

IBM Cúram Social Program Management



Cúram Deployment Guide for WebSphere Application Server

Version 6.05

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Note

Before using this information and the product it supports, read the information in "Notices" on page 43

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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

1.1 Deployment Guide

This guide discusses the steps necessary to build a IBM® Cúram Social Program Management application for deployment on the base version of IBM WebSphere® Application Server¹. The guide also details the support provided for configuring and deploying on WebSphere Application Server, and where necessary provides the manual steps required.

It is a prerequisite that the reader have knowledge of the IBM Cúram Social Program Management development environment. In other words, that they know how to develop and build a server application and web client. The guide also presumes that WebSphere Application Server is installed. For details on this installation consult the *Cúram Third Party Tools Installation Guide*².

1. For information on using the application with the Network Deployment edition of WebSphere Application Server consult “Manual WebSphere Application Server Configuration,” on page 21.

2. Refer to the installation guide that is relevant to the platform, i.e. Microsoft Windows or UNIX.

Chapter 2. Building EAR Files

2.1 Introduction

The main step before deployment of a IBM Cúram Social Program Management application is to package it into EAR (Enterprise ARchive) files. The server application (which incorporates the web client and server) and web services application are packaged into separate EAR files, and the Server Development Environment (SDEJ) provides build targets that perform this task.

Before the targets described in the following section are executed, ensure that the following environment variable is set:

- WAS_HOME

This should point to the base directory of the base WebSphere Application Server installation. For example: d:\WebSphere\AppServer or /opt/WebSphere/AppServer.

2.2 The Enterprise Application

2.2.1 Building the Application EAR File

The following target should be executed from the root directory of the server project to create the application EAR file for WebSphere Application Server:

build webspHEREEAR

This target will create a ready to install EAR file, <SERVER_MODEL_NAME>.ear located in <SERVER_DIR>/build/ear/WAS³.

Before executing this target, a fully built application must be available. For details on how to build a IBM Cúram Social Program Management application, please refer to the *Cúram Server Developer's Guide*.

Note: An EAR file cannot be built for H2 database.⁴

2.2.2 Under the Hood

The **webspHEREEAR** target takes a number of previously generated Java files and deployment descriptors and packages them up into an EAR file.

The Java files and deployment descriptors are generated during the build process based on the existence of Business Process Object (BPO) classes, i.e., the methods of *Facade* classes or *WebService* classes and can be called by remote clients.

By default all remote calls to the server are handled by the session bean `curam.util.invoke.EJBMethod`, rather than a session bean per publicly available interface. This bean provides support for IBM Cúram Social Program Management features such as authorization, auditing and tracing. If required it is also possible to generate a *Facade* interface⁵.

3. SERVER_MODEL_NAME and SERVER_DIR are environment variables which specify the name of the model in the project and the root directory of the project respectively.

4. For more information on H2 database consult the *Cúram Third-Party Tools Installation Guide for Windows*.

5. The optional build parameter `-Denableefacade=true` turns on the generation of facade code.

2.2.3 Contents of Application EAR File

The EAR file that is produced has the following structure and contents:

- **META-INF Directory**
 - application.xml
This file is automatically generated and lists the mapping of EJB modules to JAR files that are contained in the application.
 - ibm-application-bnd.xmi
A generated WebSphere Application Server -specific extension file.
 - ibm-application-ext.xmi
A generated WebSphere Application Server -specific extension file.
 - was.policy
WebSphere Application Server security policy file that grants the application the Java permission `java.security.AllPermission`.
 - MANIFEST.MF
The manifest file which details the contents of the EAR file.

- **Core JAR Files**

The core JAR files include⁶:

- antlr.jar
 - appinf.jar
 - appinf_internal.jar
 - coreinf.jar
 - rules.jar
 - jde_commons.jar
 - log4j.jar
 - commons-pool.jar
 - commons-codec.jar
 - commons-discovery.jar
 - jdom.jar
 - axis.jar
 - castor.jar
 - jaxrpc.jar
 - saaj.jar
 - java_cup.zip
 - InfrastructureModule.jar
 - InvalidationModule.jar
 - DBtoJMS.war
 - ClientModule.war
- **Facade JAR Files**

This is only present if facade generation has been enabled. All facades defined in the application are packaged into one JAR file, `FacadeModule.jar`. This JAR file contains the bean implementation classes for the EJB modules that represent the facades. The JAR file contains the following files in the META-INF directory:

 - ejb-jar.xml

6. The version numbers are not listed for the JAR files detailed.

This file is automatically generated and contains the definition of every EJB module contained in the JAR file. All the publicly available methods are listed and the details of the resources available to the EJB modules.

- `ibm-ejb-jar-bnd.xml`

A generated WebSphere Application Server -specific extension file.

- `ibm-ejb-jar-ext.xml`

A generated WebSphere Application Server -specific extension file.

