Installation Guide

JBoss Application Server - Windows

Version 1.16
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Table of Contents

About This Guide

This Installation Guide provides instructions for installing the Futuro application on a Windows operating system using a JBoss application server.

This installation guide contains general installation and configuration information. For recommendations specific to your technical environment, please refer to your Futuro Environment Guide.

As a Futuro customer, you are fully responsible for creating, configuring, and maintaining your technical environment. This includes databases, servers, network connections, PC/mobile devices, operating systems, Java/JDK, and Java application servers (Java EE servers). If you purchased client terminals, you are responsible for mounting the terminals and establishing and maintaining their network and power connections.

Futuro also expects customers to have adequate, experienced personnel to administer the non-Futuro components of their technical environment as listed above, and to have appropriate support agreements with the vendors of these non-Futuro components.

Customer Support

For customer support, have your Solution ID ready and call 800-333-4444.

Please include the following information when you contact Support:

- Contact name, phone number, and e-mail address

- Company and site name

- Version of Product

- Hardware model and serial number if reporting a hardware issue

- Software such as operating system, database software, and version

- Whether the system is a production or test system

- Any specific error codes and text

- Any steps to reproduce the issues

If possible, provide more information such as screen snapshots, exact steps leading to the issue, log files, file attachments, etc.

Validated Platforms

This section lists the databases, application servers, browsers, and other platforms that have been validated with Futuro.

If at some point the vendor stops supporting an item listed below, then the item can no longer be validated to work with Futuro.

Database Server	
Operating System Version	Operating systems depend on the Database Version you are using. Refer to your database documentation for information.
Database Version	Choose one of the following: • Microsoft SQL Server 2019 • Microsoft SQL Server 2017 • Microsoft SQL Server 2016 • Microsoft SQL Server 2014 • Oracle 19c SQL Server databases require the sqlcmd command line utility. If you are installing or upgrading the Futuro Database Schema on a SQL Server database, you must run the installer from a computer with the Windows operating system. Oracle databases require Oracle Client with SQL*Plus. The TNS Name must be configured to point to the database.

Application Server	
Operating System Version	Choose one of the following: Windows Server 2019 (64-bit) - Standard edition Windows Server 2016 (64-bit) - Standard edition Windows Server 2012 R2 (64-bit) – Standard edition Windows Server 2012 (64-bit) – Standard edition
JDK Version	Oracle JDK 11.x (64-bit version) Oracle JDK 1.8.x (64-bit version) Red Hat OpenJDK 11 Red Hat OpenJDK 8

Application Server		
Application Server Version	Red Hat JBoss EAP (Enterprise Application Platform) 7.4	Oracle JDK 11.x Oracle JDK 1.8.x Red Hat OpenJDK 11 Red Hat OpenJDK 8
	JBoss EAP 7.3	Oracle JDK 11.x Oracle JDK 1.8.x Red Hat OpenJDK 11 Red Hat OpenJDK 8
	JBoss EAP 7.1	Oracle JDK 1.8.x Red Hat OpenJDK 8
	JBoss EAP 7.0	Oracle JDK 1.8.x Red Hat OpenJDK 8

Web Client	
Browsers Validated	Firefox Chrome Edge (Chromium)

Mobile Web Application		
Validated Device	**Browser Validated**	**Operating System**
Samsung Galaxy	Chrome Samsung Internet	Android version 12
iPhone	Edge Safari	iOS version 15.4.1

Validated Terminals

Only the following terminals have been validated with Futuro:

- Futuro Clock

- Futuro XML Client

All other terminals, including those that can be configured within Futuro, may work with Futuro but have not been validated.

Futuro Terminals – Validated Hardware and Firmware	
Hardware	Futuro terminals version H4
Firmware	3.4.x Tested with versions 03.04.00.43 and 03.04.02.44
	3.2.x Tested with version 03.02.01.7
	3.1.x Tested with versions 03.01.03.45, 03.01.04.36, and 03.01.05.46
	3.0.x Tested with versions 3.0.3, 3.0.4, 3.0.5, and 3.0.6

Futoro XML Client Requirements	
Operating System	**Futuro XML Client Version**
Windows 10	3.5 or later

First Time Installation

Download the Futuro Installer

The Futuro application and database schema are packaged in an executable .jar file. The name of the Futuro-installer.jar file has the following format: **Futuro-installer-reporting-build.YYYYMMDDHHMMSS.jar**. The timestamp represents the date and time when the build was created.

The same Futuro-installer.jar file is used for first-time and upgrade installations.

Note: The Futuro application must be installed on the same machine as the application server.

Do not use the following characters in your folder names: *( ) = \ " ' #.* Oracle may not recognize these characters and as a result may not connect Futuro to the database.
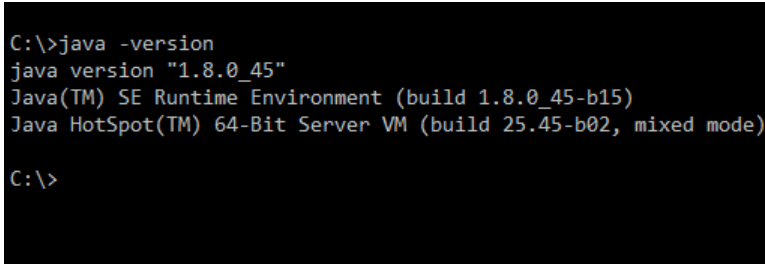
Install the Java SE Development Kit (JDK)

To use the Futuro application, you must have one of the following JDK versions installed on the application server. The application server is the location where you will install the Futuro application:

- JDK 11.x (32-bit or 64-bit version)

- JDK 1.8.x (32-bit or 64-bit version)

- OpenJDK 11

- OpenJDK 8

Note that the JDK version you can use will depend on the JBoss version you are using. Refer to Validated Platforms on page 5 for more information.

To check which version of JDK is installed on your application server, open a command prompt as an administrator and run the statement **java –version**. The version number will be shown (*1.8.0_45* in the example below).

```
C:\>java -version
java version "1.8.0_45"
Java(TM) SE Runtime Environment (build 1.8.0_45-b15)
Java HotSpot(TM) 64-Bit Server VM (build 25.45-b02, mixed mode)

C:\>
```

If you **do** have JDK installed, you must check whether the program is present in your Path variable. Run the statement **set java_home**. This command will display the JAVA_HOME location. If the wrong version displays, update the Java path on the application server to reflect the correct Java version.

If you **do not** have JDK installed, continue with the steps below.

To install JDK on your application server:

1.   Download JDK or OpenJDK.

      The website where you can download the program will depend on which version you are using.

      For example, if you want to download JDK 11.x, navigate to the Java SE Downloads page at oracle.com and locate the appropriate JDK download link (e.g., *jdk-11.0.7_windows-x64_bin.exe*). You may have to go to the Archive section of this web page to find the version you need.

2.   Save the file to a location of your choice.

3.   Locate and run the executable.

4.   When the installation is complete, restart your application server.

5.   Open a command prompt window and run the statement *java –version*. The version you installed should display. If another version displays, the issue may be resolved after you set the environment variable.

9

Futuro First Time Installation Prerequisites

This section explains the steps that are required **before** you install the Futuro application and database schema for the first time.

Install the Java SE Development Kit (JDK)

You must have the 32-bit or 64-bit version of Java SE Development Kit (JDK) version 11.x or 1.8.x, or OpenJDK version 11 or 8, installed on the application server.

