

IBM Cúram Social Program Management



# Cúram Third-Party Tools Installation Guide for UNIX

*Version 6.0.5*



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**Note**

Before using this information and the product it supports, read the information in "Notices" on page 15

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This edition applies to IBM Cúram Social Program Management v6.0.5 and to all subsequent releases unless otherwise indicated in new editions.

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# Chapter 1. Introduction

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## 1.1 Installation Overview

To be able to use IBM® Cúram Social Program Management it is necessary to install and configure software from third parties. This document describes how to install the third-party products and carry out the post-installation set-up tasks. This will leave the system ready for the deployment of the application to begin.

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## 1.2 Third-Party Products Overview

The following document outlines the products that are needed, and, for each product, whether post-installation configuration is required. A comprehensive list of supported versions is contained in a separate document, *Cúram Supported Prerequisites* document.

**Note:** IBM Cúram Social Program Management will definitely not run unless you follow the instructions; also, in some cases there is information in Chapter 2, “Installing Third-Party Software Products,” on page 3 about product configuration that you will not find anywhere else (including the product documentation).



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## Chapter 2. Installing Third-Party Software Products

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### 2.1 Overview

This chapter describes the software products you need to install before installing IBM Cúram Social Program Management.

For each product it tells you:

- Briefly what the product is and why it is used;
- Installation instructions (in most cases, this involves simply following the defaults provided by the product installer); and
- Any post-installation tasks required.

This document does not provide specific instructions for installing fix packs unless the fix pack installation has some product or application-specific steps involved.

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### 2.2 Before Installing

To install all of the products for an installation based on IBM DB2<sup>®</sup> you need disk space of approximately:

- 1.3 GB based on IBM WebSphere<sup>®</sup> .
- 1.0 GB based on WebSphere Application Server Network Deployment.
- 0.8 GB based on Oracle's Oracle WebLogic Server.

Approximately 5 GB extra is required for an installation based on Oracle Database.

It is recommended to use the default installation path for all products where possible (i.e. where there is enough disk space in the default location, and the product will not conflict with any other previously installed products).

**Installation Sequence:** The order in which you install the third-party products is not important. Also you can, if you wish, perform all the basic product installations and then do all of the post-installation tasks together.

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### 2.3 Operating System Software

Please refer to the *Cúram Supported Prerequisites* document for a comprehensive list of supported versions of operating systems and third party software.

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### 2.4 DBMS Installation

Both DB2 and Oracle are supported as database servers. DB2 is the name used on Windows and UNIX platforms; on IBM z/OS<sup>®</sup> the name is IBM DB2 for z/OS . Both DB2 and Oracle may be installed on a given machine but typically it is necessary to install only one of the databases.

Please refer to the *Cúram Supported Prerequisites* document for a comprehensive list of supported versions of database management systems (DBMS).

**Note:** No particular character set is recommended for installation and setup of the DBMS. The character set configured should be appropriate for the character range that will be used in the application. For

example, the UTF-8 character set is required to support symbols which fall outside single byte character set encoding, such as Microsoft Word smart quotes, as well as to support specific language character sets such as Chinese.

## 2.4.1 IBM DB2

This section outlines how to install DB2 as a database server.

**Note:** It is possible to use IBM Cúram Social Program Management against a remote database via the DB2 Universal Type 4 Driver supplied with the Server Development Environment for Java™ (SDEJ).

### 2.4.1.1 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of DB2 to be installed.

### 2.4.1.2 DB2 Database Encoding

This section provides important information about issues with DB2 and DB2 for z/OS database encoding, related sizing information, and action you need to consider taking.

#### What is the Issue?

When using a multi-byte character set (MBCS) and/or encoding DB2 processes columns with respect to their byte size, not their character length. This means that a CHAR, VARCHAR, or CLOB column, when using multi-byte characters, may store fewer characters, depending on the actual character length(s), than the column length specification indicates.

Consider the following illustration:

- A CHAR or VARCHAR column modeled with a length of 16.
- The sixteen-character string, "Marge says hello", (without accented characters) requires 16 bytes for storage in a single-byte character set (SBCS).
- A similar sixteen-character string, but with accented characters, "Márge says hélló", requires 18 bytes for storage in UTF-8, a multi-byte character set (MBCS).

In the case of the single-byte data the string will fit and processing will be successful; but, in the case of the multi-byte data the string will not fit, resulting in overflow errors at run time. That is, normally an IBM Cúram Social Program Management web client will capture and report field size errors in a user-friendly manner. But, in a case as above, because it checks the number of characters and not the byte length, the client will not identify this size mismatch, causing the user to receive an "un-handled server exception" error, which is an underlying SQL Code -302 error.