- `Manifest.mf`

The manifest file, detailing the classpath for the EJB.

- **Other JAR Files**

The other JAR files contain the generated and hand crafted code from the application. These include `application.jar`, `codetable.jar`, `events.jar`, `struct.jar`, `messages.jar`, `implementation.jar` and `properties.jar`. The `properties.jar` file contains the `Bootstrap.properties` file. This is the file containing the machine specific configuration properties for initially getting a connection to the database.

2.3 The Web Services Application

Support is available for the automatic generation of Web Service Definition Language (WSDL) defined web services. Application developers can thus combine the power of the IBM Cúram Social Program Management model with the accessibility of web services to produce truly reusable software components.

2.3.1 Building the Web Services EAR File

The following target should be executed from the root directory of the project to create the EAR file for web services:

build webspHEREWebServices

Optional overrides are:

- `prp.webipaddress` is the IP address on which the server hosting the web services is listening. The default is `http://localhost:2809`;
- `prp.contextproviderurl` is the URL of the JNDI context provider. This is the address of the server that hosts the IBM Cúram Social Program Management components being made accessible through web services. The default is `iiop://localhost:2809`;
- `prp.contextfactoryname` is the JNDI context factory name. The default for this is `iscom.ibm.websphere.naming.WsnInitialContextFactory` and should rarely need to be changed.

This target will create a ready to install EAR file, `<SERVER_MODEL_NAME>WebServices.ear` located in `<SERVER_DIR>/build/ear/WAS`.

Before executing this target, a fully built IBM Cúram Social Program Management application, ready for deployment, must exist.

2.3.2 Under the Hood

The **webspHEREWebServices** target takes a number of previously generated Java files and deployment descriptors and packages them up into an EAR file.

The Java files and deployment descriptors are generated during the build process (see the *Cúram Server Developer's Guide*) based on the *web service components* that have been defined in the model. BPO classes

should be mapped to server components with a stereotype of webservice for this generation to occur⁷. Any server component with a stereotype of webservice will be treated as if it also had a stereotype of ejb. This is because Web Service interfaces are wrappers on publicly available BPOs.

2.3.3 Contents of Web Services EAR File

The EAR file that is produced has the following structure and contents:

- META-INF Directory
 - application.xml
This file details the core module for the web services application, which is the `webservices.war` file.
 - ibm-application-bnd.xml
A generated WAS specific extension file.
 - ibm-application-ext.xml
A generated WAS specific extension file.
 - was.policy
WAS security policy file that grants the application the Java permission `java.security.AllPermission`.
 - MANIFEST.MF
The manifest file which details the contents of the EAR file.
- **Web Service WAR File**

This file contains support JAR files in the `WEB-INF/lib` directory, including:

- coreinf.jar
This JAR file contains the conversion methods which are used to support the serialization of the complex types used in the interface.
- axis.jar
This JAR file contains the Axis web services engine.
- appwebservices.jar
This JAR file contains the wrapper classes which enable the Axis web services to connect to the IBM Cúram Social Program Management server application session bean(s) and the classes for the complex types which are used in the interface to the web services.
- server-config.wsdd
This wsdd file is located in the `WEB-INF` directory and contains the web service engine configuration which maps IBM Cúram Social Program Management BPOs to web services.

2.3.4 Web Service WSDL

A IBM Cúram Social Program Management web service exposes its own WSDL once it is deployed.

For instance, if there is a service at the URL:

`http://localhost:9082/CuramWS/services/MyTestService`

the WSDL description will be at the URL:

`http://localhost:9082/CuramWS/services/MyTestService?wsdl`

The URL

`http://localhost:9082/CuramWS/services`

⁷. Consult the *Cúram Server Modelling Guide* for details on assigning BPOs to server components.

will return a web page that lists all web services deployed and a link to their WSDL files.

The general URL format of the locations above is

`http://<web-server>:<port-number>/<ServerModelName>WS/services/<BPO-name>`.

2.4 Multiple EAR files

Building an Application EAR also takes an optional file to allow for splitting the client components into different WAR and EAR files and also to allow for some more control of some of the EAR configuration and included modules. This file is named `deployment_packaging.xml` and should be placed in your `SERVER_DIR/project/config` directory.