For more information, see

Create Your Futuro Database

You will need to create your Oracle or SQL Server database before you run the Futuro installer. You will need to provide the database server host name, port number, user name, and password in order to complete the installation.
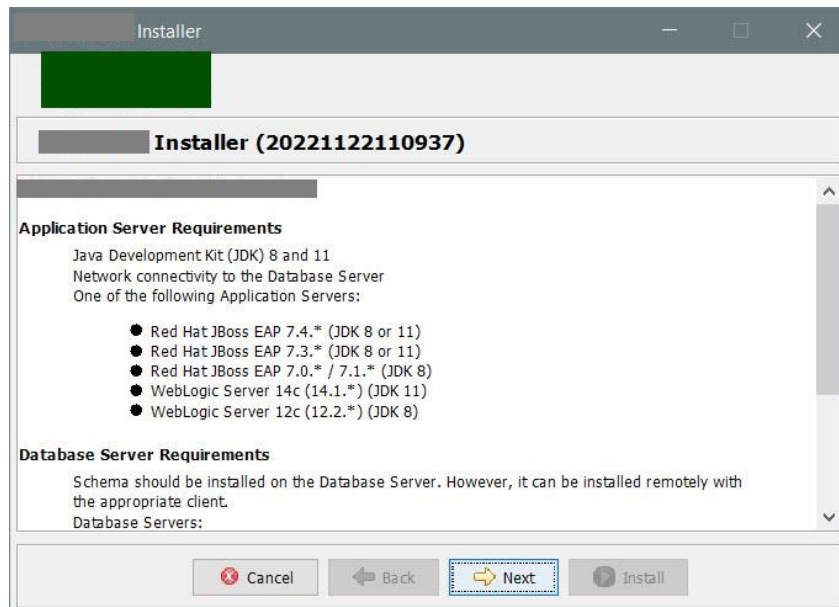
Install the Futuro Application

In addition to the method shown below, you can also run the installer in text-only mode. When you run the installer in text-only mode, you will be presented with the same options as the installer screens. However, these options will be presented as command prompts. See Run the Installer in Text-Only Mode on page 18 for more information.

1. Navigate to where you have saved the executable Futuro-installer.jar file and double-click it.
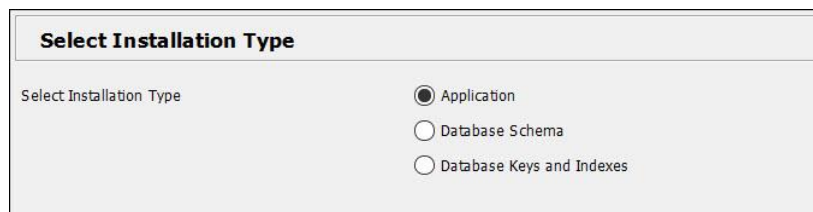
    The installer will begin extracting.

    Once extracted, the **Welcome** window appears.

2. Ensure that your application server meets the requirements shown in the Welcome window and click **Next**.

    The Select Installation Type window appears.

3. Select Application and click Next.

    Note: You will need to install the Database Schema as well, after you install the Application. These steps are explained in the next section - Install the Futuro Database Schema - on page 15.

    The **Database Keys and Indexes** option may be needed if you are upgrading the database schema and an error occurs during the creation of the keys and indexes.

    The **Install Options** window appears.

4. Select the directory where you want to install the Futuro application.

    Click **Select Folder** to navigate to the destination folder. You must single-click the folder to select it; do not double-click it.

    Do not select a folder path that contains parenthesis (e.g., *C:\Program Files (x86)...*) or you will not be able to run the JBoss application server.

5. Enter the name of the **license file** you are using. The license file determines which modules you can activate in the Futuro application.

    If you change the name of the license file, the new license name you enter will be saved in the config.xml file.

    You will install the license file in the \app directory after you complete the sections "Install the Application" and "Install the Database Schema."

6. Click **Next** to continue.

7. Click Next in the Application Components to install window.

    The **Database Type** window appears.

8. Select your **Database Type** and click **Next**.
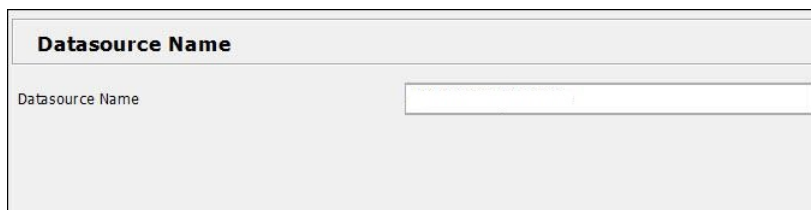
    The Application Server Port window appears.

9. Set the Application Server Port to *8080*.

The **Application Server Port** refers to the port number used by your JBoss instance. If your JBoss port is not set to the default value of 8080, you will need to change the Application Server Port after you install the application by adding a Java option to the standalone.conf.bat file (see page 22).

You will also need to add a server with this new port number after you install and log into the Futuro application. To do so, go to the Servers tab in the Application form (Main Menu > Configuration > System > Application > Servers) and click Add. Refer to your Futuro help file for more information.

Application Server Port	
Application Server Port	8080

10. Click **Next**. The **Datasource Name** window appears.

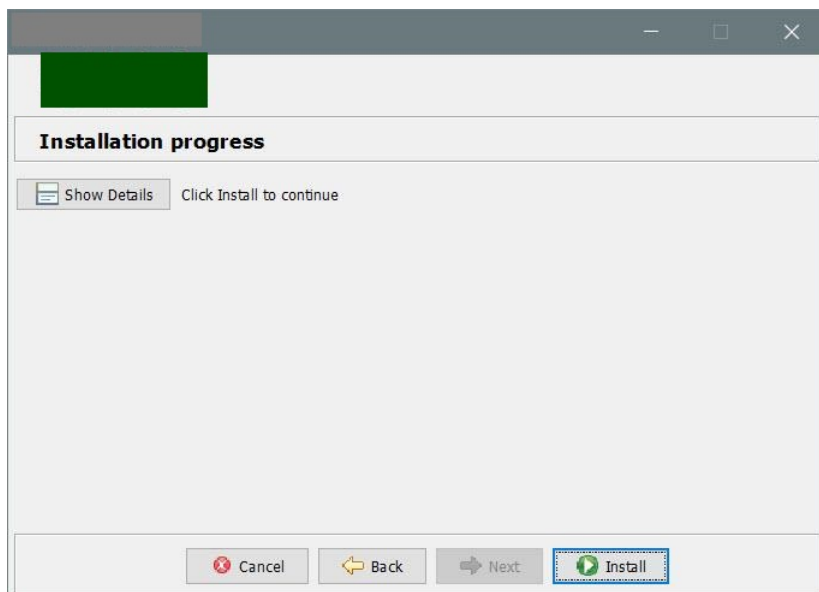| Datasource Name	
Datasource Name	

11. Keep the **Datasource Name** with its default value. Take note of this Datasource Name as you will need it later.

The Datasource name will be stored in the config.xml file, which is located in the \app folder where you install the Futuro application.

You will need this Datasource Name when you deploy the Datasource after you install the Futuro application and database schema.

12. Click **Next**.

The **Installation Progress** window appears.

Installation progress

Show Details   Click Install to continue

Cancel   Back   Next   Install

13. Click **Install** to begin installing the Futuro application. You can click **Show Details** to view the installation progress.

    When the Futuro application installation is complete, a message window will appear.

14. Click **OK**.

    The **Complete** window appears.

15. Click **Exit** to close the installer.

Continue with

Install the Futuro Database Schema

In addition to the method shown below, you can also run the installer in text-only mode. When you run the installer in text-only mode, you will be presented with the same options as the installer screens. However, these options will be presented as command prompts. See Run the Installer in Text-Only Mode on page 18 for more information.

Oracle Database Users: When you install the Database Schema, if you run the installer from a machine other than the database server, you need to have the correct Oracle Client installed on that machine. Otherwise, the Database Schema will not install correctly.

SQL Server Database Users: If you are installing the Futuro Database Schema on a SQL Server database, you must run the installer from a computer with the Windows operating system. Otherwise, the Database Schema will not install correctly.

1.   Navigate to where you have saved the executable Futuro-installer.jar file and double-click it.
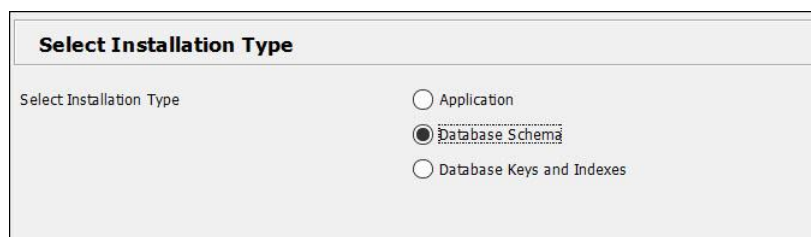
     The installer will begin extracting.