#### How Cúram Addresses the Issue

Cúram provides modeling and build-time capabilities to resize its database columns to address the issue above. These capabilities are described further in the *Cúram Modeling Reference Guide* and *Cúram Server Developer's Guide*.

Because Cúram provides support for multiple languages out-of-the-box its support for MBCS data is enabled by default with the maximum expansion set. These expansion settings are appropriate to ensure that new users, testing environments, etc. do not encounter any errors due to their language, encoding, and database sizing. Also, users may find they require MBCS data when they import or copy/paste data from other applications into their Cúram system. However, these defaults may not be appropriate for all environments. The following section describes some considerations for changing these expansion settings.

#### What You Need to Consider

It is very important to carefully consider your data encoding requirements with respect to DB2 and Cúram in order to avoid unexpected behavior with how the database stores characters.

The preceding illustration represents a boundary case in that the data length matches the maximum column width. In many cases it's unlikely that even with MBCS characters that an overflow situation will occur since most data doesn't reach the maximum defined size; however, you do need to be prepared for the possibility of these error situations.

You should use the database character set encoding appropriate to your application and environment. If possible, you should consider using an SBCS and encoding that supports your requirements. For example, CP1252 supports most Western European characters. However, CP1252 (or other SBCS encodings) may not support characters coming from different or "broader" character sets/encodings (e.g. UTF-8) that users may be using to copy and paste into their browser for Cúram.

At the point of installing your DB2 (or DB2 for z/OS) database you only need to identify your requirement for SBCS or MBCS data and be prepared to take appropriate action before building your Cúram database:

- If you require characters that use multiple bytes then you need to consider whether the default Cúram settings are appropriate. The necessary database space is dependent on various factors including:
  - The specific character sizes - in DB2 (and DB2 for z/OS) MBCS data can range from 1 to 4 bytes.
  - The frequency of MBCS characters, which can depend on the application, language, locale, column usage within the application, etc.
  - The information density of the language and locale. For instance, while some languages may require more bytes per character, each character may represent more information than, for instance, an alphabetic character and may fit into a field without any size adjustment.

See the *Cúram Server Developer's Guide* section, *Planning for DB2 MBCS Data*, for more information on MBCS data sizing considerations.

- If an SBCS is adequate then you should plan to disable database expansion as described in the "Planning for MBCS Data" topic in the *Cúram Server Developer's Guide*.

### 2.4.1.3 Installation

Ensure that your UNIX user account for the DB2 installation has administrative privileges and then follow the installers instructions to perform a default installation. Only a few options are presented during a default installation and the following are of note:

- *Name* and *Password* of the administrator account - Use an account and password as per the standards and requirements of your site and DB2. The specified user should be a UNIX user on your system.
- Certain editions of the DB2 installer support federated databases - If the installer presents an option which is defaulted to "This machine will be the instance-owning database partition server", then change this to "This machine will be a single-partition database server".

### 2.4.1.4 Post-installation

Later versions of DB2 do not include tooling such as Control Center. If your DB2 version includes Control Center you can follow the steps in the Creating and configuring a database using Control Center section below. Otherwise, convenience scripts are provided for creating a basic test database and you can follow the steps in the Creating and configuring a database using scripts section, also below.

### Creating and configuring a database using Control Center

1. Log in as the DB2 instance owner to create and configure a database.
2. To start the DB2 Control Center, run the following command:  
**db2cc**
3. Go into the General Administration Tools/Control Center.
4. Select the Databases folder (Control Center... All Systems... <Hostname>... Instances... <DB2 Instance Name>... Databases).
5. Right click the mouse.
6. Select Create -> Database using Wizard.

7. There are six pages and a summary to the wizard:
  - On page one, fill in the database name (alias should be the same as the name);

After creating the database additional parameters need to be configured. There is no command line to perform this so the Configuration Assistant and the Control Center must be used:

1. Go into the General Administration Tools/Control Center.
2. Select the Databases folder (Control Center... All Systems... <Hostname>... Instances... <DB2 Instance Name>... Databases).
3. Select the Database that was created in the previous step.
4. Right click the mouse.
5. Select Configure Parameters.
6. Update the LOCKTIMEOUT - Set Lock timeout (in the Applications section) to at least 1 second, or any desired higher value.
7. Restart the Database Manager, as follows:  
**db2 stop database manager**  
**db2 start database manager**

After configuring the database you must create the tablespaces required for the storage and running of the application.

