READ_COMMITTED</
transaction-isolation>
```

5. Search for *TODO: Define your database username and password* and define your database username and password.

```
<security>
    <user-name><username></user-name>
    <password><password></password>
</security>
```

> **NOTE:** The password is not encrypted by default. The application server relies on file security to keep the password secure.

6. After the </security> tag, verify that the validation section exists. If it does not exist, add the following:

```
<validation>
   <check-valid-connection-sql>select count(*) from
   SITE_INFO</check-valid-connection-sql>
   <background-validation>true</background-validation>
   <background-validation-millis>15000</background-
   validation-millis>
</validation>
```

7. Optionally, you can add a historical database (ODS) connection. To do so, copy and paste the <datasource ...>...</datasource> section from step 3, replace all mentions of PlantOperationsActiveDB with PlantOperationsHistoricalDB, and modify the database information as needed.
8. Search for *TODO: Define your database driver*s and define your database drivers.

- If you are using SQL Server, do nothing. The SQL Server driver is uncommented by default.
- If you are using Oracle or Oracle RAC, comment out the SQL Server section and uncomment the Oracle section.

Configure the User Authentication Window

By default the security credential is re-authenticated every 30 minutes. Therefore, if the logged-in user's password expires after they have logged onto the system, the user will not be kicked out of the system until the next re-authentication event.

If you want to reduce or lengthen this authentication window, then search for the line *TODO: Configure the user authentication window interval* and define the interval between re-authentication events. The default is 1800000 milliseconds (30 minutes).

```
<expiration max-idle="1800000"/>
```

If this property is set to 0, then JBoss will verify the user's security credentials each time an EJB call is made.

Configure the ActiveMQ Resource Adapter

NOTE: The ActiveMQ resource adapter needs to match the JMS Server URL defined in FTPC Administrator.

Configure the ActiveMQ resource adapter by performing the following steps:

Search for the line *TODO: Configure the ActiveMQ resource adapter* and replace the <*localhost*> place holder with your ActiveMQ server's hostname or IP address.

```
<config-property name="ServerUrl">
  failover:(tcp://
  <localhost>:61616)?startupMaxReconnectAttempts=15
</config-property>
```

Locate the following lines within <subsystem xmlns="urn:jboss:domain:ejb3:4.0">:

```
<mdb>
    <resource-adapter-ref resource-adapter-name="activemq-
rar.rar"/>
    <bean-instance-pool-ref pool-name="mdb-strict-max-pool"/>
</mdb>
```

Please note the resource adapter name (activemq-rar.rar) should be the same as the resource adapter ID in the following:

```
<subsystem xmlns="urn:jboss:domain:resource-adapters:4.0">
    <resource-adapters>
          <resource-adapter id="activemq-rar.rar">
...
    </resource-adapters>
```

Configure Max Pool Size and Thread Count

NOTE: The modifications in this section are only necessary if you are not using the provided template XML files.

To change the max pool size from the default value, search for the following line and replace the line **derive-size="from-worker-pools"** with **max-pool-size="40"**. The recommended value is 40.

```
<strict-max-pool name="slsb-strict-max-pool" derive-
size="from-worker-pools" instance-acquisition-timeout="5" in-
stance-acquisition-timeout-unit="MINUTES"/>
```

To increase the max thread count from the default value of 10, search for the following section and change the value of the “max-threads count” parameter. The recommended value is 80.

```
<thread-pool name="default">
    <max-threads count="10"/>
    <keepalive-time time="100" unit="milliseconds"/>
</thread-pool>
```

Configure Security

NOTE: If you use Oracle databases, do not use JBoss default security. This may prevent the database from being properly initialized in FTPC Administrator.

If you are using either FactoryTalk Security Provider or LDAP:

1. Comment out the following section:

```
<security-domain name="ProductionCentre" cache-
type="infinispan">
  <authentication>
    <login-module
code="com.datasweep.common.security.jboss.DSLoginModule"
flag="required"
```

```
module="com.datasweep.common.DSSecurity.jboss">

      <module-option
name="allowMagicPasswordIfDatabaseNotAvailable"
value="false"/>

    </login-module>

    <login-module code="Remoting" flag="optional">

      <module-option name="password-stacking"
value="useFirstPass"/>

    </login-module>

  </authentication>

</security-domain>
```

2. Search for the line *TODO: Define your security.*
3. Find the section for your security type and uncomment it.
4. Search for the following place holders and replace them with your security information:
   - **FactoryTalk Security Provider**: find the <*Host*> and <*Port*> place holders and replace them with the hostname and port of the computer running FactoryTalk Security Web Service. The default port is 80.
   - **LDAP**: find the <*Name*> and <*Value*> place holders and replace them with name and port of the machine running LDAP.

NOTE: If you have two or more security-domains all called 'ProductionCentre', you will get an error when trying to start JBoss, so only one should be uncommented at a time.

Verify Custom Security Provider Configuration

If you are using the FTPC Custom Security Provider, verify the configuration of the JBoss standalone-full.xml file after the database connections are set up.

To verify the configuration, perform the following:

1. Locate the block of code that starts with the following:

```
<login-module
code="com.datasweep.common.security.jboss.DSLoginModule"
flag="required"
module="com.datasweep.common.DSSecurity.jboss">
```

2. Verify that the section says the following:

```
<module-option name="allowMagicPasswordIfDatabaseNotAvailable"
value="false"/>
```

Configure Online Help and Download Files

The PlantOpsDownload.zip file contains all the items that will appear on the FTPC downloads page. To extract the downloaded ZIP file contents, perform the following steps.

1. In Windows Explorer, navigate to <*FTPC_install*>.
2. Locate the PlantOpsDownload.zip file.
3. Navigate to the <*Tomcat_install*>\webapps directory, where <*Tomcat_install*> is the Tomcat installation location.
4. Within the webapps folder, create a new folder called *PlantOpsDownloads*.
5. Extract the PlantOpsDownloads.zip file to the newly created PlantOpsDownloads folder. Note its URL location as you will need it for the upcoming steps.

Prepare the Applications

NOTE: The following steps should be performed on a Windows client machine even if JBoss application server has been installed on a Linux machine.

Configure the productioncentre.properties File

Configure the productioncentre.properties file and run DSDeployTools by performing the instructions in one of the following sections, depending on your operating system. As a part of configuring the productioncentre.properties file, you will be specifying the REMOTE and HTTP listener port numbers. If you are not using the default port numbers of 8080 (REMOTE) and 8080 (HTTP), check the JBoss configuration files for the current port values.

Optionally, you can also configure default tab behavior in the productioncentre.properties file.

Windows

1. Open Windows Explorer.
2. Navigate to <*FTPC_install*>.
3. Open the productioncentre.properties file in a text editor.
4. Locate the following text:

```
eaHostAddress=localhost
eaRmiPort=8080
eaHttpPort=8080
downloadURL=http://localhost:8080/PlantOpsDownloads
```

Edit it as follows:

```
downloadURL=http://<Tomcat_server_hostname>:<Tom-
cat_HTTP_port>/<PlantOpsDownloads_folder>
```

where:

- <*Tomcat_server_hostname*> is the hostname of the machine where Tomcat is installed.
- <*Tomcat_HTTP_port*> is the HTTP port number of the Tomcat help files host.
- <*PlantOpsDownloads_folder*> is the URL location of the PlantOpsDownloads folder you created in step 5 on page 59.

5. Locate the following text:

```
rmiURL=remote://localhost:8080
httpURL=http://localhost:8080
```

Edit it as follows:

```
rmiURL=remote://<App_server_hostname>:8080
httpURL=http://<App_server_hostname>:<App_server_HTTP_port>
```

where:

- <*App_Server_hostname*> is the hostname of the application host machine.
- <*App_server_HTTP_port*> is the HTTP port number of the application host machine. 8080 is the default.

IMPORTANT: You must configure both the rmiURL and httpURL parameters.

6. Locate the following text:

```
uiDefaultButtonFollowFocus=false
```

Set this option to either true or false depending on if you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false.

7. Locate the following text:

```
platform=Windows
```

Verify that the platform matches your configuration. The choices are Windows and Linux.

8. If you want to increase the client heap size, locate the following text and update the heap size:

```
JAVA_OPTS=-Xmx1024m
```

The heap size must be entered in the format specified by Java.

9. Save and close the file.

Linux

1. Log into the Linux machine as the root user.
2. Locate the productioncentre.properties file and open it in a text editor. Locate the following text:

   ```
   eaHostAddress=localhost
   eaRmiPort=8080
   eaHttpPort=8080

   downloadURL=http://localhost:8080/PlantOpsDownloads
   ```

   Edit it as follows:

   ```
   downloadURL=http://<Tomcat_server_hostname>:<Tom-
   cat_HTTP_port>/<PlantOpsDownloads_folder>
   ```

   where:

   - *<Tomcat_server_hostname>* is the hostname of the machine where Tomcat is installed.
   - *<Tomcat_HTTP_port>* is the HTTP port number of the Tomcat help files host.
   - *<PlantOpsDownloads_folder>* is the URL location of the PlantOpsDownloads folder you created in step 5 on page 59.
3. Locate the following text:

   ```
   rmiURL=remote://localhost:8080
   httpURL=http://localhost:8080
   ```

   Edit it as follows:

   ```
   rmiURL=remote://<App_server_hostname>:8080
   httpURL=http://<App_server_hostname>:<App_server_HTTP_port>
   ```

   where:

   - *<App_Server_hostname>* is the hostname of the application host machine.
   - *<App_server_HTTP_port>* is the HTTP port number of the application host machine. 8080 is the default.

   IMPORTANT: You must configure both the rmiURL and httpURL parameters.

4. Locate the following text:

   ```
   uiDefaultButtonFollowFocus=false
   ```

   Set this option to either true or false depending on if you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false.
5. Locate the following text:

   ```
   platform=Windows
   ```

Edit the platform to Linux.

6. If you want to increase the client heap size, locate the following text and update the heap size:

```
JAVA_OPTS=-Xmx1024m
```

The heap size must be entered in the format specified by Java.

7. Save your work and close the file.

Configure Default Tab Behavior (Optional)

By default, applications launched in Shop Operations and Process Designer exhibit the Metal Look and Feel (LAF) for the Tab key behavior. This results in some unexpected behavior if you are used to working in an environment with the Windows LAF. For example:

- In the Metal LAF, when you hit the Tab key, the focus moves to the next button, but the default button does not change. The default button is activated by hitting the Enter key (even when it does not have the focus). The focus button is activated using the spacebar.
- In the Windows LAF, when you hit the Tab key, the focus moves to next button, and it also becomes the default button. The default/focus button is activated by hitting the Enter key or the spacebar.

NOTE: The default button is only configured for certain built-in dialogs (e.g., Performer Signature). Most dialogs and forms do not have a default button.

To configure the Tab key behavior to reflect a Windows LAF, perform the following:

1. Open the productioncentre.properties file in a text editor.
2. Locate the **uiDefaultButtonFollowFocus** argument and update it to *true*:

```
uiDefaultButtonFollowFocus=true
```

3. Save your work and close the file.

IMPORTANT: This configuration only affects the Tab key's behavior. It does not produce a complete Windows LAF.

See the *FactoryTalk ProductionCentre Activity Developers Guide* for configuration required in the IDE to support the Windows LAF for the Tab key behavior.

Configure the standalone.conf.bat File

Because ActiveMQ forces users to explicitly whitelist packages that can be exchanged using ObjectMessages, please add the following configuration to the standalone.conf.bat file located at <*JBoss_install*>\bin

```
set "JAVA_OPTS=%JAVA_OPTS% -
Dorg.apache.activemq.SERIALIZABLE_PACKAGES=*"
```

Add Custom JAR Files

If you have custom JAR files that you want to be downloaded when an FTPC application is launched, you must add them to the Custom-<*app_server*>.war file and add the list of files to download to the custom.properties file.

1. Go to <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-<*app_server*> and open the ProductionCentreCustom.ear file.
2. Open the Custom-<*app_server*>.war file and add all your custom JAR files.
3. In the custom.properties file (located in the Custom-<*app_server*>.war file), add the list of custom JAR files in a comma-separated list to the FILE_LIST property. This tells Web Start which JARs to download when logging into an FTPC application.
4. Save and close your files.

When an FTPC application is launched, the webstart.properties file (located in ProductionCentreWebStart.ear > PlantOpsStaticContent-<*app_server*>.war) determines the set of files to download as defined by the productioncentre.properties file. The location of the custom JAR files can be found in the webstart.properties file.

When PCClient is launched, the JVM argument **-Djava.ext.dirs** includes the folder where the custom JAR files are saved after download, which is the **custom** folder of the client home defined in "Define the Download Location (Optional)" on page 63. By default, this is the following:

```
C:\.FTPC\<serverInstance>\ProductionCentre\custom
```

where <*serverInstance*> is the server instance name defined in the productioncentre.properties file.

Define the Download Location (Optional)

When an FTPC application is launched, the client JAR files are downloaded to **C:\.FTPC\AppServer** by default.

You can configure this download location by performing the following steps:

1. Go to the location where you installed FTPC and open the *productioncentre.propertie*s file.

2. Define the following properties:

   ```
   clientHome=C:/.FTPC
   serverInstance=AppServer
   ```

   If you have one client machine that will be accessing multiple instances of FTPC running on different application servers, define the **serverInstance** property so that you can differentiate between the instances. For example, you are accessing both a test and a production environment on one client machine. Define the **serverInstance** properties as "Test" for the test instance and "Production" for the production instance. Each instance will have its own folder under the defined **clientHome** directory.

   TIP: If you want to download the client JAR files to the client's user profile (either C:\Documents and Settings\<*username*>\.FTPC or C:\Users\<*username*>\.FTPC depending on your Windows operating system), set the **clientHome** as follows:

   ```
   clientHome=~/.FTPC
   ```

3. Save and close the file.

Configure the DSPlantOperations.ear File

In this section, you will run DSDeployTools.jar, which will apply the changes you made in the productioncentre.properties file to the FTPC EAR file. Perform the following steps to configure the DSPlantOperations.ear file.

1. Create a subdirectory under <*FTPC_install*> called "backup" and copy the DSPlantOperations.ear file to this location to serve as a backup copy.
2. Select Start > Run.
3. In the Open dialog, enter cmd, then click [OK] to open a command prompt.
4. Change the directory to the where DSDeployTools.jar is located. By default, this file is located at <*FTPC_install*>.
5. From the command line, enter the following command to run DSDeployTools:

   ```
   java -cp DSDeployTools.jar com.datasweep.plantops.deploytools.
   URLConfig productioncentre.properties
   ```

A series of messages indicates whether the command ran successfully. If the command was not successful, check that the syntax is correct.

Obtain the Required JDBC Drivers

To successfully configure FTPC and connect to your databases, you must obtain the necessary JDBC drivers for your database type and copy them to the

appropriate folder on each application server machine. This information is necessary when setting up the database connection and configuration.

If you are already running other applications with JBoss, you may already have the required drivers.

If you have previously extracted the contents of modules.zip to <*JBoss_install*>, then you can skip this section.

IMPORTANT: Users MUST use JDBC database connections regardless of whether they are connecting to an Oracle or MS SQL Server database.

To set up the required JDBC drivers on the application server:

1. Open the modules.zip file located at <*FTPC_install*>.
2. Extract the contents of modules.zip to <*JBoss_install*>, where <*JBoss_install*> is the directory where you unzipped the JBoss files.

TIP: The modules.zip file contains security provider JARs, JDBC drivers, and the ActiveMQ module.

3. Start the JBoss server. If it is already running, it must be restarted.

Deploy the Applications

Once you have configured the FTPC files, obtained the required JDBC drivers, and set up security, you are ready to deploy the FTPC components by copying the EAR files into the appropriate JBoss directory.

NOTE: Before continuing, ensure that you have properly configured the RMI and HTTP URLs in the productioncentre.properties file as instructed in "Configure the productioncentre.properties File" on page 59.

1. Copy the following files from <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV:
   - DSPlantOperations.ear
   - ProductionCentreWebStart.ear
   - ProductionCentreCustom.ear (This is required only if you have any custom JAR files that you want to download when launching an FTPC application. See "Add Custom JAR Files" on page 63 for details.)
2. Paste the files into the following directory:

   <*JBoss_install*>\standalone\deployments

where <*JBoss_install*> is the directory where you unzipped the JBoss files.

3. Start your JBoss application server. It can take several minutes for the EAR files to deploy.
4. Access the JBoss home page at http://<*Machine_name*>:<*Port*>/PlantOperations, where <*Machine_name*> is the name of the application server machine where FTPC will be deployed and <*Port*> is the HTTP port used in the productioncentre.properties file, such as 8080.

Launch the Applications

NOTE: If you will be launching FTPC applications (i.e., Process Designer or Shop Operations) using Java Web Start, make sure your client machine has a Java version higher than 1.5 installed and the JAVA_HOME variable is defined. Please review *FactoryTalk ProcductionCentre Supported Platforms Guide* for more information.

To launch FTPC applications, perform the following steps:

1. Access the FTPC home page by entering the following case-sensitive URL in a web browser:

   `http://<machine_name>:<port_number>/PlantOperations/index.htm`

   where <*machine_name*> is the name of the machine where FTPC and JBoss are installed and <*port_number*> is the HTTP server port number, such as 8080.

   When accessing the FTPC home page:

   - If you have any JRE that supports Web Start on your client machine, then the JRE supported by Plant Operations will be downloaded onto your machine. You will not be prompted, and Administrative privileges are not required. If you have multiple versions of a JRE installed, the FTPC Java client will only use one for the deployment Web Start. After deployment, FTPC will download and use only the version that it supports.
   - If you do not have a JRE version that supports Web Start or no JRE at all on your client machine, you will be prompted to install the JRE supported by Plant Operations. The logged-on user must have Administrative privileges to install the JRE.

Figure 4-6: FTPC Home Page

2. Click on the appropriate link to launch the application.The JAR files associated with the application will download to the location defined in "Define the Download Location (Optional)" on page 63 if this is the first time you are opening the application. The JAR files are only downloaded once. Do not modify any of the downloaded JAR files.

NOTE: Please make sure your Java console is configured correctly according to "Configure the Java JNLP Setting" on page 26. If you see a prompt regarding JNLP files (Figure 4-7), save the file, open the folder location (Figure 4-8), and then execute the file by double-clicking it.

Figure 4-7: JNLP File Prompt

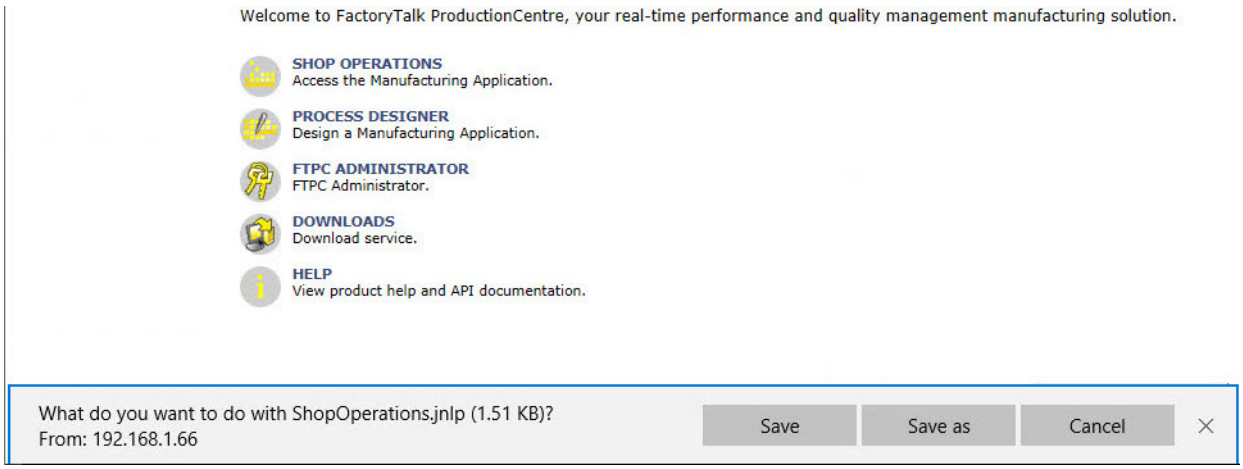
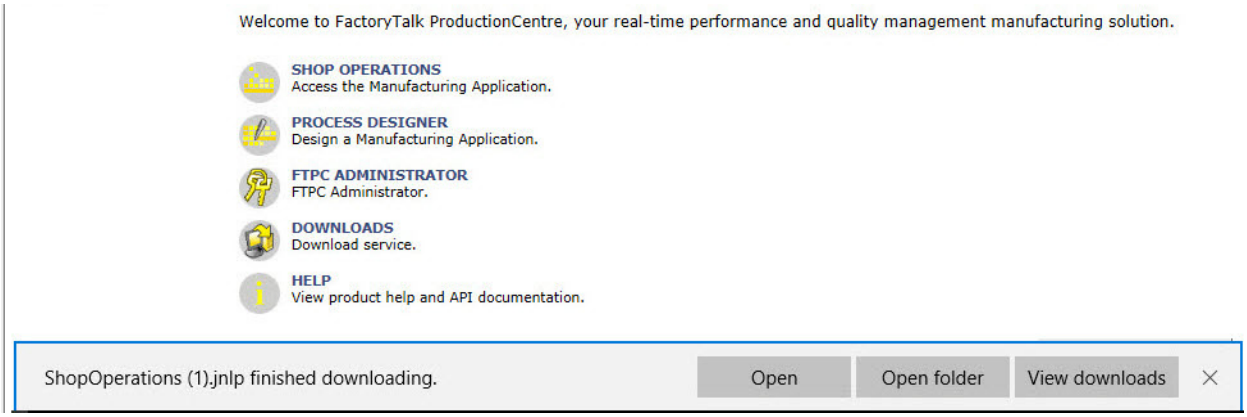


Figure 4-8: Open JNLP Folder



If you have upgraded to a new version FTPC, the system will check if the JAR files are up-to-date. If they are not, everything in the client cache will be deleted when new JAR files to be downloaded are detected. If the deletion returns an error (for example, some files are locked due to an application running), a dialog displays asking you to close all FTPC applications (Process Designer, Shop Operations, etc.) and then try again.

IMPORTANT: You must have your SOAP protocol URL (httpURL) defined in order to log into Process Designer and Shop Operations. See "Configure the productioncentre.properties File" on page 59 for details.

The main page has links to individual pages that use a Web Start to launch the individual applications. You can create bookmarks that take you directly to the individual application's home page. The URLs are listed below:

- **Shop Operations**: http://<*server*>:<*port*>/PlantOperations/ShopOps.htm
- **Process Designer**: http://<*server*>:<*port*>/PlantOperations/ProcessDesigner.htm
- **FTPC Administrator**: http://<server>:<port>/FTPCAdmin/FTPCAdmin

If you encounter an out-of-date error with Internet Explorer when trying to launch FTPC applications, perform the following steps:

1. Run the following in a command window:

```
reg add "HKCU\Software\Microsoft\Internet
Explorer\VersionManager" /v DownloadVersionList /t REG_DWORD /
d 0 /f
```

2. Delete the versionlist.xml file located at C:\Users\<*username*>\AppData\Local\Microsoft\Internet Explorer\VersionManager.

Chapter 5

Connect to a Datasource

In this chapter

Once you have installed FTPC and configured your datasources, you can set up your database connections through FTPC Administrator.

If you are migrating to a new build or version of FTPC, see "Migrate the Databases" on page 88.

Register the Databases

Before you can initialize or migrate a database, the database must be registered in FTPC Administrator so that FTPC Administrator can be used to manage the database.

Tomcat must be installed and configured for FTPC Administrator to function. For more information on manually installing and configuring FTPC Administrator, refer to the *FactoryTalk ProductionCentre Administrator User's Guide*.

NOTE: Registering your databases in FTPC Administrator does not create the connection to the application server. This is done when you deploy the datasources. See "Register the Databases" on page 70 for details.

---

1. Click the *Register Database* link on the home page to go to the Database Registration screen.
2. Enter the following information:
   - **Name**: enter a name or ID for the administered component. The name should be unique among all administered components managed by this FTPC Administrator.
   - **Description**: enter a description for the administered component for ease of identification.
   - **Type**: select either *Production* or *ODS*.
   - **Vendor**: select either *MS SQL* or *Oracle*.
   - **Drive Type**: specifies the driver type to use for this connection.
     - If you selected MS SQL as your vendor type, select from the following options:
       - If this is a Microsoft SQL Server database, the driver type is *type4*.
       - If you want to set up database mirroring for a Microsoft SQL Server database, the driver type is *mirroring*.
       - If you want to set up AlwaysOn Availability Groups for a High Availability configuration, the driver type is *alwaysOnGroup*.
     - If you selected Oracle as your vendor type, select from the following options:
       - If this is an Oracle database, the driver type is *thin*.

– If this is an Oracle database in a Real Application Clusters (RAC) configuration, the driver type is *thin (Oracle-RAC)*.

The following properties displayed depend on the Vendor and Driver Type chosen:

- **SQL**
  - *(Type4 Only) Server*: enter the server name for the database.
  - *(Mirroring Only) Principal and Mirror Server*: for both the principal server and the mirror server, enter the host node definition separated by a comma. For example, serverA,serverB. In this instance, serverA is the principal server, and serverB is the mirror server.
  - *(AlwaysOn Groups Only) Listener Server*: enter the listener server's IP address.
  - *Database Name*: enter the name of the database.
  - *User Name*: enter the user name for a user who has privileges on this database.
  - *Password*: enter the password that corresponds to the user name.
  - *Port*: enter the port on which you will connect to the database. The default is 1433.
- **Oracle**
  - *Server*: enter the server name for the database.
  - *SID*: enter the system identifier (SID) for the database.
  - *User Name*: enter the user name for a user who has privileges on this database.
  - *Password*: enter the password that corresponds to the user name.
  - *Port*: enter the port on which you will connect to the database. The default is 1521.
- **Oracle RAC**
  - *Host:Port List*: enter the host node definition:port number separated by a comma for each member of the RAC. For example, host1:1521,host2:1521.
  - *Service Name*: enter the service name for the database.
  - *User Name*: enter the user name for a user who has privileges on this database.
  - *Password*: enter the password that corresponds to the user name.
  - *ONS Node:Port List*: enter the ONS node definition:port number separated by a comma. For example, racnode1:6200,racnode2:6200.
- **Change Comment**: enter a comment for this action.

All fields are required except for the **Description** and **Change Comment** fields.

3. Click [Verify] to test the database connection.

> **NOTE:** You must verify the database connection in order to save your registration. The OK button will not be enabled until the database connection is verified.

If the Administered Component (Service) is not running, the verification will fail even if the information is correct. A dialog will be displayed to inform you if the test succeeded or failed.

4. Click [OK] to close the registration dialog and [OK] again to save the registration. A dialog asking for your password displays.
5. Enter your password and click [OK]. A registration confirmation dialog displays.
6. Click [OK] to close the confirmation dialog.

Initialize the Databases

> **NOTE:** Only complete the following steps if this is the first time you are setting up your database. If you connected to a database that is already initialized, refer to "Connect to an Existing Database" on page 74 for additional steps.

If you are working with a new database, you must initialize it using FTPC Administrator.

When you initialize a database, all data (both runtime and buildtime) is deleted and all the tables that FTPC needs to store the data will be created. Additionally, the administration user (admin/admin) that can log into all FTPC applications is also created. Always back up the database before initializing it.

Tomcat must be installed and configured for FTPC Administrator to function. For more information on manually installing and configuring FTPC Administrator, refer to the *FactoryTalk ProductionCentre Administrator User's Guide*.

> **IMPORTANT:** **Initializing the Production database resets values used by the Live Transfer process. If you are using Live Transfer and you reinitialize your Production database, then you must either reinitialize your ODS or change the site number of your Production database.**

To initialize a database:

1. Select the database on the home page, and then click **Initialize Database**.

2. Configure the following:
   - In the **Table Space Mapping** section, assign database tables (Oracle only) or file groups (MS SQL Server only) to each index and table group.
   - In the **Site Info** section, set the database's site number and site ID. This site number must be unique across all (Production and ODS) databases. Once a site number is set, it cannot be changed unless you re-initialize your database. The site ID can be changed after it is saved.
   - **Change Comment**: Enter a comment for the action.
3. Click [OK]. A confirmation dialog displays.
4. Enter your password into the confirmation dialog and click [OK] to start the initialization. Once you have started the initialization, the progress is tracked on a progress bar in a dialog. After initialization is complete, the dialog closes.
5. Repeat steps step 1 through step 4 for any additional Production and ODS databases that need to be initialized.
6. Stop and restart your application server and all running client applications. If you are running Tomcat, you must also restart Tomcat.

If initialization fails, following these steps:

1. Do one of the following:
   - If you are using SQL databases, delete and recreate the database.
   - If you are using Oracle databases:
     a. Delete and recreate the Oracle user.
     b. Re-assign any tablespaces as needed.
2. Run initialization again.

Define JMS Connection Information

For any feature that uses ActiveMQ, the JMS connection information must be defined from FTPC Administrator.

To configure the JMS connection information, perform the following steps:

1. Select the database on the home page, and then click **Edit Configuration**.
2. Edit the following fields:
   - **JMS User Name**: Enter the user name for the JMS connection. If left blank, FTPC will use default values.
   - **JMS Password**: Enter the password for the JMS connection. If left blank, FTPC will use default values.

TIP: For ActiveMQ, the user name and password are optional.

- **JMS Server URL**: Enter the server URL of the JMS connection. If ActiveMQ is not running on the local machine, change the default value of localhost to the hostname or IP address of the machine running ActiveMQ.

3. Click [OK]. A confirmation dialog displays.
4. Enter your password into the confirmation dialog and click [OK] to save the changes.

TIP: For more information on configuring the JMS connection information, please refer to the *FactoryTalk ProductionCentre Administrator User's Guide*

Disable the Ability to Delete or Rename Users (Optional)

You can disable the ability to delete users or change user names. This is done by running the dsDisallowUserDeletion stored procedure on the Production database after initializing the database. This is not intended to be reversible. If you want to change the setting after this stored procedure has been run, you must call FTPC Customer Support for assistance. Because this stored procedure exists only on an initialized Production database, a database administrator must perform this task directly on the Production database.

Once run, you cannot change a user name or delete a user using the Process Designer interface, the Process Designer API, or the Integrate Web Services API. An error will be returned indicating that this action is not allowed.

Verify the Database Connections

Once you have configured the database connections and connected to the databases, you can access Shop Operations or Process Designer.

To verify the database connections, from the FTPC home page, launch Shop Operations. See "Launch the Applications" on page 66 for details.

The login dialog for Shop Operations appears, which indicates the FTPC installation was successful.

Connect to an Existing Database

If you will be connecting to an existing database that is already initialized, you must make sure the JBoss user name and password matches an Administrator that is in the database that the application server will connect to. If you are using the

FTPC Custom Security Provider, but the database to which the application server will be connecting does not have an administrator user with a username and password of *admin/admin*, you must change the user name and password in the JBoss settings.

Chapter 6

Upgrade FTPC

In this chapter

This chapter describes the procedure for upgrading from an existing installation of FTPC 10.x.

Before continuing, please review the software and hardware requirements of FTPC in the *FactoryTalk ProductionCentre Supported Platforms Guide* to verify that you have the supported versions and hardware for the upgrade. The Supported Platforms Guide can be found at the FTPC software download web site.

NOTE: The steps in this chapter assume that all required third party software is already installed and working with the existing FTPC installation.

The procedure for upgrading FTPC is described in the following sections:

- ❑ "Pre-Upgrade Preparation"
- ❑ "Extract FTPC Deployment Files"
- ❑ "Configure Online Help and Download Files"
- ❑ "Prepare the Applications"
- ❑ "Deploy the Applications"
- ❑ "Upgrade FTPC Administrator"
- ❑ "Additional Upgrade Activities"

Pre-Upgrade Preparation

The following section must be performed if you are upgrading from a previous FTPC installation.

TIP: In the following steps, <*JBoss_install*> is the installation directory of the JBoss server.

Disconnect All Clients

Make sure all clients are disconnected from the application server by closing all instances on Shop Operations, Shop Operations Server, Process Designer, and FTPC Administrator. This reduces the chances of the upgrade encountering any problems when deleting obsolete JAR files.

Verify that no clients are running by opening the Windows Task Manager and selecting the **Show processes from all users** checkbox under the Processes tab. Then verify that no java.exe processes are running.

Unlock JRE

Verify that the JRE (C:\.FTPC\<*app_server*>\jre<*version*> by default) is not locked by making sure that the *jre* folder or a file in it is not opened in another program.

Back Up the FTPC Databases

Make sure you have backed up the Production and ODS databases. This will allow you to recover them if you encounter problems with the upgrade.

Change Oracle Database User Privilege

If you are using an Oracle database, the following privileges are required for the Oracle user.

- ALTER PROCEDURE
- CONNECT
- CREATE INDEX
- CREATE PROCEDURE
- CREATE TABLE
- CREATE TRIGGER
- CREATE VIEW
- EXECUTE PROCEDURE
- RESOURCE
- UNLIMITED TABLESPACE

For details, please refer to *FactoryTalk ProductionCentre Database Installation Guide*.

IMPORTANT: You must change this privilege BEFORE you run the FTPC migration script in FTPC Administrator or it will fail.

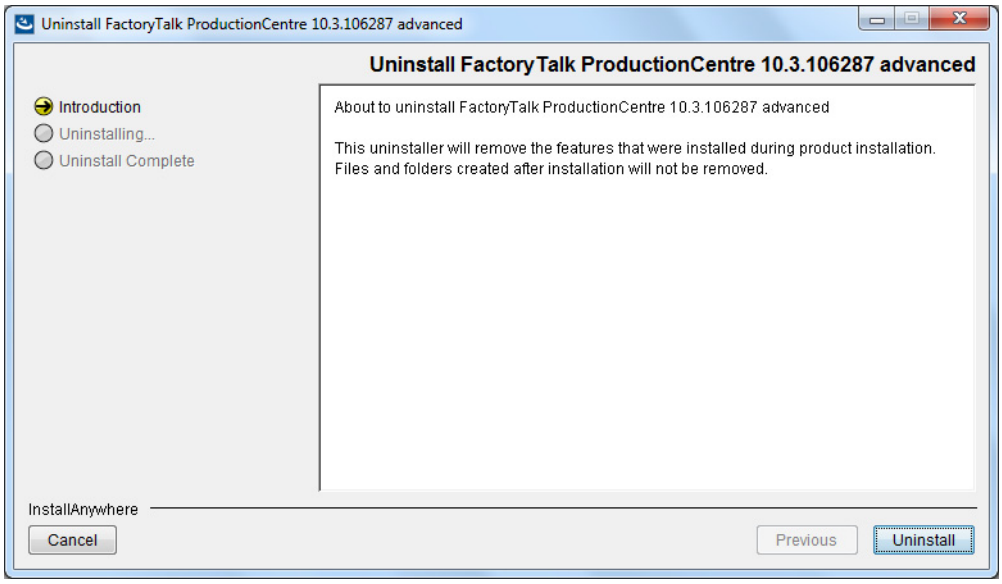
Uninstall the FTPC Application

When you uninstall FTPC, remove the applications from JBoss and then run the uninstaller program. You can also uninstall FTPC from *Add or Remove Programs* in the Control Panel.

To uninstall FTPC:

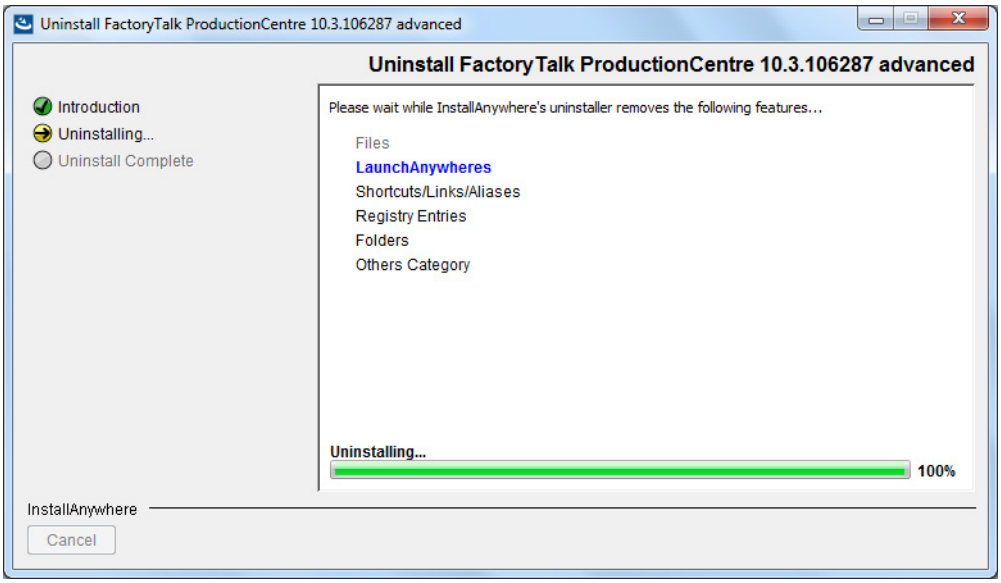
1. Open Windows Explorer. Navigate to where you chose to install FTPC.
2. In the Uninstall folder, double-click *Uninstaller.exe*. The uninstall introduction screen displays.

Figure 6-1: Uninstall Introduction Screen



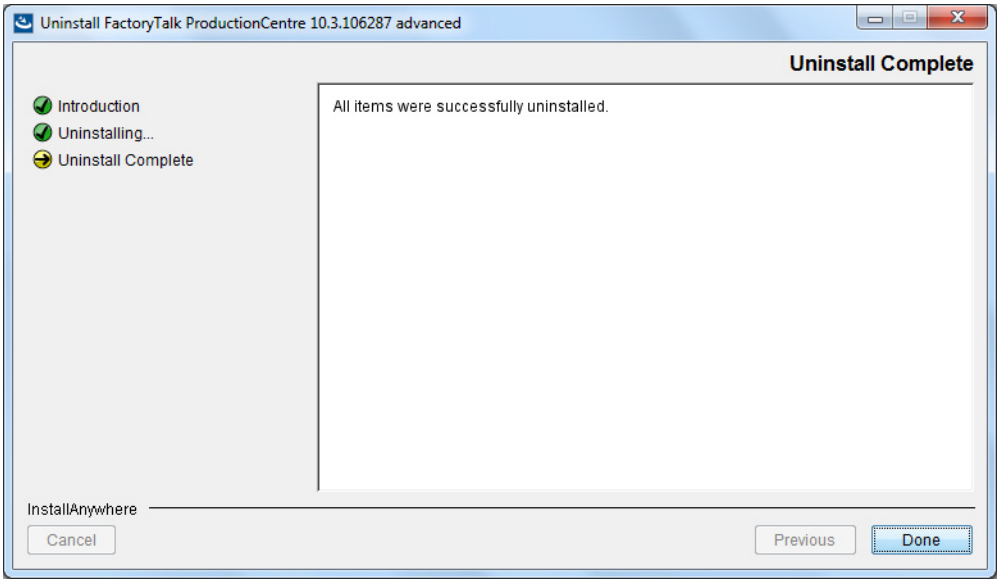
3. Click [Uninstall]. The installer displays a progress screen as FTPC is uninstalling.

Figure 6-2: Uninstall Progress Screen



The Uninstall Complete screen displays when the uninstall is complete.

Figure 6-3: Uninstall Complete Screen



4. Click [Done] to exit the uninstaller.

If you configured FTPC Administrator, that information is retained and will be available when you install FTPC again.

Extract FTPC Deployment Files

To download and extract the FTPC deployment files, please refer to "Extract FTPC Deployment Files" on page 50. When complete, return to this page to continue.

Configure Online Help and Download Files

The PlantOpsDownload.zip file contains all the items that will appear on the FTPC downloads page. To extract the downloaded ZIP file and access its contents, you must install Tomcat and configure the online help and download files. To do so, perform the steps listed in the following sections:

- "Install Tomcat" on page 41
- "Configure Online Help and Download Files" on page 59

NOTE: You can also use your own web server to serve the online help and download files if you wish.

Prepare the Applications

NOTE: The following steps should be performed on a Windows client machine even if JBoss application server has been installed on a Linux machine.

Configure the productioncentre.properties File

Configure the productioncentre.properties file and run DSDeployTools by performing the instructions in one of the following sections, depending on your operating system. As a part of configuring the productioncentre.properties file, you will be specifying the REMOTE and HTTP listener port numbers. If you are not using the default port numbers of 8080 (REMOTE) and 8080 (HTTP), check the JBoss configuration files for the current port values.

Windows

1. Open Windows Explorer.
2. Navigate to <*FTPC_install*>.
3. Open the productioncentre.properties file in a text editor.
4. Locate the following text:

   ```
   eaHostAddress=localhost
   eaRmiPort=8080
   eaHttpPort=8080
   downloadURL=http://localhost:8080/PlantOpsDownloads
   ```

   Edit it as follows:

   ```
   downloadURL=http://<Tomcat_server_hostname>:<Tom-
   cat_HTTP_port>/<PlantOpsDownloads_folder>
   ```

   where:

   - <*Tomcat_server_hostname*> is the hostname of the machine where Tomcat is installed.
   - <*Tomcat_HTTP_port*> is the HTTP port number of the Tomcat help files host.

   <*PlantOpsDownloads_folder*> is the URL location of the PlantOpsDownloads folder you created in "Configure Online Help and Download Files" on page 59.

5. Locate the following text:

   ```
   rmiURL=remote://localhost:8080
   httpURL=http://localhost:8080
   ```

   For a **stand alone installation**, edit it as follows:

   ```
   rmiURL=remote://<App_server_hostname>:8080
   httpURL=http://<App_server_hostname>:<App_server_HTTP_port>
   ```

where:

- *<App_Server_hostname>* is the hostname of the application host machine.
- *<App_server_HTTP_port>* is the HTTP port number of the application host machine. 8080 is the default.

For a c**lustered installation**, edit it as follows:

```
rmiURL=remote://
<jboss_cluster_node1>:8080,<jboss_cluster_node2>:8080,
<jboss_cluster_node3>:8080,<jboss_cluster_nodeN...>:8080
httpURL=http://<App_server_hostname1>:
<App_server_HTTP_port1>
```

where:

- *<jboss_cluster_node#>* are the IP addresses of your cluster servers.
- *<App_server_HTTP_port1>* is the HTTP port number of the first machine. 8080 is the default.

IMPORTANT: You must configure both the rmiURL and httpURL parameters.

6. Locate the following text:

   ```
   uiDefaultButtonFollowFocus=false
   ```

   Set this option to either true or false depending on if you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false.

7. Locate the following text:

   ```
   platform=Windows
   ```

   Verify that the platform matches your configuration. The choices are Windows and Linux.

8. If you want to increase the client heap size, locate the following text and update the heap size:

   ```
   JAVA_OPTS=-Xmx1024m
   ```

   The heap size must be entered in the format specified by Java.

9. Save and close the file.

Linux

1. Log into the Linux machine as the root user.
2. Locate the productioncentre.properties file and open it in a text editor. Locate the following text:

   ```
   eaHostAddress=localhost
   eaRmiPort=8080
   ```

```
eaHttpPort=8080
downloadURL=http://localhost:8080/PlantOpsDownloads
```

Edit it as follows:

```
downloadURL=http://<Tomcat_server_hostname>:<Tom-
cat_HTTP_port>/<PlantOpsDownloads_folder>
```

where:

- <*Tomcat_server_hostname*> is the hostname of the machine where Tomcat is installed.
- <*Tomcat_HTTP_port*> is the HTTP port number of the Tomcat help files host.
- <*PlantOpsDownloads_folder*> is the URL location of the PlantOpsDownloads folder you created in "Configure Online Help and Download Files" on page 59.

3. Locate the following text:

```
rmiURL=remote://localhost:8080
httpURL=http://localhost:8080
```

For a **stand alone installation**, edit it as follows:

```
rmiURL=remote://<App_server_hostname>:8080
httpURL=http://<App_server_hostname>:<App_server_HTTP_port>
```

where:

- <*App_Server_hostname*> is the hostname of the application host machine.
- <*App_server_HTTP_port*> is the HTTP port number of the application host machine. 8080 is the default.

For a **clustered installation**, edit it as follows:

```
rmiURL=remote://
<jboss_cluster_node1>:8080,<jboss_cluster_node2>:8080,
<jboss_cluster_node3>:8080,<jboss_cluster_nodeN...>:8080
httpURL=http://<App_server_hostname1>:
<App_server_HTTP_port1>
```

where:

- <*jboss_cluster_node#*> are the IP addresses of your cluster servers.
- <*App_server_HTTP_port1*> is the HTTP port number of the first machine. 8080 is the default.

IMPORTANT: You must configure both the rmiURL and httpURL parameters.

4. Locate the following text:

```
uiDefaultButtonFollowFocus=false
```

Set this option to either true or false depending on if you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false.

5. Locate the following text:

   ```
   platform=Windows
   ```

   Edit the platform to Linux.

6. If you want to increase the client heap size, locate the following text and update the heap size:

   ```
   JAVA_OPTS=-Xmx1024m
   ```

   The heap size must be entered in the format specified by Java.

7. Save your work and close the file.

Configure the DSPlantOperations.ear file

In this section, you will run DSDeployTools.jar, which will apply the changes you made in the productioncentre.properties file to the FTPC EAR file. Perform the following steps to configure the DSPlantOperations.ear file.

1. Create a subdirectory under <*FTPC_install*> called “backup” and copy the DSPlantOperations.ear file to this location to serve as a backup copy.
2. Select Start > Run.
3. In the Open dialog, enter cmd, then click [OK] to open a command prompt.
4. Change the directory to the where DSDeployTools.jar is located. By default, this file is located at <*FTPC_install*>.
5. From the command line, enter the following command to run DSDeployTools:

   ```
   java -cp DSDeployTools.jar com.datasweep.plantops.deploytools.
   URLConfig productioncentre.properties
   ```

A series of messages indicates whether the command ran successfully. If the command was not successful, check that the syntax is correct.

Deploy the Applications

NOTE: If you are upgrading a clustered environment, the steps in this section should be performed on each node of the cluster.

1. Copy the following files from <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV:

   - DSPlantOperations.ear

- ProductionCentreWebStart.ear
- ProductionCentreCustom.ear (This is required only if you have any custom JAR files that you want to download when launching an FTPC application. See "Add Custom JAR Files" on page 63 for details.)

2. Paste the files into the following directory:

   <*JBoss_install*>\standalone\deployments

   where <*JBoss_install*> is the directory where you unzipped the JBoss files.

3. Start your JBoss application server. It can take several minutes for the EAR files to deploy.
4. Access the JBoss home page at http://<*Machine_name*>:<*Port*>/PlantOperations, where <*Machine_name*> is the name of the application server machine where FTPC will be deployed and <*Port*> is the HTTP port used in the productioncentre.properties file, such as 8080.

Upgrade FTPC Administrator

NOTE: If you are upgrading a clustered environment, the steps in this section only need to be performed on the node that will run FTPC Administrator.

To upgrade FTPC Administrator, perform the following steps:

1. If Tomcat is running, stop Tomcat.
2. Create an FTPC Administrator home directory. For example: C:\ftpcadmin\home.
3. In the FTPC Administrator home directory, create two folders called **conf** and **db**. These folders will contain the configuration and database folders.

   NOTE: Do not delete these folders once they are populated.

   When you have Live Transfer and Purge jobs configured, they will be placed in a folder called **adminData** in the same location as the **conf** and **db** folders.
4. Browse to <*FTPC_install*> and copy the FTPCAdmin.war file.
5. Paste the FTPCAdmin.war file into <*Tomcat_install*>\webapps, where <*Tomcat_install*> is the Tomcat home directory.
6. Start Tomcat. A folder called *FTPCAdmin* is created in the *webapps* folder.
7. Stop Tomcat.
8. Open the web.xml file located at <*Tomcat_install*>\webapps\FTPCAdmin\WEB-INF.

9. Search for the following text:

```
<param-value>y:/PlantOperations/bldFTPCAdmin/code/home</
param-value>
```

10. Change the value to your FTPC Administrator home. For example:

```
<param-value>C:\ftpcadmin\home</param-value>
```

11. Save and close the file. Your changes will persist when Tomcat is restarted.
12. Copy the *ftpcAdmin.properties* and *logging.properties files* from <*Tomcat_install*>\webapps\FTPCAdmin\WEB-INF\lib to <*FTPCAdmin_home*>\conf.
13. Open the *ftpcAdmin.properties* file that you just copied into the conf folder.
14. Set the FTPC_ADMIN_JMS_URL value to your environment's hostname and ActiveMQ port number. For example:

```
tcp\://ussjcTestMachine\:61616
```

15. Restart Tomcat.

Additional Upgrade Activities

The following section must be performed if you are upgrading from a previous FTPC installation. Before migrating your database, please make sure to do the following tasks to your system:

Oracle

- ❑ Change the JOB_QUEUE_PROCESSES initialization parameter to disable jobs during migration.
- ❑ Turn off the archive log mode for the duration of the migration

NOTE: If you have multiple users (schema) in Oracle do not perform the tasks listed above, instead disable or delete any jobs (FTPC only uses the DBMS_JOB scheduler) that perform operations on the database being migrated. Also, if you have multiple users in Oracle, turning off archive log mode is NOT recommended to increase migration speed because it affects the entire database.

SQL Server

- ❑ Disable the SQL Server Agent in order to disable jobs during migration.

NOTE: If you have multiple databases on your SQL Server instance, disable or delete any SQL Server Agent jobs that perform operations on the database being migrated.

Migrate the Databases

If the schema has changed between the releases, then migrate your databases.

1. From the FTPC home page, launch FTPC Administrator. See "Launch the Applications" on page 66 for details.
2. Enter the default FTPC Administrator user name and password when prompted, admin/admin.

   The FTPC Administrator home page displays.
3. Select the database on the home page, and then click **Migrate Database**.
4. Optionally, enter a change comment for this action.
5. Click [OK]. A confirmation dialog displays.
6. Enter your password into the confirmation dialog and click [OK] to start the migration. Once you have started the migration, the progress is tracked on a progress bar in a dialog. After migration is complete, the dialog closes.
7. Exit FTPC Administrator.
8. Stop and start the application server. If you are running Tomcat, you must also restart Tomcat.

IMPORTANT: **If you are migrating from a pre-8.2 release, after you have migrated your ODS, you must configure and run the *populatePdXfrUpdatePid.bat* file to completion. When migrating an existing pre-8.2 ODS, the migration process creates a new column called *pd_xfr_update_pid* in any table that is loaded by Live Transfer. This column stores the original Production database's *xfr_update_pid* value. For the migrated ODS, this value is based on the information in the XFR_LOAD_LOG table. To initially populate the *pd_xfr_update_pid* column, you must configure and run the *populatePdXfrUpdatePid.bat* file after you have migrated your ODS.**

See the *FactoryTalk ProductionCentre Administrator User's Guide* for more information on the *populatePdXfrUpdatePid.bat* file and migrating your ODS.

Upgrade the Message Pack

If you upgrade your FTPC build, the latest message set for PlantOperationsErrorMessages is not automatically updated. You must update the message set in FTPC Administrator.

To update the message set:

1. Open FTPC Administrator.
2. In the home page, select you database and click **Update System Messages.**

3. Optionally, enter a comment for the action. This comment will be entered into the DS_ADMIN_LOG table as part of the audit control records.
4. Click [OK]. A confirmation dialog displays.

Enter your password into the confirmation dialog and click [OK] to start the update. Once you have started the update, the progress is tracked on a progress bar in a dialog. After update is complete, the dialog closes.

Appendix A

Understanding and Implementing Security

In this appendix

All J2EE applications, including FTPC running on JBoss Application Server, use authorization to determine what actions a user is allowed to perform. In FTPC, access privileges represent how much authority a user has to make changes to the objects in an application. All methods in FTPC, such as createStandaloneUnits(), are mapped to an access privilege.

FTPC uses a programmatic authorization model. For each transactional middletier method that makes changes to objects in the system, an access privilege can be specified by the client as a parameter to the method. If no access privilege is specified by the client, a default access privilege for that method is used.

In either case, the middletier will validate that the calling user is a member of at least one of the performer user groups associated with the access privilege. If the calling user is in a performer group, the user is authorized and the method will proceed. If not, an exception will be thrown indicating that the user is not authorized.

IMPORTANT: If you create users in one security model and then change the security model type, you must recreate all users.

The system verifies a user through a two-step process:

1. Authentication: JBoss must first authenticate that the person logging in is really the user they claim to be. This is done when the correct password is provided for a username.
2. Authorization: FTPC must then determine if the user is in one of the performer user groups assigned to the access privilege associated with the method that is allowed to complete the task.

Users, User Groups, and Access Privileges

Enterprise Archive (EAR) files are Java archive files that represent a J2EE application that can be deployed to JBoss. The FTPC EAR file is part of the FTPC deployment and contains five pre-defined user groups:

- PlantOpsAdmin: Users in this user group have complete access to everything in Shop Operations and Process Designer.
- PlantOpsDesigner: Users in this user group can log on and access all functions in Shop Operations and Process Designer, except they cannot create users.
- PlantOpsSupervisor: Users in this user group have complete access to all forms and functions in Shop Operations. They cannot log on to Process Designer.
- PlantOpsOperator: Users in this user group can log on to Shop Operations and view the form assigned to that station or themselves. They can enter data in the form and save it to the database, but they cannot open any other form.

- PlantOpsGuest: Users in this user group can log on to Shop Operations and view the form assigned to that station or themselves. They have read-only access to that form and cannot open any other forms.

These pre-defined user groups have a pre-defined default mapping to access privileges as described in Table A- 2 on page 95.

The following table lists and describes the standard access privileges provided by FTPC.

Table A- 1 Access Privileges

Access Privilege	Description
PDCreate	Groups with this privilege enabled can create objects in Process Designer at the class level.
PDUpdate	Groups with this privilege enabled can update objects in Process Designer at the class or object level.
PDDelete	Groups with this privilege enabled can delete objects in Process Designer at the class or object level.
ShopOperations	Groups with this privilege can log into Shop Operations.
OpenCloseForm	Groups with this privilege can open and close forms in Shop Operations.
RuntimeOptions	Groups with this privilege can change stations. They can also disable auto timeout and time scripts in Shop Operations.
ProcessDesigner	Groups with this privilege can log into Process Designer.
ProcessModeler	Groups with this privilege can log into Process Designer but cannot access forms, subroutines, or event sheets (i.e., application logic).
GuestPrivilege	Groups with this privilege have backwards-supporting authorization to match the FTPC 10.2 and prior release “roles”.
OperatorPrivilege	
SupervisorPrivilege	
DesignerPrivilege	
AdminPrivilege	
PlantOpsNotRequiredPrivilege	Groups with this privilege are not authenticated. This privilege is intended for internal use only.
PDUDADesigner	Groups with this privilege can create or modify UDADefinition objects in Process Designer.

Table A- 1 Access Privileges (continued)

Access Privilege	Description
FSMConfigurationDesigner	Groups with this privilege can access the FSM tab in Process Designer. This privilege is required to establish connections between classes and flexible state models.
UserAuthentication	Groups with this privilege can use Process Designer and Shop Operations Server when calling the middleware method to authenticate the user.
VersioningPlatformDesigner	Groups with this privilege can enable, configure, and disable the versioning platform feature.

The following section applies to all builds of FTPC 10.4. When you initialize a FTPC database, the five user groups previously described are automatically created with names corresponding to the FTPC privileges. FTPC provides a default user/group-to-privilege mapping, as described in Table A- 2.

IMPORTANT: **Do not remap the default groups and privileges. If you do, you may not be able to access FTPC and JBoss.**

Table A- 2 Groups and their Corresponding Privileges

Members of This Group...	Have These Access Privileges
PlantOpsAdmin	AdminPrivilege DesignerPrivilege FSMConfigurationDesigner GuestPrivilege OpenCloseForm OperatorPrivilege PDCreate PDDelete PDUDADesigner PDUpdate ProcessDesigner PRocessModeler RuntimeOptions ShopOperations SupervisorPrivilege UserAuthentication VersioningPlatformDesigner
PlantOpsDesigner	DesignerPrivilege FSMConfigurationDesigner GuestPrivilege OpenCloseForm OperatorPrivilege PDCreate PDDelete PDUDADesigner PDUpdate ProcessDesigner PRocessModeler RuntimeOptions ShopOperations SupervisorPrivilege UserAuthentication VersioningPlatformDesigner
PlantOpsSupervisor	GuestPrivilege OpenCloseForm OperatorPrivilege RuntimeOptions ShopOperations SupervisorPrivilege UserAuthentication

Table A- 2 Groups and their Corresponding Privileges (continued)

Members of This Group...	Have These Access Privileges
PlantOpsOperator	GuestPrivilege OperatorPrivilege PlantOpsNotRequiredPrivilege ShopOperations UserAuthentication
PlantOpsGuest	GuestPrivilege UserAuthentication

The group to which a user belongs is set in Process Designer. The user names and passwords are authenticated through the security provider configured in JBoss.

Supported Security Models

FTPC supports the following security models:

- "FactoryTalk Security Provider"
- "Lightweight Directory Access Protocol (LDAP)"
- "Custom"

Refer to the JBoss server documentation for additional information about the security providers.

NOTE: If you are using an Active Directory Server, the version of the Active Directory Server is tied to that of the installed Windows operating system by default. For example, if you installed Windows Server 2008, the Active Directory Server version is 2008 by default. Please note that the Active Directory Server's domain functional level, which sets the baseline features exposed to both domain controllers and member servers, can be changed to another version. Please see your Microsoft documentation for more details. Contact Technical Support for further recommendations.

FactoryTalk Security Provider

The FactoryTalk Security Provider uses the FactoryTalk Security Web Service of the FactoryTalk Services Platform (FTSP) as the source of data for authentication of users.

The first time a user logs into an FTPC application, the user is imported into the database and assigned to the user group that corresponds with the security service user group to which it belongs. If the user does not belong to a security service user group, then it will be placed in the default user group defined in FTPC Administrator. When subsequent logins for the same user occur, the FactoryTalk Security Provider authenticates the user and ignores some information stored in the

database, including the password and other security-related user attributes. Please note that the user group is not ignored.

NOTE: By default, FactoryTalk Security allows any user to change their privilege level to any level, including administrative levels. For information on tightening security, see the *FactoryTalk Security System Configuration Guide*.

This section covers the following:

- "Installing FactoryTalk Security Platform and Web Service"
- "Configuring FactoryTalk Security Web Service"
- "Configuring Available Users and Groups"
- "Testing the FactoryTalk Security Web Service"
- "Installing and Configuring FactoryTalk Security Provider"

IMPORTANT: **FactoryTalk Security Web Service is only supported on Windows operating systems.**

Installing FactoryTalk Security Platform and Web Service

The FactoryTalk Security Web Service is a web service interface for FTPC to authenticate and authorize a user against the FactoryTalk Network Directory. The FactoryTalk Services installer, which installs FTSP, does not install the security web service by default. The instructions in this section cover both the installation of FTSP via the FT Services installer and the installation of the web service.

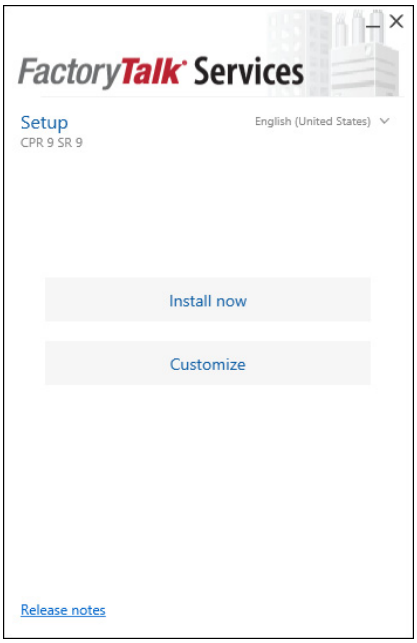
NOTE: Before you begin, verify that **ASP.NET for .NET Framework** and **Internet Information Services (IIS) with the IIS Management Service component** are installed on the machine where FTSP and FactoryTalk Network Directory reside, and that **"IIS Admin"** and **"World Wide Web Publishing"** services are started.

To install the FactoryTalk Security Web Service:

1. Download the FT Services installer. Refer to the *FactoryTalk ProductionCentre Supported Platforms Guide* for the correct version to use. After downloading the installer archive, extract its contents.
2. Launch *setup.exe* with administrative privileges to start the FactoryTalk Services installer. Click [Install Now] to begin the installation.

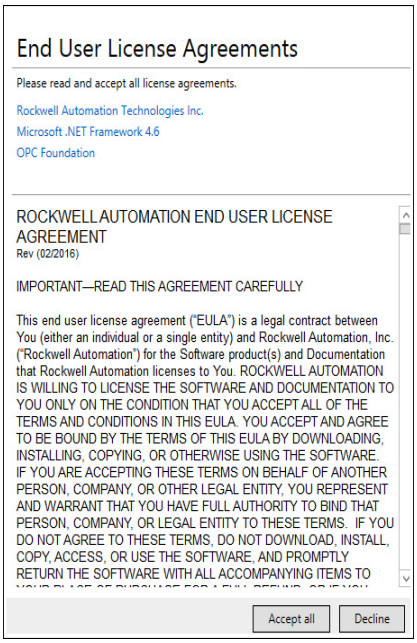
NOTE: If the installer detects that your system does not have the required .NET Framework installed, it will be automatically installed after the License Agreements are accepted.

Figure A-1: FactoryTalk Services Installer Selection Screen



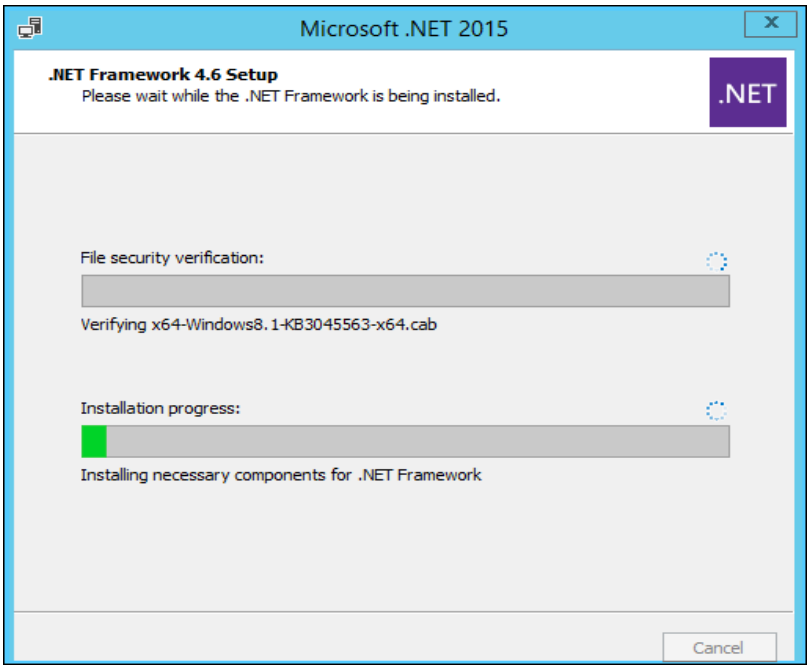
3. On the End User License Agreements screen, read the license agreements and click [Accept] if you accept the terms.

Figure A-2: FactoryTalk Services Installer License Agreements Screen



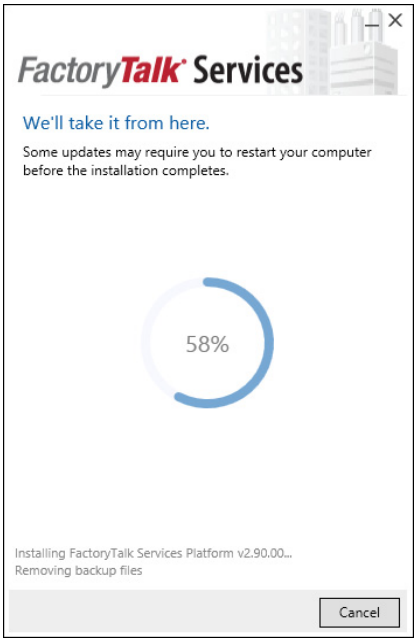
4. If the required .NET Framework is not installed, the following progress screen will appear.

Figure A-3: FactoryTalk Services Installer Microsoft .NET Screen



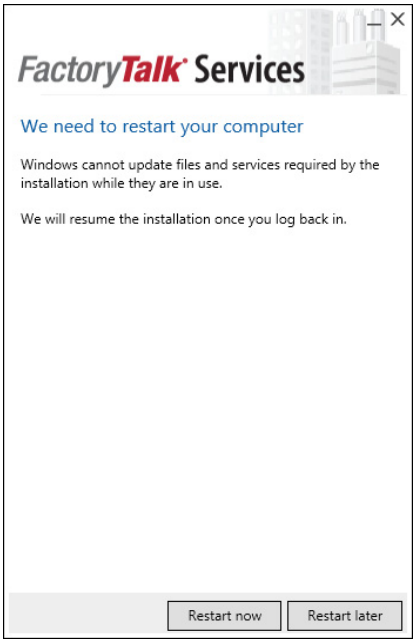
5. A screen depicting the progress of your installation will appear. Please be patient as this part of the installation may take some time.

Figure A-4: FactoryTalk Services Installer Progress Screen



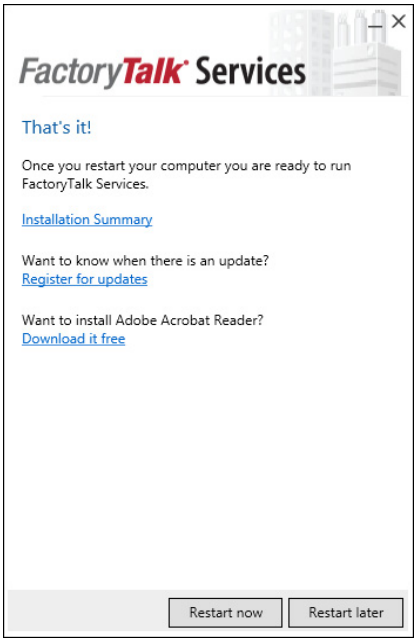
6. Throughout the installation, you may need to restart your system. This may occur more than once. Click [Restart now] to restart the computer.

Figure A-5:



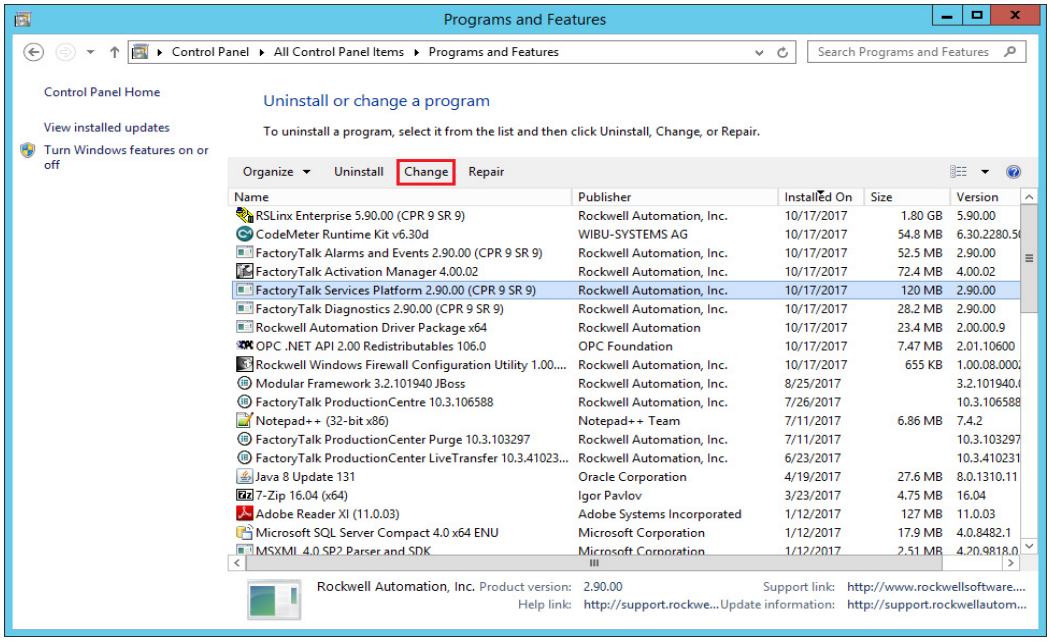
7. Once the installation is complete you will be asked to restart your system one more time. Before you click [Restart now] you can view the Installation Summary, Register for Updates, or Download Adobe Acrobat for free using the provided links. Click [Restart now] to complete the installation

Figure A-6:



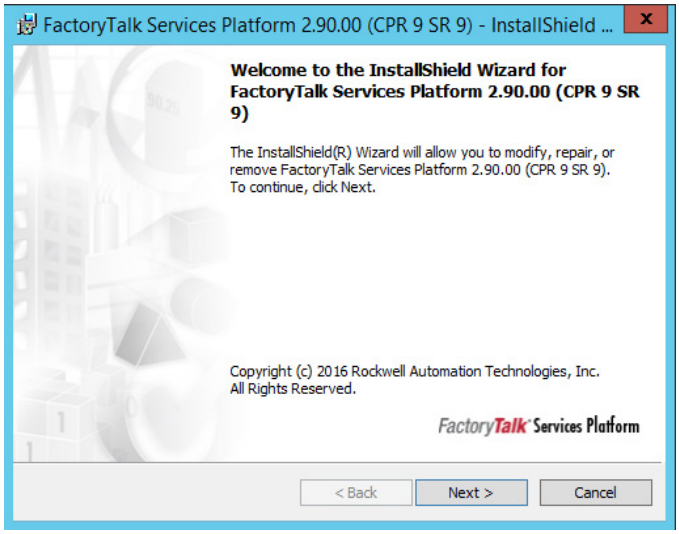
8. From Control Panel > Programs and Features, select *FactoryTalk Services Platform <version>* and click [Change] to launch the FTSP installer.

Figure A-7: Programs and Features



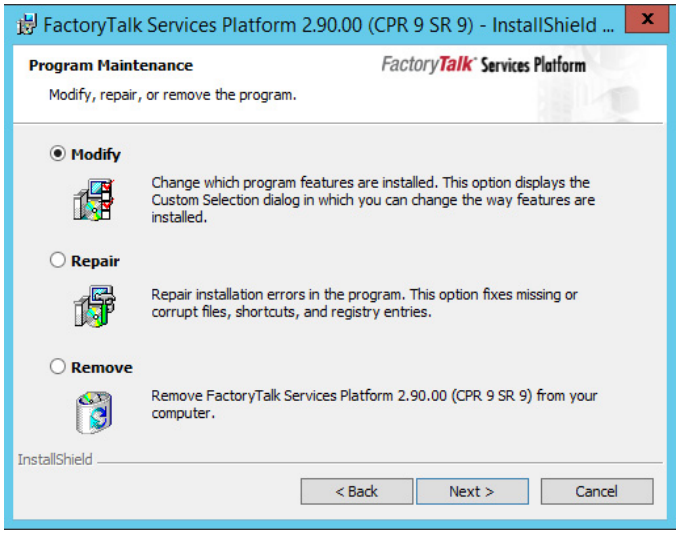
9. On the FTSP Installer Welcome screen, click [Next].

Figure 6-4: FTSP Installer Welcome Screen



10. Select the *Modify* option and click [Next].

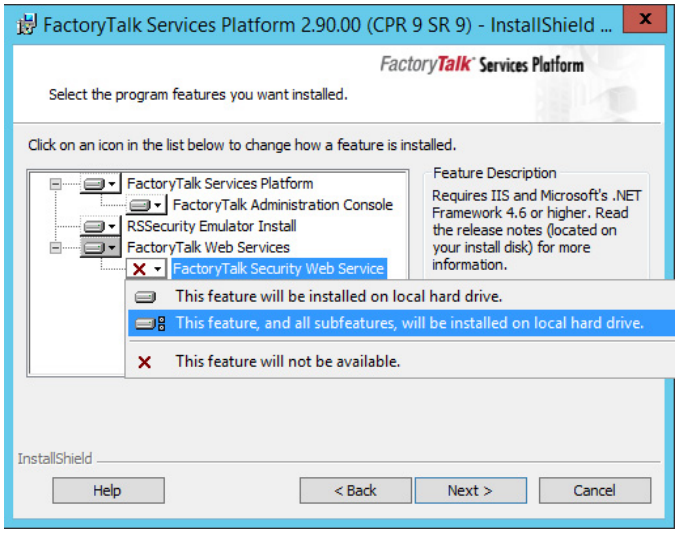
Figure A-8: FTSP Installer Program Maintenance Screen



11. Click FactoryTalk Security Web Service and select *This feature, and all subfeatures, will be installed on local hard drive*, then click [Next].

NOTE: If the installer detects that the required ASP.NET and IIS components are not installed, you will not be able to continue from this screen. If this occurs, continue to step 12. If you do not have any issues, skip to step step 24 on page 108.

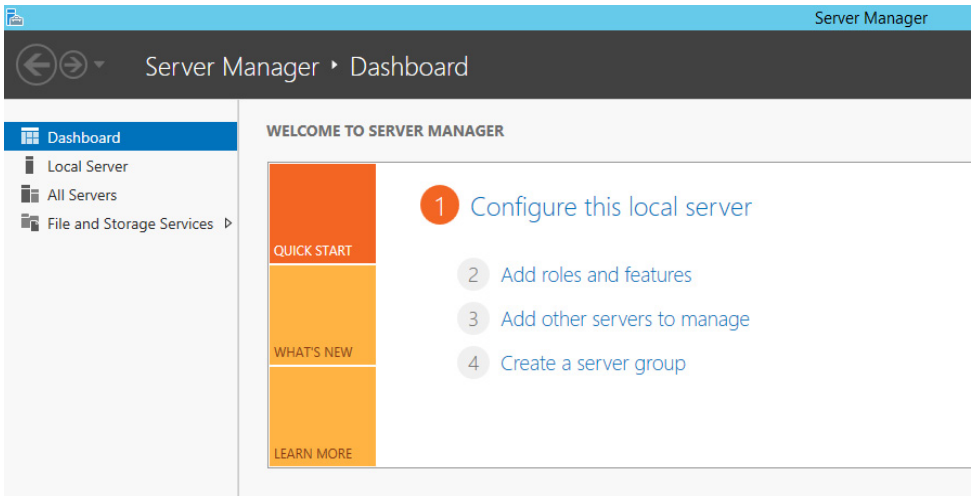
Figure A-9: FTSP Installer Select Features Screen



12. To install the Web Service prerequisites, navigate to the Server Manager by going to Windows>Administrative Tools>Server Manager.

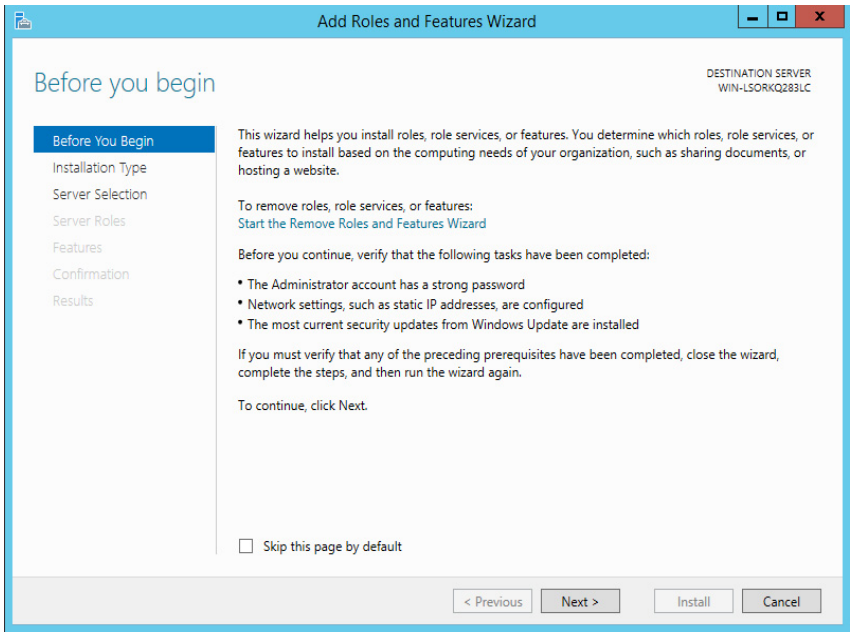
13. Click on **Add roles and features** to open the Add Roles and Features Wizard.

Figure A-10: Server Manager Dashboard



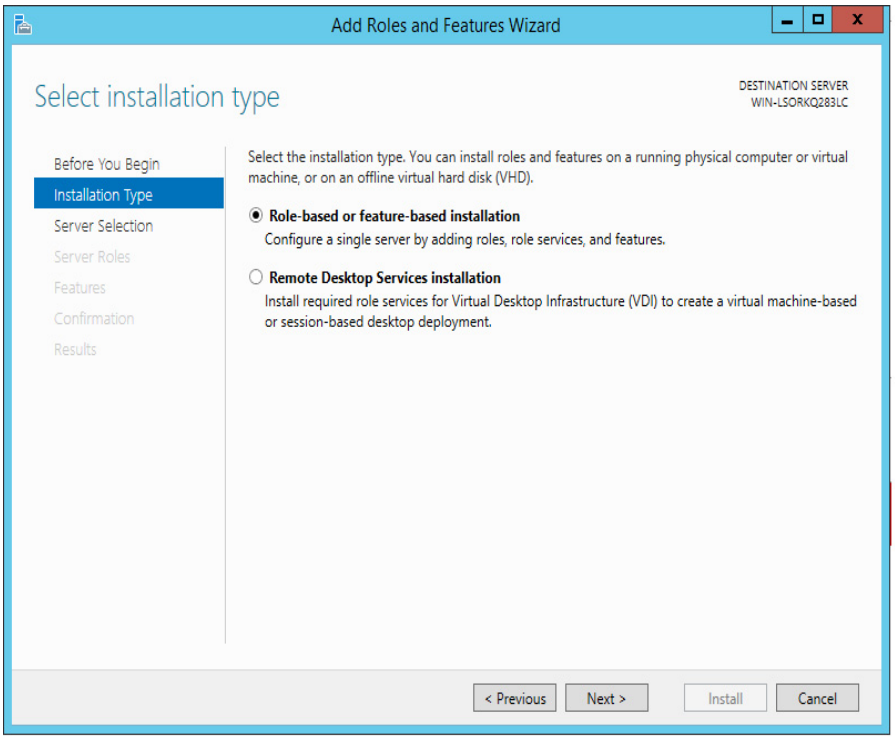
14. Click [Next] in the *Before you begin* screen.

Figure A-11: Before You Begin



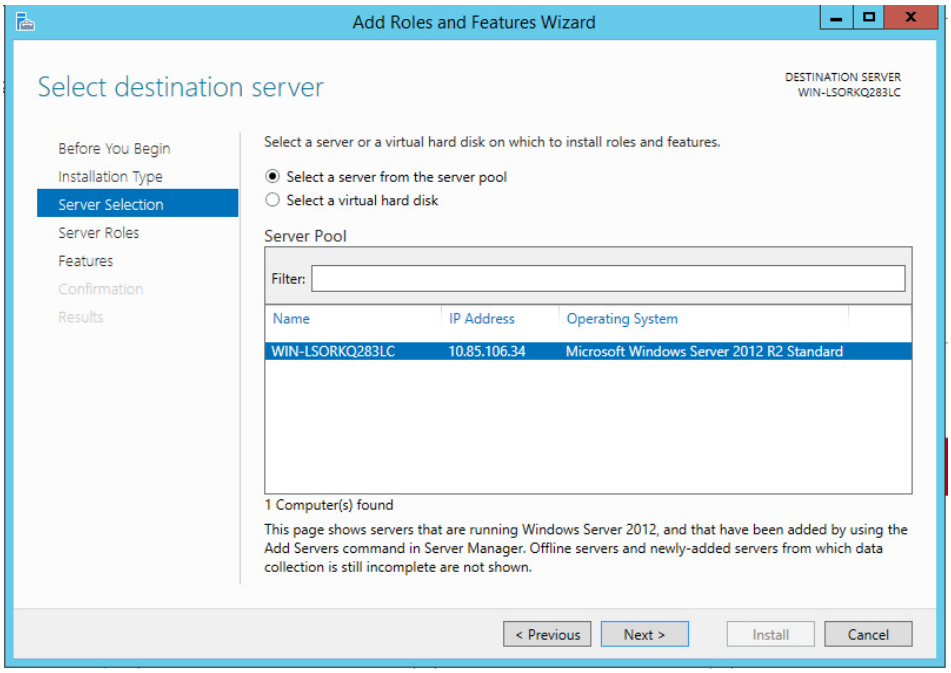
15. Accept the default of **Role-based or feature-based installation** and click [Next].

Figure A-12: Select Installation Type



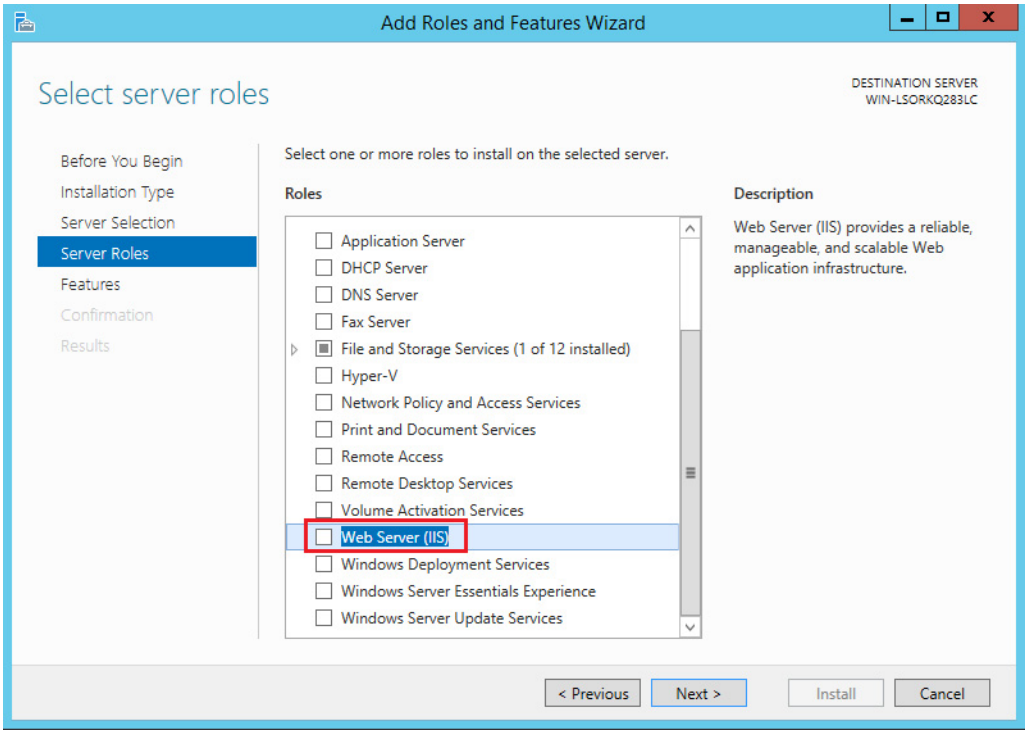
16. In the *Select destination server* screen, your server name should be selected by default. Click [Next].

Figure A-13: Select Destination Server



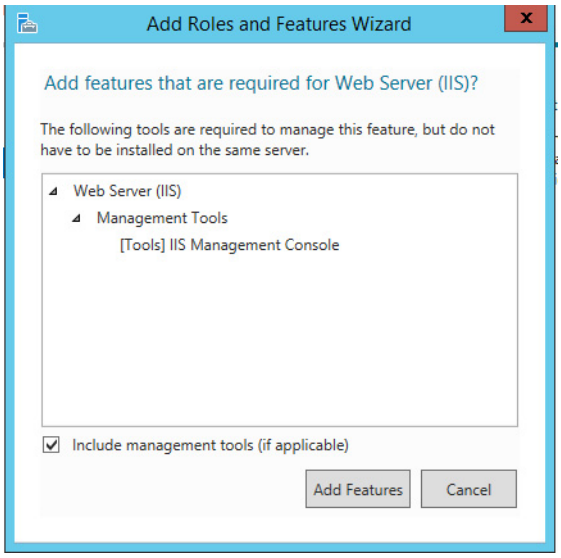
17. In the *Select server roles* screen, check the **Web Server (IIS)** checkbox in the **Roles** section. Click [Next].

Figure A-14: Select Server Roles



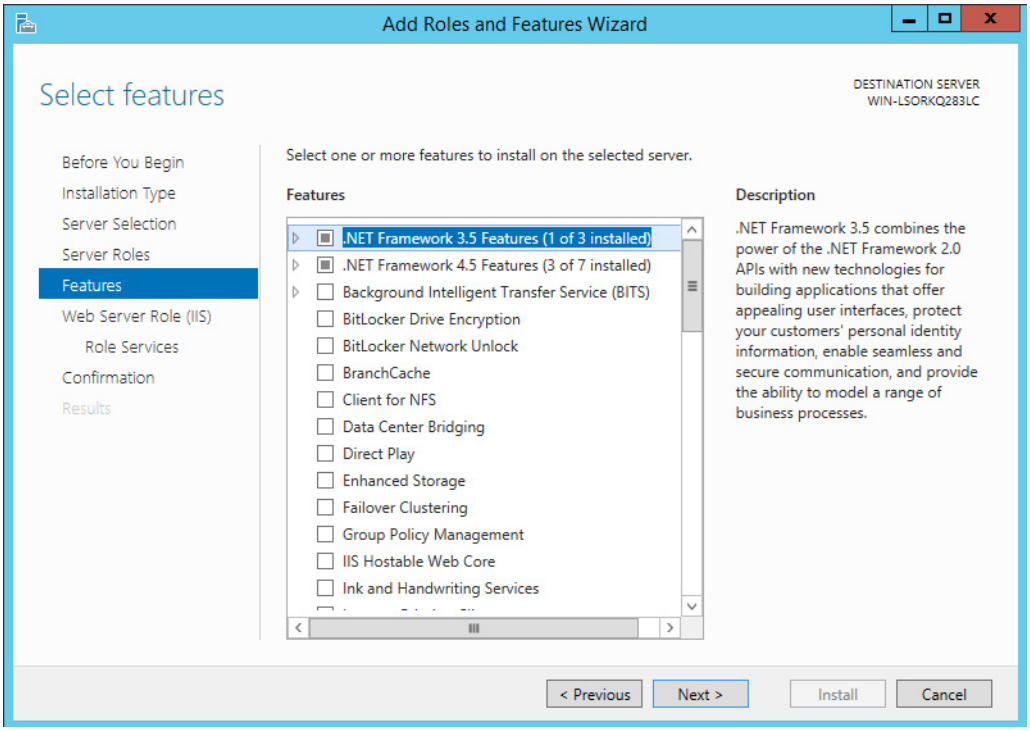
18. Click [Add Features] and then [Next].

Figure A-15: Web Server (IIS) Add Feature Selection



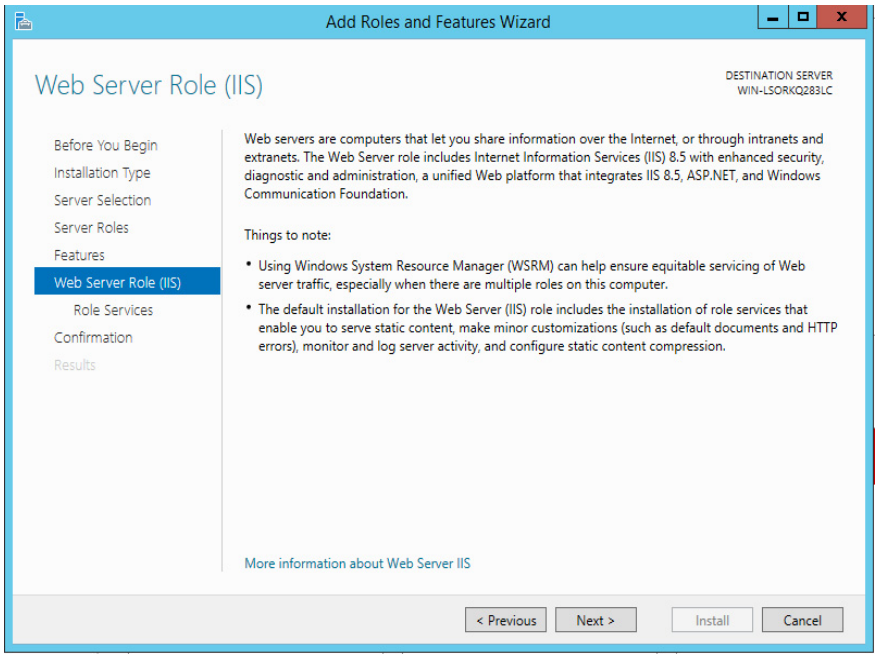
19. In the *Select Features* screen, accept the defaults and click [Next].

Figure A-16: Select Features



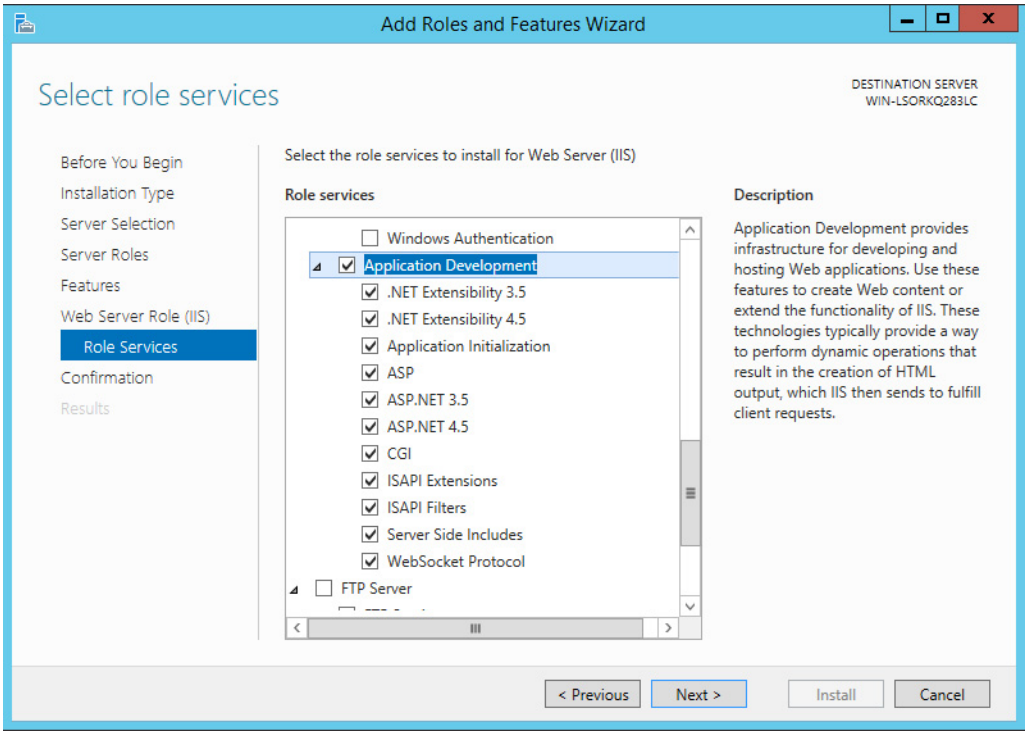
20. In the *Web Server (IIS)* screen, click [Next].

Figure A-17: Web Server Role (IIS) Information



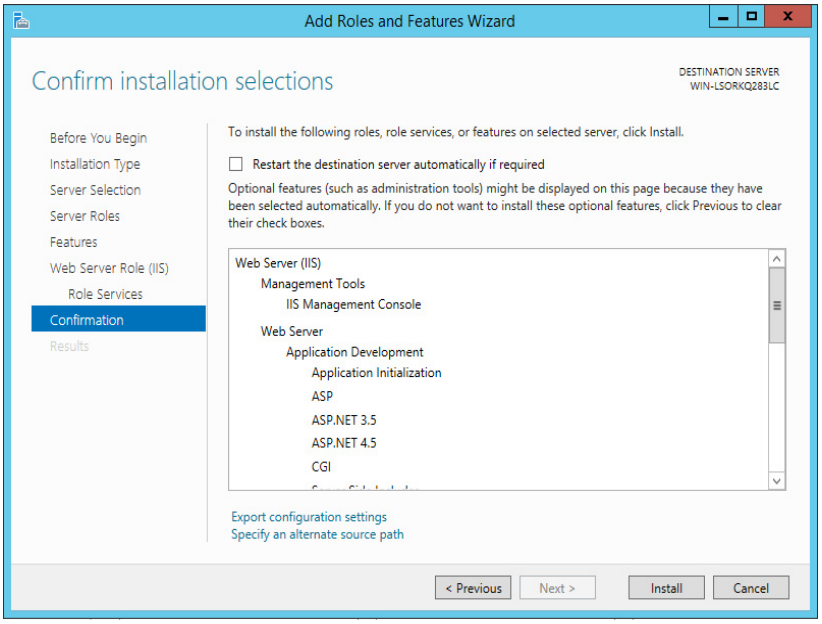
21. In the *Select role services* screen, select **Application Development** and all the role services under it. Click [Next].

Figure A-18: Select Role Services



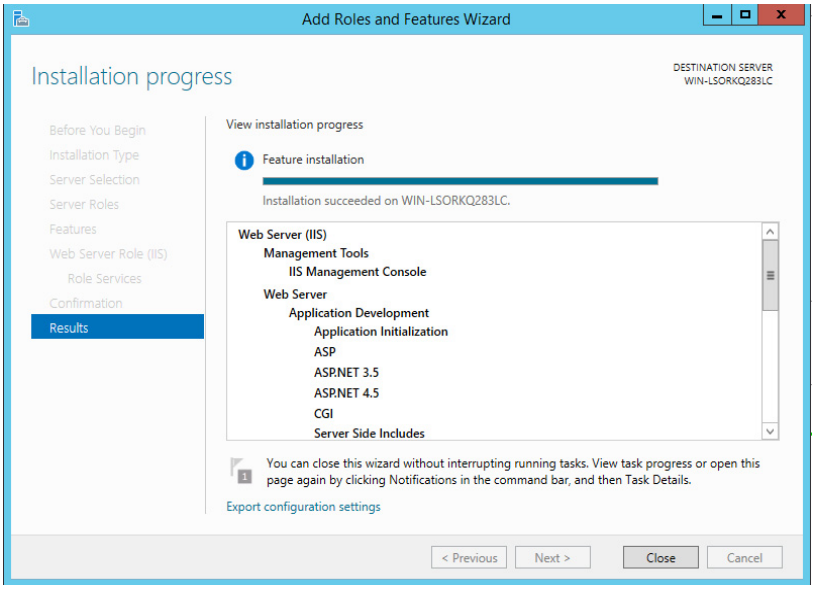
22. Confirm your installation selections. Make sure that the Web Server (IIS) and Application Development features are listed. Click [Install].

Figure A-19: Confirm Installation Selections



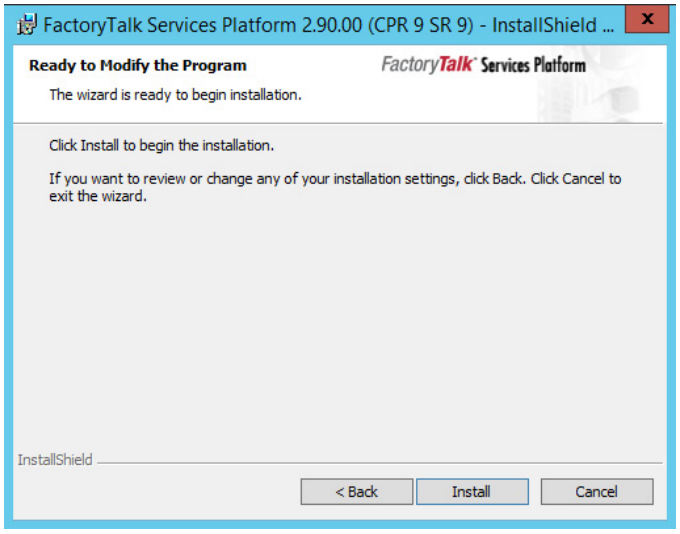
23. Click [Close] when the installation of the server roles and features is complete.

Figure A-20: Installation of Server Roles Complete



24. Click [Install] to begin the installation.

Figure A-21: FTSP Installer Ready to Modify Screen



25. Once the installation is complete, click [Finish] to close to installer.

Next, follow the instructions in the section "Configuring FactoryTalk Security Web Service" to configure the FactoryTalk Security Web Service.

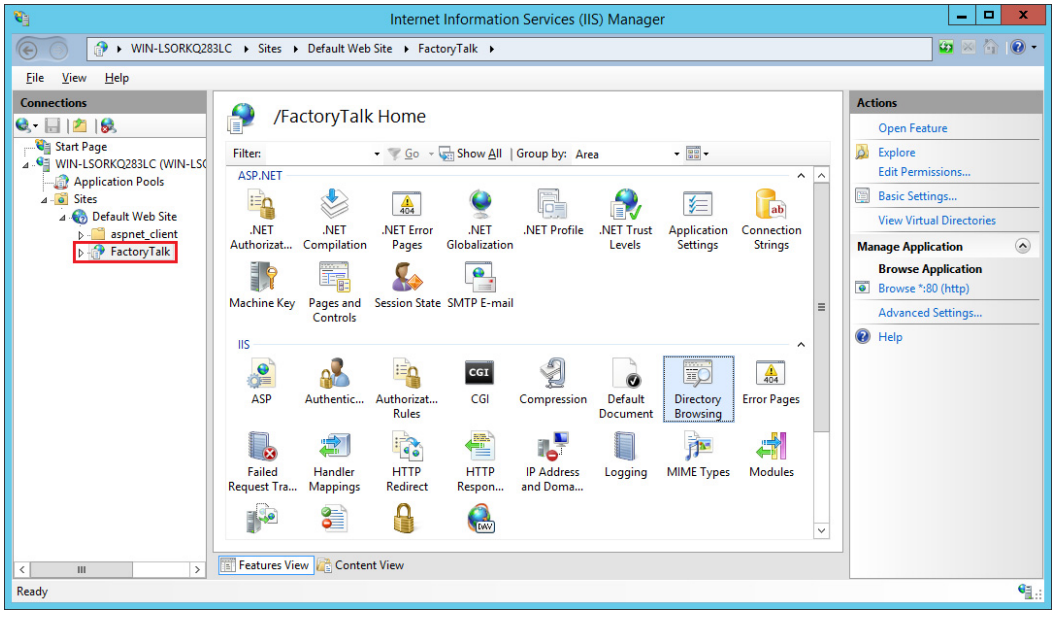
Configuring FactoryTalk Security Web Service

After installing the FactoryTalk Security Web Service, configure it by performing the following steps.

IMPORTANT: If your system is running Windows 7 or Windows Server 2012, start from step 11.

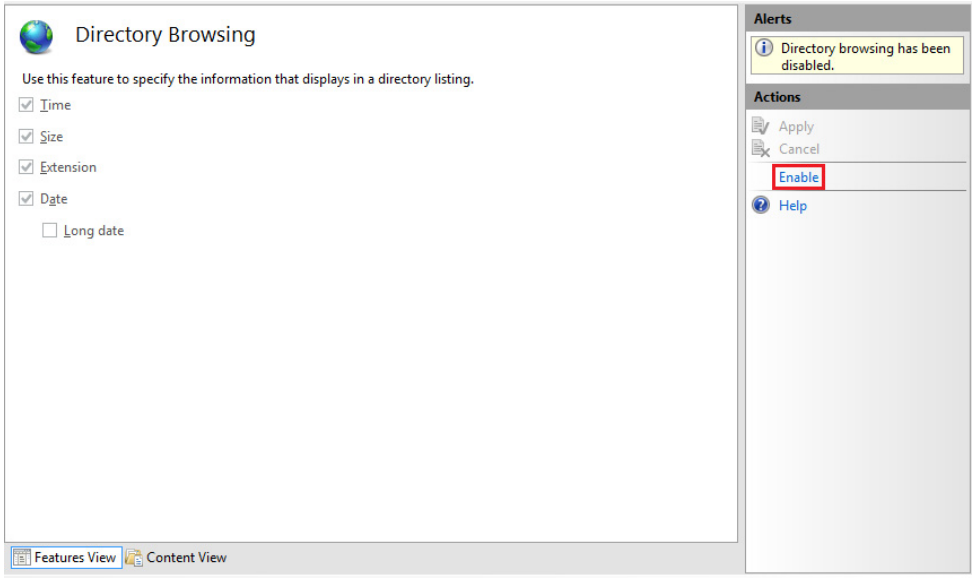
1. From Control Panel > Administrative Tools, select Component Services.
2. In the left panel, navigate to Component Services\Computers\My Computer\DCOM Config\Rockwell Directory Multiplexer.
3. Right-click *Rockwell Directory Multiplexer* and select *Properties*. Then, select the *Security* tab.
4. Under the *Launch and Activation Permissions* group, select the Customize radio button, then click [Edit].
5. On the Launch Permissions dialog, click [Add...].
6. On the Select Users, Computers, or Groups dialog, click [Locations...].
7. Select the local machine (it should be the top item on the list). Click [OK] to close the dialog.
8. Enter **aspnet** as the object name, then click [Check Names]. Click [OK] to close the dialog.
9. Make sure ASP.NET is selected and check the *Local Launch* and *Local Activation* checkboxes in the **Allow** column. Click [OK] to close the dialog.
10. Click [OK] to close the *Rockwell Directory Multiplexer Properties* dialog.
11. From Control Panel > Administrative Tools, select Internet Information Services Manager.
12. From the left panel, navigate to <*machinename*> > Sites > Default Web Site > FactoryTalk.

Figure A-22: Internet Information Services Manager



13. Double-click *Directory Browsing* to open the Directory Browsing frame, and click *Enable* in the right pane.

Figure A-23: Directory Browsing



Configuring Available Users and Groups

Add the following FTPC user groups using FactoryTalk Administration Console. This will allow you to use these groups with FactoryTalk Security Web Service.

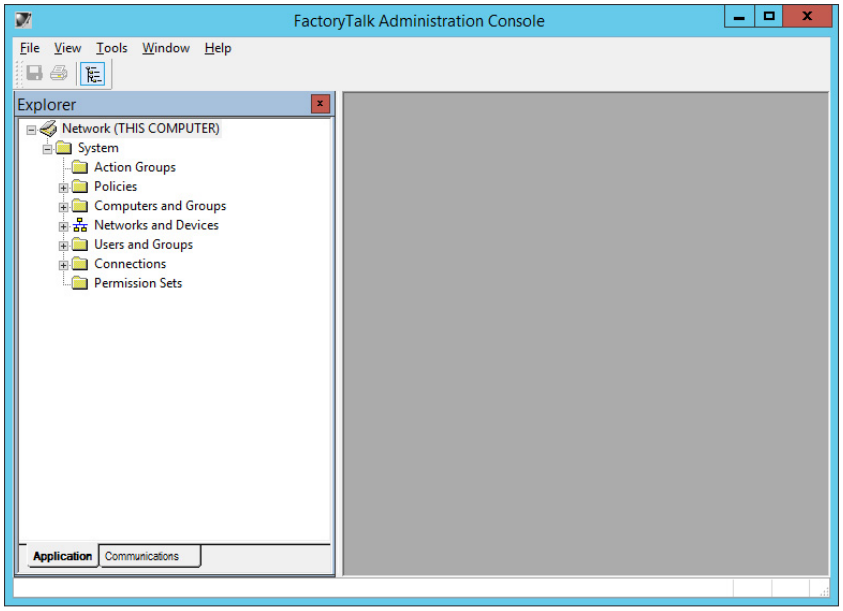
- PlantOpsAdmin
- PlantOpsDesigner
- PlantOpsSupervisor
- PlantOpsOperator
- PlantOpsGuest

IMPORTANT: The group names that you will be adding must exactly match the listed group names.

---

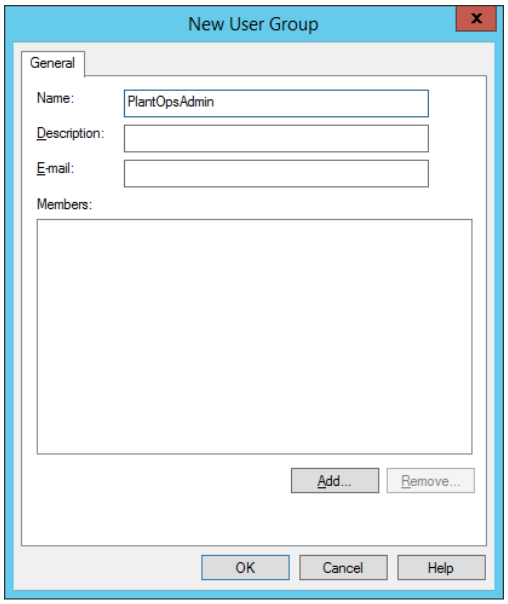
1. Go to Start > Programs > Rockwell Software > FactoryTalk Administration Console. The Select FactoryTalk Directory dialog appears.
2. Select Network and click [OK]. The FactoryTalk Administration Console appears.

Figure A-24: FactoryTalk Administration Console



3. On the Explorer pane on the left, navigate to System > Users and Groups.
4. Right-click *User Groups* and select New > User Group... The *New User Group* dialog appears.

Figure A-25: New User Group Dialog

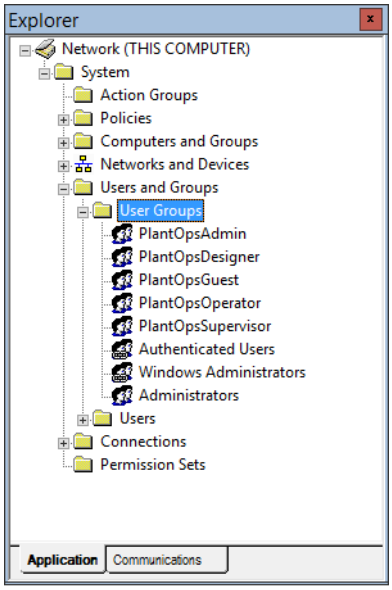


5. Enter **PlantOpsAdmin** as the name of the group and click [OK].
6. Repeat step 3 through step 5 to add the following groups:
   - PlantOpsDesigner
   - PlantOpsSupervisor

- PlantOpsOperator
- PlantOpsGuest

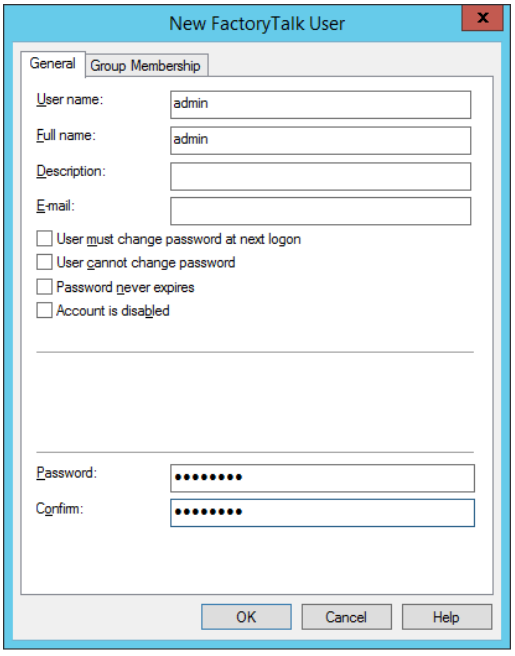
Each user group appears under the *User Groups* folder.

Figure A-26: User Groups



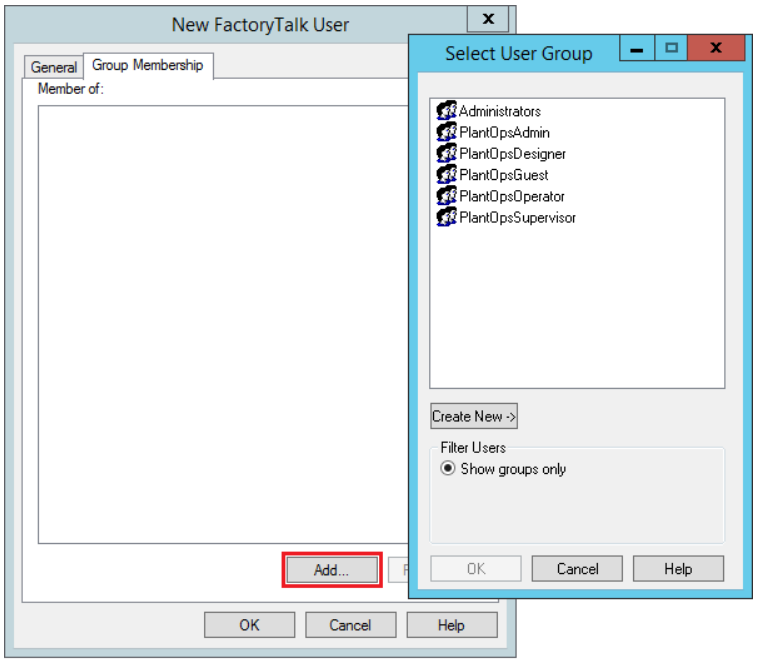
7. In the Explorer pane, right-click *User* and select New > User... The *New User* dialog appears.

Figure A-27: New User Dialog



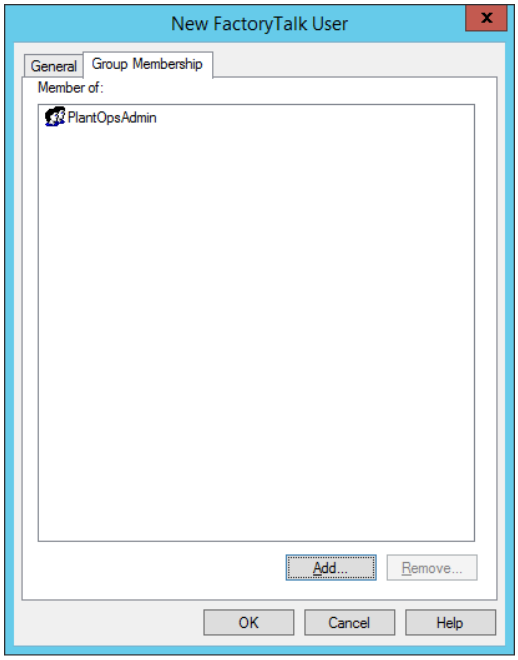
8. Enter the user name, full name, password, and password confirmation. Passwords must be at least six characters in length.
9. Select the *Group Membership* tab and click [Add...]. The *Select User Group* dialog appears.

Figure A-28: Select User Group Dialog



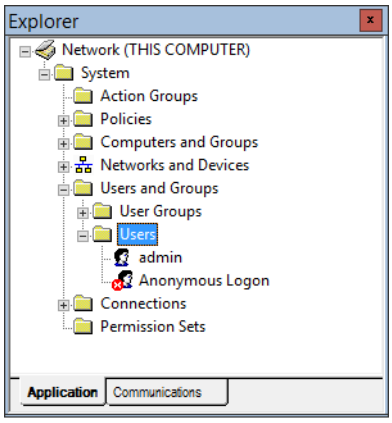
10. Select the user group(s) you want to add the user to and click [OK] to close the dialog.

Figure A-29: New User Added to User Group



11. Click [OK] to add the user to the user group. The new user appears under the *Users* folder.

Figure A-30: Newly Added User



12. Repeat step 7 through step 11 for any additional users you want to add.

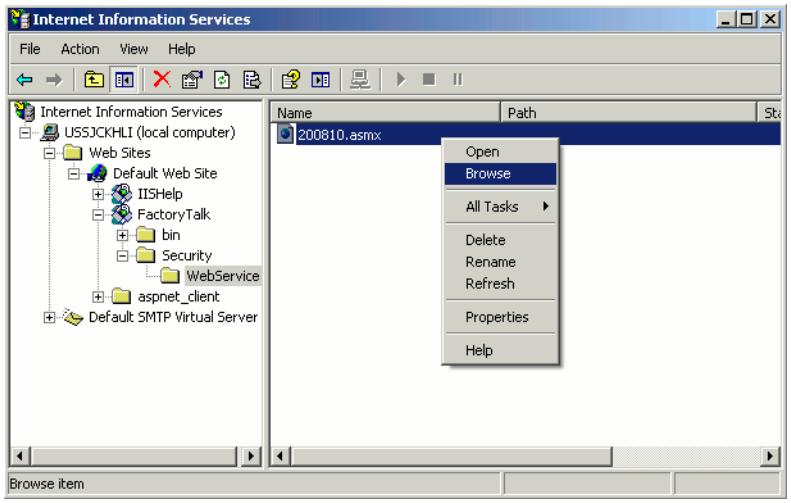
Testing the FactoryTalk Security Web Service

You can test the configuration as follows:

1. From Control Panel > Administrative Tools, double-click Internet Information Services (IIS) Manager.

2. In the *Internet Information Services Manager* window, expand the *Security* folder under *FactoryTalk* and select *WebService*.

Figure A-31: FactoryTalk Security WebService Folder



If you are using Windows 7:

a. Go to <*machinename*> > Sites > Default Web Site > FactoryTalk > Security > WebService.

b. Right-click *WebService* and go to Manage Folder > Browse.

Figure A-32: WebService Browse

This returns the result shown in Figure A-33 on page 116.

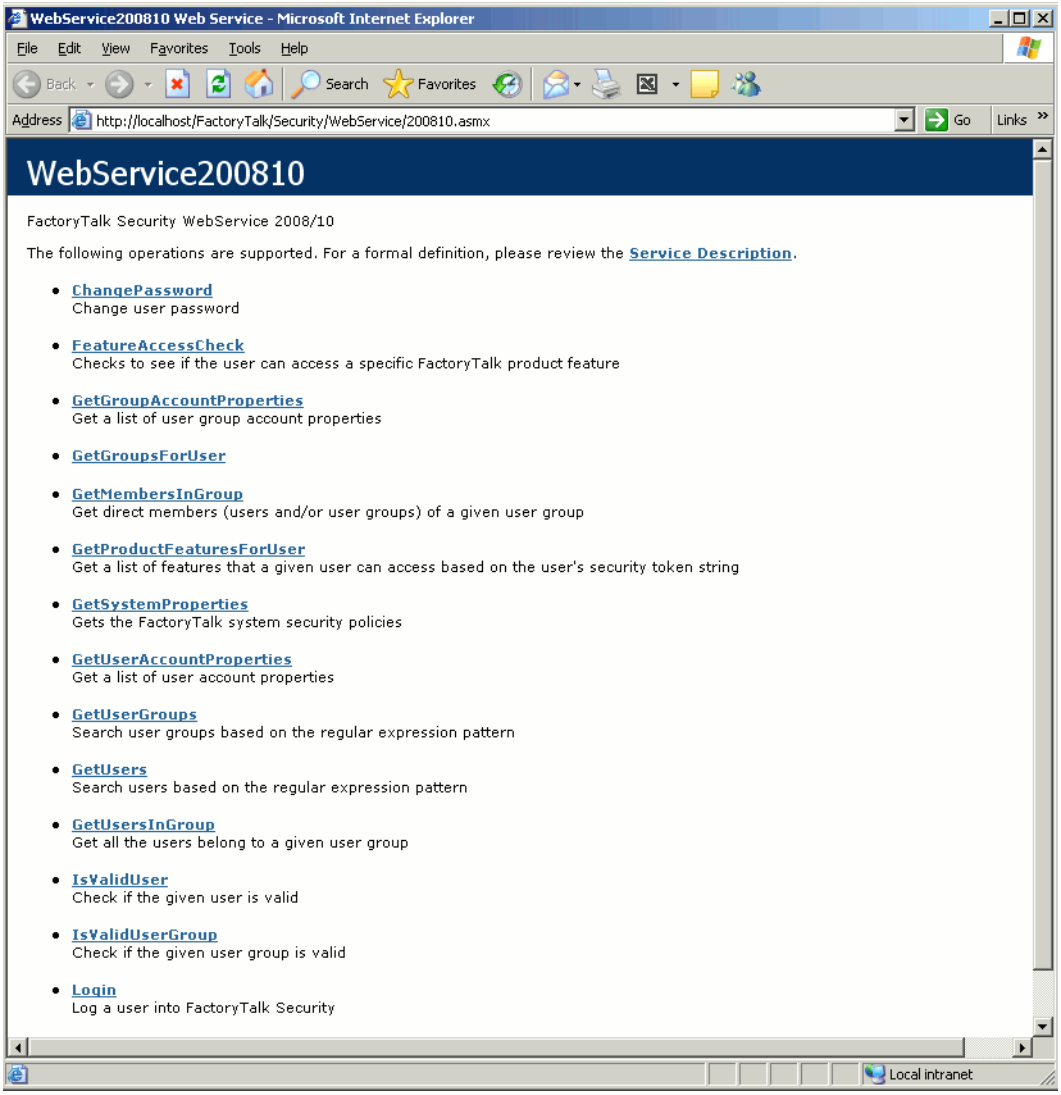
Figure A-33: Browse Result

3. On the right panel, right-click *200810.asmx* and select *Browse*.

   If you are using Windows 7, click *200810.asmx*.

   A web page opens listing supported operations for the FactoryTalk security web service.

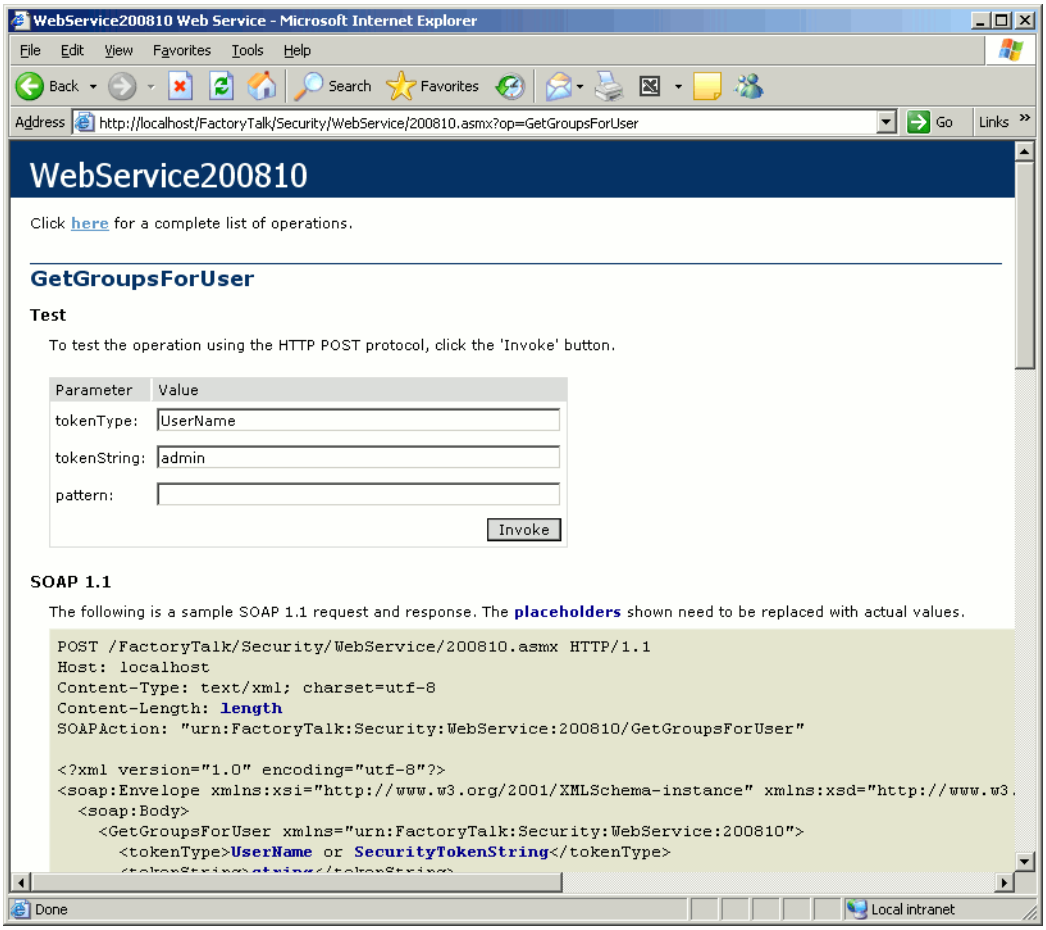
Figure A-34: FactoryTalk Security Web Service Supported Operations Web Page



4. Click *GetGroupsForUser*.

The following web page appears:

Figure A-35: GetGroupsForUser Web Page



5. In the *tokenType* text box, enter *UserName*.
6. In the *tokenString* text box, enter a valid user name in the FactoryTalk Network Directory.
7. Click [Invoke].

   A list of groups in which the user is a member of appears.

Refer to the *FactoryTalk Security System Configuration Guide* for additional information about the FactoryTalk Security Web Service and troubleshooting information if your web service is not working.

Installing and Configuring FactoryTalk Security Provider

Define the hostname and port of the computer running FactoryTalk Security Web Service in the standalone-full.xml file. See “Configure Security” on page 57 for details.

Lightweight Directory Access Protocol (LDAP)

LDAP is an Internet authentication protocol that allows JBoss to check the user registry in a database directory and verify that the user has permission to access JBoss. For complete instructions on LDAP security with JBoss, refer to the JBoss documentation.

For details on modifying the standalone-full.xml file for LDAP, refer to "Configure Security" on page 57.

Custom

Rockwell Automation provides the FTPC Custom Security Provider that manages users and passwords.

IMPORTANT: Using the Custom Security Provider affects the entire JBoss instance, including any other applications that may be running with that JBoss instance.

The "admin" user is created only after you initialize the new database. You can only configure JBoss Advanced Global Security to use the security provider after the production database has been configured and initialized. The "admin" user name and password can be changed at any time, but you still must propagate any changes to JBoss after you have changed it in Process Designer and before you stop the JBoss server. The username and password for logging in to JBoss must always match the username and password for logging in to Process Designer.

Logging into FTPC Applications

NOTE: This section applies if you are using the "FactoryTalk Security Provider" (FTSP) or "Lightweight Directory Access Protocol (LDAP)" security model. Otherwise, skip this section.

Before using non-FTPC security providers to authenticate users logging into FTPC applications (Process Designer, Shop Operations Server, etc.), a user with the same name must be created using the non-FTPC security software that has been chosen.

NOTE: If using a non-FTPC security provider, the user created in FTPC upon database initialization (i.e. *admin*) can be used for tracking and reporting purposes, but not for authentication purposes. To use *admin* for authentication purposes, please add it to the list of users for your security system.

When a user who does not exist in the APP_USER table logs into an FTPC application, that user is imported into the APP_USER table in all uppercase letters, but the username is not case-sensitive. (If you are using the FTPC security provider, the username is always case-sensitive.)

For example, if the system is configured to use a non-FTPC security provider and "Ty" logs in, the system checks to see if such a User object exists in the APP_USER table. If it does not exist, then TY is added to the APP_USER table. To log in with this user, you can enter ty, Ty, tY, or TY, and they will all be recognized as the same user. No new user is added to the APP_USER table. This is the default behavior.

TIP: If you would like to change this default behavior, please contact Technical Support for further options.

When a user is imported into the FTPC database, the security provider is still responsible for authenticating the password. Any information stored in the database, including the password and other security related user attributes, is ignored. The imported user will be placed into a default user group that can be set in FTPC Administrator. By default, this group is PlantOpsOperator. The imported user will receive the access privileges associated with this user group.

When using non-FTPC security providers to authenticate users logging into FTPC applications, only password authentication is supported. Authorization of the user's group is still done through the middleware and the FTPC database. The group or role of the user in the non-FTPC security provider is not used in the authentication process. Therefore, they can be in any group or role or in none at all.

Limitation

When initially logging into FTPC applications using a non-FTPC security authentication, the user name is automatically changed to all upper-case when FTPC imports the user into the FTPC database. However, if the user name already exists in the database (possibly from an import performed when logging in using the FTPC security provider authentication), then the user will NOT be imported and the existing name is not changed to all upper-case. This latter scenario may cause issues with future authentications. For example, you are switching to LDAP from the FTPC security provider:

1. A user (UserA) is created and used to log into an FTPC application using the FTPC security provider. At login, the user is imported into the database as-is (i.e., mixed-case).
2. The security model is changed to LDAP, and UserA is created as an LDAP user.
3. UserA is again used to log into an FTPC application, which is now using the LDAP security model. Because UserA has already been imported into the

database, it is not imported again and the name is not changed to all upper-case. However, because LDAP authentication only authenticates the password of users logging into FTPC applications, the login is successful.

4. UserA performs a task that requires a two-token electronic signature in order to save their work. When LDAP tries to authenticate the user name, it will look for USERA. However, the username saved in the database is UserA. Therefore, authentication will fail.

TIP: If you encounter this issue, please contact Technical Support for further options.

Appendix B

Clustering with FTPC

In this chapter

A JBoss Application Server cluster is a group of application servers that are all running the same application. When a client accesses the cluster, the cluster appears as a single instance. Clustered environments are set up to provide load balancing and to ensure availability.

The goal of this chapter is to set up the first node, and then to replicate that node's configuration in the other nodes. To achieve this, you will set up a horizontal cluster running those FTPC components that can be clustered (DSPlantOperations.ear).

Complete the following sections to set up JBoss Application Server and FTPC to run in a cluster environment. The steps for this configuration assume that you will be using the FTPC Custom Security Provider and security has not yet been enabled. However, you can still configure the cluster environment if you are using another security model or if security is already enabled.

IMPORTANT: **This section describes one example of a cluster setup. You may configure a different cluster setup based on your site needs. Refer to the JBoss documentation for a complete description of possible cluster configurations.**

Install the Required JDK

To run and configure FTPC application components, you must have JDK installed on your application server machine. Refer to the *FactoryTalk ProductionCentre Supported Platforms Guide* for the supported JDK versions.

Once the JDK is installed, you must add the directory to the JAVA_HOME environment variable on every machine where nodes have been installed. To add the directory, perform the following steps.

NOTE: When installing the JDK, ensure that the installation directory does not contain any spaces.

Windows

1. From the Start menu, select Settings > Control Panel > System.
2. Select the Advanced tab.
3. Click [Environment Variable].
4. Perform one of the following:
   - If a JAVA_HOME variable already exists, change the value to the JDK installation directory, such as C:\jdk1.8.0_<*version*>.

- If a JAVA_HOME variable does not exist, add the variable and set the value to the JDK installation directory, such as C:\jdk1.8.0_<*version*>.

5. Click [OK] to set the value and return to the Advanced tab, and then click [OK] to close the dialog.

Linux

1. Log in to the Linux machine as root user.
2. Install the required JDK, accepting all defaults.
3. Open a shell, and enter the following command: `#vi /root/.bashrc`
4. Add the following lines to this file. If the entries exist, find and modify them. <*java_install_directory*> is the directory where the JDK is installed.