     Once extracted, the **Welcome** window appears.
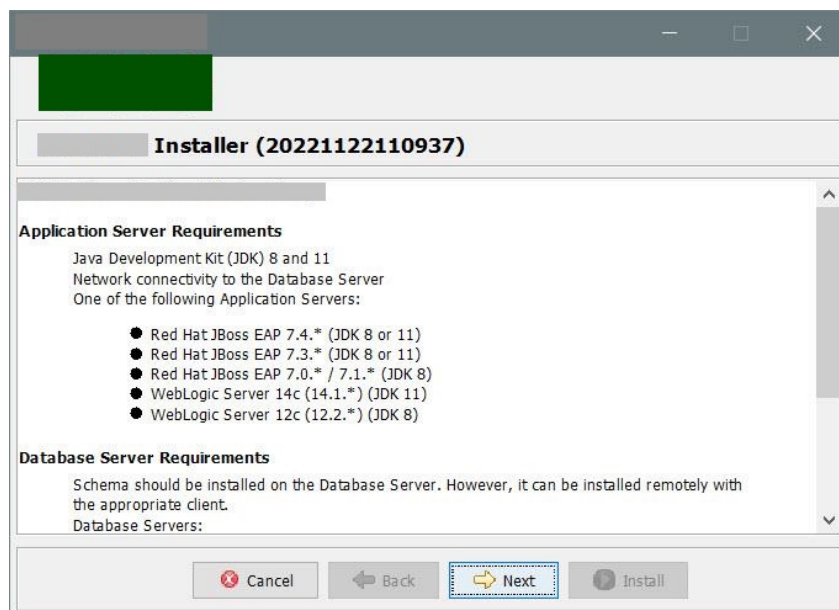
2.   Ensure that your database server meets the requirements shown in the Welcome window and click **Next**.

     The **Select Installation Type** window appears.

3.   Select **Database Schema** and click **Next**.

Because you are installing Futuro for the first time and your Futuro database has no existing tables, the installer will perform a full database schema install.

The **Database Keys and Indexes** option may be needed if you are upgrading the database schema and an error occurs during the creation of the keys and indexes.

The **Install Options** window appears.

Install options

Install SCHEMA

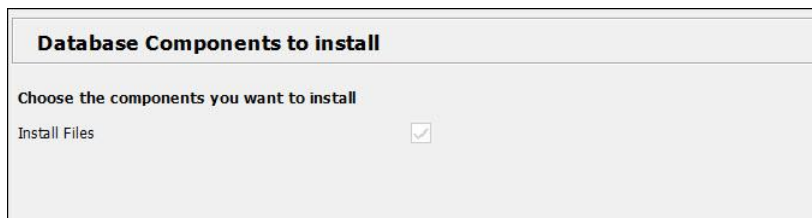Select an installation directory   [   ]   Select Fol...

4.   Select the directory where you want to install the Database Schema. Click **Select Folder** to navigate to the destination folder. You must single-click the folder to select it; do not double-click it.

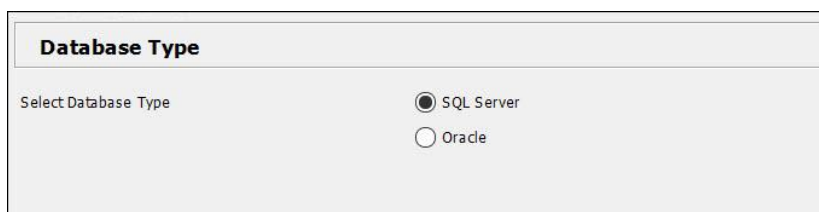   **Note:** The Database Schema folder does not have to be the same as the Futuro application folder.

5.   Click **Next** to continue.

       The **Database Components to install** window appears.

Database Components to install

Choose the components you want to install

Install Files   ☑

6.   Click **Next**.

       The **Database Type** window appears.

Database Type

Select Database Type   ⦿ SQL Server
                                                   ◯ Oracle

7.   Select your **Database Type** and click **Next**.

8.   If you selected *SQL Server* as the Database Type, the **Database Connection to MS SQL Server** window appears. Enter the following SQL Server database information:
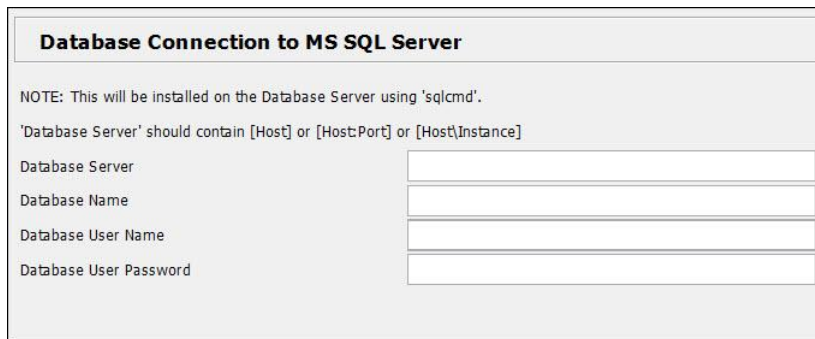
       Database Server: Name of the host computer where your Futuro database is installed.

       Database Name: Name of your Futuro database. Do not use the fully qualified domain name (FQDN).

       Database User Name: User name for your Futuro database.

       Database User Password: Password for your Futuro database.

If you are running the Futuro-installer.jar file on the same Windows machine as the database server, you can connect to the SQL Server database using Windows authentication by entering trusted for the Database User Name and Password.

Database Connection to MS SQL Server

NOTE: This will be installed on the Database Server using 'sqlcmd'.

'Database Server' should contain [Host] or [Host:Port] or [Host\Instance]

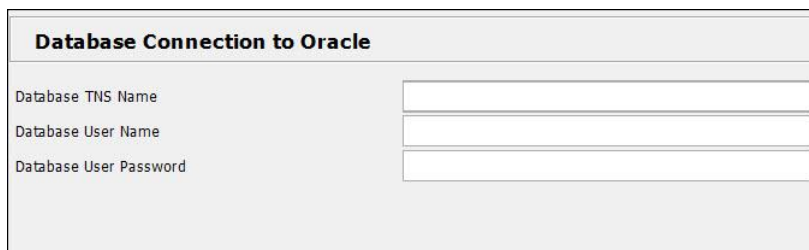|	
Database Server	
Database Name	
Database User Name	
Database User Password	

9. If you selected *Oracle* as the Database Type, the **Database Connection to Oracle** window appears. Enter the following Oracle database information:

    Database TNS Name: Enter the fully qualified domain name (FQDN) of your Futuro database.

    Database User Name: User name for your Futuro database.

    Database User Password: Password for your Futuro database.

Database Connection to Oracle

Database TNS Name	
Database User Name	
Database User Password	

10. Click **Next**.

    The **Confirm Datasource** window appears.

11. Click **Next**.

    The **Confirm Datasource** window appears.

12. Ensure that the information you provided is correct and click Next.

    The **Installation progress** window appears.
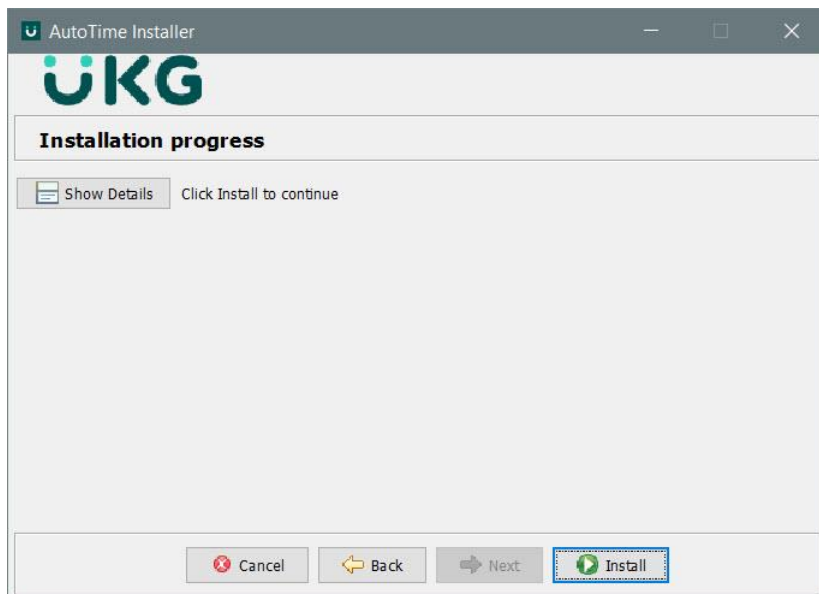
13. Click **Install** to begin installing the Futuro database schema. You can click **Show Details** to view the installation progress.

    When the Futuro database schema installation is complete, a message window will appear.

14. Click **OK**.

    The Complete window appears.

15. Click **Exit** to exit.

    If any errors (see page 19) occurred while installing the database schema, you can review these errors in the schema_install.log file.