The format of the `deployment_packaging.xml` file is as follows:

```
<deployment-config>
  <ear name="Curam"
    requireServer="true">
    <components>custom,sample,SamplePublicAccess,core</components>
    <context-root>/Curam</context-root>
  </ear>
  <ear name="CuramExternal">
    <components>SamplePublicAccessExternal</components>
    <context-root>/CuramExternal</context-root>
    <custom-web-xml>${client.dir}/custom_web_xml</custom-web-xml>
  </ear>
</deployment-config>
```

Figure 1. deployment_packaging.xml sample

Each file can have multiple ear elements and results in an EAR file being produced in the `SERVER_DIR/build/ear/WAS` directory. The options for each element are:

- `name`
This option controls the name of the EAR created from the process.
- `requireServer`
This optional attribute controls whether the server module is included in the EAR file. Valid entries are `true` or `false`. The default value is `false`. If deploying multiple EAR files to one application server, this attribute must be set to `true` for only one EAR file as only one IBM Cúram Social Program Management server module should be deployed per cluster. If `requireServer` is set to `true` for multiple EAR files, then the other EAR files must be deployed in another cluster to avoid conflicts.
- `components`
This option controls which of the client components get placed into the EAR file. It also controls the component order for the rebuild of the client that will need to take place. Usually the core directory doesn't form part of the component order but on this occasion it is important to add this to qualify whether it should be included in a particular WAR file. Entries here should follow the typical order of components defined in the *Cúram Server Developer's Guide* and should be comma separated.
- `context-root`
This option forms the Context Root of the WAR module in the `application.xml` deployment descriptor. Entries here should begin with a forward-slash.
- `custom-web-xml`
This optional element controls whether a custom `web.xml` file should overwrite the standard version in the WAR file. Entries here should be an Apache Ant path to the directory containing the `web.xml` file. It is possible to use references to environment variables as part of this path. For example, `${client.dir}` can be used to point to the web client directory and `${SERVER_DIR}` can be used to point to the server directory.

For each web client (i.e., WAR file) a separate web client component is required to contain its customizations. In the case of multiple web clients, your `CLIENT_COMPONENT_ORDER` environment variable will include all your custom components; but, separate `<ear>` elements will be required, one for each custom web component (and other components as needed).

As with the standard target, a fully built IBM Cúram Social Program Management application must be available. For details on how to build an application, please refer to the *Cúram Server Developer's Guide*.

2.5 Alternative Targets

The **websphereEAR** target will build an IBM Cúram Social Program Management application .ear file containing both the web client and application. Support is provided to build an application .ear file containing only the web application or only the server application.

These targets may be necessary where the web client and server application are required to be installed on separate servers. For example, to support secure access to the Cúram application for external users a new web client application can be developed. This web application can be deployed on its own and use an existing server application.⁸

To build an ear file containing only the web client application the following command should be used:

```
build websphereEAR -Dclient.only=true
```

To build an .ear file containing only the server application the following command should be used:

```
build websphereEAR -Dserver.only=true
```

⁸ For more information on External Access Security consult the *Cúram Server Developers Guide*.

Chapter 3. Application Server Configuration

3.1 Introduction

This chapter presumes that WebSphere has already been installed. Consult the *Cúram Third Party Tools Installation Guide*⁹ for details on the installation.

The configuration of WebSphere Application Server is similar on all platforms and the Server Development Environment for Java (SDEJ) provides a number of Ant targets to aid the configuration and management of the installation. For those interested, “Manual WebSphere Application Server Configuration,” on page 21 details the manual steps performed by the configuration scripts.

The configuration target provided by the SDEJ is a simple default configuration and may not be suitable for a production environment.

Note: The **configure** target will overwrite the *default* profile created by WebSphere Application Server unless `-Dkeep.profile=true` is passed to the target.

3.2 WebSphere Application Server Configuration

The configuration of WebSphere Application Server involves setting up a profile, data source, a number of servers and configuring the JMS and security settings. All these tasks can be performed by executing the **configure** target provided by the SDEJ.

The profile created by the **configure** target will take the following defaults unless specifically overridden when calling the target.

- `profile.name=AppSvr01`
- `cell.name=${node.name}Cell`

The command **build configure** should be executed from the `<SERVER_DIR>` directory to invoke automatic configuration. This target requires that the files `AppServer.properties` and `Bootstrap.properties` exist in the `<SERVER_DIR>/project/properties`¹⁰ directory. See the *Cúram Server Developer's Guide* for more information on the setup of a `Bootstrap.properties`. 3.2, “WebSphere Application Server Configuration” shows example contents of the `AppServer.properties` file.

9. Refer to the installation guide that is relevant to the platform, i.e Windows or **UNIX**.

10. It is possible to override this default location for the properties file by specifying `-Dprop.file.location=<new location>` when executing the **configure** target.

```

## APPLICATION SERVER PROPERTIES

# Property to indicate WebSphere is installed.
as.vendor=IBM

# The username and encrypted password for admin server.
security.username=<e.g. websphere>
security.password=<encrypted password>

# The name of the WebSphere Node
node.name=MyNode

# The name of the server on which the application will be hosted.
curam.server.name=CuramServer
curam.server.port=2809

#####
## THE FOLLOWING PROPERTIES ARE FOR WebSphere ONLY ##
#####
# The alias that should be used for the database authorization
curam.db.auth.alias=databaseAlias

# HTTP Port for the server on which the client
# will be accessed
curam.client.httpport=9044

# HTTP Port for the server on which the Web services
# will be accessed
curam.webservices.httpport=9082

# Property to set JVM initial and maximum heap size.
curam.server.jvm.heap.size=1024

```

Figure 2. AppServer properties sample

By default the **configure** target establishes a Type 4 Universal Driver (XA) data source. However, you may configure a Type 2 Universal Driver (XA) data source by setting the `curam.db.type2.required` property in the `AppServer.properties` file.