This can be done using the provided Apache Ant scripts by invoking:

```
ant -f $CURAMSDEJ/util/db2_postconfig.xml -Ddb2.dir=<DB2_directory>
```

where <DB2\_directory> is the DB2 installation path (e.g. <drive>:/IBM/SQLLIB). Otherwise, complete the following steps:

1. Start a db2command window by starting a shell in which DB2 can be controlled.
2. Enter the following at the command prompt:  
**db2 connect to <database\_name> user <user\_name> using <password>**  
**db2 CREATE BUFFERPOOL highmem SIZE 50 PAGESIZE 32K**  
**db2 connect reset**
3. Cycle all DB2 services as follows:  
**db2 force application all**  
**db2 terminate**  
**db2 start database manager**
4. Start a db2 command window
5. Enter the following at the command prompt:  
**db2 connect to <database\_name> user <user\_name> using <password>**  
**db2 create tablespace Curam\_L PAGESIZE 32K MANAGED BY SYSTEM using (<dir\_name\_A>) BUFFERPOOL highmem**  
**db2 create temporary tablespace Curam\_T PAGESIZE 32K MANAGED BY SYSTEM using (<dir\_name\_B>) BUFFERPOOL highmem**  
**db2 connect reset**
6. Cycle all DB2 services using the same commands as above.

**Note:** -<dir\_name\_A> and <dir\_name\_B> should be empty directories on a drive with a significant amount of space.

- All DB2 commands above are one-line commands (i.e. no line breaks)



- If the username used to connect to the database when executing the commands is not the same as the username which will be used to access the database, the following command should also be executed, where <user\_name> is the name of the user that will be used to access the database:

```
db2 grant use of tablespace Curam_L to user <user_name> with grant option
```

## Creating and configuring a database using scripts

Ant scripts are provided for creating and configuring a basic test database. To create a database, invoke the following commands, which use the database properties from your Bootstrap.properties file:

- `ant -f $CURAMSDEJ/util/db2_createdb.xml`
- `ant -f $CURAMSDEJ/util/db2_postconfig.xml -Ddb2.dir=<DB2_directory>`  
where <DB2\_directory> is the DB2 installation path (e.g. /IBM/SQLLIB).
- `ant -f $CURAMSDEJ/util/db2_createdb.xml restart.db2`  
**Note:** this script restarts your DB2 system.
- `ant -f $CURAMSDEJ/util/db2_optimizedbrecreation.xml`

The following script invocation can be used to drop the database to rerun the process above:

```
ant -f $CURAMSDEJ/util/db2_createdb.xml dropdb
```

## Providing a DB2 License File

This post-installation step is required for all users of IBM DB2 for Linux, Unix and Windows for the IBM Cúram Social Program Management Platform development or runtime environments.

An empty db2jcc\_license\_cu.jar file exists in the \$CURAMSDEJ/drivers directory. This empty jar should be overwritten with a real license for accessing IBM DB2 for Linux, Unix and Windows.

The IBM DB2 db2jcc\_license\_cu.jar file should be copied from <DB2\_directory>/java/db2jcc\_license\_cu.jar (where <DB2\_directory> is the DB2 installation path; e.g. /opt/ibm/db2) to \$CURAMSDEJ/drivers (where \$CURAMSDEJ points to the root CuramSDEJ location).

Please refer to the *Cúram Supported Prerequisites* document for further information regarding the supported versions of third party database software.

## Replacing the Packaged DB2 Drivers

Usually the latest JDBC drivers available at the time of release are packaged with IBM Cúram Social Program Management. However, if you wish to replace the drivers shipped in \$CURAMSDEJ/drivers, copy the following files from <DB2\_directory>/java.

(where <DB2\_directory> is the DB2 installation path e.g. <drive>:/IBM/SQLLIB)

- db2jcc.jar
- db2jcc\_license\_cu.jar
- sqlj4.zip

Replace the drivers db2jcc.jar, db2jcc\_license\_cu.jar, and sqlj.zip in \$CURAMSDEJ/drivers directory.

Please refer to the *Cúram Supported Prerequisites* document for details of the supported versions of third party products.

## Using DB2 pureScale

When using DB2 pureScale<sup>®</sup> with Cúram you will need to perform the following steps to set the necessary data source property or properties when using DB2 from the command line (e.g. with Cúram batch processing). See the relevant Information Centers for DB2 and WebSphere for their specific pureScale settings.