16. You need to install the license file (see page 20). The license file enables the applicable modules within the Futuro application.

17. To continue the installation, you also need to install and configure JBoss (see page 21) and configure and run the application server (see page 25).

Run the Installer in Text-Only Mode

Note: If you are installing the Futuro Database Schema on a SQL Server database, you must run the installer from a computer with the Windows operating system. Otherwise, the Database Schema will not install correctly.

When you run the installer in text-only mode, you will be presented with the same options as the installer screens. However, these options will be presented as command prompts.

1. Using the cd command, navigate to the folder where the Futuro-installer.jar file is located.

2. Enter **java –jar <installer.jar> text** to launch the installer.

    Note: *<installer.jar>* must match the name of the Futuro-installer.jar file.

The installer will begin extracting.

3.	The installer will display the validated platforms. Press N to continue to the next page.

4.	Select the Installation Type (enter 1, 2, or 3 and press Enter).
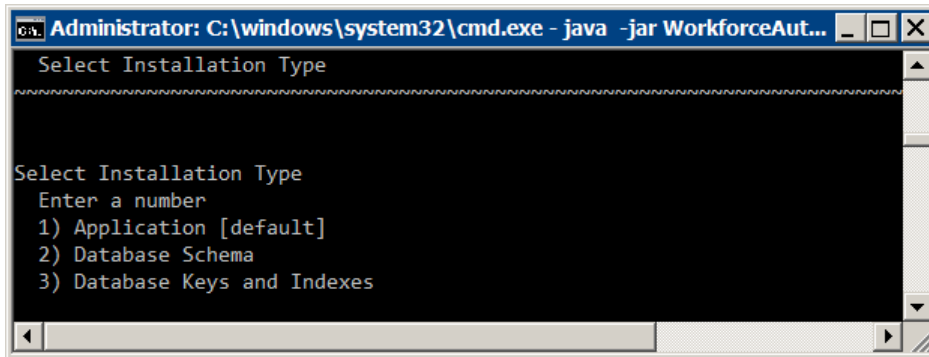
5.	The installer prompts will be the same as those presented in the installer screens. You will need to type your response to each prompt and press Enter. See Install the Application on page 11 or Install the Database Schema on page 15 for information on these prompts.

	When the installation is complete, the command prompt window will display the word *Finished*.

6.	Press CTRL+C to exit the installer. You can then close the command prompt window.

Installation Errors

You can review the schema_install.log file for any errors. The file is located in <Schema Installation Directory>\db\bin. The Schema Installation Directory is the folder you chose in the Install Options step (see page 16).

- If errors occurred while creating the keys and indexes, you will need to correct these problems in the database. Once the problems are corrected, you should upgrade the database schema and select the *Database Keys and Indexes* option.

- If you have an Oracle database, ignore the following errors in the log:

	ORA-02293: cannot validate - check constraint violated

	ORA-02443: Cannot drop constraint - nonexistent constraint

- If you receive errors such as ORA-00942: table or view does not exist, check your Oracle clients. If the application server from which you are running the installer is not using a validated Oracle client, the database schema will not install correctly.

If there are any other errors, please contact Customer Support (see page 4).

License

The Futuro application requires a license. The license activates and authorizes you to use the modules you purchased with the application. If the license is not installed, a violation notice will appear when you attempt to log in to the application.

Installing the License

Copy the license file (e.g., *license.xml*) into the \app folder of the Futuro installation directory.

The license file must reside in the same folder as the *config.xml* file.

You may have [changed the license name](#) (see page 12) when you installed the Futuro application. If so, the new license name was saved in the config.xml file.

Futuro will first look for the license name specified in the config.xml file. If this license cannot be found, the application will look for *license.xml*.

If you installed the license properly, you will be able to log in to the application successfully. However, if the license is corrupt, if you exceed the number of licensed users, or if the license has expired, a [violation notice](#) (see page 43) will appear.

Install and Configure JBoss

Before installing JBoss, you must have a working installation of Java (JDK); see Install the Java SE Development Kit (JDK) on page 9.

To install JBoss:

1.   Download JBoss.

2.   Extract the contents of the file (for example, *jboss-eap-7.3.0.zip*) to a location of your choice.

Note: The JBoss installation folder is referred to as JBOSS_HOME in the rest of this document.

Set Your JAVA_HOME, FUTURO_HOME, and Java Options

The JAVA_HOME, FUTURO_HOME, and Java options can be configured by editing the **standalone.conf.bat** file.

This file is located in the /**bin** folder inside your JBOSS_HOME folder.

You should make a backup copy of the standalone.conf.bat file before you edit it.

Save your changes as you edit the file. You will need to start the JBoss application server when you are done.

Set the JAVA_HOME Location

Look for the JAVA_HOME line in the standalone.conf.bat file. For example: *rem set "JAVA_HOME=C:\opt\jdk1.6.0_23"*

Enter the path of JDK you installed (see page 9). Remove "rem" and the space before this line. For example: *set "JAVA_HOME=C:\Program Files\Java\ jdk-11.0.7"*

Increase the memory allocation to the Java Virtual Machine

Look for the line with the memory settings (Xms, Xmx, MetaspaceSize, MaxMetaspaceSize).

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

Modify the values to increase the memory allocation to the Java Virtual Machine. Make sure the *MaxMetaspaceSize* is set to at least 512M. These settings should be based on the recommendations in your Futuro Environment Guide.

Set the FUTURO_HOME Location

Look for the following line:

rem set "JAVA_OPTS=%JAVA_OPTS% -Djboss.modules.lockless=true"

Add the following line after the line listed above:

set "JAVA_OPTS=%JAVA_OPTS% -Dorg.apache.el.parser.COERCE_TO_ZERO=false -DFUTURO_HOME=MyFuturoHome"

In the above example, *MyFuturoHome* is the \app directory where the <u>Futuro application was installed</u> (see page 11). For example, if the Futuro application was installed in the location *C:\Futuro*, your FUTURO_HOME setting would be *C:\Futuro\app*.

Note that JBoss EAP 7.1 and JBoss EAP 7.0 do not support the use of spaces in the JAVA_OPTS parameter. If your FUTURO_HOME path contains spaces, you should change the folder names to remove the spaces. If you cannot remove the spaces, you can use the *dir /x* command to determine the folder's short name, which does not have spaces. For example, suppose Futuro is installed in the folder *C:\Program Files\Futuro*. When the *dir /x* command is run on the C:\ drive, the short name for *Program Files* is *PROGRA~1*. The FUTURO_HOME path would therefore be *C:\PROGRA~1\Futuro\app*.

Change Number of Threads Used When Scheduling Services

When a service instance runs in Futuro, it uses a thread and then releases the thread when the run is complete. You can adjust this thread count in JBoss so that it is high enough to keep the maximum number of concurrent services running.

To change the number of threads used when scheduling and running service instances, you need to add a Java parameter called *Dorg.quartz.threadPool.threadCount* to the standalone.conf.bat file. For example: *set "JAVA_OPTS=%JAVA_OPTS% -Dorg.quartz.threadPool.threadCount=15"*.

You can add this parameter to any line below the existing initialization of the JAVA_OPTIONS.

Change the JBoss Port Number

By default, port **8080** is used for the JBoss server. If you **modified** your JBoss port number (e.g., from 8080 to 8180), you will have <u>specified this port number when you installed the Futuro application</u> (see page 12).

You will also you will need to add a Java option to the standalone.conf.bat file.

1.   Shut down the JBoss server (standalone.bat) that is running on port 8080.

2.   Open the standalone.conf.bat file for the JBoss instance that will have the new port number.

3.   Look for the following line:

      set "JAVA_OPTS=%JAVA_OPTS% -Dorg.apache.el.parser.COERCE_TO_ZERO=false -DFUTURO_HOME=MyFuturoHome"

      MyFuturoHome is the /app directory where the application was installed.

4.   Add the line *set "JAVA_OPTS=%JAVA_OPTS% -Djboss.socket.binding.port-offset=100"*.

      set "JAVA_OPTS=%JAVA_OPTS% -Dorg.apache.el.parser.COERCE_TO_ZERO=false -DFUTURO_HOME=MyFuturoHome"

      set "JAVA_OPTS=%JAVA_OPTS% -Djboss.socket.binding.port-offset=100"

This option will change the JBoss port by the specified offset. The offset is a number added to 8080. In the example above, the offset is set to 100, so the new JBoss port number will be 8180.

5.   When you are done editing the standalone.conf.bat file, you must **restart** the JBoss server (standalone.bat) for your changes to take effect.