```
export JAVA_HOME=<java_install_directory>
export PATH=$JAVA_HOME/bin:$PATH
```

5. Save and exit from the vi editor.
6. From a shell, enter the following: #source /root/.bashrc

When you finish the above steps, enter the following from the command line to verify the Java version available:

```
java -version
```

The resulting version should be the version of JDK you installed just now. If not, you may need to check your work and run the command again.

Stop Other HTTP Servers

NOTE: This step should be performed for each machine in the cluster.

Before you can install JBoss server on the machine, you should stop any other web servers. If IIS, Apache, or any other HTTP Server is started, it may interfere with the installation.

To stop the servers:

Windows

1. Select Start > Settings > Control Panel > Administrative Tools > Services.
2. If the World Wide Web Publishing Service is running, stop the service.
3. Set the Startup Type to Manual.
4. Stop any other HTTP servers or applications using port 80, and set the Startup Type to Manual.

5. Click [OK].
6. Close the window.

Linux

1. Open a shell and enter the command:

   ```
   #netstat -lnp
   ```

   This step provides a list of currently running processes. Take special notice of the related port, such as 80, 8080 etc. You can use this list to find a process that would have a port conflict with JBoss. Note the PID (process ID) of any port that is in conflict for use in step 2.
2. Close any ports that conflict with a JBoss port by entering the following command:

   ```
   #kill <PID>
   ```

   where <*PID*> is the process ID of the port that is in conflict.

Install and Configure the JBoss Software

For detailed JBoss installation instructions, refer to the JBoss documentation. For information on supported JBoss versions, refer to the *FactoryTalk ProductionCentre Supported Platforms Guide*.

IMPORTANT: **Because the JBoss Application Server includes many complicated configuration requirements, we strongly recommend that a trained JBoss administrator perform the JBoss installation and configuration. Make sure that only authorized users can make changes to your JBoss configuration files. Please see your JBoss documentation for recommendations on file permission security.**

To install JBoss on the first node of your cluster:

1. Create a directory on your application server machine where you would like to install JBoss or select an existing directory to use. The directory path cannot contain any spaces.
2. Extract all the files from the JBoss ZIP package into the designated directory.

TIP: In the following subsections, <*JBoss_install*> is the installation directory of the JBoss server.

After the JBoss files are unzipped, you must configure several files to run FTPC. Perform the steps in the following sections to prepare the application server machine.

Update the JBoss Configuration File

Perform the following steps to configure the JBoss standalone-full-ha.xml file located at <*JBoss_install*>\standalone\configuration. Use this file to configure the following:

- ❑ "Define the ProductionCentreRealm"
- ❑ "Define the Transaction Timeout"
- ❑ "Configure the Default Logging Priority Value (Optional)"
- ❑ "Configuring Datasources"
- ❑ "Configure the User Authentication Window"
- ❑ "Configure the Messaging Cluster Password"
- ❑ "Configure the ActiveMQ Resource Adapter"
- ❑ "Configuring Security"
- ❑ "Verify Custom Security Provider Configuration"
- ❑ "Configure Single Sign-On"

NOTE: If you are configuring a mod_cluster load balancer, this will also require you to modify the standalone-full-ha.xml file. See "Configure the Mod_Cluster Load Balancer (Optional)" on page 136 for details.

Restart your application server after making the changes to the standalone-full-ha.xml file.

TIP: A template standalone-full-ha.xml file is provided for you at <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV\jbossSampleConfigTemplates (see "Extract FTPC Deployment Files" on page 50). This template provides TODO comments that indicate a section that requires you to provide some configuration information. Do one of the following:

- If you have minimal or no JBoss customization, copy the template standalone-full-ha.xml file into <*JBoss_install*>\standalone\configuration to overwrite the existing file. Then update the file with whatever JBoss customization you previously had before performing the steps in this section.

- If you have a lot of JBoss customization, compare your standalone-full-ha.xml file with the provided template standalone-full-hal.xml file and copy anything that appears in the template standalone-full-ha.xml file into your standalone-full-ha.xml file. Then search for the TODO comments in the template standalone-full-ha.xml file and use them as a guide to make the required FTPC configurations outlined in this section in your existing standalone-full-ha.xml file.

Define the ProductionCentreRealm

Add the ProductionCentreRealm to your JBoss configuration file under <security-realms> as follows:

```
<security-realm name="ProductionCentreRealm">
  <authentication>
     <jaas name="ProductionCentre"/>
  </authentication>
</security-realm>
```

Define the Transaction Timeout

Define the transaction timeout in the <subsystem xmlns="urn:jboss:domain:transactions:3.0"> subsystem as follows:

```
<subsystem xmlns="urn:jboss:domain:transactions:3.0">
    ....
    <coordinator-environment default-timeout="600"/>
</subsystem>
```

Configure the Default Logging Priority Value (Optional)

By default, the JBoss log file is set to INFO. To change this, search for *TODO: To change the default Logging Priority Value* and change the level name to your desired level (WARN, ERROR, etc.).

```
<subsystem xmlns="urn:jboss:domain:logging:3.0">
<console-handler name="CONSOLE">
<level name="INFO"/>
```

Configuring Datasources

NOTE: If you make any changes to the database connection information, you must copy the XML files that store the datasource definitions from the FTPC application server to each node in the cluster. The JBoss server on each node must be restarted afterwards.

To define your datasources:

1. Search for the line *TODO: Define your database information.*
2. Find the section for your database type and uncomment it. The section for a SQL Server database is uncommented by default.
3. Search for the following place holders and replace them with your connection information:
   - **SQL Server**:

- ❖ <*host*>: the hostname of the database server.
- ❖ <*DatabaseName*>: the database name.

▶ **Oracle**:

- ❖ <*host*>: the hostname of the database server.
- ❖ <*SID*>: the Oracle System ID.

▶ **Oracle RAC**:

- ❖ <*Scan_IP1*>: the Single Client Access Name (SCAN) of the first database server, <*Scan_IP2*>: the SCAN of the second database server, and so on.
- ❖ <*port1*>: the port for the first database server (1521 is the default), <*port2*>: the port for the second database server, and so on.
- ❖ <*service*>: the name of the service.

4. Search for *TODO: Define your Transaction Isolation setting* and make sure your transaction setting is set to READ COMMITTED. If the setting does not exist, add the following line:

```
<transaction-isolation>TRANSACTION_READ_COMMITTED</
transaction-isolation>
```

5. Search for *TODO: Define your database username and password* and define your database username and password.

```
<security>
    <user-name><username></user-name>
    <password><password></password>
</security>
```

> **NOTE:** For Oracle, the password is not encrypted by default. The application server relies on file security to keep the password secure.

6. Search for *TODO: Define your database driver*s and define your database drivers.
   - ▶ If you are using SQL Server, do nothing. The SQL Server driver is uncommented by default.
   - ▶ If you are using Oracle or Oracle RAC, comment out the SQL Server section and uncomment the Oracle section.

Configure the User Authentication Window

By default the security credential is re-authenticated every 30 minutes. Therefore, if the logged-in user's password expires after they have logged onto the system, the user will not be logged out of the system until the next re-authentication event.

If you want to reduce or lengthen this authentication window, then search for the line *TODO: Configure the user authentication window interval* and define the interval between re-authentication events. The default is 1800000 milliseconds (30 minutes).

```
<expiration max-idle="1800000"/>
```

If this property is set to 0, then JBoss will verify the user's security credentials each time an EJB call is made.

Configure the Messaging Cluster Password

Search for *TODO: Change your messaging cluster password as needed* and replace the password if needed.

```
<cluster
password="${jboss.messaging.cluster.password:airtest}"/>
```

Configure the ActiveMQ Resource Adapter

NOTE: The ActiveMQ resource adapter needs to match the JMS Server URL setting defined in FTPC Administrator.

Search for the line *TODO: Configure the ActiveMQ resource adapter* and replace the <*localhost*> place holder with your ActiveMQ server's hostname or IP address.

```
<config-property name="ServerUrl">
  failover:(tcp://
  <localhost>:61616)?startupMaxReconnectAttempts=15
</config-property>
```

Locate the following lines within <subsystem xmlns="urn:jboss:domain:ejb3:4.0">:

```
<mdb>
    <resource-adapter-ref resource-adapter-name="activemq-
rar.rar"/>
    <bean-instance-pool-ref pool-name="mdb-strict-max-pool"/>
</mdb>
```

Please note the resource adapter name above (activemq-rar.rar) should be the same as the resource adapter ID in the following:

```
<subsystem xmlns="urn:jboss:domain:resource-adapters:4.0">
    <resource-adapters>
          <resource-adapter id="activemq-rar.rar">
...
    </resource-adapters>
```

Configuring Security

If you are using either FactoryTalk Security Provider or LDAP:

1. Comment out the following section:

```
<security-domain name="ProductionCentre" cache-
type="infinispan">
  <authentication>
    <login-module
code="com.datasweep.common.security.jboss.DSLoginModule"
flag="required"
module="com.datasweep.common.DSSecurity.jboss">
      <module-option
name="allowMagicPasswordIfDatabaseNotAvailable"
value="false"/>
    </login-module>
    <login-module code="Remoting" flag="optional">
      <module-option name="password-stacking"
value="useFirstPass"/>
    </login-module>
  </authentication>
</security-domain>
```

2. Search for the line *TODO: Define your security.*
3. Find the section for your security type and uncomment it.
4. Search for the following place holders and replace them with your security information:
   - **FactoryTalk Security Provider**: find the <*Host*> and <*Port*> place holders and replace them with the hostname and port of the computer running FactoryTalk Security Web Service. The default port is 80.
   - **LDAP**: find the <*Name*> and <*Value*> place holders and replace them with name and port of the machine running LDAP.

Verify Custom Security Provider Configuration

If you are using the FTPC Custom Security Provider, verify the configuration of the JBoss standalone-full.xml file after the database connections are set up.

To verify the configuration, perform the following:

1. Locate the block of code that starts with the following:

```
<login-module
code="com.datasweep.common.security.jboss.DSLoginModule"
flag="required"
module="com.datasweep.common.DSSecurity.jboss">
```

2. Verify that the section says the following:

```
<module-option
name="allowMagicPasswordIfDatabaseNotAvailable"
value="false"/>
```

Configure Single Sign-On

To configure single sign-on (SSO) for clustering, add the **<single-sign-on/>** tag to the undertow's host tag. For example:

```
<subsystem xmlns="urn:jboss:domain:undertow:3.1">
 <buffer-cache name="default"/>
 <server name="default-server">
   <http-listener name="default" socket-binding="http"
redirect-socket="https"/>
   <host name="default-host" alias="localhost">
     <location name="/" handler="welcome-content"/>
     <filter-ref name="server-header"/>
     <filter-ref name="x-powered-by-header"/>
     <single-sign-on/>
   </host>
 </server>
```

NOTE: In order for clustered SSO to work, your application must be distributable (i.e., the <distributable/> tag has been added to the WEF-INF/web.xml file). Please see the Redhat knowledgebase article located at https://access.redhat.com/solutions/2650221 for more information.

Configure the JBOSS_HOME Variable

Windows

1. From the Start menu, select Settings > Control Panel > System.
2. Select the Advanced tab.
3. Click [Environment Variable].
4. Perform one of the following:
   - If a JBOSS_HOME variable already exists, change the value to the JBoss installation directory, such as C:\jboss-eap-7.x.
   - If a JBOSS_HOME variable does not exist, add the variable and set the value to the JBoss installation directory, such as C:\jboss-eap-7.x.

5. Click [OK] to set the value and return to the Advanced tab, and then click [OK] to close the dialog.

Linux

1. Open a shell and enter the following:

```
#vi /root/.bashrc
```

2. Add the following lines to the bashrc file. If the entry already exists, find and modify it.

```
export JBOSS_HOME=<JBoss_install>
export PATH=$JBOSS_HOME/bin:$PATH
```

3. Save and exit from the vi editor.
4. Open a shell and enter the following:

```
#source /root/.bashrc
```

5. Verify the JBoss installation.

Configure Explicit Binding to a Network Interface (Optional)

If the machine where you installed JBoss contains more than one network interface, you can configure JBoss to explicitly bind to one network interface when you start JBoss. To do so, start JBoss at the command line with the -b option to specify the IP address of the network interface to bind to. For example, if you are starting JBoss from the command line in Windows, run:

```
<JBoss_install>\bin\standalone.bat -c standalone-full-ha.xml -
b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
u 230.0.0.5
```

where

- *<JBoss_install>* is the directory where you unzipped the JBoss files.
- **-c** defines the server configuration file to be used.\
- **-b** sets the binding address.
- **-bprivate** makes your multicast port 55200 run on the binding IP address.
- **-Djboss.server.name=<node_name>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
- **-u** defines the multicast address.

Create a JBoss Administrative User

Make sure you have a JBoss administrative user named *admin* defined.

1. Launch a command prompt with administrative privileges.

2. Navigate to <*JBoss_install*>\bin, where *JBoss_install* is the file directory of your JBoss installation.
3. Run add-user.bat.
4. Select “a” to create a Management User.
5. Define the user name as *admin*.
6. Define a password, and then confirm the password.
7. When asked to define the groups of the user, leave this blank. Respond to any remaining prompts as needed.
8. Enter “yes” on the final confirmation prompt. The username and password will be used for the --user and --pwd inputs for the RegisterServer command.

Enable JBoss Client Logging

To enable logging for the JBoss client, perform the following steps.

1. Navigate to <*Client_home*>\<*hostname*>\ProductionCentre\logs where:
   - <*Client_home*> is the FTPC client home. This is C:\.FTPC by default. See “Define the Download Location (Optional)” on page 156 for instructions on defining the client home.
   - <*hostname*> is the name of your application server machine.
2. Open the log.config file and manually add and define the following lines:

   ```
   -Dorg.jboss.logging.provider=<logging_provider>
   org.jboss.ejb.client=<logging_level>
   org.jboss.remoting=<logging_level>
   ```

   For example, the following setting tells the JBoss client to use the JDKModule component to accept log messages for all levels.

   ```
   -Dorg.jboss.logging.provider=jdk
   org.jboss.ejb.client=ALL
   org.jboss.remoting=ALL
   ```

   TIP: Common levels that are used to filter log messages include **ALL**, **SEVERE**, and **INFO**.

3. Save and close your file.

Remove the MetaspaceSize Parameters

Remove the JBoss server's MetaspaceSize parameters by performing the following steps:

1. In <*JBoss_install*>\bin, open the standalone.conf.bat file in a text editor.

2. Search for the following line:

```
set "JAVA_OPTS=-Xms1G -Xmx1G -XX:MetaspaceSize=96M -
XX:MaxMetaspaceSize=256m"
```

3. Delete the MetaspaceSize parameters so that the line now looks like the following:

```
set "JAVA_OPTS=-Xms1G -Xmx1G
```

4. Save and close your file.

Download the ActiveMQ Archives

The ActiveMQ-<*version*>.rar file contains the ActiveMQ <*version*> archives required for deploying ActiveMQ on JBoss as a module

1. Download the activemq-rar-<*version*>.rar file from the following URL:

```
http://repo1.maven.org/maven2/org/apache/activemq/activemq-
rar/<version>/
```

2. Create this path:
<*JBoss_Install*>\modules\system\layers\base\org\apache\activemq\main
3. Change the extension of the ActiveMQ-<*version*>.rar file to .zip (i.e., ActiveMQ-<*version*>.zip).
4. Extract the contents of the ActiveMQ-<*version*>.zip file to <*JBoss_Install*>\modules\system\layers\base\org\apache\activemq\main.

Configure the Mod_Cluster Load Balancer (Optional)

TIP: While the load balancer can run on one of the clustered machines, for better availability it is preferred to have the load balancer deployed on a separate server.

To configure the mod_cluster HTTPD load balancer, perform the steps listed in the following sections.

For more information on mod_cluster, please read the official documentation located at https://modcluster.io/.

Windows

Perform the steps in this section if you are configuring mod_cluster on a Windows system.

Download Binaries and Modify mod_cluster.conf

To download the mod_cluster binaries and modify the mod_cluster.conf configuration file, perform the following steps:

1. Download the jbcs-httpd24-httpd-2.4.29 binaries zip bundle from the JBoss Software Downloads page.
2. Extract the contents of the zip file to any location.
3. Navigate to jbcs-httpd24-2.4\etc and run postinstall.httpd.bat. This will create a mod_cluster.conf file in the jbcs-httpd24-2.4\etc\httpd\conf.d directory.
4. Navigate to jbcs-httpd24-2.4\etc\httpd\conf.d and open the mod_cluster.conf file using a text editor.
5. Verify that the following LoadModules are listed in mod_cluster.conf:

```
LoadModule proxy_module modules/mod_proxy.so

LoadModule proxy_ajp_module modules/mod_proxy_ajp.so

LoadModule proxy_cluster_module modules/mod_proxy_cluster.so

LoadModule cluster_slotmem_module modules/
mod_cluster_slotmem.so

LoadModule manager_module modules/mod_manager.so

LoadModule advertise_module modules/mod_advertise.so
```

6. Locate the <IfModule manager_module> section. Replace the entire section with the following:

```
<IfModule manager_module>
     Listen <IP_Address_and_Port>
     ManagerBalancerName <Cluster_Name>
     <VirtualHost <IP_Address_and_Port>>
     <Directory />
          Require ip 127.0.0.1
          Require all denied
          Require all granted
     </Directory>
     KeepAliveTimeout 60
     MaxKeepAliveRequests 0
     AdvertiseFrequency 5
     EnableMCPMReceive On
     ServerAdvertise On
     AllowDisplay On
     <Location /mod_cluster_manager>
          SetHandler mod_cluster-manager
          Require ip 127.0.0.1
          Require all denied
          Require all granted
     </Location>
     AdvertiseGroup <Multicast_Address_and_Port>
     AdvertiseBindAddress <Multicast_Address_and_Port>
     </VirtualHost>
</IfModule>
```

Where:

- *IP_Address_and_Port* is the IP address and port of the machine where you ran postinstall.httpd.bat.
- *Cluster_Name* is the user-defined ManagerBalancerName. This can be modified to whatever you want.
- *Multicast_Address_and_Port* is the multicast address and port that will be used in the JBoss configuration in the upcoming steps.

Modify JBoss Configuration

IMPORTANT: The steps listed in this section must be performed on all nodes of the cluster.

TIP: When updating the standalone-full-ha.xml file, search for TODO. This comment marks sections that require user configuration.

JBoss must be configured to work with mod_cluster. Modify standalone-full-ha.xml as shown in the following steps:

1. Navigate to <*JBoss_install*>\standalone\configuration and open standalone-full-ha.xml with a text editor.
2. Locate and change all instances of "127.0.0.1" to the host IP address of the machine.
3. Locate <socket-binding-group name="standard-sockets" default-interface="public" port-offset="${jboss.socket.binding.port-offset:0}"> and add the following section:

```
<outbound-socket-binding name="proxy1">
    <remote-destination host="<IP_Address>" port="<port>"/>
</outbound-socket-binding>
```

   where <*IP_Address*> and <*port*> are the IP address and port of the machine where you ran installconf.bat.

4. Locate the following section and update the IP address and port with the IP address and port that was configured in the httpd.conf file in *step 6 on page 137*.

```
<mod-cluster-config advertise-socket="modcluster"
proxies="proxy1" balancer="kylinBalancer" sticky-
session="true" advertise-security-key="123456789"
connector="ajp">
    <dynamic-load-provider>
    <load-metric type="cpu"/>
    </dynamic-load-provider>
</mod-cluster-config>
```

where <*proxy1*> is the outbound-socket-binding name defined under the socket-binding-group in the previous step. If this name was changed, then change the name here as well.

5. Locate and update the following section:

```
<socket-binding name="modcluster" port="0" multicast-
address="<Multicast_Address>" multicast-
port="<Multicast_Address_Port>/>
```

where *Multicast_Address* is the multicast address (excluding the port number) and *Multicast_Address_Port* is the multicast port number. The multicast address must match that which was configured in the httpd.conf file in *step 6 on page 137*.

6. Save and close standalone-full-ha.xml.

Install and Start the Service

IMPORTANT: The mod_cluster service must be started before the JBoss service. Ensure that the JBoss service is stopped before continuing.

To install and start the mod_cluster service, perform the following steps:

1. Open a command prompt window.
2. Change the directory to the jbcs-httpd24-2.4\bin folder.
3. Enter the following to install the service:

```
httpd.exe -k install -f <install-path>\jbcs-httpd24-
2.4\etc\httpd\conf\httpd.conf -n "<MyServiceName>"
```

Where *MyServiceName* is the name you want to assign to the service.

4. Enter the following command to start the service:

```
NET START <MyServiceName>
```

To stop the service, enter:

```
NET STOP <MyServiceName>
```

TIP: Services can also be started or stopped from the Windows Service Manager.

Linux

Perform the steps in this section if you are configuring mod_cluster on a Linux system.

Download and Install HTTPD

To download and install HTTPD on Linux, perform the following steps:

1. Navigate to the following URL and download the httpd-2.2.29.tar.gz file.

   ```
   http://httpd.apache.org/download.cgi
   ```

2. Extract the tar.gz file. The path of the extracted file in the following steps will be /httpd-2-2.29.

3. Install Apache Portable Runtime (APR) by opening a command terminal and entering the following commands:

   ```
   # cd /httpd-2-2.29/srclib/apr
   # ./configure --prefix=/usr/local/apr
   # make
   # make install
   ```

4. Install APR Util by entering the following commands:

   ```
   # cd ../apr-util
   # ./configure --prefix=/usr/local/apr-util –with-apr=/usr/local/apr
   # make
   # make install
   ```

5. Install the HTTPD server by entering the following commands:

   ```
   # cd ../../
   # ./configure --prefix=/usr/local/httpd --with-apr=/usr/local/apr --
   with-apr-util=/usr/local/apr-util --enable-so
   # make
   # make install
   ```

6. Load the mod_proxy module by entering the following commands:

   ```
   # cd /usr/local/httpd/bin
   # ./apxs –i –a –c /httpd-2-2.29/modules/proxy/mod_proxy.c /httpd-2-
   2.29/modules/proxy/proxy_util.c
   # ./apxs –i –a –c /httpd-2-2.29/modules/proxy/mod_proxy_http.c
   ```

7. Load the ajp module by entering the following commands:

   ```
   # cd /usr/local/httpd/bin
   # ./apxs –i –a –c  /httpd-2-2.29/modules/proxy/mod_proxy_ajp.c /httpd-
   2-2.29/modules/proxy/ajp*.c
   ```

Modify jboss_cluster.conf and Httpd.conf

To download the mod_cluster dynamic libraries and modify the configuration files, perform the following steps:

1. Download mod_cluster for Linux (“dynamic libraries linux2-x64”) from the following address:

   ```
   http://mod-cluster.jboss.org/mod_cluster/downloads/1-2-0-
   Final
   ```

2. Extract the four .so files to /usr/local/httpd/modules.

3. Navigate to /usr/local/httpd/conf and create a file named jboss_cluster.conf. Add the following lines to the file:

```
<IfModule manager_module>
  Listen <IP_Address_and_Port>
  <VirtualHost <IP_Address_and_Port>>
    <Directory />
      Order deny,allow
      Deny from all
      Allow from all
    </Directory>
    KeepAliveTimeout 60
    MaxKeepAliveRequests 0
    ManagerBalancerName <Cluster_Name>
    AdvertiseFrequency 5
    EnableMCPMReceive On
    ServerAdvertise On
    AllowDisplay On
    AdvertiseGroup <Multicast_Address_and_Port>
    AdvertiseBindAddress <Multicast_Address_and_Port>
    <Location /mod_cluster_manager>
      SetHandler mod_cluster-manager
      Order deny,allow
      Deny from all
      Allow from all
    </Location>
    </VirtualHost>
</IfModule>
```

Where:

- *IP_Address_and_Port* is the IP address and port of the machine where you ran installconf.bat.
- *Cluster_Name* is the user-defined ManagerBalancerName. This can be modified to whatever you want.
- *Multicast_Address_and_Port* is the multicast address and port that will be used in the JBoss configuration in the upcoming steps (e.g., 224.0.1.108:23333.). Do not use the multicast address provided by default.

4. Save and close jboss_cluster.conf.
5. Navigate to /usr/local/httpd/conf and open httpd.conf with a text editor.
6. Locate the ServerName line, which by default will look like this:

```
#ServerName localhost:8000
```

Then, perform the following:

- Uncomment the line by removing the # symbol.
- Change “localhost” to the hostname of the node.
- Change the port number from 8000 to 80 or any unused port.

7. Locate the LoadModules lines shown below:

```
LoadModule proxy_cluster_module modules/mod_proxy_cluster.so
LoadModule manager_module modules/mod_manager.so
LoadModule slotmem_module modules/mod_slotmem.so
LoadModule advertise_module modules/mod_advertise.so
```

   Add the following line beneath the above section:

```
Include conf/jboss_cluster.conf
```

8. Save and close httpd.conf.

Modify JBoss Configuration

IMPORTANT: This steps listed in this section must be performed on all nodes of the cluster.

JBoss must be configured to work with mod_cluster. Modify standalone-full-ha.xml as shown in the following steps:

1. Navigate to <*JBoss_install*>\standalone\configuration and open standalone-full-ha.xml with a text editor.
2. Locate and change all instances of "127.0.0.1" to the host IP address of the machine.
3. Locate <socket-binding-group name="standard-sockets" default-interface="public" port-offset="${jboss.socket.binding.port-offset:0}"> and add the following section:

```
<outbound-socket-binding name="proxy1">
    <remote-destination host="<IP_Address>" port="<port>"/>
</outbound-socket-binding>
```

   where <*IP_Address*> and <*port*> are the IP address and port of the machine where you ran installconf.bat.

4. Locate the following section and update the IP address and port with the IP address and port that was configured in the httpd.conf file in *step 6 on page 137*.