Also by default the **configure** target sets the JVM initial and maximum heap size to "1024" MB. However, you can override the default JVM initial and maximum heap size by setting the `curam.server.jvm.heap.size` property in the `AppServer.properties` file.

Note:

1. The setting of the Java heap as described in the 3.2, "WebSphere Application Server Configuration," on page 9 example and set by the configuration scripts is for illustrative purposes. Based on the size of your customized application, deployment strategy, etc. these settings may be too low or too high. The optimum value should be determined by monitoring the memory performance of your server.
2. Memory issues have been noticed with the WebSphere Application Server wrapped database drivers during the retrieval of large CLOBs and BLOBs (3MB+) from the database. These issues may be worked-around by increasing the Max Heap Size JVM parameter as appropriate on the deployed server.
3. The **configure** target cannot be run when H2 database is in use.¹¹

11. For more information on H2 database consult the *Cúram Third-Party Tools Installation Guide for Windows*.

3.3 Security Configuration

The default security configuration of IBM Cúram Social Program Management within WebSphere Application Server involves the default file-based user registry and a JAAS Login Module. The *Default Configuration for IBM WebSphere Application Server* section in the *Cúram Security Handbook* should be referenced for further details on this.

There are a number of alternative security configurations that can be used with WebSphere Application Server. The configurations are available to support the use of alternative authentication mechanisms, such as an LDAP directory server or a single sign-on solution.

To avail of a different configuration the properties detailed in the following sections should be set in the `AppServer.properties` file before running the `configure` target. Any alternative authentication mechanisms should be configured manually after running the `configure` target with the relevant properties set. To configure the login module for identity only authentication the `curam.security.check.identity.only` property should be set to `true`. This is to ensure that the configured alternative authentication mechanism is used.

The *Identity Only Authentication* section in the *Cúram Security Handbook* should be consulted for further details.

3.3.1 Special Configuration Steps When Using Identity Only and LDAP

When using identity only in combination with WebSphere Application Server and LDAP you may need to perform additional manual configuration steps; this is regardless of whether configuration is done via the WebSphere Application Server administrative console or the `configure` target. With this combination you may find that WebSphere Application Server fails to start successfully and this is due to the need to add a WebSphere Application Server -generated username to the login module `exclude list` property (`exclude_usernames`) described in A.2.10.1, “Add the Login Module,” on page 29. In this case of WebSphere Application Server failing to start there will be a SECJ0270E error message in the `SystemOut.log` file prior to the failure.

These are the steps needed to resolve this error:

1. Identify the username that is causing WebSphere Application Server start to fail. Configure the login module trace as described in 3.3.3, “Logging the Authentication Process,” on page 13 (in regard to the `configure` target) or A.2.10.1, “Add the Login Module,” on page 29 (in regard to configuring via the Administrative Console), and restart WebSphere Application Server. With the login module trace running, prior to the SECJ0270E error in the `SystemOut.log` file, the trace data will identify the failing username with a record like this:

```
SystemOut      0 Username: server:MyNodeCell_MyNode_CuramServer
```

Where “MyNode” is the node name, “MyNodeCell” is the cell name, and “CuramServer” is the WebSphere server name. Following the login module trace data will be the error, which will look like this:

```
SECJ0270E: Failed to get actual credentials.  
The exception is javax.security.auth.login.LoginException:  
Context: MyNodeCell/nodes/MyNode/servers/CuramServer,  
name: curamejb/LoginHome:  
First component in name curamejb/LoginHome not found.
```

2. Specify the failing username in the login module `exclude_usernames` property in the WebSphere Application Server configuration. Since WebSphere Application Server is failing to start you cannot make this change via the Administrative Console and you must edit the WebSphere Application Server configuration file directly. In the WebSphere Application Server configuration file system edit `config\cells\MyNodeCell\security.xml`, which will have three occurrences of the `exclude_usernames`

property (one for each alias); e.g.:

```
<options xmi:id="Property_1301940482165"  
  name="exclude_usernames"  
  value="websphere,db2admin"  
  required="false"/>
```

You must modify the three occurrences to include the newly identified username from the trace entry above; e.g.:

```
<options xmi:id="Property_1301940482165"  
  name="exclude_usernames"  
  value="websphere,db2admin,server:MyNodeCell_MyNode_CuramServer"  
  required="false"/>
```

Note that in the `exclude_usernames` occurrences the `id` attribute will vary per your system configuration and the comma separator in the example value attribute represents the default `curam.security.usernames.delimiter` value, which may be different in your case.