You must generate a `.bindings` file based on your `Bootstrap.properties` file database settings, which specify the DB2 pureScale connect member. To do this:

1. In your `Bootstrap.properties` file set property `curam.db.enable.bindings.generation=true` and specify a valid location value for property `curam.environment.bindings.location`; e.g., `curam.environment.bindings.location=/Cúram`;
2. Run the Ant **configtest** target, which will cause the `.bindings` file to be generated in the specified location;
3. In your `Bootstrap.properties` file remove `curam.db.enable.bindings.generation=true` or set it to `false` and set `curam.db.disable.bindings.generation=true`;
4. Set the Content value for the relevant pureScale data source properties in the `.bindings` file (much easier if you sort it first); for example, set `enableSysplexWLB` to 'true'. Save the changes.

From this point forward the Cúram DB2 data source, when used from the command line, will use these properties and changes to the database properties in `Bootstrap.properties` would need to be reflected in `.bindings` or by rerunning the procedure above. However, Ant scripts using the `<sql>` task will not use these pureScale settings. These Ant scripts (e.g. **database** target) are typically not run frequently nor have a processing profile that would require pureScale settings; but, you can modify scripts as needed to specify these properties using the Ant `<connectionProperty>` nested element.

## 2.4.2 Remote DB2 for z/OS Connectivity

### About this task

Before the connection can be established to the remote database it must be configured. The full details of installation of DB2 for z/OS are beyond the scope of this document set. However the following are the main post-installation steps to note:

### Procedure

1. A database can be configured for EBCDIC, ASCII, or UNICODE mode for use by the application. This can be done when creating the database using the `CCSID` keyword. For ASCII or UNICODE databases see the *Cúram Server Developer's Guide* for information about required property `curam.db.zos.encoding`.

```
CREATE DATABASE <database_name> BUFFERPOOL BP0 INDEXBP BP0 STOGROUP <storage_group> CCSID <EBCDIC, ASCII or UNICODE>;
```

2. An environment variable called `DB2JCC_LICENSE_CISUZ_JAR` must be created which points to the installed DB2 for z/OS license jar file used for connectivity to the remote database server. This is normally named `db2jcc_license_cisuz.jar` and is provided with the DB2 for z/OS or DB2 Connect product.

## 2.4.3 Oracle

This section outlines how to install Oracle as a database server.

**Note:** It is possible to use a remote database via the Oracle Type 4 Driver supplied with the SDEJ.

### 2.4.3.1 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of Oracle to be installed.

### 2.4.3.2 Installation

Assuming that there have been no previous versions of Oracle installed, the installers instructions can be followed to perform a typical server installation.

#### 2.4.3.3 Oracle Database Encoding

It is important to consider the character set for data that will be stored on your database when configuring your database for use with IBM Cúram Social Program Management. For Oracle, there are 2 parameters to consider: NLS\_CHARACTERSET and NLS\_LENGTH\_SEMANTICS.

- The NLS\_CHARACTERSET parameter details the allowable character set of any data loaded to the database, generally AL32UTF8 is recommended by Oracle here.
- The NLS\_LENGTH\_SEMANTICS determines how Oracle interprets length specifiers on CHAR and VARCHAR columns. To handle supplementary characters, e.g. ß in German, where the storage of the character would be two bytes and could overrun the length of a defined column; the NLS\_LENGTH\_SEMANTICS parameter should be set to CHAR as this directs the database to size columns with a character length rather than byte length.

#### 2.4.3.4 Replacing the Packaged Oracle JDBC Drivers

Usually the latest JDBC drivers available at the time of release are packaged with IBM Cúram Social Program Management. However, if you wish to replace the drivers shipped in \$CURAMSDEJ/drivers, please follow the sample steps below:

- Copy <ORA\_directory>/product/11.1.x/db\_1/jdbc/lib/ojdbc6.jar to a <temp> location.  
where <ORA\_directory> is the Oracle installation path (e.g. <drive>:/oracle11g1)
- Rename ojdbc6.jar to ojdbc.jar (to match and replace the name of the driver shipped).
- Copy <ORA\_directory>/product/11.1.x/db\_1/oc4j/sqlj/lib/translator.jar to a <temp>> location.
- Copy <ORA\_directory>/product/11.1.x/db\_1/oc4j/sqlj/lib/runtime12.jar to a <temp> location.
- Replace the drivers ojdbc.jar, runtime12.jar, and translator.jar in \$CURAMSDEJ/drivers with the drivers in your temp location.