```
<mod-cluster-config advertise-socket="modcluster"
proxies="proxy1" balancer="kylinBalancer" sticky-
session="true" advertise-security-key="123456789"
connector="ajp">
    <dynamic-load-provider>
    <load-metric type="cpu"/>
    </dynamic-load-provider>
</mod-cluster-config>
```

   where <*proxy1*> is the outbound-socket-binding name defined under the socket-binding-group in the previous step. If this name was changed, then change the name here as well.

5. Locate and update the following section:

```
<socket-binding name="modcluster" port="0" multicast-
address="<Multicast_Address>" multicast-
port="<Multicast_Address_Port>/>
```

where *Multicast_Address* is the multicast address (excluding the port number) and *Multicast_Address_Port* is the multicast port number. The multicast address must match that which was configured in the httpd.conf file in *step 3 on page 141*.

6. Save and close standalone-full-ha.xml.

Start the Service

IMPORTANT: The mod_cluster service must be started before the JBoss service. Ensure that the JBoss service is stopped before continuing.

To start the mod_cluster service, use the command under the path /usr/local/httpd/bin:

```
# ./apachectl start
```

To verify that it has started successfully, enter the following URL into a web browser to access the manager page:

```
http://<IP_Address>:<Port>/mod_cluster_manager
```

Fit-For-Purpose Configurations

The sections described here are only required if you will be running any Fit-For-Purpose applications (e.g., Modular Framework, Production Management, etc.) on FTPC.

Configure the X-Frame-Options HTTP Response Header

In order to prevent a malicious third-party website from hosting a Fit-For-Purpose application in an iframe and, therefore, being able to intercept events and information being sent to that application, configure your web server to include the X-Frame-Options HTTP response header set it to one of the following:

- **NONE**: the Fit-For-Purpose application cannot be hosted in an iframe.
- **SAMEORIGIN**. an application can be developed on the same web server that hosts a Fit-For-Purpose application in an iframe. Use this option if you want to include an MES application in addition to other applications in a wrapper application. This is the recommendation.

1. Open your JBoss standalone-full-ha.xml file located at <*JBoss_install*>\jboss\standalone\configuration.

2. Locate the Undertow subsystem.

```
<subsystem xmlns="urn:jboss:domain:undertow:3.1">
```

3. In the filters tag, add a new response-header tag as follows:

```
<filters>
  <response-header name="x-frame-options-header" header-
name="X-Frame-Options" header-value="SAMEORIGIN"/>
  ...
</filters>
```

4. In the server tag's host tag, add a new filter-ref tag as follows:

```
<server name="default-server">
  ...
  <host name="default-host" alias="localhost">
    ...
    <filter-ref name="x-frame-options-header"/>
  </host>
</server>
```

5. Save and close your file.
6. Repeat these steps in the standalone-full-ha.xml file of each node in your cluster.

Enable SSL for Encryption

Perform the steps outlined in these sections to enable Secure Sockets Layer (SSL) for data encryption.

The purpose of these instructions is to set up SSL in a way that will force FTPCApps to be used over SSL but will not affect the operation of ProductionCentre remote clients (e.g., Shop Operations, Shop Operations Server, and Process Designer).

For a cluster, make the same changes to the JBoss configuration files on each node. Also, you will need to distribute the server.keystore and server.truststore files to each node.

Create the Required Security Components

To enable SSL, you need to create keystores, a self-signed certificate, and trustores. The following steps show how to complete this process with a self-signed certificate. You will want to consider using a certificate issued from a trusted certificate authority.

1. Open a command window and go to <*JBoss_home*>\standalone\configuration

```
cd $JBOSS_HOME\standalone\configuration
```

2. Create a private/public key pair with the keytool:

```
%JAVA_HOME%\bin\keytool -genkeypair -alias jboss-ssl -keyalg
RSA -keystore server.keystore -storetype JKS -validity 1095


Enter keystore password: yourpassword
What is your first and last name? First Last
What is the name of your organizational unit? XYZ Unit
What is the name of your organization? Company Inc
What is the name of your City or Locality? My City
What is the name of your State or Province? XX
What is the two-letter country code for this unit? US
…[no]: Enter yes to confirm
Enter a key password for <jboss-ssl>: Press RETURN to use the
same keystore password.
```

This creates the server.keystore file that contains the newly-generated public and private key pair.

Configure the JBoss Configuration File

After your SSL components have been created, update your JBoss standalone-full-ha.xml file located at <*JBoss_install*>\jboss\standalone\configuration.

1. Make a copy of your original standalone-full-ha.xml file and rename the copy standalone-full-ha-ssl.xml.
2. Open standalone-full-ha-ssl.xml in a text editor.
3. Add a keystore and truststore to the ProductionCentreRealm by changing the following:

```
<security-realm name="ProductionCentreRealm">
  <authentication>
     <jaas name="ProductionCentre"/>
  </authentication>
</security-realm>
```

to the following:

```
<security-realm name="ProductionCentreRealm">
   <server-identities>
      <ssl>
         <keystore path="server.keystore" relative-
to="jboss.server.config.dir" keystore-
password="yourpassword"/>
      </ssl>
   </server-identities>
   <authentication>
      <truststore path="server.truststore" relative-
to="jboss.server.config.dir" keystore-
password="yourpassword"/>
      <jaas name="ProductionCentre"/>
   </authentication>
</security-realm>
```

4. If security-domain for jmx-console is configured, change the configuration for the security-domain to use the *Remoting* and *RealmDirect* login modules:

```
<security-domain name="jmx-console" cache-type="default">
   <authentication>
      <login-module code="Remoting" flag="optional">
         <module-option name="password-stacking"
value="useFirstPass"/>
      </login-module>
      <login-module code="RealmDirect" flag="required">
         <module-option name="password-stacking"
value="useFirstPass"/>
      </login-module>
   </authentication>
</security-domain>
```

5. Configure UnderTow to have an https-listener and to redirect HTTP access to /FTPCApps to the HTTPS URL:

```
<subsystem xmlns="urn:jboss:domain:undertow:3.1">
   <buffer-cache name="default"/>
   <server name="default-server">
      <http-listener name="default" redirect-socket="https"
socket-binding="http"/>
      <https-listener name="https" verify-
client="NOT_REQUESTED" security-realm="ProductionCentreRealm"
```

```
socket-binding="https"/>
   <host name="default-host" alias="localhost">
      <location name="/" handler="welcome-content"/>
          ...
        <filter-ref name="http-to-https"
predicate="equals(%p,8080) and path-prefix['/FTPCApps']"/>
   </host>
      ...
   <filters>
      ...
      <rewrite name="http-to-https" redirect="true"
target="https://%A:8443%U"/>
   </filters>
</subsystem>
```

6. Save and close your file.

Enforce Security Version

In order to disallow any attempts by TLS/SSL to negotiate down to a version prior to 1.1, please perform the instructions outlined in the following Red Hat solution: https://access.redhat.com/solutions/1364853

Enable Debug Logging (Optional)

To enable SSL debug logging, perform the following steps.

1. Open the standalone.comf file located at <*JBoss_install*>\jboss\bin.
2. Add the following line:

   ```
   JAVA_OPTS="$JAVA_OPTS -Djavax.net.debug=ssl:handshake"
   ```

3. Save and close your file.
4. Open the standalone-full-ha-ssl.xml file located at <*JBoss_install*>\jboss\standalone\configuration.

5. Add the following lines to enable TRACE level logging.

```
<logger category="org.jboss.as.domain.management.security">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.remoting">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.sasl">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.as.security">
   <level name="TRACE"/>
</logger>
<logger category="org.jboss.security">
   <level name="TRACE"/>
</logger>
<logger category="org.undertow">
   <level name="TRACE"/>
</logger>
```

6. Save and close your file.

Verify the JBoss Installation

To verify that JBoss was installed properly:

Windows

1. Select Start > Run.
2. In the Open dialog, enter `cmd`, and then click [OK].
3. Enter the following on a single line at the command prompt to start the JBoss Server:

```
<JBoss_install>\bin\standalone.bat -c standalone-full-ha.xml -
b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
u 230.0.0.5
```

where <*JBoss_install*> is the directory where you unzipped the JBoss files and x.x.x.x is the binding address.

NOTE: If the Network Load Balancing feature is enabled, use **-b 0.0.0.0** and specify the JGroups binding address by adding the following launch parameter:

-Djgroups.bind_addr=y.y.y.y

where y.y.y.y is the JGroups binding address.

4. Access the JBoss home page at http://<*machine_name*>:<*port*>, where <*machine_name*> is the name of the application server machine where FTPC will be deployed and <*port*> is the HTTP port, such as 8080.
5. If JBoss was successfully installed and started, you should see the screen shown in Figure on page 150.

IMPORTANT: **If you have enabled SSL according to the instructions in "Enable SSL for Encryption" on page 144, start JBoss by running the following command line:**

<*JBoss_install*>\bin\standalone.bat -c standalone-full-ha-ssl.xml -b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -u 230.0.0.5

If SSL debug logging has been enabled, run the following:

<*JBoss_install*>\bin\standalone.bat -c standalone-full-ha-ssl.xml -b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -u 230.0.0.5 -Djavax.net.debug=ssl:handshake

Linux

1. Log in to the Linux machine as root user.
2. Enter the following on a single line at the command prompt to start the JBoss Server:

```
<JBoss_install>/bin/./standalone.sh -c standalone-full-ha.xml
-b x.x.x.x
```

   where <*JBoss_install*> is the directory where you unzipped the JBoss files and x.x.x.x is the binding address.
3. Access the JBoss home page at http://<*machine_name*>:<*port*>, where <*machine_name*> is the name of the application server machine where FTPC is deployed and <*port*> is the HTTP port, such as 8080.
4. If JBoss was successfully installed and started, you should see the JBoss home page.

IMPORTANT: **If you have enabled SSL according to the instructions in "Enable SSL for Encryption" on page 144, start JBoss by running the following command line:**

<*JBoss_install*>/bin/./standalone.sh -c standalone-full-ha-ssl.xml -b x.x.x.x

If SSL debug logging has been enabled, run the following:

<*JBoss_install*>/bin/./standalone.sh -c standalone-full-ha-ssl.xml -b x.x.x.x -Djavax.net.debug=ssl:handshake

Select and Configure the Security Model

If you are not going to use the FTPC default security, you should choose and configure an alternate security model supported by the application server software. See Appendix A, "Understanding and Implementing Security" for more information about using FTPC security. See the appropriate JBoss documentation for information about the supported security models and instructions about setting them up.

If you will use the FTPC default security, the procedure for installing and configuring that capability appears later in this document.

Extract FTPC Deployment Files

NOTE: This section should only be performed for the first node of the cluster. For subsequent nodes, skip this section.

To download and extract the FTPC deployment files, please refer to "Extract FTPC Deployment Files" on page 50. When complete, return to this page to continue.

Obtain the Required JDBC Drivers

NOTE: This section should only be performed for the first node of the cluster. For subsequent nodes, skip this section.

To successfully configure FTPC and connect to your databases, you must obtain the necessary JDBC drivers for your database type and copy them to the

appropriate folder on the first node in the cluster. Refer to "Obtain the Required JDBC Drivers" on page 64 for more information.

Prepare the Production Database

Use FTPC Administrator to register and then initialize the production database. For more information, please refer to "Register the Databases" on page 70 and "Initialize the Databases" on page 72.

Configure Online Help and Download Files

The PlantOpsDownload.zip file contains all the items that will appear on the FTPC downloads page. To extract the downloaded ZIP file and access its contents, you must install Tomcat and configure the online help and download files. To do so, perform the steps listed in the following sections:

- "Install Tomcat" on page 41
- "Configure Online Help and Download Files" on page 59

NOTE: You can also use your own web server to serve the online help and download files if you wish.

Prepare the Applications

To prepare the applications for deployment, you must perform the following:

- ❑ "Configure the productioncentre.properties File"
- ❑ "Add Custom JAR Files"
- ❑ "Define the Download Location (Optional)"
- ❑ "Configure the DSPlantOperations.ear File"

Configure the productioncentre.properties File

Configure the productioncentre.properties file and run DSDeployTools by performing the instructions in one of the following sections, depending on your operating system. As a part of configuring the productioncentre.properties file, you will be specifying the REMOTE and HTTP listener port numbers. If you are not using the default port numbers of 8080 (REMOTE) and 8080 (HTTP), check the JBoss configuration files for the current port values.

Optionally, you can also configure default tab behavior in the productioncentre.properties file.

NOTE: It is recommended that all machines in the cluster have the same port numbers.

Windows

1. Open Windows Explorer.
2. Navigate to <*FTPC_install*> where <*FTPC_install*> is the location where you unzipped the FTPC ZIP file.
3. Open the productioncentre.properties file in a text editor.
4. Locate the following text:

   ```
   downloadURL=http://localhost:8080/PlantOperations
   ```

   Edit it as follows:

   ```
   downloadURL=http://<Tomcat_server_hostname>:<Tom-
   cat_HTTP_port>/<PlantOpsDownloads_folder>
   ```

   where:

   - <*Tomcat_server_hostname*> is the hostname of the machine where Tomcat is installed.
   - <*Tomcat_HTTP_port*> is the HTTP port number of the Tomcat help files host.
   - <*PlantOpsDownloads_folder*> is the URL location of the PlantOpsDownloads folder.

5. Locate the following text:

   ```
   rmiURL=remote://localhost:8080
   httpURL=http://localhost:8080
   ```

   Edit it as follows:

   ```
   rmiURL=remote://
   <jboss_cluster_node1>:8080,<jboss_cluster_node2>:8080,
   <jboss_cluster_node3>:8080,<jboss_cluster_nodeN...>:8080
   httpURL=http://<App_server_hostname1>:
   <App_server_HTTP_port1>
   ```

   where:

- *<jboss_cluster_node#>* are the IP addresses of your cluster servers.
- *<App_server_HTTP_port1>* is the HTTP port number of the first machine. 8080 is the default.

IMPORTANT: You must configure both the rmiURL and httpURL parameters.

If the primary node becomes disconnected, the working copy of the RMI URL will be rearranged for use in subsequent user transaction operations. This reordering improves the time it takes to detect a replacement node when the primary node goes down.

For example, the RMI URL is configured as follows:

```
jnp://A:1099,B:1099,C:1099,D:1099
```

When node A is disconnected, the client will detect this and reorder the URL, placing the disconnected node last in priority:

```
jnp://B:1099,C:1099,D:1099,A:1099
```

6. Locate the following text:

   ```
   uiDefaultButtonFollowFocus=false
   ```

   Set this option to either true or false depending on if you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false. See also "Obtain the Required JDBC Drivers" on page 64.

7. Locate the following text:

   ```
   platform=Windows
   ```

   Verify that the platform matches your configuration. The choices are Windows and Linux.

8. If you want to increase the client heap size, locate the following text and update the heap size:

   ```
   JAVA_OPTS=-Xmx1024m
   ```

   The heap size must be entered in the format specified by Java.

9. Save your work and close the file.

When an invalid account or password is used to log into Process Designer or Shop Operations in a cluster environment, the FAILED_LOGIN_ATTEMPT_COUNT column will appear in the APP_USER database table. To avoid this, define the following parameter for JAVA_OPTS in the productioncentre.properties file.

```
DBadLoginResponseTime=2500
```

For example:

```
JAVA_OPTS=-Xmx1024M -Djboss-ejb-
client.reconnectOnAuthenticationFailures=false -
```

```
DBadLoginResponseTime=2500
```

Linux

1. Log into the Linux machine as the root user.
2. Locate the productioncentre.properties file and open it in a text editor. Locate the following text:

   ```
   downloadURL=http://localhost:8080/PlantOperations
   ```

   Edit it as follows:

   ```
   downloadURL=<Tomcat_server_hostname>:<Tomcat_HTTP_port>/
   <PlantOpsDownloads_folder>
   ```

   where:

   - *<Tomcat_server_hostname>* is the hostname of the machine where Tomcat is deployed.
   - *<Tomcat_HTTP_port>* is the HTTP port number of the Tomcat help files host. 8080 is the default.
   - *<PlantOpsDownloads_folder>* is the URL location of the PlantOpsDownloads folder you created in step 5 on page 59.
3. Locate the following text:

   ```
   rmiURL=remote://localhost:8080
   httpURL=http://localhost:8080
   ```

   Edit it as follows:

   ```
   rmiURL=remote://
   <jboss_cluster_node1>:8080,<jboss_cluster_node2>:8080,
   <jboss_cluster_node3>:8080,<jboss_cluster_nodeN...>:8080
   httpURL=http://<App_server_hostname1>:
   <App_server_HTTP_port1>
   ```

   where:

   - *<jboss_cluster_node#>* are the IP addresses of your cluster servers.
   - *<App_server_HTTP_port1>* is the HTTP port number of the first machine. 8080 is the default.

   IMPORTANT: You must configure both the rmiURL and httpURL parameters.

   If the primary node becomes disconnected, the working copy of the RMI URL will be rearranged for use in subsequent user transaction operations. This reordering improves the time it takes to detect a replacement node when the primary node goes down.

   For example, the RMI URL is configured as follows:

   ```
   jnp://A:1099,B:1099,C:1099,D:1099
   ```

When node A is disconnected, the client will detect this and reorder the URL, placing the disconnected node to be last in priority:

```
jnp://B:1099,C:1099,D:1099,A:1099
```

4. Locate the following text:

   ```
   uiDefaultButtonFollowFocus=false
   ```

   Set this option to either true or false depending on whether you want the user interface default button to always be the focused button (to exhibit a Metal Look and Feel). The default option is false. See also "Obtain the Required JDBC Drivers" on page 64.

5. Locate the following text:

   ```
   platform=Windows
   ```

   Edit the platform to Linux.

6. If you want to increase the client heap size, locate the following text and update the heap size:

   ```
   JAVA_OPTS=-Xmx1024m
   ```

   The heap size must be entered in the format specified by Java.

7. Save your work and close the file.

Configure Default Tab Behavior (Optional)

By default, applications launched in Shop Operations and Process Designer exhibit the Metal Look and Feel (LAF) for the Tab key behavior. This results in some unexpected behavior if you are used to working in an environment with the Windows LAF. For more information about configuring default tab behavior, see "Configure Default Tab Behavior (Optional)" on page 62.

Configure the Standalone Configuration File

Because ActiveMQ forces users to explicitly whitelist packages that can be exchanges using ObjectMessages, please perform the following steps according to your operating system.

Windows

Please add the following configuration to the standalone.conf.bat file located at <*JBoss_install*>\bin

```
set "JAVA_OPTS=%JAVA_OPTS%  -
Dorg.apache.activemq.SERIALIZABLE_PACKAGES=*"
```

Linux

In a Linux environment:

1. In the standalone.conf file located at <*JBoss_install*>\bin, search for the following:

```
if [ "x$JAVA_OPTS" = "x" ]; then

   JAVA_OPTS="-Xms1303m -Xmx1303m -XX:MetaspaceSize=96M -
XX:MaxMetaspaceSize=256m -Djava.net.preferIPv4Stack=true"

   JAVA_OPTS="$JAVA_OPTS -Djboss.modules.system.pkgs=$JBOSS_-
MODULES_SYSTEM_PKGS -Djava.awt.headless=true"
```

2. Add the following line after this section:

```
   JAVA_OPTS="$JAVA_OPTS -
Dorg.apache.activemq.SERIALIZABLE_PACKAGES=*"
```

Add Custom JAR Files

If you have custom JAR files that you want to be downloaded when an FTPC application is launched, you must add them to the Custom-<*app_server*>.war file and add the list of files to download to the custom.properties file.

To add custom JAR files, see "Add Custom JAR Files" on page 63.

Linux

Configure the standalone.conf file for Linux by performing the following steps.

1. Go to <*JBoss_install*>\bin and locate the standalone.conf file
2. Search for the following script:

```
if [ "x$JAVA_OPTS" = "x" ]; then JAVA_OPTS="-Xms1303m -Xmx1303m
-XX:MetaspaceSize=96M -XX:MaxMetaspaceSize=256m -
Djava.net.preferIPv4Stack=true"

JAVA_OPTS="$JAVA_OPTS -
Djboss.modules.system.pkgs=$JBOSS_MODULES_SYSTEM_PKGS -
Djava.awt.headless=true"
```

3. Add the following line after the script:

```
JAVA_OPTS="$JAVA_OPTS -Dorg.apache.activemq.SERIALIZ-
ABLE_PACKAGES=*"
```

Define the Download Location (Optional)

NOTE: This section should only be performed for the first node in the cluster. For subsequent nodes, skip this section.

When an FTPC application is launched, the client JAR files are downloaded to **C:\.FTPC\AppServer** by default.

You can configure this download location by performing the steps in "Define the Download Location (Optional)" on page 63.

Configure the DSPlantOperations.ear File

Perform the following steps to configure the DSPlantOperations.ear file.

1. Create a subdirectory under <*FTPC_install*> called “backup” and copy the DSPlantOperations.ear file to this location to serve as a backup copy.
2. Select Start > Run.
3. In the Open dialog, enter cmd, then click [OK] to open a command prompt.
4. Change the directory to the where DSDeployTools.jar is located. By default, this file is located at <*FTPC_install*>.
5. From the command line, enter the following command to run DSDeployTools:

```
java -cp DSDeployTools.jar com.datasweep.plantops.deploytools.
URLConfig productioncentre.properties
```

A series of messages indicates whether the command ran successfully. If the command was not successful, check that the syntax is correct.

Deploy the Applications

NOTE: This section should only be performed for the first node in the cluster. For subsequent nodes, skip this section.

Once you have configured the FTPC EAR file, set up security, and obtained the JDBC drivers, you are ready to deploy FTPC. Next, depending on whether you are using Windows or Linux, perform one of the following sections.

NOTE: Before continuing, ensure that you have properly configured the RMI and HTTP URLs in the productioncentre.properties file as instructed in “Configure the productioncentre.properties File” on page 152.

Windows

1. Copy the following files from <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV:
   - DSPlantOperations.ear
   - ProductionCentreWebStart.ear
   - ProductionCentreCustom.ear (This is required only if you have any custom JAR files that you want to download when launching an FTPC application. See “Add Custom JAR Files” on page 156 for details.)
2. Paste the files into the following directory:

<*JBoss_install*>\standalone\deployments

where <*JBoss_install*> is the directory where you unzipped the JBoss files.

3. Verify that the instructions to edit the productioncentre.properties file as documented in the section "Configure the productioncentre.properties File" on page 152 have been performed.
4. Open a command line prompt by selecting Start > Run. Enter `cmd` in the Open dialog, and then click [OK].
5. Change to the <*JBoss_install*>\bin directory.
6. Enter the following at the command prompt to start the JBoss Server:

```
<JBoss_install>\bin\standalone.bat -c standalone-full-ha.xml -
b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
u 230.0.0.5
```

where:

- <*JBoss_install*> is the directory where you unzipped the JBoss files.
- **-c** defines the server configuration file to be used.
- **-b** defines the binding address where your applications start.
- **-bprivate** makes your multicast port 55200 run on the binding IP address.
- **-Djboss.server.name=<node_name>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
- **-u** defines the multicast address.

NOTE: If the Network Load Balancing feature is enabled, use "-b 0.0.0.0" and specify the JGroups binding address by adding the following launch parameter: "-Djgroups.bind_addr=y.y.y.y", where y.y.y.y is the JGroups binding address.

NOTE: A single server can be configured to inherit the socket bindings of the server group at a port offset. For example, if the HTTP port of the socket binding group is 8080, then with a port offset of 100, its HTTP port would be 8180. To define a port offset, use the **-Djboss.socket.binding.port-offset=<*offset*>** parameter.

---

7. Access the FTPC home page. See "Launch the Applications" on page 66 for details. It may take several minutes to load the FTPC home page after starting the JBoss server.

Linux

1. Copy the following files from <*FTPC_install*>\sw-ProductionCentre-Plant Operations Server-JBossADV:

- DSPlantOperations.ear
- ProductionCentreWebStart.ear
- ProductionCentreCustom.ear (This is required only if you have any custom JAR files that you want to download when launching an FTPC application. See "Add Custom JAR Files" on page 156 for details.)

2. Paste the files into the following directory:

   <*JBoss_install*>\standalone\deployments

   where <*JBoss_install*> is the directory where you unzipped the JBoss files.

3. Verify that the instructions to edit the productioncentre.properties file as documented in the section "Configure the productioncentre.properties File" on page 152 have been performed.
4. Log in to the Linux machine as the root user.
5. Enter the following at the command prompt to start the JBoss Server:

   ```
   <JBoss_install>/bin/./standalone.sh -c standalone-full-ha.xml
   -b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
   u 230.0.0.5
   ```

   where:

   - <*JBoss_install*> is the directory where you unzipped the JBoss files.
   - **-c** defines the server configuration file to be used.
   - **-b** defines the binding address where your applications start.
   - -**bprivate** makes your multicast port 55200 run on the binding IP address.
   - **-Djboss.server.name=<node_name>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
   - **-u** defines the multicast address.

NOTE: A single server can be configured to inherit the socket bindings of the server group at a port offset. For example, if the HTTP port of the socket binding group is 8080, then with a port offset of 100, its HTTP port would be 8180. To define a port offset, use the **-Djboss.socket.binding.port-offset=<*offset*>** parameter.

---

6. Access the FTPC home page. See "Launch the Applications" on page 66 for details. It may take several minutes to load the FTPC home page after starting the JBoss server.

Run JBoss as a Service

JBoss can be configured to run as a service in both Windows and Linux. Perform the instructions in this section for the relevant operating system.

TIP: For more information about running JBoss as a service, please refer to https://access.redhat.com/documentation/en-us/red_hat_jboss_enterprise_application_platform/7.0/html/installation_guide/configuring_jboss_eap_to_run_as_a_service.

Windows

IMPORTANT: If you choose to start JBoss server as a service, the user who starts the server must have administrator privileges on the computer where JBoss is being started.

To run JBoss as a service on Windows, perform the following steps.

1. Open the modules.zip file located at <*FTPC_install*>, where <*FTPC_install*> is the location where you unzipped the FTPC ZIP file. Extract the contents of modules.zip to <*JBoss_install*>, where <*JBoss_install*> is the directory where you unzipped the JBoss files.
2. Navigate to the <*JBoss_install*>\modules\native\sbin directory and open the service.bat file in a text editor. Add or modify the following line at the top of the file to point to your JAVA_HOME directory:

   ```
   set JAVA_HOME=<JAVA_HOME>
   ```

   Where <*JAVA_HOME*> is the directory where you installed the JDK.

NOTE: Set the JAVA_HOME property to the appropriate paths for your system configuration.

3. Search for the following:

   ```
   if "%CONFIG%"=="" set CONFIG=standalone-full.xml
   ```

   and edit the line to use standalone-full-ha.xml:

   ```
   if "%CONFIG%"=="" set CONFIG=standalone-full-ha.xml
   ```

4. Search for the following:

   ```
   --server-config="!CONFIG!"
   ```

   and add the following after that line:

   ```
   #-b=x.x.x.x#
   ```

For a cluster, this parameter is used as part of the start command. For example:

```
set STARTPARAM="/c#set#NOPAUSE=Y#&&#!START_SCRIPT!#-
Djboss.server.base.dir=!BASE!#--server-config=!CONFIG!#-
b=192.168.1.253#-bprivate=192.168.1.253#-
Djboss.server.name=%ComputerName%#-u=230.0.0.9"
```

5. Save your work and close the file.
6. From a command line, navigate to the <*JBoss_install*>\modules\native\sbin directory and run the following command to register JBoss as a service:

```
service.bat install
```

7. (Optional) To start JBoss as a service from the command line, open a command window and enter the following command:

```
net start JBossServiceName
```

To stop JBoss as a service:

```
net stop JBossServiceName
```

Linux

To run JBoss as a service on Linux, perform the following steps.

1. Navigate to the <*JBoss_install*>/bin/init.d directory and open the jboss-eap.conf file with a text editor.
2. Customize the start-up options in the jboss-eap.conf file. Locate or create the following lines and specify the correct values:

```
JBOSS_HOME=<JBoss_install>

JBOSS_USER=root

JBOSS_CONFIG= standalone-full-ha.xml

JBOSS_OPTS="-b x.x.x.x -bprivate x.x.x.x  -
Djboss.server.name=<node_name> -u 230.0.0.5"
```

where

- <*JBoss_install*> is your JBoss directory.
- **-b x.x.x.x** defines the binding address where your applications start. **x.x.x.x** is the binding address.
- **-bprivate** makes your multicast port 55200 run on the binding address.
- **-Djboss.server.name=<*node_name*>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
- **-u** defines the multicast address defined in your standalone-full-ha.xml.

Once the correct values have been specified, save and close the file.

3. Using a text editor, open the jboss-eap-rhel.sh file located in the same directory.

   a. Locate the following text:

   ```
   if [ -z "$JBOSS_CONFIG" ]; then
     JBOSS_CONFIG=standalone.xml
   ```

   b. Edit the second line to use standalone-full-ha.xml:

   ```
   JBOSS_CONFIG=standalone-full-ha.xml
   ```

4. Open a command line interface.

5. Copy jboss-eap.conf to the /etc/default directory. To do this from the command line interface, enter the following lines:

   ```
   [user@ host init.d]# sudo cp jboss-eap.conf /etc/default
   ```

6. Copy jboss-eap-rhel.sh from <*JBoss_install*>/bin/init.d to the /etc/init.d directory. Enter the following:

   ```
   [user@ host init.d]# sudo cp jboss-eap-rhel.sh /etc/init.d
   ```

7. Add the new jboss-eap-rhel.sh service to a list of automatically started services. Enter the following on one line:

   ```
   [user@ host init.d]# sudo chkconfig --add jboss-eap-rhel.sh
   ```

8. Modify execution permissions for the JBoss service. Enter the following statements, each on one line:

   ```
   [user@ host init.d]# sudo chmod 755 /etc/init.d/jboss-eap-
   rhel.sh
   [user@ host init.d]# sudo chmod 755 <JBoss_install>/bin/
   standalone.sh
   ```

9. Test the service by starting and stopping it.

   ▶ Red Hat Enterprise Linux 6

   To start the service:

   ```
   [user@ host bin]# sudo service jboss-eap-rhel.sh start
   ```

   To stop the service:

   ```
   [user@ host bin]# sudo service jboss-eap-rhel.sh stop
   ```

   ▶ Red Hat Enterprise Linux 7

   To start the service:

   ```
   [user@ host bin]# sudo service jboss-eap-rhel start
   ```

   To stop the service:

   ```
   [user@ host bin]# sudo service jboss-eap-rhel stop
   ```

   If everything has gone correctly, you should get a green [OK]. If you instead get an error, check the error logs and make sure the paths in the configuration file are correct.

10. To add the service to a list of services that automatically start, issue the following command:

```
[user@ host init.d]# sudo chkconfig jboss-eap-rhel.sh on
```

JBoss starts automatically when the Red Hat Enterprise Linux reaches its default run-level, and stops automatically when the operating system goes through its shutdown routine.

Unregister the JBoss Service

To unregister the JBoss service you just created, perform the following steps:

For Windows:

1. Stop the JBoss service.
2. Navigate to <*JBoss_install*>\modules\native\sbin and run the following command.

```
service.bat uninstall
```

For Linux:

1. Stop the JBoss service.
2. Remove JBoss EAP from the list of services by running the following command:

```
sudo chkconfig --del jboss-eap-rhel.sh
```

3. Delete the service configuration file and start up script by running the following commands:

```
sudo rm /etc/init.d/jboss-eap-rhel.sh
sudo rm/etc/default/jboss-eap.conf
```

Configure Additional Nodes

After you have verified that JBoss has been installed correctly on the first node, use the following steps to set up additional nodes:

1. Copy the JBoss installation directory from the original machine where the EAR files have been deployed onto all the machines that will make up the other nodes in the cluster. For more information, please refer to “New Clustered Application Server Checklist” on page 18.
2. If JBoss is being used as a service, configure JBoss to run as a service on the additional nodes. For details, please refer to “Run JBoss as a Service” on page 160. This step is not required if JBoss is not being used as a service.
3. Start JBoss on all nodes. To do so, either start JBoss as a service on each node, or enter the following on a single line at the command prompt on each machine, depending on your operating system:

Windows

```
<JBoss_install>\bin\standalone.bat -c standalone-full-ha.xml -
b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
u 230.0.0.5
```

where:

- *<JBoss_install>* is the directory where you unzipped the JBoss files.
- **-c** defines the server configuration file to be used.
- **-b** defines the binding address where your applications start.
- -**bprivate** makes your multicast port 55200 run on the binding IP address.
- **-Djboss.server.name=<node_name>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
- **-u** defines the multicast address.

NOTE: A single server can be configured to inherit the socket bindings of the server group at a port offset. For example, if the HTTP port of the socket binding group is 8080, then with a port offset of 100, its HTTP port would be 8180. To define a port offset, use the **-Djboss.socket.binding.port-offset=<*offset*>** parameter.

Linux

```
<JBoss_install>\bin\standalone.sh -c standalone-full-ha.xml -
b x.x.x.x -bprivate x.x.x.x -Djboss.server.name=<node_name> -
u 230.0.0.5
```

where:

- *<JBoss_install>* is the directory where you unzipped the JBoss files.
- **-c** defines the server configuration file to be used.
- **-b** defines the binding address where your applications start.
- -**bprivate** makes your multicast port 55200 run on the binding IP address.
- **-Djboss.server.name=<node_name>** defines the node name of the cluster. If you do not specify the node name, the computer name will be used as the node name.
- **-u** defines the multicast address.

NOTE: A single server can be configured to inherit the socket bindings of the server group at a port offset. For example, if the HTTP port of the socket binding group is 8080, then with a port offset of 100, its HTTP port would be 8180. To define a port offset, use the **-Djboss.socket.binding.port-offset=<*offset*>** parameter.

4. You can use the JBoss administration console to see detailed information on your JBoss setup. To access the administration console, you must have a user with the appropriate privileges. To create a user, open a command prompt, navigate to the <*JBoss_install*>\jboss-eap-<*version*>\bin directory, and run the add-user.bat file. Follow the on-screen instructions to create a user.
5. In a browser, navigate to http://<*machine name*>:<*port*>/console to access the administration console, where <*machine name*> is the name of any one of the cluster nodes and <*port*> is the HTTP port (default 9990). Login with the appropriate credentials.

Appendix C

Troubleshooting

In this appendix

The following sections describe troubleshooting methods for FTPC issues you may encounter.

Viewing Available Log Files

If you encounter errors when running FTPC, refer to the log files listed in the following sections for information about the errors.

Server-Side Log Files

Depending on the error messages you receive, refer to the log files saved on the application server machine in the following directories:

Table C-1 Server-Side Log File Locations

Category	Log File Location
Messages generated if you are running JBoss as a Windows service using the local system account	For **Windows Server 2008** and **2012**, the default location for this directory is: C:\Users\<*user_home*>\AppData\Roaming\Rockwell Automation\FactoryTalk ProductionCentre\logs, where <*user_home*> is the home of the user that starts JBoss. For **Linux**, the default location for this directory is: /root/Application Data/Rockwell Automation/FactoryTalk ProductionCentre/logs/PlantOpsServer.

Table C-1 Server-Side Log File Locations

Category	Log File Location
Errors related to migration concerning initializing, migrating, and reorganizing databases using FTPC Administrator	For **Windows Server 2008** and **2012**, the default location for this directory is: C:\Users\<*user_home*>\AppData\Roaming\Rockwell Automation\FactoryTalk ProductionCentre\logs\PlantOpsAdminServer\DsPlantOpsAdminServer.html, where <*user_home*> is the home of the user that starts JBoss. For **Linux**, the default location for this directory is: /root/Application Data/Rockwell Automation/FactoryTalk ProductionCentre/logs/PlantOpsAdminServer/DsPlantOpsAdminServer.html
Errors related to middle-tier issues	For **Windows Server 2008** and **2012**, the default location for this directory is: C:\Users\<*user_home*>\AppData\Roaming\Rockwell Automation\FactoryTalk ProductionCentre\Logs\PlantOpsServer\ where <*user_home*> is the home of the user that starts JBoss. For **Linux**, the default location for this directory is: /root/Application Data/Rockwell Automation/FactoryTalk ProductionCentre/logs/PlantOpsServer/ These folders contain the following log files: • **PlantOpsServerLog.html**: writes shorter, easily-read messages. • **PlantOpsServerDetailLog.html**: writes longer, more detailed messages, including exception stack traces. If you want to log debug messages as well, set the logging level to FINE. See "Logging Debug Messages" on page 221 for details.

Once a log file reaches a certain size, the logging information is sent to a new log file, so multiple files may be present in these directories. To locate the most recent log file, look at the file with the latest timestamp and a name ending in .html.

Changing the Default Logging Priority Value (Optional)

By default, the JBoss log file records warning messages. These can be numerous and cause the log file to grow and roll-over frequently. If you do not need the warnings recorded in the log, filter them by changing the logging priority value from WARN to ERROR. To do so, perform the following steps.

1. Navigate to <*JBoss_install*>\standalone\configuration.
2. In a text editor, open standalone-full.xml. If you are in a cluster environment, open standalone-full-ha.xml.

3. Locate the following text:

```
<subsystem xmlns="urn:jboss:domain:logging:3.0">
<console-handler name="CONSOLE">
<level name="INFO"/>
```

4. Replace it with the following text:

```
<subsystem xmlns="urn:jboss:domain:logging:3.0">
<console-handler name="CONSOLE">
<level name="ERROR"/>
```

5. Save and close the file.

Client-Side Log Files

If you receive FTPC errors while running the application as a client, look for the following folder, <*download_location*>\ProductionCentre\logs\PlantOpsClient\, where <*download_location*> is the location defined at "Define the Download Location (Optional)" on page 63. This folder contains the following log files:

- **PlantOpsClientLog.html**: writes shorter, easily-read messages.
- **PlantOpsClientDetailLog.html**: writes longer, more detailed messages, including exception stack traces.

Once a log file reaches a certain size, the logging information is sent to a new log file, so multiple files may be present in this directory. To locate the most recent log file, look at the file with the latest timestamp and a name ending in .html.

If you want the PlantOpsClientLog.html file to log debug messages as well, set the logging level to FINE. See "Logging Debug Messages" on page 221 for details.

Consolidated Log

The CONSOLIDATED_LOG database table contains messages from the following clients:

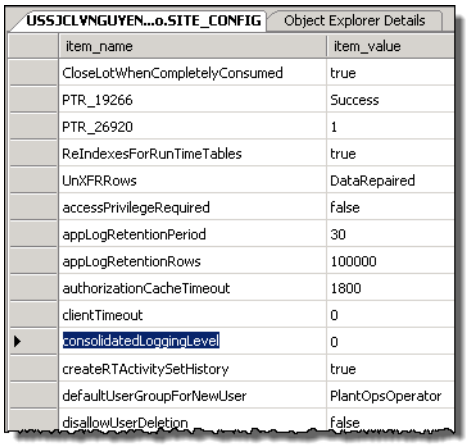
- Shop Operations
- Shop Operations Server
- The middletier
- Any WebServices client running through a proxy server (See "Using a Proxy Server" on page 173 for details.)

Any messages that are currently logged to the PlantOpsClient log file should also be logged in the Consolidated Log. Using this centralized view of log messages across clients, you can isolate and investigate information logged based on specific criteria (for example, information from a particular Shop Operations Server client). Each entry captures both client and server times for the log message as well as other details (client type, client ID, severity level, etc.).

To enable logging to this log, do one of the following:

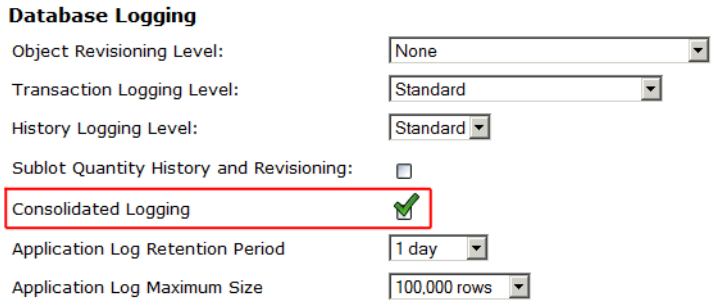
- ❑ Set the **consolidatedLoggingLevel** property in the SITE_CONFIG database table to 1.

Figure C-1: Consolidated Log Configuration (SITE_CONFIG)



- ❑ In FTPC Administrator, check the **Consolidated Logging** property in the Database Logging section of the Database Configuration screen.

Figure C-2: Consolidated Log Configuration (FTPC Administrator)



You can view the log messages from the CONSOLIDATED_LOG database table and query for log messages based on specific client criteria using the FTPC Administrator. See the *FactoryTalk ProductionCentre Administrator User's Guide* for details.

Application Log

An Application Log stores an application's debugging messages. These messages are the application log items that are created and enabled in Process Designer using the Application object editor and then written to the Application Log using the *writeApplicationLogMessage (ApplicationLogItem, String)* method. Application log items are written to the Application Log if both of the following conditions are met:

- ❑ The application log item is enabled.

- If the application log item is a child of another application log item, the parent application log item is also enabled.

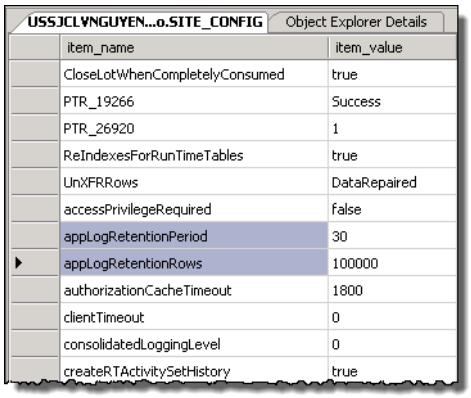
Please see the *Process Designer and Objects Help* for more information on creating and enabling application log items.

Application Logs are located at <*download_location*>\ ProductionCentre\logs\ApplicationLog, where <*download_location*> is the location defined at "Define the Download Location (Optional)" on page 63. The log for each client is only available on that specific client.

You can configure the Application Log by defining the following properties in either the SITE_CONFIG database table or FTPC Administrator:

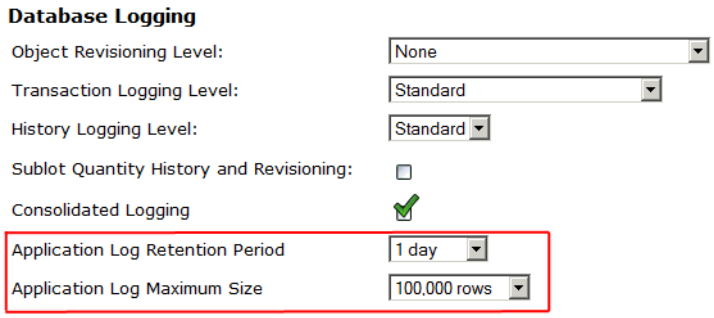
- **appLogRetentionPeriod (SITE_CONFIG)** or **Application Log Retention Period (FTPC Administrator)**: indicates the number of days the Application Log messages will be saved before they are deleted. The default is 30 days.
- **appLogRetentionRows (SITE_CONFIG)** or **Application Log Maximum Size (FTPC Administrator)**: indicates the maximum number of rows that can be stored before the messages will be deleted. The default is 100,000 rows. Therefore, by default, only the latest 100,000 messages will be stored in descending order of insertion, and the rest are deleted.

Figure C-3: Application Log Configuration (SITE_CONFIG)



item_name	item_value
CloseLotWhenCompletelyConsumed	true
PTR_19266	Success
PTR_26920	1
ReIndexesForRunTimeTables	true
UnXFRRows	DataRepaired
accessPrivilegeRequired	false
appLogRetentionPeriod	30
appLogRetentionRows	100000
authorizationCacheTimeout	1800
clientTimeout	0
consolidatedLoggingLevel	0
createRTActivitySetHistory	true

Figure C-4: Application Log Configuration (FTPC Administrator)



Messages will be deleted if either one of these criteria are met. For example, there are only 500 messages, but these messages have been saved in the database for 31 days. All the messages will be deleted because one of the criteria has been met.

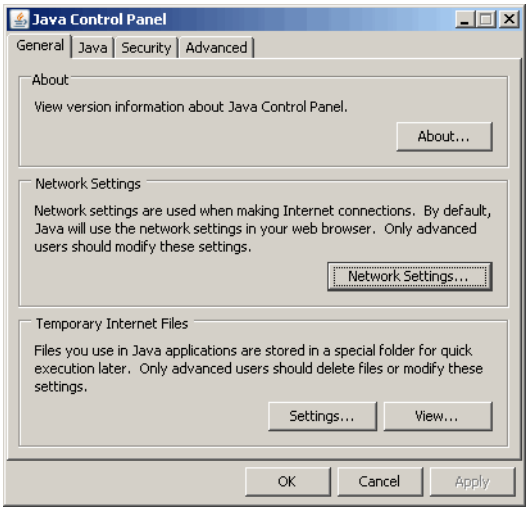
You can also view this log in the Shop Operations Server administration console. This interface enables you to view a filtered list of application log messages. See "Viewing Application Logs" on page 222 for more details.

Using a Proxy Server

To set up the client machine for use with a proxy server, perform the following:

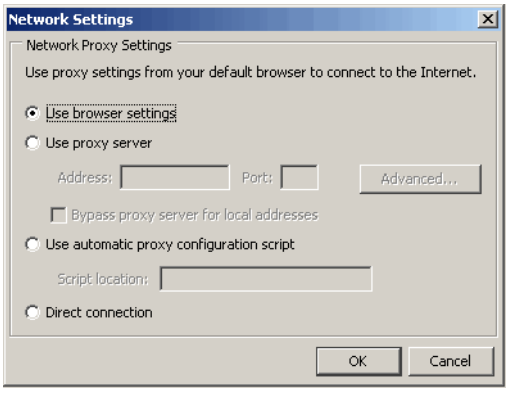
1. From the client machine's main menu, go to Settings > Control Panel > Java.
2. Select the General tab, then click [Network Settings].

Figure C-5: LAN Settings



3. Under Network Proxy Settings, check the *Use browser settings* radio button, then click [OK] and [OK] again to close out of the Java Control Panel dialog.

Figure C-6: Proxy Server Pane



Running Java after Upgrading

When you uninstall a lower version of Java JDK or JRE and reset the JAVA_HOME, sometimes the command Java -version returns the lower Java version. To resolve this problem, you can do either of the following:

- When you run a Java command, specify the full path to the executable:

  ```
  C:\Java\jdk1.8.0_<version>\bin\java.exe DSDeployTools.jar ...
  ```

- To set the PATH permanently, add the full path of the jdk1.8.0_<*version*>\bin directory to the PATH variable where <*version*> is the installed Java build.

Appendix D

FTPC Performance

In this appendix

Due to the many interrelationships between the hardware, operating system, network software, and application and database servers, it is not possible to define an ideal configuration for any one of these components. However, we have gathered some general guidelines from our installations that can help optimize performance of your FTPC installation. Our suggestions may improve performance in the described environment. Whether a suggestion applies to your site can only be assessed by you.

We recommend that your deployment strategy address information system needs at all levels:

- Network
- Database Server
- Application Server
- Client

FTPC Performance Recommendations

The suggestions described in the following section are based on our experience with various specific configurations. We suggest the following general practices:

- When you introduce change:
  - Plan in advance what to change.
  - Change only one thing at a time.
  - Always be able to undo the change or have a recovery plan.
  - Allow adequate time to evaluate the change before making final decisions.
- Plan data transfer from the Production database to the ODS (historical database) in your deployment strategy. Make frequent and regular data transfers to the ODS, followed by database backup and purge. In other words, keep the Production database small.
- Schedule reports to run with minimal impact by running them against the ODS or, when you must run reports against the Production database, do so during off-peak use, if possible.
- Schedule large data imports, like part, BOM, and ECO information, to run with minimal impact by running them against the Production database during off-peak use, if possible.
- It is prudent to collect baseline performance statistics and then regularly collect statistical updates. As demands on the FTPC application and database change over time, these statistics can serve as a foundation for decisions regarding performance and scaling.

Network Configuration

This section provides guidelines that apply to network configuration and can help optimize performance of installations within the described cases. Many sections refer to the FTPC knowledge base at http://datasweep.custhelp.com, where you will find details and technical information.

Reviewing Network Design

We recommend that you connect all parts of the FTPC application–database server, application server(s), and clients–over the same local area network. Crossing any WAN connections may affect performance.

Any time a connection is passed over a wide area network link, there is a high probability of poor performance due to latency.

We recommend you review your network connections before transferring data. Ensure that all the cables that need to be connected are physically connected. Verify that IP addresses, default gateway, and other network information are entered properly. FTPC requires that application servers be able to resolve the database server (for communication) by name and vice versa (bi-directional).

The best performance comes from networks with the minimum number of switches possible between client and application server, and between application server and database server. Consider the impact of logical as well as physical distance between servers and clients. Minimal switching contributes to maximum performance.

See the FTPC knowledge base for more information about tools for troubleshooting your network connections.

Assessing Network Utilization

If network-sustained utilization registers about 40% in a non-switched environment, then you may have too much traffic. We recommend that you break the network into smaller segments. It is important to monitor network utilization using a separate tool, such as Microsoft Called Network Monitoring Manager. Switched networks may be able to sustain a higher amount of traffic. Please see your Network Administrator to assess and optimize your network configuration.

Configuring Network Cards

If a server has multiple network cards, then we recommend that you place each network card on a separate subnet. Otherwise, the operating system will switch between them during the same conversation. When this happens, the client sees a different IP address trying to continue a conversation that had been started earlier. The client does not know that this is the same machine and will drop the conversation.

In systems with more than one network card (NIC) on the same subnet, the operating system may switch between NICs during one conversation. This commonly happens in a system with load balancing or teaming adapters.

See the FTPC knowledge base article 320 for more information.

Configuring Duplex Settings

If the network cards have an auto-detect function that optimizes duplex settings, we recommend you determine which settings are best and manually set them because the auto-detect feature may not make the best selection.

Application Server Configuration

This section provides suggestions for improving the performance of your application server.

Assessing Hardware Requirements

Please contact Rockwell Automation Customer Support for hardware requirements. Because these requirements can vary from site to site, Customer Support will determine the appropriate configuration for each of your sites based upon the volume of transactions and use of the application.

Scaling

When the application moves from development to production, check for potential traffic congestion. If monitoring indicates that the application server is a point of traffic congestion, due to heavy CPU usage, you can add a second CPU. The next step is to add another application server.

Application servers should have CPUs with the fastest possible clock speeds. Application servers perform intensive processing and the faster the processing clock speed, the better the performance. The application servers should have the ability to add up to two CPUs. Our tests indicated that adding more application servers provides more performance gains than adding more than two processors at the application server level. See the FTPC knowledge base article 103 for more information.

Scaling up or enlarging a single system means getting a more powerful machine. Scaling up may refer to any of the components in a system: getting more memory, a faster processor, or more drives.

Scaling out or adding systems refers to distributing the work amongst a group of systems. The group of machines sharing the work is commonly referred to as a cluster.

FTPC application servers can be configured using load balancing to share the work load among systems. This means that FTPC application servers can be scaled out. Note that database servers, which cannot be scaled out, can use cluster services for fail-over. Application servers, which can be scaled out, can use load balancing, a different kind of cluster service.

See the FTPC knowledge base articles 316 and 395 for more information.

Appendix E

Using the Shop Operations HMI Client

In this appendix

There is an FTPC Shop Operations HMI Client that can be placed onto a FactoryTalk View display. This control has properties and methods that can be called via Visual Basic Applications (VBA) scripting. The Shop Operations HMI Client needs to be installed in each computer where FactoryTalk View Site Edition Client or FactoryTalk View Studio will display the Shop Operations HMI Client.

IMPORTANT: A build for the Shop Operations HMI Client is not provided with FTPC 10.4. In order to use this client with 10.4, you must download the FTPC 10.3 Shop Operations HMI Client.

Audience and Expectations

These instructions are written with the expectation that the user is familiar with:

- Visual Basic programming
- FactoryTalk View Studio and FactoryTalk View Site Edition client

IMPORTANT: Although FTPC supports Java 8, the HMI client requires Java 7.

Install the Shop Operations HMI Client

Before you install the Shop Operations HMI Client, verify that the following conditions are met:

- Ensure that FactoryTalk View is installed before running the HMI Client installer. For more information, please refer to the FactoryTalk View documentation.
- The Shop Operations HMI Client version must match that of the FTPC version you are running. To verify this, check the build numbers in the name of the executables.
- The logged-in user must have administrative privileges.
- The Oracle JRE must be configured as the default plug-in. (For Windows 7, the checkbox located at Java Control Panel > Advanced > Default Java for browsers > Microsoft Internet Explorer is checked and disabled by default.) The version must match the Oracle JDK version listed in the *FactoryTalk ProductionCentre Supported Platforms Guide*.

IMPORTANT: The Oracle JRE must be installed in a directory without any spaces. The Shop Operations HMI Client will not work correctly otherwise.

To install the Shop Operations HMI Client, perform the following directions.

1. Obtain the Shop Operations HMI Client installer for your application server and copy it to your machine.
2. Double-click the Shop Operations HMI Client installer. When the welcome screen appears, click [Next].
3. Accept the terms of the license agreement and click [Next].
4. Enter or browse to a location to which the Shop Operations HMI Client files will be extracted and click [Next]. The default location is C:\Rockwell\FT_ProductionCentre\ShopOps_AX.

IMPORTANT: If you choose your own installation location, note that the directory name cannot contain any spaces.

---

5. On the JRE Installation Reminder screen, click [Next].
6. On the Pre-Installation Summary screen, verify the installation details and click [Install] to start the installation.
7. If you have not already installed the necessary JRE version, a warning appears telling you that the JRE is necessary to run the Shop Operations HMI client and prompting you to install it now. Click [Next] to install the JRE. Otherwise, skip to step 10.
8. Review the Java License Agreement, and click [Install].

Figure E-1: JRE Runtime Environment License

9. When the JRE has finished installing, click [Close] to exit the install wizard.

Figure E-2: Installation Complete

10. When all the files have been placed on the hard drive, an Installation Complete screen appears. Click [Finish] to exit the program.

Set Java Runtime Properties

After you install the JRE, set the Java runtime properties:

1. Go to Window's Control Panel and double-click on **Java**.
2. Check the Java runtime parameters by going to the *Java* tab and clicking [View...]. The Java runtime parameter should be listed as:

   -Dcom.datasweep.plantops.j2eevendor\=JBoss -Djava.ext.dirs\=\Java\jre7\lib\ext;\Java\jre7\axbridge\lib;\Users\<*user_name*>\Application Data\Rockwell Automation\FactoryTalk ProductionCentre\jars\ShopOps
3. Open the *deployment.properties* file, located by default at C:\Users\<*user_name*>\AppData\LocalLow\Sun\Java\Deployment where <*user_name*> is the name of the logged-in user.
4. Make sure it contains the following settings:

```
deployment.javaws.jre.0.registered=true
deployment.javaws.jre.0.platform=1.8
deployment.javaws.jre.0.osname=Windows
deployment.javaws.jre.0.path=C\:\\Program Files\\Java\\jre7\\
bin\\javaw.exe
deployment.javaws.jre.0.product=1.8.0_<version>
deployment.javaws.jre.0.osarch=x86
deployment.javaws.jre.0.location=http\://java.sun.com/
products/autodl/j2se
deployment.javaws.jre.0.enabled=true
```

5. In addition to the settings in the previous step, make sure the *deployment.properties* file also contains the following settings:

```
deployment.javaws.jre.0.args=-
Dcom.datasweep.plantops.j2eevendor\=JBoss -
Djava.ext.dirs\=\\Java\\jre7\\lib\\ext;\\Java\\jre7\\axbridge
\\lib;\\Users\\<user_name>\\Application Data\\Rockwell
Automation\\FactoryTalk ProductionCentre\\jars\\ShopOps -
Djava.net.preferIPv4Stack\=true
```

Note this information in case another application modifies these settings and you need to restore them.

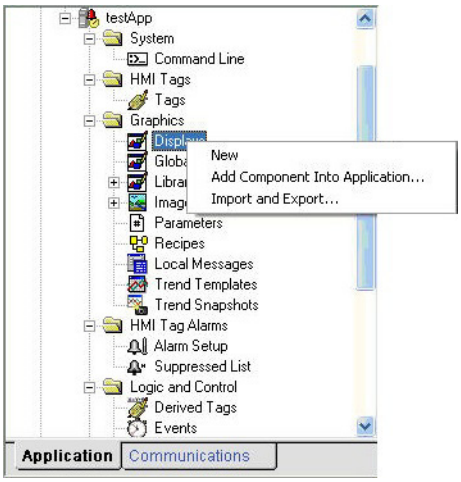
NOTE: If you choose to edit this file, you *must* use Notepad. Other text editors add hidden characters that may cause Java to fail. Note also that the line breaks shown here should be edited out.

Add the Shop Operations HMI Client to an HMI Display

After you have installed the Shop Operations HMI client, add the client to an HMI display. To do so, perform the following steps.

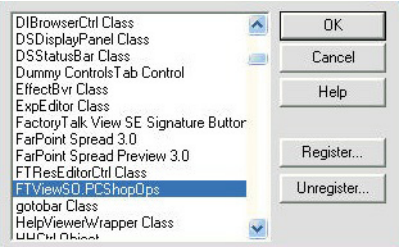
1. Open FactoryTalk View Studio.
2. Open your existing application or create a new application inside FactoryTalk View Studio.
3. Inside your application, under the Graphics node in the left-hand pane, right-click Displays and select *New* to create a new display. The new display appears.

Figure E-3: Add the Shop Operations HMI Client to the New Display



4. Add the ActiveX control to the FactoryTalk View display by selecting File > Objects > ActiveX Control.... A dialog appears prompting you to insert an ActiveX control.

Figure E-4: ActiveX Controls to Insert

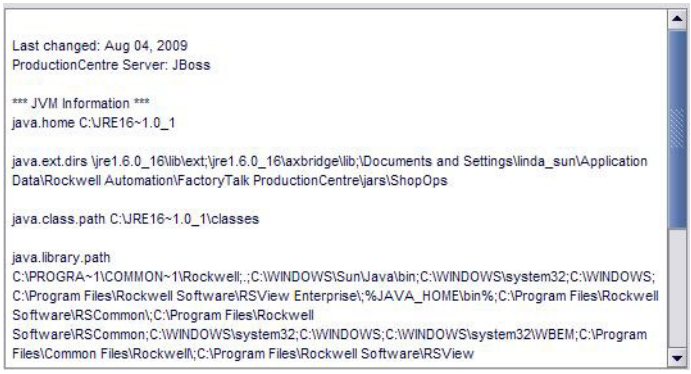


5. Select *FTViewSO.PCShopOps*, then click [OK].

IMPORTANT: When you open the window to select the Shop Operations HMI Client control to add to your display, two Shop Operations ActiveX controls appear: FTViewSO.PCShopOps and AXShopOps Bean Control. It is very important that you select FTViewSO.PCShopOps. AXShopOps Bean Control is intended for use only by the application.

The Shop Operations HMI Client is added. The following output screen displays the results of the installation.

Figure E-5: Results of Successful Installation



6. Right-click the control you just added, and select *VBA Code*. The Microsoft Visual Basic editor appears. You are ready to start adding your code to instruct the control where to connect, to log on to the FTPC Shop Operations HMI Client, open a specific form, or whatever else your application calls for. Go to the next section for a list of available Visual Basic APIs.

Visual Basic APIs

Following is a list of Visual Basic APIs available to Visual Basic programmers for use with the Shop Operations HMI Client.

- Public Event propertyChangedByPDForm()
- Public Function changePassword(ByVal newPwd As String) As Integer
- Public Function closeSOForm() As Integer
- Public Function connectToServer(ByVal rmi As String, ByVal http As String) As Integer
- Public Function getChangedPropertyName() As String
- Public Function getChangedPropertyValue() As String
- Public Function logOff() As Integer
- Public Function logOn(ByVal userName As String, ByVal password As String) As Integer
- Public Function openSOForm(ByVal formName As String) As Integer
- Public Function setBooleanGlobalProperty(ByVal propName As String, ByVal booleanValue As Boolean) As Integer
- Public Function setDoubleGlobalProperty(ByVal propName As String, ByVal doubleValue As Double) As Integer
- Public Function setLanguage(ByVal language As String) As Integer
- Public Function setLanguageCountry(ByVal language As String, ByVal country As String)
- Public Function setLanguageCountryVariant(ByVal language As String, ByVal country As String, ByVal pcVariant As String)
- Public Function setLongGlobalProperty(ByVal propName As String, ByVal longValue As Long) As Integer
- Public Function setNormalScreen() As Integer
- Public Function setStation(ByVal stationName As String, ByVal timeOut As Boolean) As Integer
- Public Function setStringGlobalProperty(ByVal propName As String, ByVal stringValue As String) As Integer
- Public Function setTouchScreen() As Integer

This example performs the following tasks:

- Connects to a server using the host name *samplehostname* and RMI port 8080
- Sets the TTTP port to 8080
- Logs in user *userid* with the password *password*
- Sets the language to French (“fr”)

- Sets the language country to French Canada (“fr”, “CA”)
- Sets the language country variant to French Canada Automotive (“fr”, “CA”, “Automotive”).
- Defines the form that will be opened.

```
FTViewSOPCShopOps1.ConnectToServer
 ("remote://samplehostname:8080", "http://
samplehostname:8080")
FTViewSOPCShopOps1.LogOn("userid", "password")
FTViewSOPCShopOps1.SetLanguage("fr")
FTViewSOPCShopOps1.SetLanguageCountry("fr", "CA")
FTViewSOPCShopOps1.SetLanguageCountryVariant("fr", "CA",
"Automotive")
FTViewSOPCShopOps1.OpenSOForm("formName")
```

Once you enter the code into the Visual Basic editor, you must test the code. To do so, either test the display or launch FactoryTalk View Site Edition Client. If the code shown in this example were to be located in the Display_Load method, the display would connect, log on, and open the form once the display was loaded.

Return Codes for APIs

The following table lists numerical codes that describe information or the status of the operation. Return codes that range between 1 and 99 are error indicators. 101 through 199 are informational.

NOTE: For every operation, code 0 appears for a successful operation. If the operation fails, the default error code is 1. If there is more information about the cause of the failure, other more descriptive error codes *may* appear.

Table 0- 1 Return Codes

Code	Meaning
Error Codes	
0	Operation ok
1	Operation failed
2	Error when getting database information
3	Database schema error
4	Application error
5	System error
6	Invalid username password
7	Invalid password length

Table 0- 1 Return Codes

Code	Meaning
8	Invalid argument
9	Password expired
51	Not connected
52	Not logged on
53	No privilege
Informational Codes	
101	Password about to expire
102	Default form loaded

Uninstall the Shop Operations HMI Client

To uninstall the Shop Operations HMI Client, perform the following directions.

WARNING: Do not use FactoryTalk View to unregister the Shop Operations HMI Client. Use the Shop Operations HMI uninstaller.

1. In Windows Explorer, navigate to:

   C:\<*ShopOperations_AXinstall_location*>\ShopOps_AX_uninst. Double-click uninstaller.exe.
2. When the uninstall wizard appears, click [Next].
3. Select the features you want to uninstall (or accept the default selections) and click [Next].
4. Click [Uninstall] to start the uninstallation.
5. A screen appears telling you that the uninstallation was successful. Click [Finish] to continue.

Upgrade the Shop Operations HMI Client

The build numbers for the Shop Operations HMI Client and for FTPC must match. Therefore, uninstall, reboot, and reinstall the Shop Operations HMI Client each time you upgrade FTPC.

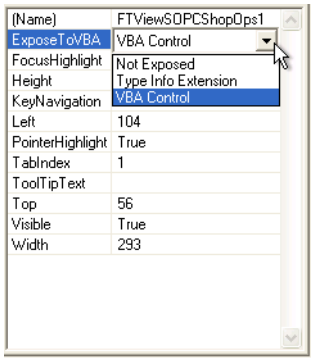
IMPORTANT: **Because of a known Microsoft issue, the following steps are necessary when upgrading to a new build. For more information about this issue, please refer to Microsoft's support website, http://support.microsoft.com.**

1. Delete the *FTViewSO.exd* file from <*FTViewStudio_install*>\RSView Enterprise\VBA, where <*FTViewStudio_install*> is the location where FactoryTalk View Studio is installed on your system.
2. Back up and remove your HMI client's current *deployment.properties* file to allow the HMI installer to generate a new file. You can modify the file to reapply any custom configuration after the installation.

NOTE: After installing the new HMI client, you do not need to replace the ActiveX control from each display. The following steps allow you to upgrade the ActiveX control for all of your views.

3. Open FactoryTalk View Studio.
4. Open your existing application or create a new application inside FactoryTalk View Studio.
5. Create a new display for the open application.
6. Add the ActiveX control to the FactoryTalk View display by selecting File > Objects > ActiveX Control
7. Unregister the ActiveX control you just added by clicking [Unregister…].
8. Re-register the same control by clicking [Register] and selecting the correct OCX file.
9. In the Property Panel for the Shop Operations HMI Client, change the control's *ExposeToVBA* property from *Not Exposed* to *VBA Control*.

Figure E-6: Property Panel



Appendix F

Shop Operations Server

In this chapter:

Shop Operations Server is a Java application that performs as a runtime client to Plant Operations server. It provides a runtime environment for event sheets, which are non GUI-driven applications developed in Process Designer. Operationally, Shop Operations Server is downloaded to and run on a separate machine from the Plant Operations server. Each Shop Operations Server instance runs one event sheet.

Shop Operations Server runs in Windows and Linux. A Java Service Wrapper is used to install and run Shop Operations Server as a Windows service or Linux daemon. This allows Shop Operations Server to run in the background and be automatically started when the operating system boots up.

Shop Operations Server also contains an embedded servlet engine to process web services events and to host an administration console that is used for configuration and monitoring of event sheets. An event sheet running in two Shop Operations Server instances can have failover support when the Shop Operations Server instances are configured for failover. Note that Shop Operations Server cannot write to remote file systems.

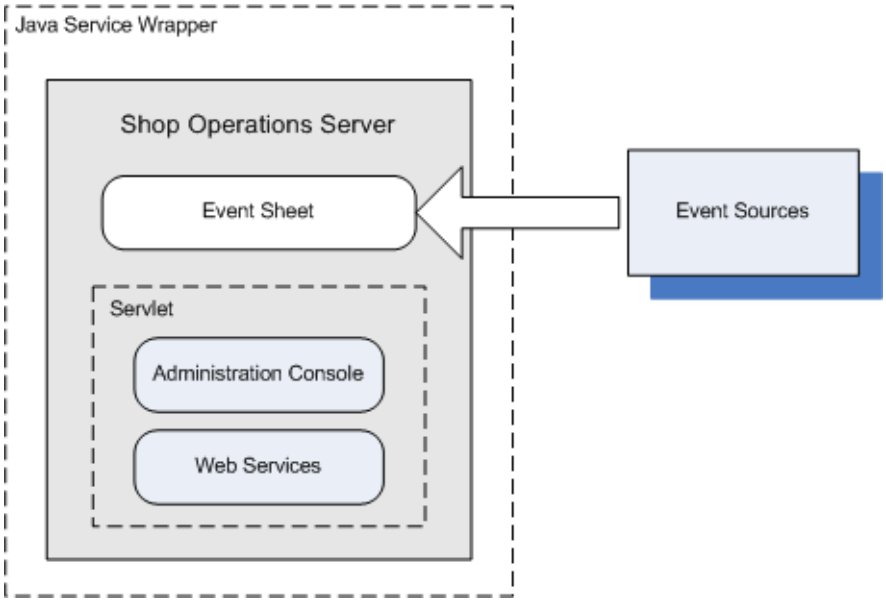
Event sheets running in Shop Operations Server support the creation and management of event sources for executing script code. Supported event sources are:

- FactoryTalk Live Data
- Timer (repetitive events)
- Calendar (scheduled events)
- Serial port (RS232)
- Socket (TCP/IP and UDP multicast)
- Message groups (from other event sheets and forms)
- Web services
- Event sheet events (Pnuts script functions and events such as before or after an event sheet is started or stopped)

Event sheets provide a framework for developing non GUI-driven applications. Process Designer is used to develop event sheets that are then run in Shop Operations Server, which can be configured to provide failover for event sheets.

Figure F-1 provides an overall functional depiction of Shop Operations Server.

Figure F-1: Shop Operations Server



This chapter describes the installation, configuration, administration, and operation of Shop Operations Server.

Prerequisites

These instructions are written with the expectation that the user is familiar with Windows services and how to install them.

Downloading Shop Operations Server

To download the Shop Operations Server archive, perform the following steps.

1. From the FTPC home page, click on the Downloads link.
2. From the Downloads page, click the Shop Operations Server link appropriate to your operating system.
   - For Windows, the Shop Operations Server archive is the ShopOperationsServer.zip file.
   - For Linux, the Shop Operations Server archive is the ShopOperationsServerLinux.zip file.
3. A dialog appears, prompting you to specify an extraction location on the target machine. Navigate to the location of your choice.
4. Extract the contents of ShopOperationsServer.zip into the desired location. These Shop Operations Server folders are extracted to this location: *bin, conf*,

lib, *logs*, *java*, *META-INF*, *plug-ins*, and *properties.* Note the following folders:

- bin - contains the Windows batch files used to install, start, stop, and uninstall Shop Operations Server. For Linux, it contains the script files used to configure and run Shop Operations Sever. It also contains the Java Service Wrapper wrapper.exe file (or wrapper) from Tanuki Software for running the Windows (or Linux) service. The ShopOperationsServer.xml configuration file is also in this folder.
- conf - contains the wrapper.conf file used to configure the Shop Operations Server.
- lib - for Windows, the lib folder contains the Java library (JAR) files and the NativeLibsWin32.jar subfolder contains native Windows DLL files. For Linux, the lib folder contains the JAR files only.
- logs - contains the wrapper.log file. This file contains error and informational messages as well as application information originating from the println script statement. This is a rolling log file, so older files will have a number appended to the end of the file name (e.g., 1, 2, 3...) up to the number of log files configured for retainment. Consult these files if the application is not functioning correctly.

Installing Shop Operations Server

To install Shop Operations Server, you must either be logged in as a Windows administrator or be in the Windows administrator user group.

Installing as a Windows Administrator

If you are logged in as a Windows administrator, perform the following steps.

1. In Windows Explorer, navigate to <*ShopOpsServer_install*>\conf, where <*ShopOpsServer_install*> is the location where you extracted the Shop Operations Server files.
2. Open wrapper.conf in a text editor and modify the wrapper.java.additional.2 setting. You will see several lines that begin with wrapper.java.additional.2. Locate the one for your application server type, and uncomment it. Verify that all the other server types are commented out.
3. Add an additional wrapper.java.additional property after the other wrapper.java.additional properties and name it accordingly. For example, if there are eight wrapper.java.additional properties, this new property would be added after wrapper.java.additonal.8 and be called wrapper.java.additonal.9.

NOTE: This step is only needed if the code requires additional lines. If no additional lines are needed, skip this step.

4. Save your work and close the file.
5. Set the JAVA_HOME variable on your computer to <*JRE_install*>, where <*JRE_install*> is the location where the Oracle JRE is installed on your computer.
6. In <*ShopOpsServer_install*>\bin, open ShopOperationsServer.xml in a text editor.
7. Locate the http-uRL and iiop-uRL properties and verify that they are configured correctly for your installation. For example: http://<*server_name*>:<*port*>, where <*server_name*> is the name of the machine where FTPC is installed, and <*port*> is the embedded web server port number. Save your work and close the file.
8. Set the jetty-port value to a port that will not conflict with any other processes running on the computer. Save your work and close the file.
9. In Windows Explorer, navigate to <*ShopOpsServer_install*>\bin.
10. Double-click on InstallApp-NT.bat to install the Windows service.
11. Double-click on StartApp-NT.bat to run the Windows service.

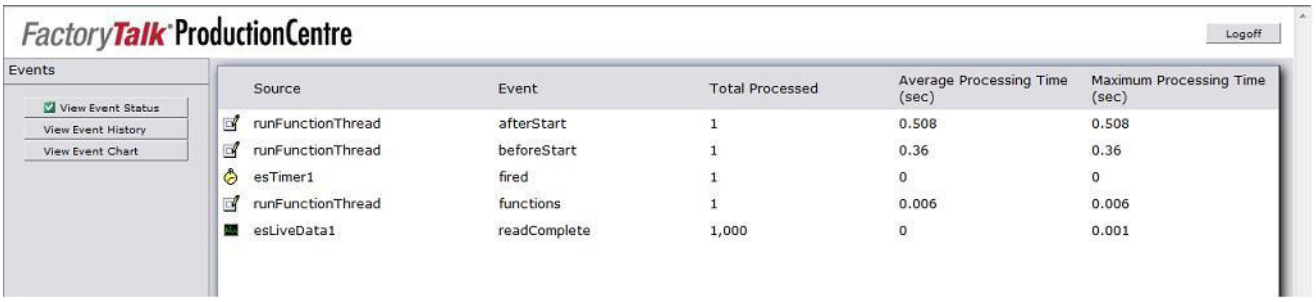
TIP: See "Running Shop Operations Server" on page 203 for additional methods for running Shop Operations Server.

12. Open a browser and go to http://<*ShopOpsServer_name*>:<*jetty_port*>/ShopOperationsServer.

Figure F-2: Shop Operations Server Login

13. When the Shop Operations Server Login page appears, enter your username and password. The following screen appears. The default login user/password is *admin/admin*. This can be changed later.

Figure F-3: Shop Operations Server Administrative Console



14. (Optional) If you want to run multiple Shop Operations Servers on a machine, the Shop Operations Server archive must be copied to different locations on the machine and each instance must be configured separately. If you want to enable failover support, then two Shop Operations Servers must be running the same event sheet. If one Shop Operations Server is running, then the other will be in standby mode and will only start processing if the first Shop Operations Server stops running. For more information about configuring failover support, see "Configuring Failover" on page 225. To install multiple Shop Operations Server services, note the following:

    - Each Shop Operations Server must be installed on a separate directory.
    - The jetty-port property must be configured in the ShopOperationsServer.xml file located in the bin subdirectory. The port for the embedded jetty web server must be unique.

- The ntservice.displayname property must be configured in the wrapper.conf file located in the Shop Operations Server's conf directory so that the name of each Shop Operations Server service is unique. For example:

  wrapper.ntservice.displayname=Rockwell Shop Operations Server2

- The ntservice.name property must be configured in the wrapper.conf file located in the Shop Operations Server's conf directory so that the name of each Shop Operations Server service is unique. For example:

  wrapper.ntservice.name=Rockwell Shop Operations Server2

- (Optional) Update the corresponding service description property. For example:

  wrapper.ntservice.description=Shop Operations Server

15. (Optional) To use a third-party JAR, uncomment the Java Library Path property and add the location of the JAR to it. This property is configured in the wrapper.conf file located in the Shop Operations Server's conf directory. For example:

    wrapper.java.library.path.1=../lib;../lib/NativeLibsWin32.jar

> **IMPORTANT:** **If you will be running Shop Operations Server with Live Data, the Java Library Path property line must be uncommented.**

Installing as an Administrator User Group Member

If you are not a Windows administrator but are in the administrator user group, perform the following steps.

1. Follow step 1 through step 8 of "Installing as a Windows Administrator" on page 195.
2. Go to Start > All Programs > Accessories. Right-click on Command Prompt and select *Run as Administrator*. The command prompt window opens.
3. Change to the location of the Shop Operations Server installation bin folder.
4. Run the following command:

   ```
   InstallApp-NT.bat
   ```

5. Follow step 11 through step 13 of "Installing as a Windows Administrator" on page 195.

Modifying the Startup Delay Interval (Optional)

If your application server and Shop Operations Server are both running on the same machine and are both configured to run as Windows services, Shop

Operations Server may start up before the application server is ready to communicate. In this situation, the Shop Operations Server will receive an exception when it tries to connect to the application server and will then terminate. To solve this problem, you can configure Shop Operations Server to have a delayed startup by defining the following configuration parameters in the Java Service Wrapper configuration files.

If Shop Operations Server is started as a service, perform the following directions.

1. Navigate to <*ShopOpsServer_install*>/conf where <*ShopOpsServer_install*> is the location where Shop Operations Server is installed.
2. Open the wrapper.conf file, found in the ShopOperationsServer.zip file and locate the following line:

   ```
   wrapper.startup.delay.service=0
   ```

3. Configure the startup delay in seconds. The default is 0 (no delay).
4. Save your work and close the file.
5. Restart Shop Operations Server.

If Shop Operations Server is started from the console, perform the following directions.

1. Navigate to <*ShopOpsServer_install*>/conf where <*ShopOpsServer_install*> is the location where Shop Operations Server is installed.
2. Open the wrapper.conf file, found in the ShopOperationsServer.zip file. Locate the following line:

   ```
   wrapper.startup.delay.console=0
   ```

3. Configure the startup delay in seconds. The default is 0 (no delay).
4. Save your work and close the file.
5. Restart Shop Operations Server as a Windows service.

Because of the delayed startup, Shop Operations Server will be able to connect to the application server after it starts. The optimum startup delay for your system depends on many factors, including your hardware and software configuration. Please contact your administrator for more information.

Installing Shop Operations Server (Linux)

To install Shop Operations Server on a Linux machine, perform the following directions.

1. If you are on Linux 7.0, update the wrapper files by performing the steps below. If not, skip to step 2:
   a. Go to following website to download the 64-bit version wrapper for Linux: http://wrapper.tanukisoftware.com/doc/english/download.jsp .
   b. Go to the *bin* folder of the wrapper installer you downloaded in step a and copy the wrapper file.
   c. Replace the wrapper file in <*SOS_install*>/bin by pasting in the new wrapper file.
   d. Go to the *lib* folder of the wrapper installer you downloaded in step a and copy the wrapper.jar file.
   e. Replace the wrapper.jar file in <*SOS_install*>/lib by pasting in the new wrapper.jar file.
2. Locate and run the configSosEnv.sh file in the <*ShopOpsServer_install*>/bin subdirectory.
3. Locate the wrapper.conf file in the <*ShopOpsServer_install*>/conf subdirectory and open it using a text editor.
   a. To use a third-party JAR, add the location of the third-party JAR to the Java Library Path property:

      ```
      wrapper.java.library.path.1=../lib

      #wrapper.java.library.path.2=
      ```

   Note that on a Linux platform, the separator character for path is ";"
   b. Update the Java command property. This property determines the number of seconds to allow between the time that the JVM reports that it is stopped and the time that the JVM process actually terminates, with a default of 15 seconds. This will take effect when beforeStop and afterStop are called:

      ```
      wrapper.jvm_exit.timeout=15
      ```

      When you are finished, save the file.
4. In <*ShopOpsServer_install*>\bin, open ShopOperationsServer.xml in a text editor.
5. Set the jetty-port value to a port that will not conflict with any other processes running on the computer. Save your work and close the file.
6. Stop the JBoss application server.
7. Locate the jdom-1.0.jar file in the /lib folder of the directory you unzipped from <*ShopOpsServer_Install*>/lib.
8. Copy the jdom-1.0.jar file to the <*JBoss_directory*>/lib directory.
9. Backup the jdom.jar file that is already in the <*JBoss_directory*>/lib directory to a separate location, then delete it. Rename jdom-1.0.jar to jdom.jar.

10. Locate the runSos.sh file in the <*ShopOpsServer_install*>bin subdirectory. This shell script accepts six parameters: console|start|stop|restart|status|dump. The script can be run with the parameters directly. However, to set it up as a Linux service, perform the following steps:

NOTE: <*ShopOpsServer_install*> is the location where you unzipped the ShopOperationsServer.zip, such as */root/ShopOperationsServer*.

a. Copy the runSos.sh file to the /etc/init.d directory and rename it to runSos. Run the following commands:

```
#cd <SOS_Install_Directory>/bin
#cp -a runSos.sh /etc/init.d/runSos
```

NOTE: Make sure you use the -a option to preserve the execute attribute that was added by configSosEnv.sh in step 2 above.

b. From /etc/init.d/, open runSos in a text editor and update the following properties:

APP_NAME="runSos"

APP_LONG_NAME="Rockwell Shop Operations Server"

APP_PATH="<*ShopOpsServer_install*>"

c. Add Shop Operations Server as a service by running the following command:

```
#chkconfig --add runSos
```

d. Start Shop Operations Server in the background by running the following command:

```
#service runSos start
```

Modifying the Startup Delay Interval (Optional)

If your application server and Shop Operations Server are both running on the same machine, Shop Operations Server may start up before the application server is ready to communicate. In this situation, the Shop Operations Server will receive an exception when it tries to connect to the application server and will then terminate. To solve this problem, you can configure Shop Operations Server to have a delayed startup by defining the following configuration parameters in the Java Service Wrapper configuration files. To do so, perform the following directions.

1. Navigate to <*ShopOpsServer_install*>/conf where <*ShopOpsServer_install*> is the location where Shop Operations Server is installed.

2. Open the wrapper.conf file, found in the ShopOperationsServerLinux.zip file. Locate the following line:

```
wrapper.startup.delay.console=0
```

3. Configure the startup delay in seconds. The default is 0 (no delay).
4. Save your work and close the file.
5. Restart Shop Operations Server.

Because of the delayed startup, Shop Operations Server will be able to connect to the application server after it starts. The optimum startup delay for your system depends on many factors, including your hardware and software configuration. Please contact your administrator for more information.

Installing Multiple Shop Operations Server Services

If you want to run multiple event sheets on a single machine, you must install multiple Shop Operations Server services. To do so, perform the following steps:

Windows

1. Install each Shop Operations Server instance to a separate directory. Note that the name of each Shop Operations Server service must be unique.
2. Navigate to the <*ShopOpsServer_install*>/bin subdirectory. In a text editor, open the ShopOperationsServer.xml file. Give each Shop Operations Server instance a unique port number. Each embedded jetty web server port (identified as jetty-port="8081") must be unique.

Linux

1. Install each Shop Operations Server instance to a separate directory. Note that the name of each Shop Operations Server service must be unique.
2. Navigate to /etc/init.d/. Rename each sh file and its APP_NAME and APP_PATH to a unique name. For example, you could name the sh file as runSos, runSos_server2 and set the APP_NAME to runSos, runSos_server2, and so on.
3. Navigate to the <*ShopOpsServer_install*>/bin subdirectory. In a text editor, open the ShopOperationsServer.xml file. Give each Shop Operations Server instance a unique port number. Each embedded jetty web server port must be unique.

Configuring the Function Thread Pool Size (Optional)

If your event sheet will process events that will be handled in parallel, the events should be handled with Function.runFunctionThread(...), which allows events to be processed by a pool of worker threads. The default number of worker threads is 25. The optimum number of threads for your application may vary depending on your system configuration. This number can be changed if necessary, within the limits of your system configuration. To do so, perform the following steps.

1. In <*ShopOpsServer_install*>\bin, open ShopOperationsServer.xml in a text editor.
2. Locate the following line and define the number of worker threads. The default is 25.

   ```
   function-thread-pool-size="25"
   ```

3. Save your work and close the file.
4. Restart Shop Operations Server.

Running Shop Operations Server

Shop Operations Server can be started and stopped in a Windows environment using the following methods. See "Installing Shop Operations Server (Linux)" on page 199 for instructions on running Shop Operations Server in a Linux environment.

- To run Shop Operations Server as a Windows service, use the Windows Services Control Panel. Look for the "Rockwell Shop Operations Server" service. Before you can run Shop Operations Server as a service, you must install it as a service by running the InstallApp-NT.bat file located at <*SOS_install*>\bin.

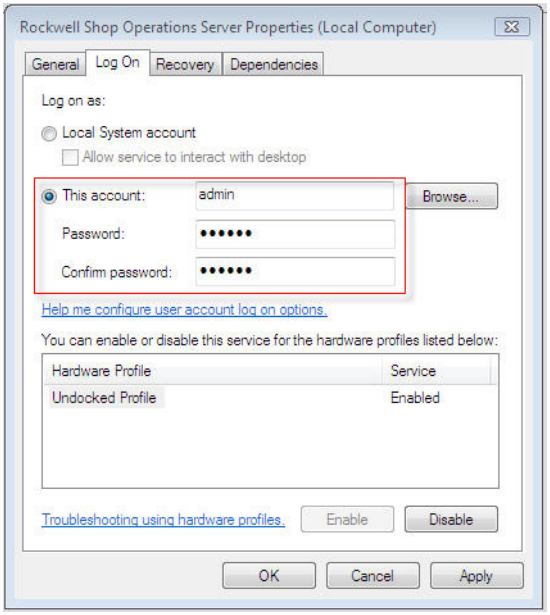
  To run Shop Operations Server as a service on Windows 7, you must either be logged in as a Windows administrator or be in the Windows administrator user group. If you are not a Windows administrator but are in the administrator user group, perform the following steps.

  a. To register Shop Operations Server as a service, open the Services console by going to Start > Run and entering services.msc.

  b. In the list of services, right-click on *Rockwell Shop Operations Server* and select Properties.

  c. Select the Log On tab, and select *This Account*.

Figure 6-5: Log On Tab



d. Enter the system administrator's user name and password, then click [OK].

e. Go to Start > All Programs > Accessories. Right-click on Command Prompt and select *Run as Administrator*. The command prompt window opens.

f. Change the location to <*SOS_install*>\bin.

g. Run the following command:

```
StartApp-NT.bat
```

h. To stop Shop Operations Server, run the following command:

```
StopApp-NT.bat
```

- If you want to use the Java wrapper, run the App.bat file located in the <*SOS_install*>\bin folder from the command line. This method automatically creates the wrapper.log file because it calls the Java wrapper to start Shop Operations Server. Use this method if you want the wrapper to restart the JVM if it is unexpectedly stopped.

> **NOTE:** When using the Java wrapper with Windows, the socket connection may close unexpectedly at the OS level. See http://wrapper.tanukisoftware.com/doc/english/release-notes.html for details.

- If you do not want to use the Java wrapper, run the runSos.bat file from the command line. This file is also located in the <*SOS_install*>\bin folder. Running this file will not create the wrapper.log file.

Administering Shop Operations Server

The Shop Operations Server administration console allows the user to configure the system, view the event log, view event history, and monitor system performance. To access the administration console, go to http://<*server_name*>:<*port*>/*ShopOperationsServer*.

NOTE: If you are using Internet Explorer 10, please click the Compatibility View icon in your browser's address bar to display the administration console's login page correctly.

The GUI is customized based on which of the five system-defined groups the logged-in user is a member of. Access is defined as follows:

- PlantOpsGuest: can view statistics only, cannot change anything.
- PlantOpsOperator: can view statistics, view the error log, and invoke events.
- PlantOpsSupervisor: has PlantOpsOperator privileges plus the ability to turn statistics on/off and change the configuration of statistics gathered.
- PlantOpsDesigner: has PlantOpsSupervisor privileges plus the ability to change the event sheet configured to run on the Shop Operations Server.
- PlantOpsAdmin: has PlantOpsDesigner privileges plus the ability to configure the logged-in username/password and change the server configuration.

An ability to log out of the administration console is also provided. Online help is provided through the use of tool tips where appropriate.

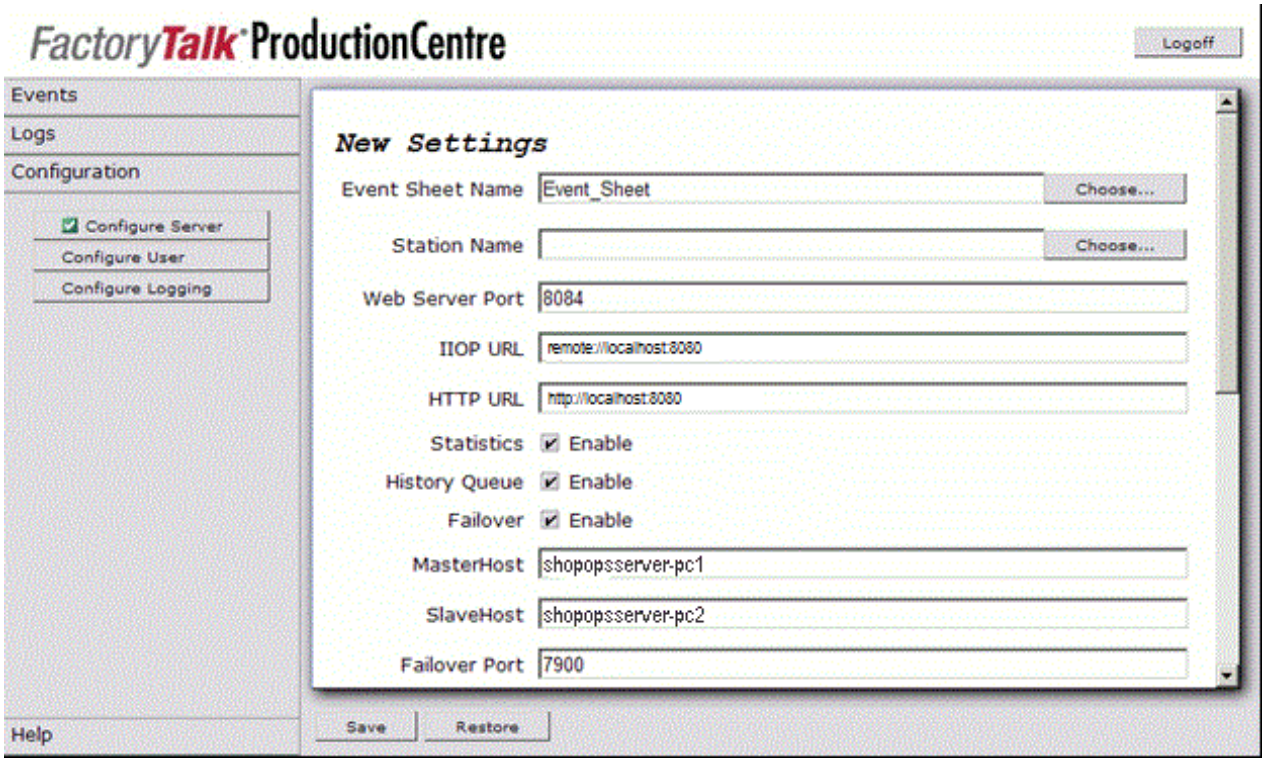
IMPORTANT: **Before restarting either an application server or database server, stop Shop Operations Server first, then restart it only after the other servers are running.**

NOTE: If Shop Operations Server is stopped while processing events, the currently executing event will be aborted and all outstanding events discarded. Therefore, the server should be stopped when it is idle (i.e. let all outstanding events complete first). The administration console can be used to choose a time when there is no activity by inspecting server status pages.

Configuring the Server

To configure the server, in the left navigation pane, click [Configuration], then [Configure Server].

Figure F-4: Configuring the Server



The following items, located in the *New Settings* section, can be configured for the server:

- Event Sheet Name: Select an event sheet from a list of event sheets stored in the database or enter the name of an event sheet.
- Station Name: Select an event sheet from a list of stations stored in the database or enter the name of a station.
- Web Server Port Number: Enter the Shop Operations Server's Jetty port number.
- IIOP URL: A default value is provided from the value configured in the Plant Operations EAR file by DsDeployTools.jar. You can enter multiple servers for this property. For example, remote://*<server1>*:*<port1>*,*<server2>*:*<port2>*...
- HTTP URL: A default value is provided from the value configured in the Plant Operations EAR file by DsDeployTools. Enter only one server for this property.
- Enable the Statistics flag for charting purposes.
- Enable the event History Queue flag for monitoring purposes.
- Enable the Failover flag to enable and configure Shop Operations Server failover. Refer to the section "Configuring Failover" on page 225 for

information on how failover works and instructions to fill in the MasterHost, SlaveHost, and Failover Port fields.

NOTE: If you want to preserve the existing settings in the ShopOperationsServer.xml file, then be sure to save a copy of the file. Any changes you make will overwrite this file.

To save your changes to the ShopOperationsServer.xml file, click [Save]. Changes to the following require a restart of Shop Operations Server:

- Event Sheet Name
- Station Name
- IIOP URL
- HTTP application server URL
- Embedded web server port number
- Failover Enable check box
- MasterHost
- SlaveHost
- Failover Port

To undo changes that have not been saved yet, click [Restore] before you click [Save]. This will reset the values to those stored in the ShopOperationsServer.xml file.

The following field updates take effect immediately and do not require a server restart:

- Enable statistics flag
- Enable history queue flag

Configuring for Clustered Plant Operations Servers

NOTE: For information on configuring Shop Operations Server for event sheet failover, see "Configuring Failover" on page 225.

To configure Shop Operations Server to connect to a cluster of Plant Operations servers, edit the HTTP URL and IIOP URL settings. This can be done using the Shop Operations Server administration console shown in Figure F-4 or a text editor to edit the file ShopOperationsServer.xml. Edit the settings as follows:

- HTTP URL

  Change this to the hostname/IP address and port value pair of the HTTP URL for the cluster as configured in the Plant Operations EAR file by DsDeployTools. There should only be one hostname/IP address and port

value pair for this URL. If you are editing ShopOperationsServer.xml, this value pair is in the <http-uRL> tag.

- IIOP URL

  Add the hostnames/IP addresses and port values of the IIOP URL for the cluster as configured in the Plant Operations EAR file by DsDeployTools. These are the hostnames/IP addresses and port numbers of all Plant Operations servers participating in the cluster. If you are editing ShopOperationsServer.xml, these values are in the <iiop-uRL> tag.

  If you are using the Shop Operations Server administration console to enter the IIOP URL, use the same format as in the <iiop-uRL> tag (including the remote:// URL prefix):

`remote://<hostname1>:<port1>,<hostname2>:<port2>,<hostname3>:<port3>`

  In both the Shop Operations Server administration console and ShopOperationsServer.xml file, use a comma to delimit each set of <*hostname*>:<*port*> values.

  If the primary node becomes disconnected, the working copy of the IIOP URL will be rearranged for use in subsequent user transaction operations. This reordering improves the time it takes to detect a replacement node when the primary node goes down.

  For example, the URL is configured as follows:

  `jnp://A:1099,B:1099,C:1099,D:1099`

  When node A is disconnected, the client will detect this and reorder the URL, placing the disconnected node last in priority:

  `jnp://B:1099,C:1099,D:1099,A:1099`

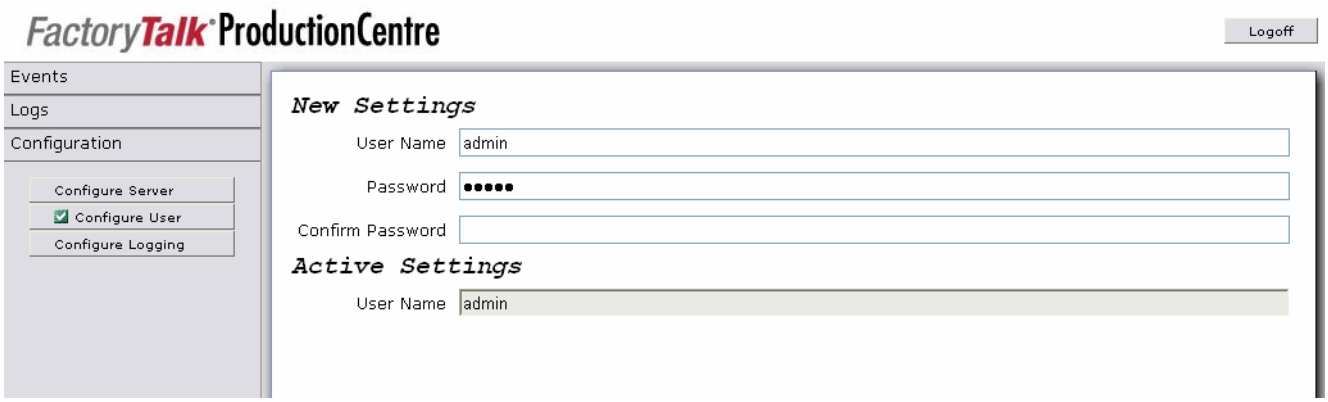
NOTE: Refer to Appendix B, “Clustering with FTPC” for information on how to cluster Plant Operations servers.

Configuring the User

The Configure User screen allows the administrator to specify the username and password of the logged-in user who will be processing event sheets. To configure the user, in the left navigation pane, click [Configuration], then [Configure User]. Enter or confirm the following information, and then click [Save] to save the information to the ShopOperationsServer.xml file.

- User Name
- Password
- Confirm Password

Figure F-5: Configuring the User



Configuring Logging

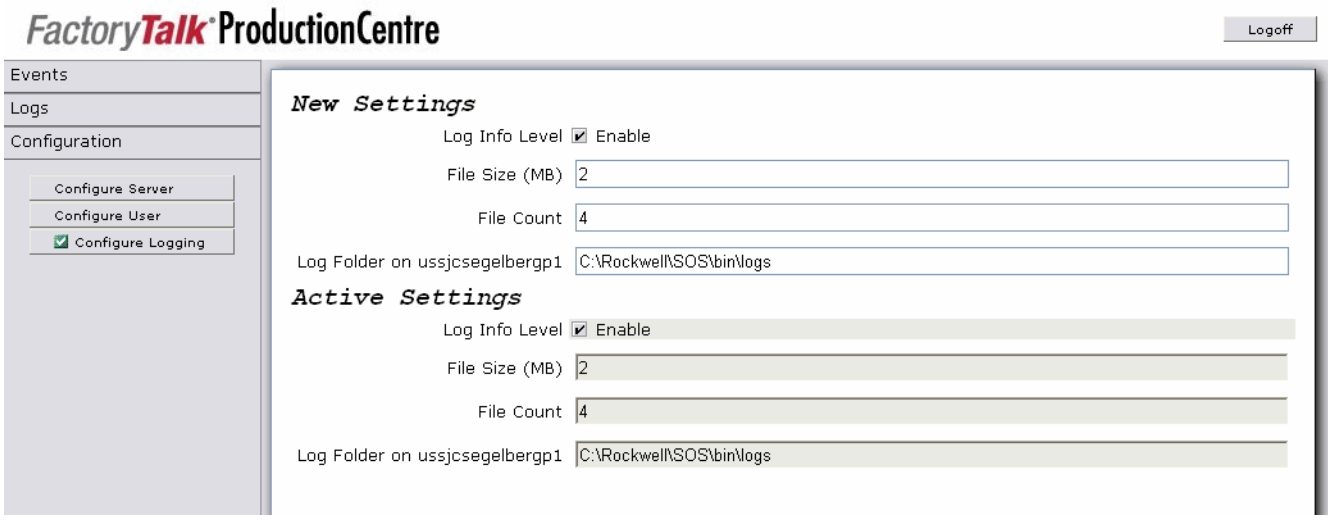
The Configure Logging screen allows the administrator to edit server logging parameters. To configure logging, in the left navigation pane, click [Configuration], then [Configure Logging]. Either accept the default configuration parameters or enter your own information, and then click [Save] to save the information to the ShopOperationsServer.xml file.

- Log Info Level: Enable this flag if you want informational messages as well as errors to be logged. If not enabled, then only errors will be logged. Note that informational logging will negatively impact performance.
- File Size (MB): Enter the maximum file size to allow in megabytes for each log file.
- File Count: Enter the maximum number of files to keep on disk. The oldest file past the file count will be deleted.
- Log Folder on <*machine name*>: Define the path on the specified machine to the location of the log files. The name of the log files are ShopOpsServerLogX.X.xml and ShopOpsServerDetailLogX.X.xml where X.X indicates the log's rollover sequence. The most recent log is always numbered 0.0, and the next most recent is 0.1, etc. The ShopOpsServerLog logs information about the execution of the event sheet currently running, such as scripting errors and events that have fired. These messages are short and easily-read. The ShopOpsServerDetailLog logs the same information but in a more detailed format. It also logs exception stack traces.

IMPORTANT: If you have multiple instances of Shop Operations Server installed on one machine, each instance must have a unique log folder defined.

Once you have saved your changes, the configuration populates the *Active Settings* section. This section displays the currently saved configuration and is read-only.

Figure F-6: Configuring Logging



Using Event Sheets

NOTE: The following section provides a general overview of the structure and function of event sheets. For detailed instruction on how to create an event sheet, definitions of each event sheet property, and an overview of each event sheet container, please refer to the Process Designer and Objects Online Help.

Event sheets provide a framework for developers to create non-GUI applications. Shop Operations Server provides a runtime environment for executing script in event sheets. Event sheets can also be debugged in test mode in Process Designer. An event sheet:

- Is a top-level object in Process Designer (like a form).
- Contains definitions of events grouped into a container type. Event containers have properties and their events have associated script. The types of event containers are as follows:
  - Activity Event: allows the application developer to specify an event to configure, execute, and monitor the execution of activities.
  - ActivitySetEvent: allows the application developer to specify an event to configure, execute, and monitor the execution of activity sets.
  - Calendar Event: allows the application developer to specify an event that fires based on the Gregorian calendar.

  - JMS MessageEvent: allows the application developer to send and receive JMS messages using an event sheet.
  - Live Data Event: allows the application developer to specify an event that fires based on data from the Live Data server.

NOTE: The Live Data event is not supported on the Linux platform.

  - Message Group Event: provides communication capability over a JGroup channel.
  - Serial Event: allows the application developer to specify an event that fires based on data received on a serial port.
  - Socket Event: allows the application developer to specify an event that fires based on data received on a socket.
  - Timer Event: allows the application developer to specify an event that repeats after a specified time interval.
  - Web Service Event: allows the application developer to specify an event that is invoked by an external web services operation.
  - UserWebServiceEvent: allows the application developer to specify an event that is invoked by an external user-defined web services operation.

- Supports standard import/export behavior to a DSX file.
- Has script executed when an event occurs.
- Has properties.
- Has events.

Some events in the containers must be triggered by an external application:

- JMS Message: a JMS messageEvent is triggered by an event sheet.
- Live Data: an OPC server that is monitoring tag values is the source for data change events. The *readComplete* and *writeComplete* events are triggered whenever an asynchronous read or write to a tag completes. The *shutdownRequest* event is triggered when a request is made to shut down an OPC server. The *cancelComplete* event is triggered when an asynchronous read or write is cancelled.
- Message Group: the messageGroup event is triggered when another form or event sheet sends an application message or when a shared hash table or queue data structure is modified by another form or event sheet.
- Serial: the dataReceived event is triggered when data is received on a serial communication port.
- Socket: the dataReceived event is triggered when data is received on a Windows socket.

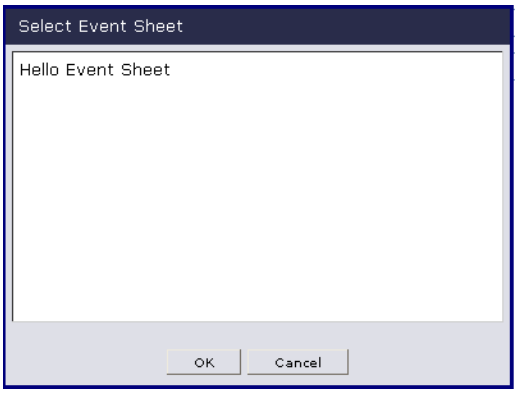
- Web Service: the webService event is triggered when the signalEvent() operation is invoked on the web services interface.
- User Web Service: the userWebServiceEvent is triggered by the user-defined web services class that was created by extending the UserService class.

Running an Event Sheet

To run an event sheet:

1. Log on to the Shop Operations Server administrative console.
2. Choose an event sheet from the server configuration page or type in its name.

Figure F-7: Select Event Sheet



3. Stop Shop Operations Server by navigating to <*ShopOpsServer_install*>\bin in Windows Explorer and double-clicking on StopApp-NT.bat to stop the Windows service. For Linux, run the following command:

```
#service runSos stop
```

or

```
#cd /etc/init.d
#service runSos stop
```

4. Restart Shop Operations Server by navigating to <*ShopOpsServer_install*>\bin in Windows Explorer and double-clicking on StartApp-NT.bat to start the Windows service. For Linux, run the following command:

```
#service runSos restart
```

or

```
#cd /etc/init.d
#service runSos restart
```

IMPORTANT: **If you make any changes to an event sheet that is running in Shop Operations Server, you must stop and restart all instances of Shop Operations Server running that event sheet. This guarantees that the latest version of the event sheet is being executed.**

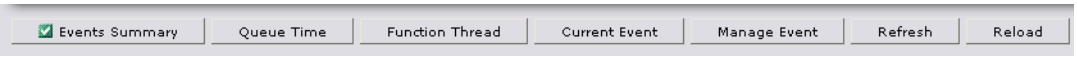
Monitoring the Event Sheet

The Shop Operations Server administration console allows the user to monitor the event sheet's performance in a number of different ways. The purpose of the Shop Operations Server event pages and charts is to help you understand how your server is performing.

View Event Status

The navigation buttons at the bottom of the View Event Status screen allow you to view the following information about your events.

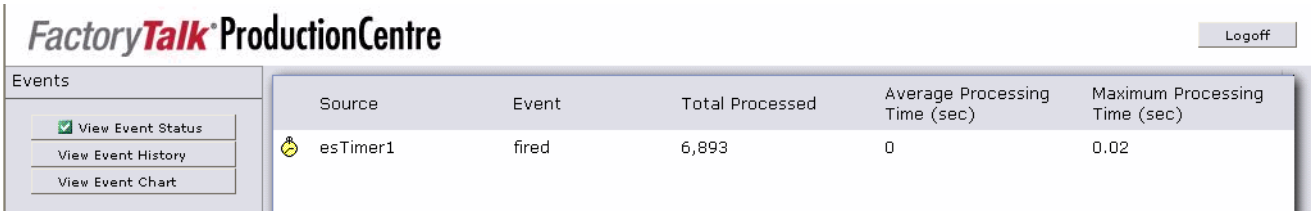
Figure F-8: Bottom Pane Navigation Buttons



- "Events Summary" consists of a table with the following columns:
  - Source: the source of the event.
  - Event: the name of the event.
  - Total Processed: the number of events processed.
  - Average Processing Time (sec.): the average amount of time in seconds required for processing the event.
  - Maximum Processing time (sec.): the maximum amount of time in seconds required for processing the event.

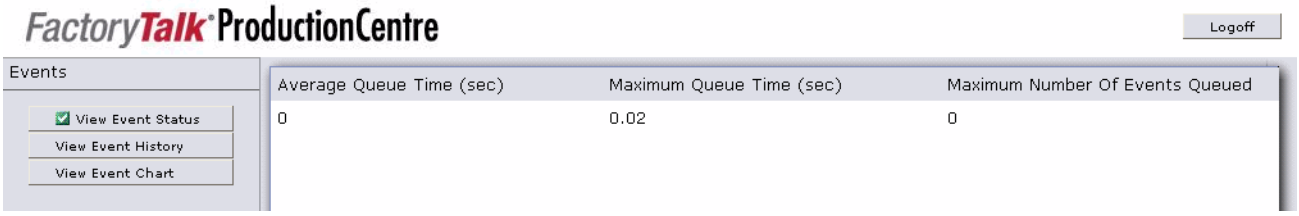
  If an event source has unusually large processing times compared to the others, it could indicate that this event is taking too long to execute and thus is a candidate for optimization. Also, if there is a big difference between the average and maximum times, this could indicate that the server is not performing in an optimal manner.

Figure F-9: Events Summary



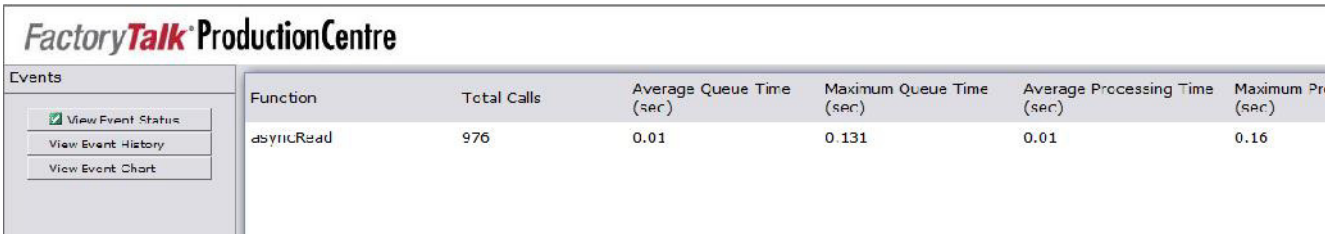
- "Queue Time" shows the average time an event spent in the queue, the maximum time spent in the queue, and the maximum number of events that were waiting in the queue. Large queue times and a large queue count indicate that the server is not processing events fast enough to keep up with new ones arriving.

Figure F-10: Queue Time



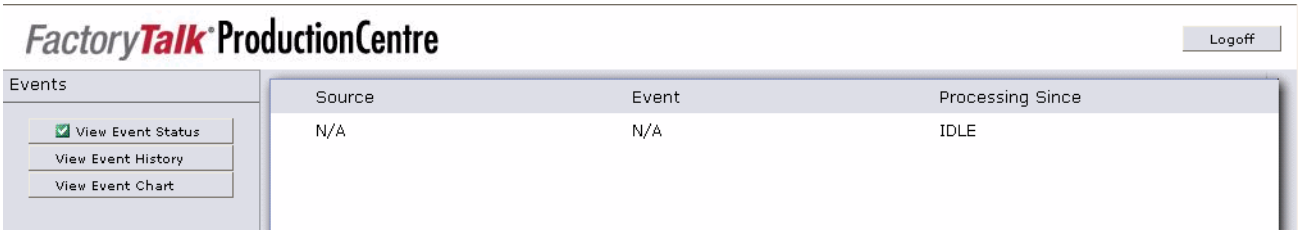
- "Function Thread" shows the total number of times the function was called, the average and maximum queue times for the event that called the function, and the average and maximum processing times for the event that called the function. This information can be used to identify script code isolated to a particular event sheet function that could be a candidate for performance optimization.

Figure F-11: Function Thread



- "Current Event" shows the currently executing event source, the name of the event, and the time when it started processing. A single event that takes an exceptionally long time to process could either indicate inefficient script code or just a large amount of processing that needs to be done.

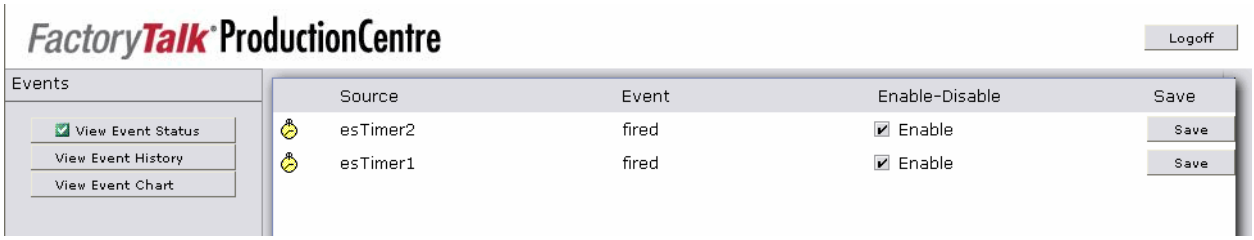
Figure F-12: Current Event



- "Manage Event" allows the user to temporarily enable or disable each event in the event sheet from within the Administrative Console. To enable or disable an event, click the checkbox in the Enable/Disable column in the appropriate row. Clicking [Save] in the row of the event that has been

enabled or disabled updates that event definition and saves the entire event sheet.

Figure F-13: Manage Event



- "Refresh" updates the results displayed in the table using the most current information available.

NOTE: The tables are not refreshed automatically.

- "Reload" updates the event sheet using any changes saved in Process Designer since the server was started. This button is disabled when failover is enabled.

NOTE: If you delete or rename your currently running event sheet in Process Designer, clicking Refresh or Reload will not affect your event sheet's performance. Event sheets are stored in Shop Operations Server's cache. To clear the cache, you must stop and restart Shop Operations Server for your changes to take effect.

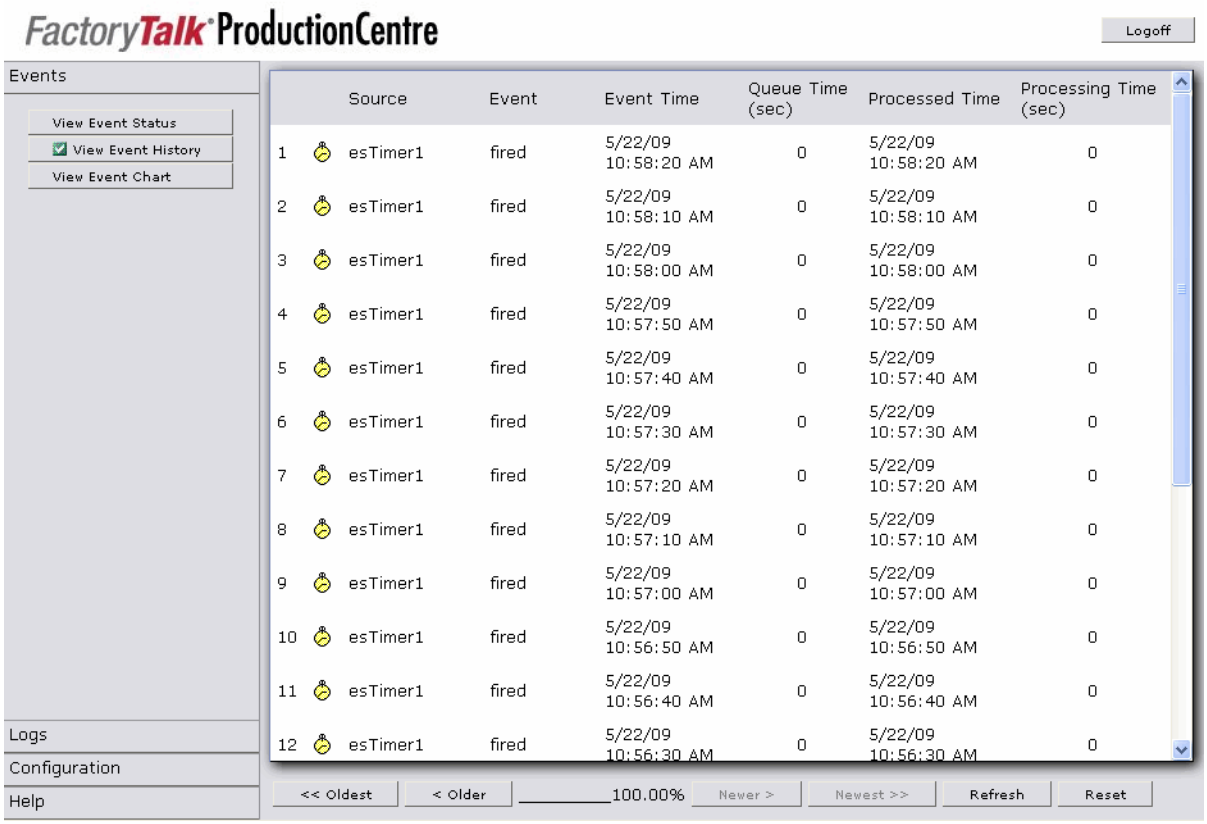
View Event History

The View Event History screen displays the following columns:

- Source: the source of the event
- Event: the name of the event
- Event time: the time the event was put into the processing queue
- Queue time: the amount of time spent in the queue
- Processed time: the time the event started processing
- Processing time (sec.): the amount of time in seconds spent processing the event

A large queue time indicates that the server is not keeping up with new events coming in. A large processing time could indicate inefficiencies in the script code.

Figure F-14: View Event History

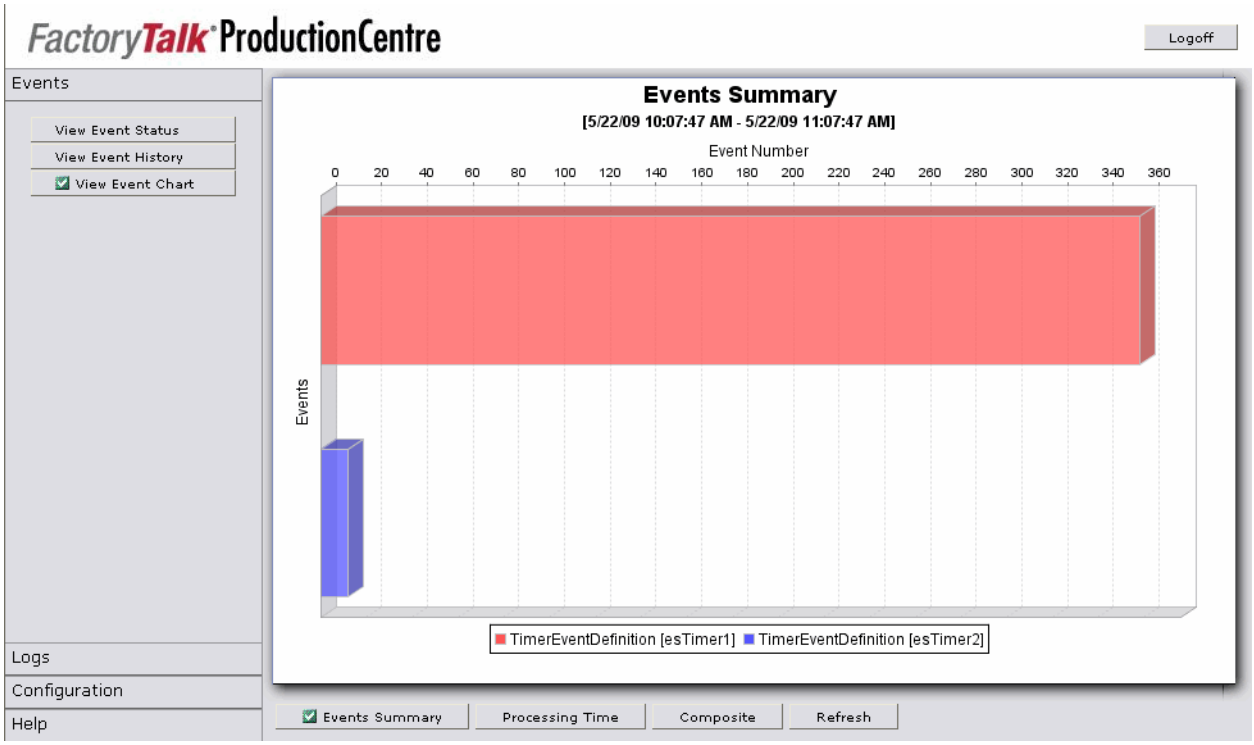


View Event Chart

View Event Chart allows the user to view a variety of reports about the events being processed. The reports include:

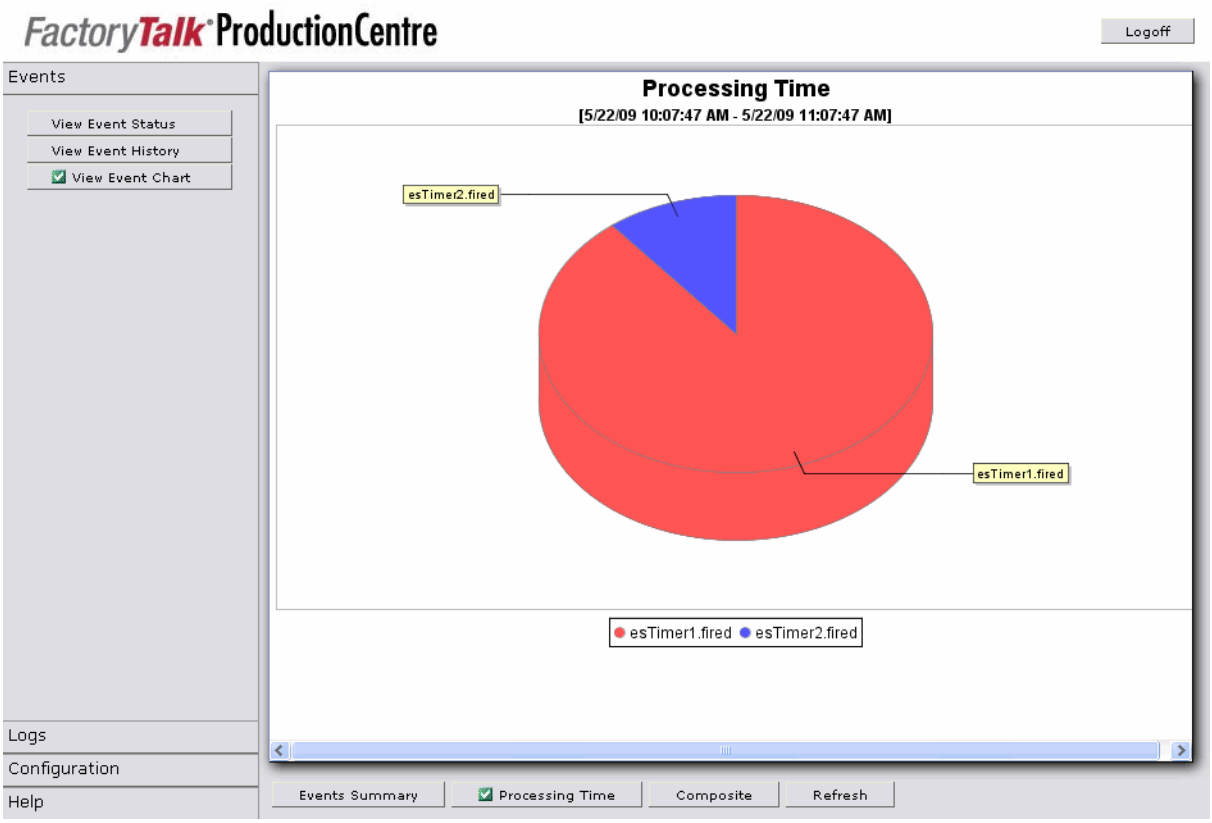
- **Event Processed**: a bar chart of the count of events processed, separated according to event source. A large number of events of a particular source could be expected, or it could indicate that the volume is higher than anticipated.

Figure F-15: View Event Chart



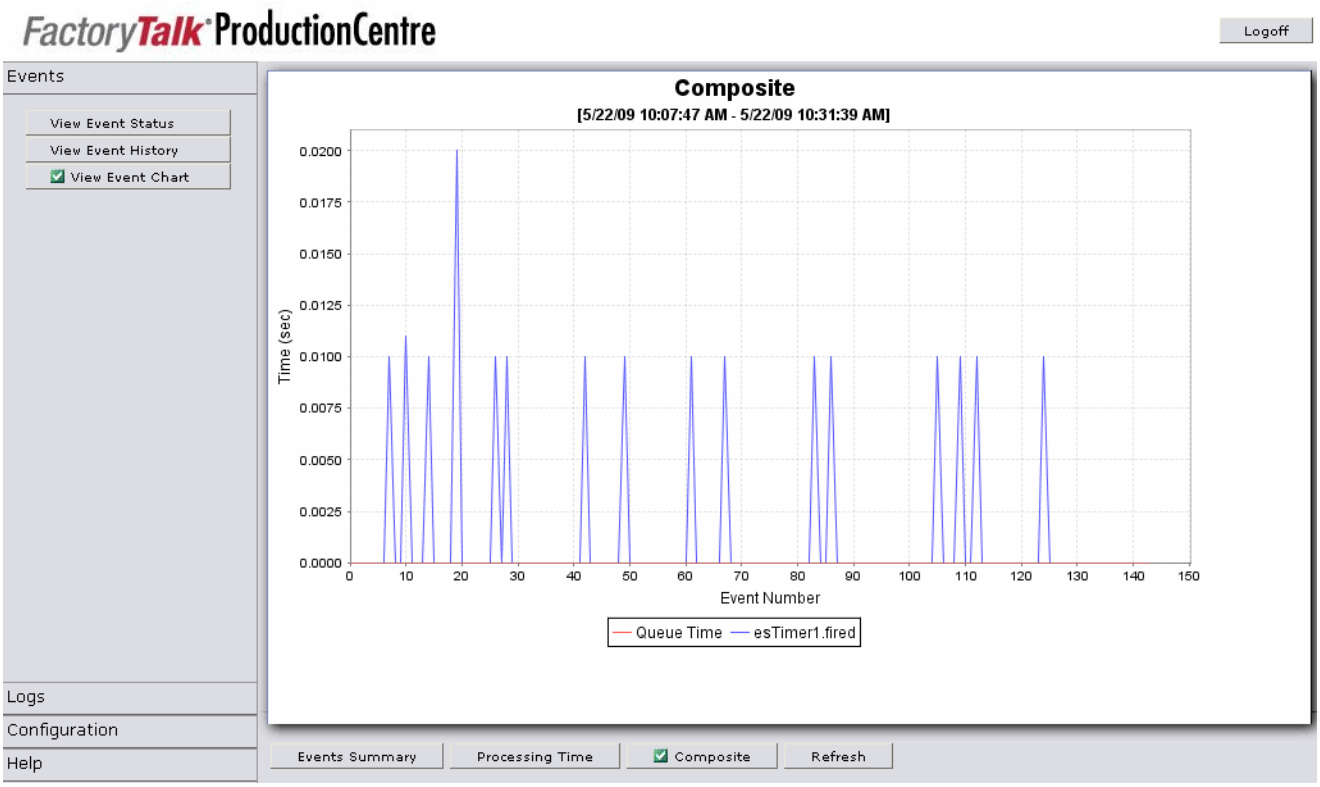
- **Processing Time**: a pie chart of the total processing times by event source. A large portion of the pie indicates that this event source is consuming the majority of the available processing time compared to other events. This might be expected, or it could indicate inefficient script.

Figure F-16: Processing Time Pie Chart



- **Composite**: shows a line chart for queue and processing times by event (new events are recorded on the right-hand side of the chart). A queue time that tends to increase over time indicates that the server is not keeping up with the volume of new events coming in. Large processing times could indicate inefficient script.

Figure F-17: Composite Line Chart



- **Refresh:** redraws the charts using the most current information available.

Viewing Logs

The Shop Operations Server administration console allows the user to view the following types of logs:

- Error/Informational Logs
- Println Outputs
- Application Logs

NOTE: The rockwell_client_dir define controls where the log files are stored by SOS and *<serverHost>* is the name of the machine on which the client JAR files are downloaded. If you define rockwell_client_dir, the location of the log files will change. For more information on how to change the default location, please refer to "Installing as a Windows Administrator" on page 195.

Viewing Error/Information Logs

The View Logs screen displays information about any informational or error entries logged. Each log entry includes the following information:

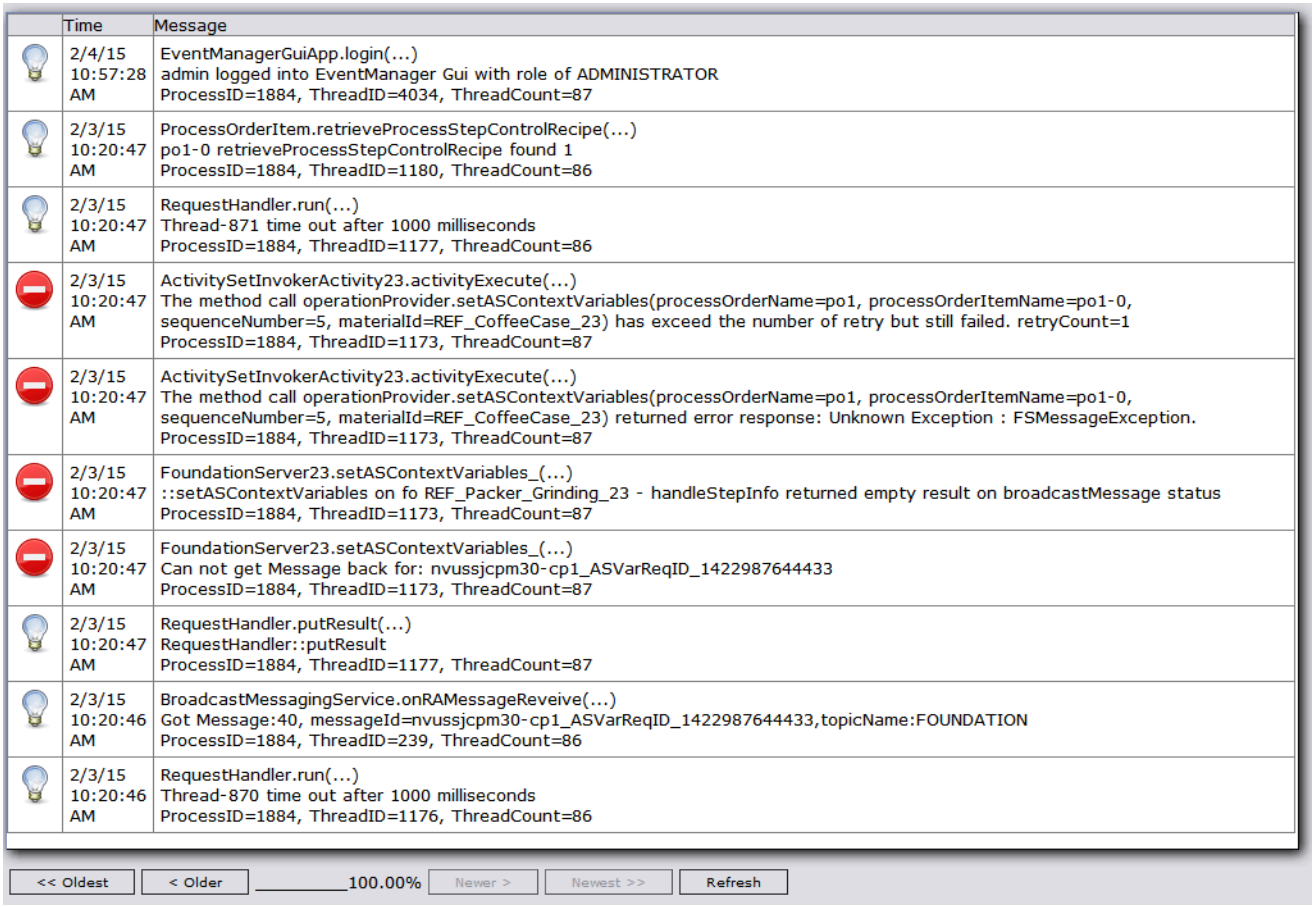
- an icon that indicates whether the entry is for an error or is informational only. Depending on the type of entry, one of the two following icons will be displayed:
  - An informational entry will include a light bulb. 
  - An error entry will include a traffic warning sign. 
- time the log entry was created.
- detailed information about the entry.

When the server is not executing script as expected, use the View Logs screen to see if any errors were logged that would indicate the root cause of the problem.

- [<<Oldest] shows the page with the oldest log entries.
- [<Older] shows the next page with older log entries.
- [Newer>] shows the next page with newer log entries.
- [Newest>>] shows the page with the newest log entries.
- [Refresh] rereads the log file from the disk.

An indicator of the current page's relative position in the log file is displayed. For example, "20%" indicates that the current page is 20% of the way through all entries in the log file.

Figure F-18: Error/Information Log



Logging Debug Messages

If you want the Error/Information log to list debug messages as well, set the log level to FINE in the ShopOperationsServer.xml file located in the <*SOS_Install*>\bin folder. This level is set to INFO by default.

```
<log-level>INFO</log-level>
```

NOTE: This setting also affects the Plant Operations Server and Client logs as well as any Foundation Server and Live Data entry in these logs.

Please note that setting your logging level to FINE will vastly increase your log count. If you no longer want the debug messages to appear in the Error/Information log, set the log level back to INFO or SEVERE.

It is also recommended that you increase the log file count to at least 10. The default is 4.

```
log-file-count="4"
```

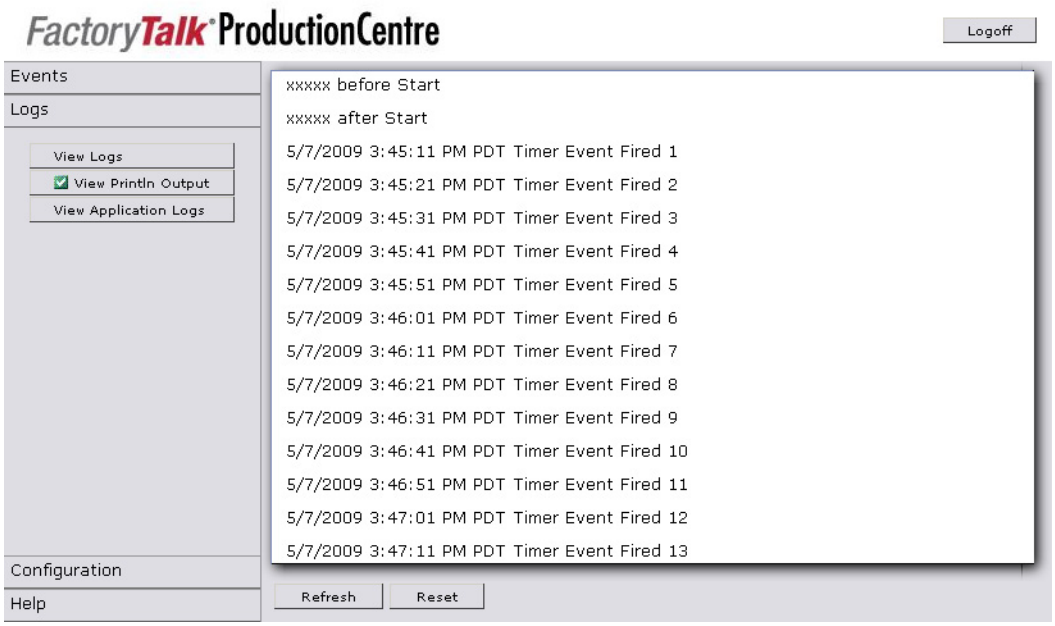
Viewing Println Output

The View Println Output screen displays the output that has been scripted inside the event sheet (i.e., messages generated by the println() method). The most recent 500 println messages are stored and displayed with the oldest message being displayed first.

Click [Refresh] to fetch the latest data that Shop Operations Server has generated. The console does not automatically refresh the screen after it is first displayed.

Click [Reset] to clear all previously collected data from Shop Operations Server. Restarting Shop Operations Server also clears all previously collected data.

Figure F-19: View Println Output



Viewing Application Logs

The View Application Logs screen enables you to view a list of application log messages filtered by the Application object, date, and time. These messages are stored for 30 days by default and then purged.

An Application Log stores an application's debugging messages. These messages are the application log items that are created and enabled in Process Designer using the Application object editor and then written to the Application Log using the *writeApplicationLogMessage (ApplicationLogItem, String)* method. Application log items are written to the Application Log if both of the following conditions are met:

- ❑ The application log item is enabled.
- ❑ If the application log item is a child of another application log item, the parent application log item is also enabled.

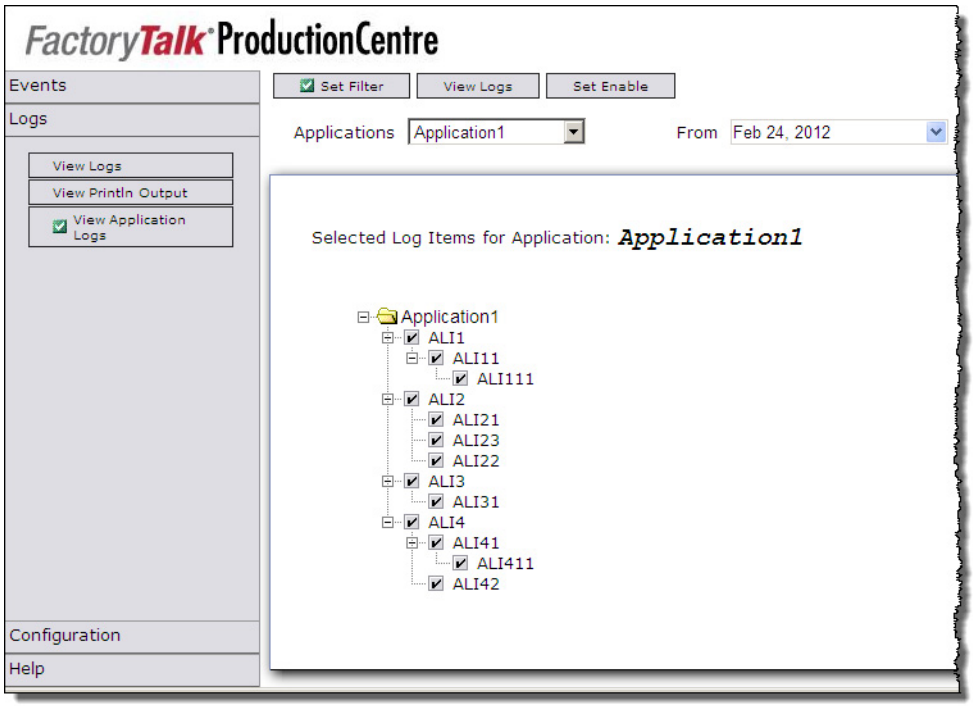
Please see the *Process Designer and Objects Help* for more information on creating and enabling application log items.

Application Logs are located at <*download_location*>\ ProductionCentre\logs\ApplicationLog, where <*download_location*> is the location defined at "Define the Download Location (Optional)" on page 63. The log for each client is only available on that specific client.

To view an Application Log:

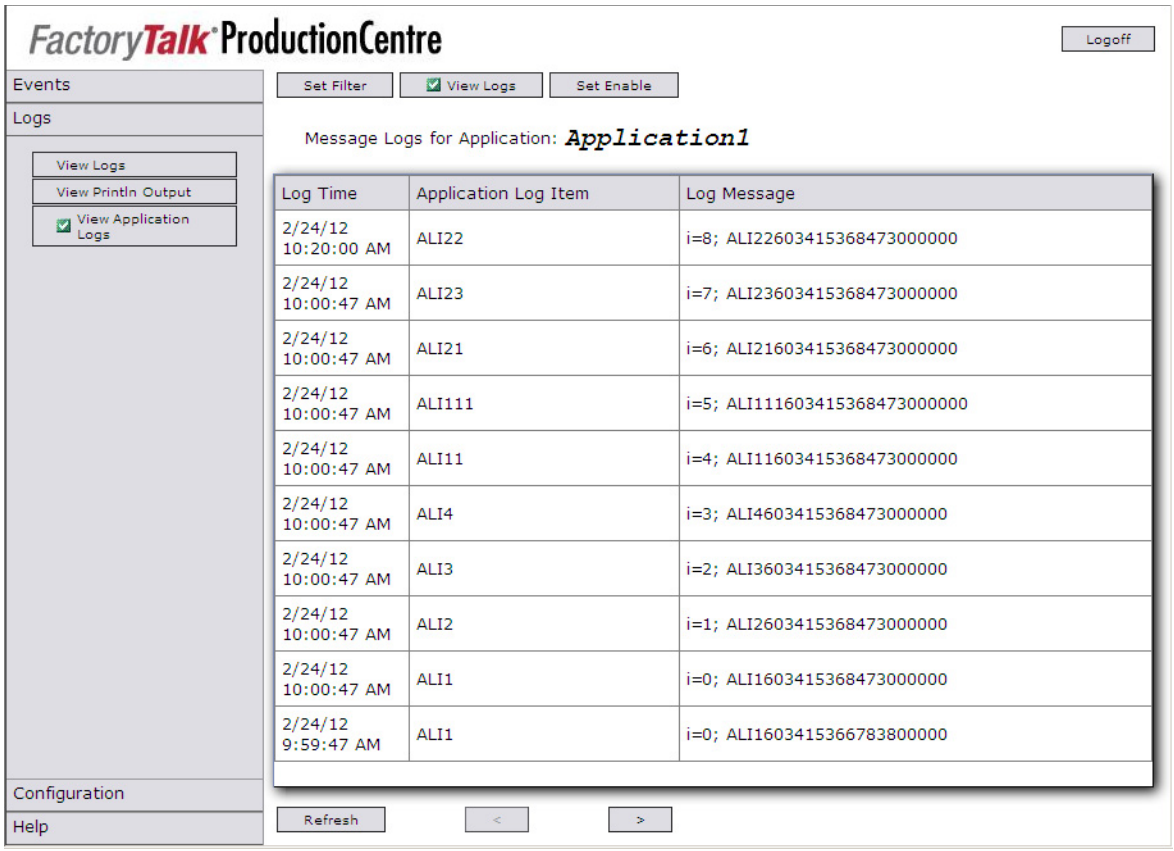
1. Go to Logs > View Application Logs.
2. Select an Application object, a day, and a time period using the drop-down menus at the top of the screen. The application and its corresponding application log items for the selected objects display.

Figure F-20: Set Filter Display



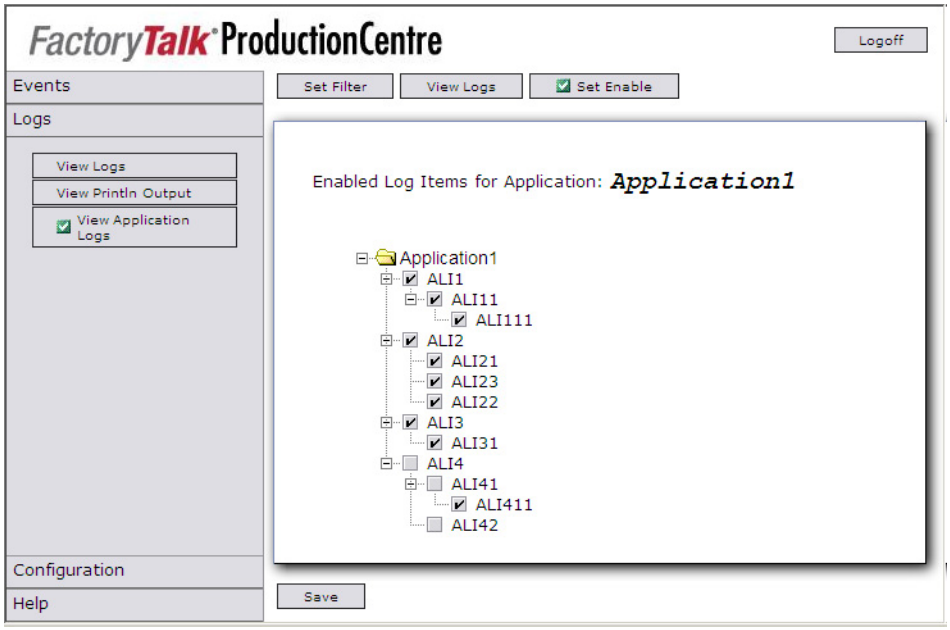
3. Select the items you want displayed in the Application Log.
4. Click [View Logs] to display the Application Log. Use the [<] and [>] buttons to navigate through the log.

Figure F-21: View Logs Display



5. Click [Refresh] to redisplay the log after changing the filtering criteria or to display the most up-to-date messages. The console does not automatically refresh the screen after it is first displayed.
6. Click [Set Filter] to change the application log items displayed in the Application Log.
7. Click [Set Enable] to enable and disable application log items.

Figure F-22: Set Enable Display



8. Select the items you want enabled or disabled and then click [Save]. Your changes will be reflected in Process Designer after you have refreshed Process Designer.

Configuring Failover

Two Shop Operations Server instances running the same event sheet can be configured with master and slave roles to provide failover capability for the event sheet. The master and slave instances run as a two-instance cluster in an active-standby configuration with the two instances running on separate physical or virtual machines with unique IP addresses. Both instances must be identically configured with the same event sheet. Each instance runs only one event sheet.

Configuration for failover is performed using the Shop Operations Server administration console for each instance (Figure F-4 on page 206). The IP addresses or hostnames of the machines running the master and slave instances are explicitly entered together with a common port number. This configuration allows a TCP connection to be established between the master and slave instances. This connection is used to send messages between the master and slave instances to establish that each instance is performing its role as master or slave. The messages are sent between a default interval period of 500 milliseconds. This interval period is known as the *failover ping period*.

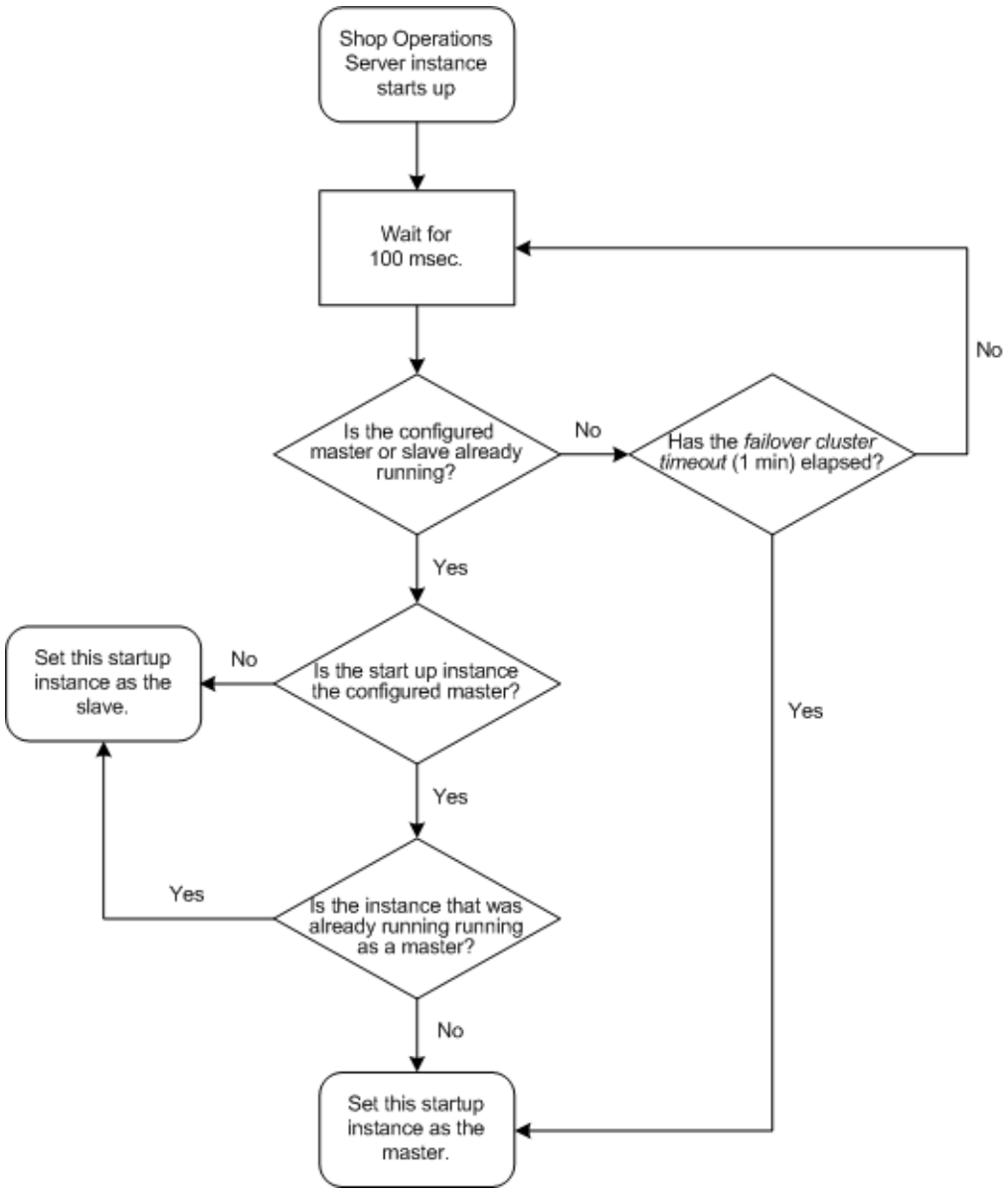
During startup, the master should be started before the slave. Thereafter, the slave must be started and running within 60,000 milliseconds (1 minute) of the startup of the master in order for the slave to be acknowledged. If the slave takes longer to start up and run, the master will start processing first. If the slave starts up later, it

will join the running master in a cluster as the slave instance. This time period when the master waits for the slave to start up is known as the *failover cluster timeout*.

If the configured slave is started before the master, it will wait the duration of *failover cluster timeout* for the master to start. If the master is not started and running after *failover cluster timeout* has elapsed, the configured slave is promoted to be the master instance and starts processing its event sheet. Thereafter, if the configured master is started, it will detect that a master instance is already running and will demote itself to be the running slave instance.

The flowchart in Figure F-23 describes the logic used by each Shop Operations Server instance when it starts up.

Figure F-23: Startup Logic for the Master or Slave Shop Operations Server Instance



To determine if the master instance has failed, the slave instance uses the consecutive occurrence of the following two criteria:

- when no message is received from the master after an interval period of 500 milliseconds (the *failover ping period*), and
- the last message received from the master is older than 3,000 milliseconds; this time value is known as the *failover connection timeout*.

NOTE: If you need to change the default values of *failover ping period*, *failover cluster timeout*, or *failover connection timeout*, contact Rockwell support.

When these two criteria are met, the master is assumed to have failed. The slave instance is promoted to be the master instance and begins processing as the master. If the configured master is started up successfully later, it detects that an existing master is running and demotes itself to be the slave instance.

NOTE: In order for the slave to promote itself to the master, it must verify that it can communicate with JBoss using port 7. Please make sure port 7 is not blocked.

To configure Shop Operations Server for failover, do the following for both the master and slave instances:

1. Open a browser and go to http://<*ShopOpsServer_name*>:<*jetty_port*>/ShopOperationsServer.
2. When the Shop Operations Server Login page (Figure F-2) appears, enter your username and password. The default login user/password is *admin/admin*.
3. When the administration console web page appears, in the left navigation pane, click [Configuration], then [Configure Server].

   The server configuration settings web page (Figure F-4) appears.
4. To enable the current Shop Operations Server for failover, click the Failover check box.
5. In the MasterHost field, enter the IP address or hostname of the physical or virtual machine running the master Shop Operations Server instance.
6. In the SlaveHost field, enter the IP address or hostname of the physical or virtual machine running the slave Shop Operations Server instance.

NOTE: Do not enter “localhost” in the MasterHost or SlaveHost field. Also, if you are using two VMware virtual machines for failover, one to run the master Shop Operations Server instance and one to run the slave Shop Operations Server instance, specify the IP address assigned to the VMware network adapter of each virtual machine in the MasterHost or SlaveHost field.

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7. In the Failover Port field, enter the port number that is used for master-slave communication. This value must be between 1025 to 65535. The default is 7700.
8. Click [Save] to save the changes you made.
9. Restart the Shop Operations Server.
10. Ensure that you enter identical settings for both the master and slave instances.

NOTE: In order for SOS failover to work, the master and slave instances must be able to connect to the application server. To ensure that the master and slave instances can connect to the application server, the IP addresses of both the master and slave should be whitelisted in any security software and/or firewalls that are used in the network.

Limitations

When a connection failure occurs between the master and slave instances that does not involve failure of the master instance, such as a network connection failure, a scenario can occur where two master instances exist concurrently. For example, assume that the configured master and slave instances are running in their respective roles when a network connection failure occurs between them. During this network failure, the slave instance does not receive any messages from the master instance after the *failover ping period*, and the last message received from the master was older than the *failover connection timeout* value. The slave instance concludes that the master has failed, promotes itself to be the new master instance, and starts processing its event sheet. All this while, the configured master instance is still running but not communicating with the configured slave instance. When the network connection is recovers, two conflicting master instances exist.

When two master instances are detected, the system will restart the master node that has the shorter run cycle, and that node will become the slave node.

If there is a communication loss or a temporary promotion from slave to master, when network stability is restored, the longest-running node becomes the designated master.

Uninstalling Shop Operations Server

Perform the following steps to uninstall Shop Operations Server.

Windows

To uninstall the Shop Operations Server, run the UninstallApp-NT.bat script. This script uninstalls the Shop Operations Server Windows service. Once you have done that, back up your installation directory at <*ShopOpsServer_install*> and then delete it.

Linux

To uninstall the Shop Operations Server, perform the following steps:

1. Navigate to /etc/init.d. Delete the runSos file.
2. Delete the <*ShopOpsServer_installation*> folder and its contents.

Upgrading Shop Operations Server

To upgrade FTPC, you must uninstall the old version and install the newest version of SOS. For directions on how to uninstall SOS refer to “Uninstalling Shop Operations Server” on page 229. Make sure that SOS is completely uninstalled before reinstalling the newest version. Refer to “Installing Shop Operations Server” on page 195 for instructions on how to properly install SOS.

Glossary

Active Database	See *Production Database*.
Application Instance	A single FTPC application installed in a logical server on a physical machine that contains JBoss.
Application Server	A single process that serves up applications. In JBoss, you can configure more than one application server to be running.
Client Session	A Shop Operations, Process Designer, or FTPC Administrator session running from a remote machine that accesses the JBoss machine where FTPC is installed.
Dedicated Server	A single system with one instance of JBoss installed that runs only the FTPC application. JBoss runs no other applications on this machine.
Historical Database	See *Operational Data Store (ODS) Database*.
Java 2 Enterprise Edition (J2EE)	A platform that provides standards for multitiered enterprise applications, such as JBoss. The enterprise applications use a standard set of services and components that are provided and supported by J2EE.
JBoss	Java 2 Enterprise Edition (J2EE)-based enterprise application software that manages and maintains web-based software applications installed on the same machine. FTPC is installed on the JBoss machine.
Machine	A physical computer system.
Message Object	An object in Process Designer that allows you to translate one message into languages from one or more supported locales.
Node	A logical group of servers located on the same machine.

Operational Data Store (ODS) Database	Also called a historical database, an ODS database archives aging information, transferred from the Production database.
FactoryTalk ProductionCentre Application Server	The machine where FTPC is installed. JBoss must already be installed.
Production Database	Also called an active database, this transactional database records and stores all data collected by FTPC. After a configured period of time, this data is transferred to the ODS database.
Web Container	An object that contains an application and authorizes that application to execute in the application server.
Workspace	A grouping of database connections and logical servers that are part of an administrative configuration.

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