3. Restart WebSphere Application Server.

3.3.2 WebSphere Application Server User Registry

By default the configured WebSphere Application Server user registry is not queried as part of authentication. When the login module is configured for identity only, the user registry is queried. It is possible to override this default behavior by setting the `curam.security.user.registry.enabled` property. If this property is set to `true` the WebSphere Application Server user registry will be queried during the authentication process, regardless of whether identity only authentication is enabled or disabled. If this property is set to `false`, the WebSphere Application Server user registry will not be queried. For example, if `curam.security.check.identity.only` is set to `true` and `curam.security.user.registry.enabled` is set to `false`, neither the IBM Cúram Social Program Management authentication verifications nor the WebSphere Application Server user registry will be used as part of the authentication process.

You can also control the authentication of types of external users (i.e. non-internal users) against the WebSphere Application Server user registry via use of the `curam.security.user.registry.enabled.types` and/or the `curam.security.user.registry.disabled.types` properties. These properties specify a comma-delimited list of external user types that will, or will not be, authenticated via the WebSphere Application Server user registry:

- User types specified in the `curam.security.user.registry.enabled.types` list will be processed against the WebSphere Application Server user registry (e.g. LDAP) and your `ExternalAccessSecurity` implementation.
- User types specified in the `curam.security.user.registry.disabled.types` list will not be processed against the WebSphere Application Server user registry and the processing of your `ExternalAccessSecurity` implementation will be the authority for authentication.

The precedence order in processing these three properties and the WebSphere Application Server user or external (e.g. LDAP) registry is as follows:

- By default the WebSphere Application Server user registry is not checked and application authentication is used.
- The setting of the `curam.security.user.registry.enabled` property to `true` requires authentication by both the WebSphere Application Server, or external (e.g. LDAP), user registry and application security (for internal users) or your `ExternalAccessSecurity` implementation (for external users).
- An external user of a type specified in the `curam.security.user.registry.enabled.types` list must be authenticated by the WebSphere Application Server, or external, user registry and your `ExternalAccessSecurity` implementation.

- An external user of a type specified in the `curam.security.user.registry.disabled.types` list is not authenticated by the WebSphere Application Server, or external, user registry and your `ExternalAccessSecurity` implementation is the authority.

See A.2.10, “Set up the System JAAS Login Module,” on page 28 for more information on setting the resultant properties in the `CuramLoginModule` configuration.

3.3.3 Logging the Authentication Process

`curam.security.login.trace` is an optional property that will enable logging for the login module. When set to `true` this property results in tracing information being added to the WebSphere Application Server `SystemOut.log` file during the authentication process.

3.3.4 Establishing an Alternate Exclude Username Delimiter

`curam.security.usernames.delimiter` is an optional property that will enable setting an alternate delimiter for the list of usernames in the `exclude_usernames` property. The property can be set to a character that will allow usernames with embedded commas such as with LDAP.

3.3.5 WebSphere Application Server Caching Behavior

WebSphere Application Server caches user information and credentials in a security cache and the login module will not be invoked while a user entry is valid in this cache. The default invalidation time for this security cache is ten minutes, where the user has been inactive for ten minutes. The *WebSphere Application Server Caching Behavior* section in the *Cúram Security Handbook* should be consulted for further details on this.

3.3.6 Security custom properties

- `com.ibm.ws.security.webChallengeIfCustomSubjectNotFound`

This property determines the behavior of a single sign-on LTPA Token2 login.

When this property value is set to `true`, the token contains a custom cache key, and the custom Subject cannot be found, the token is used to log in directly as the custom information needs to be gathered again. A challenge occurs so that the user to login again. When this property value is set to `false` and the custom Subject is not found, the LTPA Token2 is used to login and gather all of the registry attributes. However, the token might not obtain any of the special attributes that downstream applications might expect.

By default the configuration script sets a WebSphere Application Server property, `com.ibm.ws.security.webChallengeIfCustomSubjectNotFound`, to `false` to ensure that web sessions can seamlessly transfer between two servers in a cluster (for example, in a fail over scenario) without being asked for security credentials. This setting allows the security token used by WebSphere Application Server to be validated correctly, without user input.

If this behavior is not required it is possible to change this property to `true`, see A.2.10, “Set up the System JAAS Login Module,” on page 28 for more information on setting *Security custom properties*. If the property is set to `true`, when a web session switches from one server in the cluster to another, perhaps due to the original server failing, the user will be asked for security information before being able to proceed.

3.3.7 Security hardening measures

When a user logs into the application, they provide a username & password. This is sent to the server, and if successfully authenticated, the server responds with a unique token. The token, in this case, is 'LTPA token'. This token is used in all subsequent requests to recognize the user and then serves privileged content. When the user logs out, we would expect this token to become invalid. but this is not the case and there is no way to invalidate the LTPA token, which has been confirmed by IBM. **IBM's recommendation is to use two "security hardening measures" of:**

1. Setting the security Requires SSL option;

2. Setting a custom property to limit LTPA cookies to SSL only.

The default configuration scripts make this change and the steps are documented A.2.7, “Configure Administration Security,” on page 27.