Please note, the renaming of the ojdbc6.jar file is necessary due to the fact that the SDEJ expects the driver file to be named ojdbc.jar.

Please refer to the *Cúram Supported Prerequisites* document for details of the supported versions of third party products.

#### 2.4.3.5 Post-installation

There are a number of post-installation tasks which must be performed:

- Create an Oracle role for the application server(s).

**Note:** The post-installation tasks require connecting to Oracle as the privileged 'sys' user. Immediately after installing Oracle, the password for this user is 'change\_on\_install'. Oracle requires that this be changed.

#### Create an Oracle role for Application Servers

The application needs certain privileges in order to use the Oracle XA interface. Later, when configuring the application, the username under which the server connects to Oracle is specified. The appropriate privileges must be assigned to this username for the server to work successfully.

An easy way to bundle together the various privileges required is to create an Oracle *Role*. Privileges can be granted to this role. Later this role can be granted to your users, thereby granting all the privileges associated with that role.

The following commands create a role called CURAM\_SERVER and give it the necessary privileges. A user named CURAM\_USER is then assigned that role and given the password PASSWORD. The commands should be run from an SQL prompt.

**Note:** To run the commands from an SQL prompt, log in as the user who installed Oracle, and type the following at a command prompt: `sqlplus ?/? as SYSDBA`

```
CREATE ROLE "CURAM_SERVER";

GRANT RESOURCE TO "CURAM_SERVER";

@$ORACLE_HOME/rdbms/admin/xaview.sql

GRANT SELECT ON V$XATRANS$ TO PUBLIC;

GRANT SELECT ON PENDING_TRANS$ TO PUBLIC;

GRANT SELECT ON DBA_2PC_PENDING TO PUBLIC;

GRANT SELECT ON DBA_PENDING_TRANSACTIONS TO PUBLIC;

GRANT EXECUTE ON DBMS_SYSTEM TO CURAM_SERVER;

CREATE USER <CURAM_USER> IDENTIFIED BY <PASSWORD> DEFAULT TABLESPACE "USERS" TEMPORARY TABLESPACE "TEMP";

GRANT "CONNECT", "CURAM_SERVER", UNLIMITED TABLESPACE TO <CURAM_USER>;
```

*Figure 1. Oracle Configuration*

**Note:** Replace <CURAM\_USER> and <PASSWORD> in the CREATE USER command with the username and password you wish to use for the database user.

---

## 2.5 Apache Ant

### 2.5.1 Overview

Apache Ant from the Apache Jakarta project is a Java -based build tool. For those familiar with tools used in other environments it can be viewed as being similar to the make tool.

### 2.5.2 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of Ant to be installed.

### 2.5.3 Installation

The Ant zip file can be obtained from Apache and extracted to a folder on your machine. For example, unzip `apache-ant-<version>-bin.zip` into a location of your choice. When unzipping this file, it is worth remembering that it installs everything under `apache-ant-<version>`. There is no need to unzip into a directory named ant.

Installation is now complete.

### 2.5.4 Post-installation

#### About this task

The following steps need to be followed:

## Procedure

1. Create a system environment variable, `ANT_HOME`, which points to the installation directory chosen above;
2. Add `$ANT_HOME/bin` to the `PATH` environment variable.
3. Create a system environment variable, `ANT_OPTS`, which should be set to `be-Xmx756m`.

---

## 2.6 Application Server

The supported application servers on UNIX are WebSphere Application Server and WebLogic Server. An application server must be installed on a machine which builds applications for deployment as well as on machines which host the deployed application.

### 2.6.1 WebSphere Application Server

#### 2.6.1.1 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of WebSphere Application Server to be installed.

#### 2.6.1.2 Installation

Install WebSphere Application Server from the IBM installation media as *root*. The default installation is used, without any configuration changes.

**Note:** Please avoid installing the WebSphere Application Server sample applications. This is because the sample application Apache Derby DataSource will result in a classpath conflict with the application web client's use of Derby.

#### 2.6.1.3 Post-installation

The `WAS_HOME` environment variable must be setup. It should be set to the server directory of the WebSphere Application Server installation (e.g. `/opt/IBM/WebSphere/AppServer`).

On Oracle Solaris the preference order of security providers in `$JAVA_HOME/java/jre/lib/security/java.security` must be changed. Provider `com.ibm.security.jgss.IBMJGSSProvider` must be moved from position 1 into position after `com.ibm.jsse2.IBMJSSEProvider2` in the list of providers. This must be done to support secure web services.