6.   You will use this new port number when you log into Futuro. You will also need to add a server with this new port number. To do so, go to the Servers tab in the Application form (Main Menu > Configuration > System > Application > Servers) and click Add. Refer to your Futuro help file for more information.

Configure JBoss to Use a Proxy Server

If you want to configure this instance of JBoss to use a proxy server, you need to add the following parameters to the standalone.conf.bat file:

http.proxyHost: Used to set the proxy host name

http.proxyPort: Used to specify the proxy host port

http.proxyUser: Used to specify the proxy user name

http.proxyPassword: Used to specify the proxy Password

For example:

set "JAVA_OPTS= -Dhttp.proxyHost=*localhost* -Dhttp.proxyPort=*8580* -Dhttp.proxyUser=*username* -Dhttp.proxyPassword=*password* %JAVA_OPTS%"

Start the JBoss Server

When you are done editing and saving the standalone.conf.bat file, run the **standalone.bat** file to start the JBoss server.

Add a User to the JBoss Server

In order to access the JBoss console, you need to add a user to the server.

If necessary, run the standalone.bat file to start the JBoss server.

1.   Open a command prompt window as an administrator and navigate to the **\bin** folder inside your JBOSS_HOME folder.

       You will need to set the JAVA_HOME location for this configuration session. Note that this JAVA_HOME setting is only for this configuration session. The setting you entered in the standalone.conf.bat file (see page 21) is for the JBoss instance.

2.   Type `set JAVA_HOME=MyJDK8Home` where `MyJDK8Home` is the location where JDK 8 is installed. This command will set your JAVA_HOME to JDK8 for this configuration session. For example: `set JAVA_HOME=C:\Program Files\Java\jdk1.8.0_45`.

3. Press **Enter**.

4. Type **add-user**. At the (a) prompt, type "a" for the first option (Management User) and press **Enter**.

```
C:\JBoss\jboss-eap-7.0\bin>set JAVA_HOME=C:\Program Files\Java\jdk1.8.0_144

C:\JBoss\jboss-eap-7.0\bin>add-user

What type of user do you wish to add?
 a) Management User (mgmt-users.properties)
 b) Application User (application-users.properties)
(a):
```

5. In the screens that follow, enter the **Username** and **Password** for your JBoss console user.

```
 a) Management User (mgmt-users.properties)
 b) Application User (application-users.properties)
(a): a

Enter the details of the new user to add.
Using realm 'ManagementRealm' as discovered from the existing property files.
Username : jbadmin
Password recommendations are listed below. To modify these restrictions edit the ad
 configuration file.
 - The password should be different from the username
 - The password should not be one of the following restricted values {root, admin,
 - The password should contain at least 8 characters, 1 alphabetic character(s), 1
lphanumeric symbol(s)
Password : _
```

6. If you are asked which groups you want the user to belong to, do not enter any value and press **Enter**.

7. When asked to confirm that you are adding this user, type **yes** and press **Enter**.

8. When asked if the new user is going to be used for one AS process to connect to another AS process, type **no** and press **Enter**.

9. Press any key to return to the command line.

10. Keep this command prompt window open to continue with the next section below, "Configure and Run the JBoss Application Server."

Configure and Run the JBoss Application Server

This section explains the steps to deploy your Futuro data source and application from the JBoss Console.

1. [Configure the Network Interface](#) (see page 25)

2. [Deploy the Futuro Database Driver](#) (see page 25)

3. [Create the Futuro Datasource](#) (see page 26)

4. [Deploy the Futuro Application](#) (see page 29)

The appearance of the JBoss console and the editing options in the console will depend on the version of JBoss you are using and the web browser you are using. For example, you may have to edit settings using the Tools > Management Model menu at the bottom of the console window.

Note: If you are using JBoss EAP 7.3, refer to the [Known Issues](#) on page 42 for troubleshooting information.

Configure the Network Interface

1. If necessary, run the **standalone.bat** file to start the JBoss server.

2. Open your web browser and clear the browser's cache.

3. Log into the JBoss console (http://localhost:9990/console/) as the [user you created](#) (see page 23). Make sure the port number in this URL is your correct JBoss port number.

4. Go to the **Configuration > Interfaces** section and edit the **public** interface.

5. Delete everything from the **Inet Address** field.

6. Enable the **Any Address** option.

   Note: If you are using JBoss EAP 7.3 and your web browser is Firefox, you may get an error when you try to enable the Any Address option. To resolve this issue, go back to Configuration > Interfaces and select the public interface again. Enter "localhost" in the Inet Address field and save your changes. Edit the public interface again and delete "localhost" from the Inet Address field. You can then enable the Any Address option without an error.

7. Click **Save**.

8. Restart JBoss by stopping and restarting the **standalone.bat** file.

Deploy the Futuro Database Driver

You need to deploy the JDBC driver that is compatible with your database version. Refer to your database documentation for information on which driver you should use.

If necessary, start the JBoss server (standalone.bat) and log into the JBoss console as the [user you created](#) (see page 23).

In the JBoss console, use the option to add/upload a new deployment. Select the database driver and make sure you also Enable it.
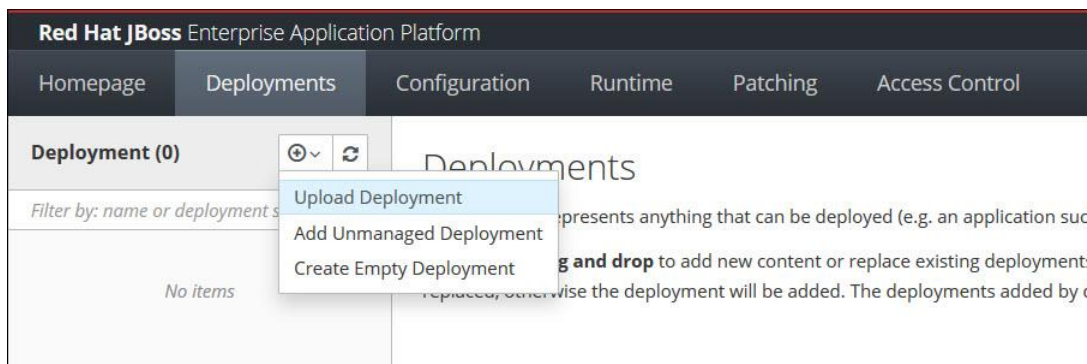
Once you have deployed the database driver, it will display in the Deployments page of the JBoss console.

Continue with "Create the Futuro Datasource" (below).

Create the Futuro Datasource

After you deploy the database driver, you need to create the datasource that connects the Futuro application to the database.

The Datasource Name was defined when you installed the Futuro application (see page 13). It can be found in the config.xml file (located in the \app directory where the Futuro application is installed).

In the JBoss console, navigate to the **Configuration tab** and use the option to add a **custom**, **Non-XA datasource**.

Note: *Do not delete* the datasource called *ExampleDS*.
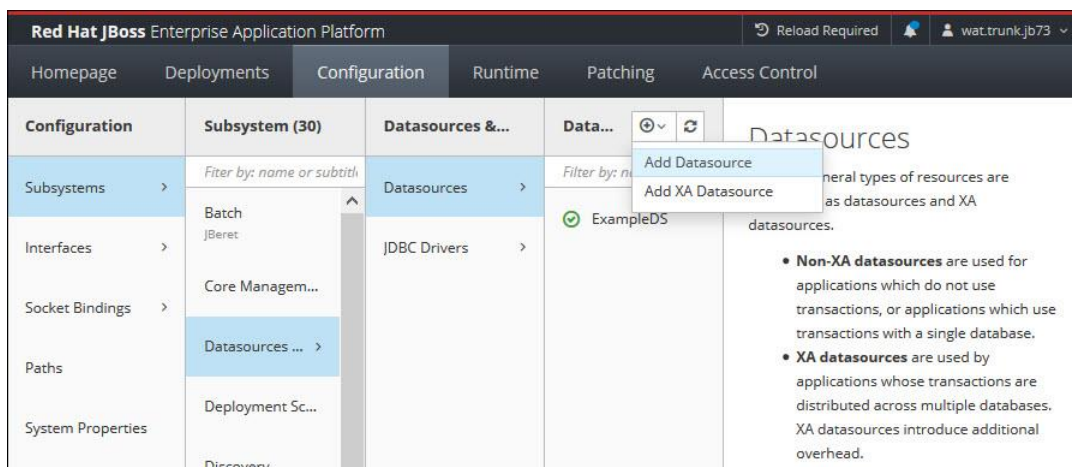
You will need to provide the information explained below.