For more information see:

- http://www.ibm.com/developerworks/websphere/techjournal/1004_botzum/1004_botzum.html?ca=drs#step19
- http://www.ibm.com/developerworks/websphere/techjournal/1004_botzum/1004_botzum.html?ca=drs#step29

3.3.8 Cúram Cryptography

Cúram cryptography relates to functionality for managing passwords and is covered in detail in the *Cúram Security Handbook* and you should consult it in consideration that:

- For production environments it is strongly recommended that you modify the default settings.
- For development and test environments you need to consider where the defaults provide acceptable protection in your environment.
- For users upgrading from a previous version of IBM Cúram Social Program Management, existing passwords will not work out-of-the-box. You can, if you are willing to accept a reduced level of security, at your own risk, choose to take the steps to leave existing system and user passwords as-is, but this is not recommended. More information about upgrading is available in the *Cúram Upgrade Guide*.

3.4 Time Zone Configuration

If multiple server machines are used, they all must have their clocks in sync and be in the same time zone in order that the "natural" ordering of date/times on the database accurately reflects the order that the events occurred in the real world. For example if on the database record *A* has a creation date/time field earlier than that on record *B*, then we can say for sure that *A* was created before *B*, no matter which server created either record.

The time zone of the server(s) must never change during the lifetime of the application. The reason for this that the time zone assumed when storing dates in the database is the current server's time zone; therefore if the server's time zone changes then all dates entered prior to the time zone change will be out by the number of hours equal to the difference between the old and new time zones.

3.5 Starting and Stopping WebSphere Servers

A number of Ant targets are provided to aid in the starting and stopping of WebSphere servers. These targets should be executed from the <SERVER_DIR> directory and as for the **configure** target, they require the `AppServer.properties` file to be setup correctly (3.2, “WebSphere Application Server Configuration,” on page 9). They also require a number of extra parameters to be specified and these are detailed below.

3.5.1 Start a WebSphere Server

The target for starting a WebSphere server is **startserver** and requires the following options:

- `-Dserver.name`

The name of the server to be started.

Important: Before starting the application server for the first time you must have run the **database** target followed by the **prepare.application.data** target. Failing to run this sequence will likely result in transaction timeouts during first login and a failure to initialize and access the application. Whenever the **database** target is rerun (e.g. in a development environment) the **prepare.application.data** target must

also be rerun.

```
build startserver -Dserver.name=CuramServer
```

Figure 3. Example of Usage

3.5.2 Stop a WebSphere Server

The target for stopping a WebSphere server is **stopserver** and requires the following options:

- -Dserver.name

The name of the server to be stopped.

```
build stopserver -Dserver.name=CuramServer
```

Figure 4. Example of Usage

3.5.3 Restart a WebSphere Server

The target for restarting a WebSphere server is **restartserver** and the options are the same as for the **startserver** target. See 3.5.1, “Start a WebSphere Server,” on page 14 for an example of usage.

Note: If the server is not already started when attempting to restart it, the stop portion of the target will not cause the restart target to fail.

Chapter 4. Deployment

4.1 Introduction

The final step after packaging the IBM Cúram Social Program Management application and web services application in EAR files is to deploy them to the application server.

Before deploying, it is important to note that in WebSphere Application Server the configuration scripts provided support a simple configuration targeted at the single server in the Express or Base editions of WebSphere Application Server.

4.2 Deployment

The SDEJ provides targets for installing and un-installing applications on a WebSphere server. As with the **startserver** / **stopserver** targets, the **installapp** / **uninstallapp** targets require that the `AppServer.properties` file is configured correctly (see 3.2, “WebSphere Application Server Configuration,” on page 9). The targets also require a number of options to be specified and these are detailed below.

Ensure the server is started before installing an application. There is no need to restart the server after installation, as the `install` target will automatically start the application.

4.2.1 Install an Application

The Ant target to install an application (in the form of an EAR file) is **installapp** and requires the following options:

- `-Dserver.name`
The name of the server to install the application on.
- `-Dear.file`
The fully qualified name of the EAR file to install.
- `-Dapplication.name`
The name of the application.

```
build installapp -Dserver.name=CuramServer  
-Dear.file=d:/ear/Curam.ear  
-Dapplication.name=Curam
```

Figure 5. Example of Usage

Note: The EAR file containing the server module must be deployed before installing any other (client-only) EAR files.

An optional Ant property is available for passing additional arguments to WebSphere `wsadmin`: `wsadmin.extra.args`. For example, the following sets new Java™ heap sizes and passes the option to append `wsadmin` tracing:

```
-Dwsadmin.extra.args="-javaoption -Xms1024m -javaoption -Xmx1024m -appendtrace true"
```

You should not use this property to set arguments already passed via the Curam Ant scripts and you can observe these when running Ant by specifying its verbose option: `-v`.