### 2.6.2 WebSphere Application Server Network Deployment

#### 2.6.2.1 Overview

IBMs WebSphere Application Server Network Deployment is an optional component that manages one or many IBM WebSphere Application Server editions and offers advanced deployment services, including clustering, edge services and high availability for distributed configurations.

#### 2.6.2.2 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of WebSphere Application Server Network Deployment to be installed.

#### 2.6.2.3 Installation

WebSphere Application Server Network Deployment should be installed from the installation media. To install simply run `install`.

**Note:** Please avoid installing the WebSphere Application Server sample applications. This is because the sample application Apache Derby DataSource will result in a classpath conflict with the application web client's use of Derby.

### 2.6.2.4 Post-installation

The WAS\_HOME environment variable must be setup. It should be set to the server directory of the WebSphere Application Server Network Deployment installation (e.g. /opt/IBM/WebSphere/AppServer).

On Solaris the preference order of security providers in \$JAVA\_HOME/java/jre/lib/security/java.security must be changed. Provider *com.ibm.security.jgss.IBMJGSSProvider* must be moved from position 1 into position after *com.ibm.jsse2.IBMJSSEProvider2* in the list of providers. This must be done to support secure web services.

## 2.6.3 WebLogic Server

### 2.6.3.1 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of Oracle WebLogic Server to be installed.

### 2.6.3.2 Installation

#### About this task

When installing WebLogic Server, from a command prompt, run the installer, e.g.:

```
$ serverxxx _solaris32.bin
```

and then follow these steps:

#### Procedure

1. Click **Next** on the initial welcome screen;
2. Specify the WebLogic Server home directory where you wish to install and click **Next**.
3. Choose a custom installation and click **Next**;
4. De-select all options except the WebLogic Server branch and click **Next**;
5. Select the JDK(s) you require and click **Next**;
6. Specify the Product Directory based on the WebLogic Server home directory you specified above and click **Next**;
7. Review the installation summary and click **Next**;
8. Once the installation is complete uncheck **Run Quickstart** click **Next** and click **Done** to exit the installer.

### 2.6.3.3 Post-installation

The WLS\_HOME environment variable must be setup. It should be set to the server directory of the WebLogic Server installation (e.g. /opt/wls/wlserver\_10.3/server).

On Solaris the preference order of security providers in \$JAVA\_HOME/jre/lib/security/java.security must be changed. Provider *sun.security.pkcs11.SunPKCS11* `/${java.home}/lib/security/sunpkcs11-solaris.cfg` must be moved from position 1 into the final position in the list of providers. This must be done to support secure web services.

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## 2.7 Java SE/Java EE

### 2.7.1 Overview

Both a Java SE and a Java EE are necessary.

## 2.7.2 Supported Versions

Please refer to the *Cúram Supported Prerequisites* document for the exact version of J Java SE and Java EE to be installed.

## 2.7.3 Installation

Specific installation instructions are not provided for the Java SE or Java EE as each application server ships with a Java SE and Java EE which can be used.

**Note:** Irrespective of which Java SE and Java EE are used the post-installation steps listed below must be followed.

## 2.7.4 Post-installation

### Procedure

1. An environment variable called `JAVA_HOME` must be created that points to the installed Java SE. `$JAVA_HOME/bin` should be placed at the beginning of the `PATH` environment variable. On a number of sites, it may be necessary to have multiple Java SE s installed on any given machine. For this reason, the choice of scope for these environment variables (system wide, through a script file or symbolic links) is left up to you.
2. An environment variable called `J2EE_JAR` must be created that points to the installed Java EE jar file. For WebSphere Application Server this should point at `$WAS_HOME/lib/j2ee.jar` and for WebLogic Server this should point at `$WLS_HOME/lib/weblogic.jar` or `$WLS_HOME/lib/wlfullclient.jar`. You can generate the `wlfullclient.jar` by running the WebLogic Server JarBuilder tool: go to the `server/lib` directory (e.g. `cd $WLS_HOME/lib`) and use the `java` command to create the `wlfullclient.jar` file (e.g. `java -jar wljarbuilder.jar`); see the WebLogic Server product documentation for more information on the WebLogic Server JarBuilder tool. On a number of sites, it may be necessary to have multiple Java EE s installed on any given machine. For this reason, the choice of scope for these environment variables (system wide, through a script file or symbolic links) is left up to you.





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