Name and JNDI Name

Enter the **Name** for the datasource. You will also have to enter the **JNDI Name**, which is the name of the datasource you entered when you installed the Futuro application (see page 13). The datasource name can be found in the config.xml file (located in the \app directory where the Futuro application is installed). Make sure the JNDI Name includes the prefix *java:/*.

JDBC Driver

In the **JDBC Driver** form, select the Driver Name of the database driver you deployed previously (see page 25). If the Driver Module Name and Driver Class Name fields appear in the form, you can leave these fields blank.

If you are using JBoss EAP 7.3 and an error appears when you open the Driver Name list box, start typing the name of the driver in this field and then select it from the list when it opens.

If you are using JBoss EAP 7.1 or 7.0, you will need to select the JDBC driver you deployed from the *Detected Driver* tab.

Connection URL

Enter the **Connection URL** for the JDBC driver.

The Connection URL is different for Oracle or SQL Server databases.

For Oracle:

> *jdbc:oracle:thin:@<Database Host Name>:1521:<TNS Name>*

> In the above URL, *<Database Host Name>* is the host name of the database server and *<TNS Name>* is the TNS used to connect to the specific Oracle database.

For SQL Server:

> *jdbc:sqlserver://<Database Host Name>\<Database Instance Name>;DatabaseName=<Database Name>;SelectMethod=cursor*

> In the above URL:

> *<Database Host Name>* is the host name of the database server.

> *<Database Instance Name>* is optional. If you include the *<Database Instance Name>*, you must place one backslash character between the *<Database Host Name>* and the *<Database Instance Name>* as shown in the above example.

> *<Database Name>* is the name of the Futuro SQL Server database.

Username and Password

Enter the **Username** and **Password** for your Futuro database.

Leave the **Security Domain** field empty.

Make sure you test the connection.

After you add the datasource, disable it and edit it.

Connection Properties – SQL Server Database

If your Futuro database is a SQL Server database, you need to add the following parameter in the Connection Properties field: *sendStringParametersAsUnicode=false*.

Pool

Change the **Max Pool Size** according to the recommendations in your Futuro Environment Guide.

Validation Method

You need to select a validation method – **Validate On Match** or **Background Validation**. You can refer to your JBoss documentation for information on each option.

Do not select both options. If you set Validate On Match to ON, then make sure Background Validation is OFF and vice versa.

If you turn on Background Validation, you also need to set the **Background Validation in Milliseconds**.

Check Valid Connection SQL

Add the Check Valid Connection SQL setting so that if the database connection is lost (e.g., the database server restarts), you will not have to restart JBoss in order to log into the Futuro application.

For an **Oracle** database, enter **select * from dual** in the Check Valid Connection SQL field.

For a **SQL Server** database, enter **select 1** in the Check Valid Connection SQL field.

Valid Connection Checker Class Name

For a **SQL Server** database, enter *org.jboss.jca.adapters.jdbc.extensions.mssql.MSSQLValidConnectionChecker* in the Valid Connection Checker Class Name field.

For an **Oracle** database, enter *org.jboss.jca.adapters.jdbc.extensions.oracle.OracleValidConnectionChecker* in the Valid Connection Checker Class Name field.

Exception Sorter Class Name

For a **SQL Server** database, enter *org.jboss.jca.adapters.jdbc.extensions.mssql.MSSQLExceptionSorter* in the Exception Sorter Class Name field.

For an **Oracle** database, enter *org.jboss.jca.adapters.jdbc.extensions.oracle.OracleExceptionSorter* in the Exception Sorter Class Name field.

Save and Enable

When you are done, save and enable the datasource.

Continue with "Deploy the Futuro Application" (below).

Deploy the Futuro Application

After you create the datasource, you need to deploy the Futuro application in the JBoss console.

In the JBoss console, use the option to add/upload a new deployment. Select the **Futuro.ear** file. The Futuro.ear file is in the \app\lib directory where the Futuro application is installed.

Select the Futuro.ear file and make sure you also Enable it.

Once you have deployed the Futuro application, the Futuro.ear file will display in the Deployments page of the JBoss console.

Continue with

Connect to the Futuro Web Application

1.   If necessary, start the JBoss application server by running the standalone.bat file.

2.   Open your web browser and clear the web browser's cache.

3.   Go to the URL below:

      http://localhost:8080/futuro

      If you changed your port number, make sure you use the correct port number in this URL.

      If you are connecting to Futuro from a remote client, you can replace *localhost* with the actual IP address of the machine and port where the JBoss application server is running. For example - *http://<IP address of app server>:8080/futuro*

      The login page appears.

      After you start the application server, it will take about two minutes before the server is completely up and running and the login page appears.

      If the login page still does not appear once the application server is running, please contact Customer Support (see page 4).

4.   Once you are logged in to Futuro, you should check to see if any issues occurred after the database installation/upgrade. To do so, use the Schema Checker form (Main Menu > Administration > System > Schema Checker). The form will display any differences between the database and application schema. If any differences appear in red, you should notify Customer Support.

Application Settings for Services

In order to run the Futuro services, you need to ensure that several Application Settings are configured correctly.

Refer to your Futuro help file for more information.

Optional Configurations

This section contains additional configurations that you may need to use for your Futuro system.

HTTPS Configuration

HTTPS communication uses encryption (SSL) to secure data exchanges between a server and a client. If you want to configure your Futuro server to use HTTPS communication, follow the steps below.

These configurations are typically done only once, the first time you install and configure your application server. You do not have to repeat these HTTPS configurations unless you install a new instance of the application server.

If you are using client terminals and want to configure the clients and server for HTTPS communication, refer to your client terminal's configuration guide for information. The server-side configuration is the same for all client terminals, but the terminal configuration will depend on what type of terminal you are using. The Futuro help file includes HTTPS configuration steps for Futuro terminals.

Configure the Application Server for HTTPS Communication

You must obtain an SSL Certificate file and import it to your Java keystore file.

- If you use a self-signed certificate with a Futuro terminal, kiosk events such as Accruals View and Open Jobs View will not function correctly on the terminal.

- If you are using a certificate signed by a certificate authority (CA) that is not recognized in your JDK's cacerts file, then you must also import the CA certificate into the JDK's cacerts file.

You must then configure your application server to use HTTPS communication and to recognize the keystore file. This configuration will depend on the type of application server you have. Refer to your application server's documentation for more information. An example of this configuration for JBoss EAP 7.3 is shown below.

Restart the application server after you finish this configuration.

If you are using Futuro terminals, refer to your Futuro help file for additional configuration steps.

Example – HTTPS Configuration for JBoss EAP 7.3

1. Copy your keystore file into your *[JBOSS_HOME]\standalone\configuration* folder.

2. Edit the **standalone.xml file**.

3. Search for the security-realm called **ApplicationRealm** and modify the section below it.

    Replace the **keystore path** with the name of your keystore file. In the example below, the keystore file is named *server.keystore*.

    Replace the **keystore-password** and **key-password** parameters with your keystore password. In the example below, the keystore password is *test123*.

Replace the **alias** parameter with your certificate alias. In the example below, the alias is *AT*.

```
<security-realm name="ApplicationRealm">
   <server-identities>
      <ssl>
         <keystore path="server.keystore" relative-to="jboss.server.config.dir" keystore-
password="test123" alias="AT" key-password="test123" generate-self-signed-certificate-
host="localhost"/>
      </ssl>
   </server-identities>
```

4.   Start the application server (standalone.bat) and deploy Futuro as usual.

When the application server is configured for HTTPS, its port number will be 8443. The Futuro URL will be *https://<Domain Name or IP Address of Server>:8443/futuro*. If you added a port offset to your standalone.conf.bat file, this offset will also be used for you HTTPS port number. For example, if your port offset is 100, your HTTPS port will be 8543.

Enable HTTPS on the Application Server

You need to define an instance of the application server that uses HTTPS communication.

1.   Navigate to Main Menu > Configuration > System > Application.

2.   Click the **Servers tab** and click **Add**.

3.   Enter the **Host Name** and **Port** of the application server that will use HTTPS communication.

4.   Check the **HTTPS Port** box.

5.   Click **Save**.

Connect to the Web Application Using HTTPS

After you have completed above configurations and restarted your application server, navigate to the URL listed below. Note that the SSL Port Number will be 8443 plus any port offset you specified in your standalone.conf.bat file.