4.2.2 Change SYSTEM Username

It is strongly recommended that you change the username for JMS invocation while deploying the application. The following properties should be set in the `AppServer.properties` file before deployment to modify this username:

- `curam.security.credentials.async.username`
The username JMS invocations should run under.
- `curam.security.credentials.async.password`
The encrypted password associated with the username. The password must be encrypted using the Ant **encrypt** target. See the *Cúram Server Developers Guide* for more information.

It is also possible to change the username once the application has been deployed using the WebSphere Application Server administrative console. Navigate to **Applications > Application Types > WebSphere enterprise applications** and select the IBM Cúram Social Program Management application. Select the **User RunAs roles** link. Check the everyone role, enter a new username and password (note, password should be entered in the unencrypted format here) and click the **Apply** button. Save the changes as detailed in A.2.6, “Save the Master Configuration,” on page 27.

Note, if the username is changed, the new username must exist in the Users database table and this user must have a role of 'SUPERROLE'.

The SYSTEM user is the user under which JMS messages are executed.

4.2.3 Uninstall an Application

The Ant target to uninstall an application is **uninstall** and requires the following options:

- `-Dserver.name`
The name of the server the application is installed on.
- `-Dapplication.name`
The name of the application to uninstall (as configured during install).

```
build uninstallapp -Dserver.name=CuramServer  
-Dapplication.name=Curam
```

Figure 6. Example of Usage

4.3 Pre-compiling JSPs

There is one additional target available during deployment, **precompilejsp**, which allows for the JSPs of a client EAR to be pre-compiled *before* installing the EAR file. Pre-compiling the JSPs before installation will speed up the display of a particular page in the web browser the first time it is accessed.

The options for the **precompilejsp** target are:

- `-Dear.file`
The fully qualified name of the EAR file to be pre-compiled.

```
build precompilejsp -Dear.file=d:/Curam.ear
```

Figure 7. Example of Usage

Note: While running the **precompilejsp** target for WebSphere Application Server, an out of memory exception may occur (or some JSPs may silently be ignored and not pre-compiled). To work around this the `JspBatchCompiler.bat` script in the `%WAS_HOME%\bin` directory should be modified to increase the maximum memory size. Change the memory consumption from `-Xmx256m` to at least `-Xmx1024m`.

4.4 Testing Deployment

When the application is installed¹² on a configured WebSphere Application Server installation the next step is to start and test the application.

Ensure the relevant server is started¹³ and open the following page in a web browser:

`https://<some.machine.com>:<port>/<context-root>`

where,

`<some.machine.com>` identifies the the host name or IP address where your WebSphere Application Server is running, `<port>` identifies the server port on which client application is deployed and `<context-root>` identifies the Context Root of the WAR module (see 2.4, "Multiple EAR files," on page 7, for details).

Before the page can be opened, the browser will be directed to the login page. Log in with a valid Cúram username and password and the browser will be redirected to the requested page.

Note: The usage of EAR file name `Curam.ear` for `option-Default.file` and usage of application server name `Curam` for `option-Default.application.name` in the examples of this chapter are for illustrative purposes. Based on your customized application and deployment strategy these values may change.

12. The installation of a web services application may also be required.

13. There is no need to restart the server after an application is deployed.

Appendix. Manual WebSphere Application Server Configuration

A.1 Introduction

The sections of this chapter cover the manual steps required to configure and deploy on the Base or Express edition of WebSphere Application Server. You will have to alter these steps appropriately to deploy in a Network Deployment installation of WebSphere Application Server. See A.4, "WebSphere Network Deployment," on page 41 for more information in this area.

A.2 Manual WebSphere Application Server Configuration

The IBM WebSphere Application Server installation can be configured manually if required, but this is not recommended. This section details the manual steps required to configure WebSphere Application Server for information purposes only.

It is worth noting that any settings entered under the **Resources** section of the WebSphere Application Server Administrative Console can be configured at multiple levels that control the JNDI scope. These include cell, node, or server. Upon selecting a **Resource**, the top of the main browser window shows this scope and allows the various resources in the current scope to be viewed. The scope, and in turn the location of any resources set, should be based upon planned use, i.e. if working in a cluster it may not be necessary to set the same settings on each server, so the scope may be set to cell or node.

A.2.1 The Administrative Console

Most of the configuration of WebSphere Application Server is done using the Administrative Console. To run the Administrative Console, the default server, e.g. server1, must be started as the Administrative Console is installed as a web application on this server.

To start server1, the startServer.bat, located in the profiles/AppSvr01/bin directory of the WebSphere Application Server installation, should be used:

```
<WEBSPPHERE INSTALL DIR>/profiles/AppSvr01/bin/startServer server1
```

To open the Administrative Console, a web browser should be pointed at:
`http://localhost:9060/ibm/console"/>`

Alternatively, the Administrative Console can be started from **Start > Programs > IBM WebSphere > Application Server V7.0 > Profiles > AppSvr01 > Administrative console**. The **Start the server** and **Stop the server** commands can also be used from this menu to start and stop the servers.