Product	URL
Futuro	https://<Domain Name or IP Address of Server>:<SSL Port Number>/futuro
Timeclock	https://<Domain Name or IP Address of Server>:<SSL Port Number>/timeclock

If the SSL certificate is valid, the browser will display the Futuro login page and indicate that the connection is secure. The secure connection is usually represented by a lock icon in the URL field.

Validate Host Header in HTTP Requests

This configuration is a security measure designed to help prevent host header attacks. It adds an expression-filter called "host-checker" to the standalone.xml file. This filter validates the Host Header in the http requests that are sent to the JBoss application server. For more information, refer to your JBoss documentation.

1. If your JBoss server is not already running, run the **standalone.bat** file to start the server.

2. Open a command prompt window as an administrator and navigate to the **\bin** folder inside your JBOSS_HOME folder.

3. In the command prompt window, type **jboss-cli** and press **Enter** to run the jboss-cli.bat file.

    The jboss-cli.bat file is located in the \bin folder inside your JBOSS_HOME folder.

4. Type a *connect* command to connect to the application server.

    If your JBoss port number is the default value (8080), type **connect** and press **Enter**.

    If your JBoss port number is an offset of 8080 (e.g., 8180, 8280, etc.), you must use the following connect statement: **connect localhost:<value>**. The *<value>* field will contain the JBoss port offset plus the value 9990. For example, if your JBoss port is 8180, the port offset is 100. Add 100 + 9990 to get 10090. The connect statement would be *connect localhost:10090.* Press **Enter** after you type the connect statement.

5. In the command prompt window, type the following command. Replace `[Application_Server:Port]` with the host name and port number of the application server you are configuring.
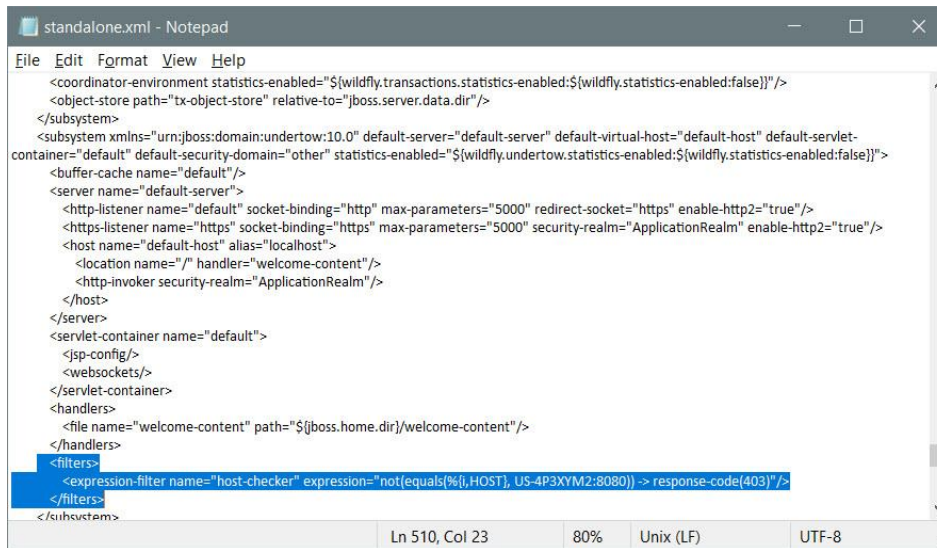
    ```
    /subsystem=undertow/configuration=filter/expression-filter=host-
    checker:add(expression="not(equals(%{i,HOST}, [Application_Server:Port]))
    -> response-code(403)")
    ```

    Example:

    ```
    /subsystem=undertow/configuration=filter/expression-filter=host-
    checker:add(expression="not(equals(%{i,HOST}, US-4P3XYM2:8080)) ->
    response-code(403)")
    ```

6. Press **Enter**.

    The standalone.xml file is now updated.

7.   Type **exit** and press **Enter**. You can then close the command window.

8.   Restart your JBoss server.

Futuro 1.16 Installation Guide for JBoss on Windows

Application Server Configuration for the SAP Interface

This section explains how to configure your application server as part of the SAP Interface configuration. The SAP Interface configuration, including the information below, is explained in your Futuro help file. This interface is used to import and export data between Futuro and SAP using IDOCs.

Futuro has been validated with SAP ERP 6.0 EHP7 and is compatible with the following SAP modules: HR (Human Resources), PP (Production Planning), PM (Plant Maintenance), PS (Project Systems), and FI/CO (Finance/Controlling).

Futuro has also been validated with versions 3.1.x (3.1.4) and 3.0.x (3.0.10) of the SAP Java Connector library.

To allow Futuro to communicate with SAP, you need to obtain the following SAP Java Connector library files from SAP:

- sapidoc3.jar (make sure you get the correct version for the Windows operating system)

- sapjco3.jar

- sapjco3.dll

You will need to deploy these files in your application server as explained below.

Shut down the application server before you start this configuration.

1. Copy the **sapjco3.dll** file into a folder called *native* in a location of your choice. This path will be referenced in a later step.

2. Copy the **sapidoc3.jar** and **sapjco3.jar** files to the following location.

   JBOSS_HOME\modules\com\sap\conn\jco\main

   You may need to create these folders if they do not already exist. Note that JBOSS_HOME is the folder where JBoss is installed.

3. Create an XML file called **module.xml** and place it in the above location with the sapidoc3.jar and sapjco3.jar files.

   The module.xml file will have the following text:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<module xmlns="urn:jboss:module:1.0" name="com.sap.conn.jco">
  <resources>
<resource-root path="sapjco3.jar"/>
<resource-root path="sapidoc3.jar"/>
  </resources>
 <dependencies>
     <system export="true">
       <paths>
          <path name="javax/crypto"/>
         <path name="javax/net/ssl"/>
         <path name="javax/security/cert"/>
       </paths>
     </system>
```

```
    </dependencies>
</module>
```

If you are using **version 3.0.x** of the SAP Java Connector library, you do not need to include the *javax/net/ssl* and *javax/security/cert* path names.

4. Add this module as a global module to the **standalone.xml file**. The standalone.xml file is in the JBOSS_HOME\standalone\configuration folder.

   In the standalone.xml file, look for the subsystem *urn:jboss:domain:ee*.

    Add the following lines under that subsystem:

    ```
    <global-modules>
      <module name="com.sap.conn.jco" />
    </global-modules>
    ```

5. Set the java library path for the sapjco3.dll file in your Path environment variable. You copied this file to the *native* folder in step 1.

    For example, if the sapjco3.dll file is in *C:\Futuro\native*, you will add this directory location to the beginning of the Path environment variable.
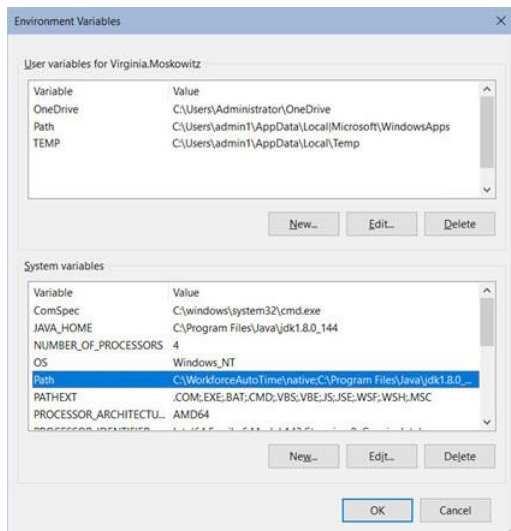
6. Define a port in your Windows operating system for the SAP Listener and the SAP client.

    Edit the **services** file located in C:\Windows\System32\drivers\etc.

    Add a line such as the following to open the port for a TCP connection:

    sapgw00   3300/tcp

    The port name and port number that you enter (sapgw00 and 3300 in the above example) will depend on how your SAP client is configured in SAP.

7. When you are done, restart the application server.

GDPR Compliance

To make Futuro compliant with the European Union General Data Protection Regulations (GDPR), the application has a mechanism to remove personally identifiable information from the database. This procedure will allow a person who has left the company to exercise the "right to be forgotten."

When you execute a stored procedure called **FuturoForgetEmployee**, the stored procedure will delete all personal data for a specified employee. You will need to run a script called **forgetEmployeeProc.sql** to install this stored procedure in your Futuro database.

You will also need to populate the **gdpr_go_ahead table** in your Futuro database with the Person Number of the person whose records will be deleted. The FuturoForgetEmployee stored procedure will look up and delete the records of the person identified in this table.

You can only use the FuturoForgetEmployee stored procedure to delete the records of a Terminated employee (Employee Status is "Terminated" in the Employment Profile record). You cannot use this stored procedure to delete the ADMIN user (person_num "ADMIN") or any person with a Person ID value that is less than 10000.

Install the Stored Procedure

To install the FuturoForgetEmployee stored procedure, you need to run a script on your Futuro database called forgetEmployeeProc.sql.

This script is located in the following directory where you installed the Futuro database schema:

\db\sql\scripts\schema\ORACLE\forgetEmployeeProc.sql

\db\sql\scripts\schema\SQLSERVER\forgetEmployeeProc.sql

Run the script that corresponds to your database type (Oracle or SQL Server).

Populate the GDPR Table

The **gdpr_go_ahead table** in your Futuro database has two columns: person_num and forget. The FuturoForgetEmployee stored procedure will look up and delete the records of the person identified in this table.

In the person_num column, put the person_num of the Terminated person whose records will be deleted.

The forget column should contain the word FORGET so the stored procedure will know this person should be forgotten (have their records deleted).

Once you populate this table, you can execute the FuturoForgetEmployee stored procedure as explained below.

Note: After the FuturoForgetEmployee stored procedure runs, both columns in the gdpr_go_ahead table will be deleted. Before you run the FuturoForgetEmployee stored procedure again, you will have to populate this table.

Execute the Stored Procedure

Once you have installed the FuturoForgetEmployee stored procedure and populated the gdpr_go_ahead table, you can execute the FuturoForgetEmployee stored procedure.

You will have to enter the person's Employee Number twice, the person's First Name, and the person's Last Name.

When the stored procedure is finished executing, it will list each table that was checked and the number of rows deleted in each table.

Create a Log File

You can create a log file that lists all the tables that were checked, and the number of rows deleted in each table. This log file can be created when you execute the FuturoForgetEmployee stored procedure as shown below.

Note: The log file may contain personally identifiable information. It is the user's responsibility to delete this log file if necessary.

SQL Server Database

When you execute the stored procedure, enter the following at the command line:

```
sqlcmd  -s server_name   -d database_name   -u database_user   -p
database_password    -q "exec futuroforgetemployee @emp_num1='person_num',
@emp_num2='person_num', @first_name='first_name', @last_name='last_name';
"  -o    futuroforgetemployee.log
```

For example, the following command would be used for person 101 John Doe, server name KASG_SQL2014, database name WAT_DB, database username wat_admin, and database password 019FLA2.

```
sqlcmd  -s KASG_SQL2014   -d WAT_DB   -u wat_admin   -p 019FLA2    -q "exec
futuroforgetemployee @emp_num1='101', @emp_num2='101', @first_name=' John',
@last_name='Doe'; "  -o    futuroforgetemployee.log
```

Oracle Database

When you execute the stored procedure, enter the following in SQL Plus:

```
spool FuturoForgetEmployee.log;
SELECT SYSDATE FROM DUAL;
DECLARE
emp_num1   NVARCHAR2(40);
emp_num2   NVARCHAR2(40);
first_name NVARCHAR2(40);
last_name  NVARCHAR2(40);
BEGIN
            emp_num1:='person_num';
            emp_num2:='person_num';
```

```
                first_name:='first_name';
                last_name:='last_name';
                FuturoForgetEmployee(emp_num1,emp_num2,first_name,last_name);
END;
/
SELECT SYSDATE FROM DUAL;
spool off;
```

Records That Will Be Deleted

The FuturoForgetEmployee stored procedure will delete the person's records from the tables listed below. The person's records will be identified by the person_id column.

The tables listed below are in alphabetical order, not the order in which the records will be deleted.

The person's records will also be deleted from child tables of the tables listed below. For example, all the person's records in the transaction tables will be deleted.

action	person_group_member
charge_filter_manager	person_info
delegation	person_manager
export_output	person_period_statusperson_pin
ot_offer_person	person_points
person	person_points_check
person_address	person_points_level
person_adhoc	person_portal
person_accumulator	person_dashboard_view
person_assignment	person_portal_view_detail
person_assignment_transient	person_posting_lock
person_attendance_reward	person_pay_scale
person_authorized_hours	person_recalculation
person_badge	person_schedule
person_balance	person_setting
person_balance_trans	person_shortcut
person_cookie	person_vendor
person_context_cookie	process_thread
person_discipline_balance	pto_request
person_discipline_level	pve_session_data
person_discipline_ticket	report_instance
person_discipline_trans	security_module_person

person_employee_profile   sign

person_favorite   sign_audit

person_favorite_response   trans_action

person_form_cookie   trans_atomic

person_form_saved_filter   trans_import.

The FuturoForgetEmployee stored procedure will also delete the person's records from the following tables:

Table	Field used to identify the person's records
delegation	manager_id delegated_manager_id
person_group_manger	manager_id
person_manager	manager_id
person_group (for DIRECT_MANAGER groups)	person_num
message	reciever_id

Records That Will Not Be Deleted

All the Futuro tables contain an updated_by column which may identify a particular person. However, there are no foreign keys that link an updated_by column value back to the person table. The updated_by column therefore does not identify a particular person and the updated_by column values will not trigger the FuturoForgetEmployee stored procedure to delete any records.

Some Futuro tables contain columns that identify the person who created the data, but the data itself is not about this person and may be about a different person. The FuturoForgetEmployee stored procedure will not delete these records. This data includes all tables with created_by columns and includes records in the message table where the person is the sender_id but not the reciever_id. In the case of the message table records, the message receiver may want to keep the record if it contains favorable comments about the receiver or the message is needed as evidence in a grievance brought by the receiver.

Records in the interface tables will not be deleted. These tables often contain large record_data columns that contain the data for many different persons. The FuturoForgetEmployee stored procedure cannot locate the records for a specific person in this type of column.

Saved report results will also not be deleted, because the FuturoForgetEmployee stored procedure cannot locate records for a specific person in these tables.

The FuturoForgetEmployee stored procedure will not delete biometric data (fingerprint records) that are used to identify employees on shop floor terminals.

If you have any backup copies of your Futuro database, you will need to make sure the person is deleted from these databases as well.

Known Issues with JBoss EAP 7.3

Configure the Network Interface – Any Address Setting

See "Configure the Network Interface" in the chapter on configuring and running the JBoss application server.

If you are using JBoss EAP 7.3 and your web browser is Firefox, you may get an error when you try to enable the *Any Address* option. To resolve this issue, go back to Configuration > Interfaces and select the *public* interface again. Enter *localhost* in the *Inet Address* field and save your changes. Edit the public interface again and delete *localhost* from the Inet Address field. You can then enable the Any Address option without an error.

Create the Futuro Datasource – JDBC Driver Name Field

When you create the Futuro datasource, you will need to specify the database driver you previously deployed. An error may appear when you open the Driver Name list box. If this error occurs, start typing the name of the driver in the Driver Name field instead of opening the list box. Once you start typing the name of the driver, you will be able to select it from the Driver Name list box.

Display Error when Modifying a Datasource

If you modify a datasource in the JBoss EAP 7.3 Console and click Save, a message will state that the XA datasource was modified successfully, even if it was not an XA datasource. Although the message text may not be correct, the datasource will be saved successfully.

Datasources – Unresponsive Script Warning

When you navigate to the Datasources section in the JBoss Console (Configuration > Subsystems > Datasources & Drivers > Datasources), a warming message might display if the form is taking a long time to load. This warning message will ask if you want to stop the script that is running. You should click the Continue button and allow the system finish loading the datasources.

Violation Notices

The Futuro application requires you to install a license file after installing the application. The license file activates and authorizes you to use the modules you purchased with the Futuro application. If you do not install the license file, a violation notice will appear when you attempt to log in. The violation notice will appear each time you attempt to log in until the license file is installed.

Violation Notice	Description
Login Failed. License File is Missing	The license file cannot be found or cannot be opened.
License Decryption Error	The license key is not correct; the license key and/or the module key contain invalid characters.
Invalid XML:Parse Error	The license file (license.xml) has been changed.
License File Corrupt	The license key tag is empty, the Module specified in the license key does not exist, or the module key is empty.
Your company is in violation of license agreement. The following modules have expired: Module License has expired: Configuration	The Configuration license has expired.

Index