The first time the Administration Console is opened, a username will be requested for login. This username can be anything! The Administration Console is divided into two sections. The left hand side contains a tree hierarchy for navigating the console and the right hand side displays the information related to the current node selected in the tree. When instructed to **Navigate to**, the tree hierarchy should be traversed to the relevant node.

A.2.2 Scripting Support

To support the execution of provided Ant scripts it is necessary to change the WebSphere Application Server property files.

A.2.2.1 sas.client.props

Open the `sas.client.props` file found in the `profiles/AppSvr01/properties` directory of the WebSphere Application Server installation. It is necessary to set the login source to retrieve the username and password from a properties file rather than having to type them in each time the scripts are run. Set or where necessary add the following properties:

```
com.ibm.CORBA.loginSource=properties
# RMI/IIOP user identity
com.ibm.CORBA.loginUserId=websphere
com.ibm.CORBA.loginPassword=websphere
com.ibm.CORBA.principalName=curam
```

where *websphere* is the username and password for the Administration Console.

A.2.2.2 soap.client.props

Open the `soap.client.props` file, also found in the `profiles/AppSvr01/properties` directory of the WebSphere Application Server installation. It is necessary to set the login source to retrieve the username and password from a properties file rather than having to type them in each time the scripts are run. Set the following properties to match the credentials you configured for WebSphere as in 3.2, "WebSphere Application Server Configuration," on page 9. In the example below the values are merely examples and the password specified in this file cannot be encrypted:

```
com.ibm.SOAP.loginUserId=websphere
com.ibm.SOAP.loginPassword=websphere
```

where *websphere* is the username and password for the Administrative Console.

To avoid timeouts when installing EAR files ensure that the following is set to be at least:

```
com.ibm.SOAP.requestTimeout=3600
```

A.2.2.3 server.policy

Open the `server.policy` file found in the `profiles/AppSvr01/properties` directory of the WebSphere Application Server installation. Add the following lines to the end of this file:

```
grant codeBase "file:<CURAMSDEJ>/drivers/-" {
permission java.security.AllPermission;
};
```

where *<CURAMSDEJ>* is the SDEJ installation directory.

```
grant codeBase "file:${was.install.root}/
profiles/<profile.name>/installedApps/
<cell.name>/<SERVER_MODEL_NAME>.ear/
guice-2.0.jar" { permission java.lang.RuntimePermission
"modifyThread"; permission java.lang.RuntimePermission
"modifyThreadGroup"; };
```

where *<profile.name>* is the name of the target WebSphere Application Server profile;

where *<cell.name>* is the name of the target WebSphere Application Server cell;

where *<SERVER_MODEL_NAME>* is the name of the application (base name of the EAR file).

A.2.3 Creating the Data Source Login Alias

About this task

IBM DB2[®], IBM DB2 for z/OS[®], and Oracle Database are the databases supported. The Administrative Console can be used to configure a login alias for both the DB2 and Oracle data sources as follows:

Procedure

1. Navigate to **Security > Global security**;
2. Expand the **Java Authentication and Authorization Service** option in the **Authentication** section and select the **J2C authentication data** option;
3. Click **New** to open the Configuration screen;
4. Set the following fields:
 - Alias** = dbadmin
 - User ID** = *<database username>*
 - Password** = *<database password>*
 - Description** = The database security alias
where *<database username>* and *<database password>* are set to the username and password used to login to the database;
5. Click **OK** to confirm the changes.

A.2.4 Configure DB2 Data Sources

A.2.4.1 Set up DB2 Environment Variable

Procedure

1. Navigate to **Environment > WebSphere variables**;
2. Select the DB2UNIVERSAL_JDBC_DRIVER_PATH link from the list of environment variables. This will open the configuration screen for this variable;
3. Set the **Value** field to point to the directory containing the Type 4/Type 2 drivers. This is normally the drivers directory under the SDEJ installation, e.g. D:\Curam\CuramSDEJ\drivers;
4. Click **OK** to confirm the changes.

A.2.4.2 Set up the Database Driver Provider

Procedure

1. Navigate to **Resources > JDBC > JDBC providers**;
2. *Note:* The appropriate scope where the data source is to be defined should be selected at this point.
3. Click **New** to add a new driver. This will open a configuration screen;
4. Select **DB2** from the list in the **database type** drop down supplied;
5. Select the **DB2 Universal JDBC Driver Provider** from the list in the **Provider type** drop down supplied;
6. Select the **XA data source** from the list in the **Implementation type** drop down supplied;
7. Click **Next** to continue;
8. Review the properties on the configuration screen that opens. There should be no need to change any of them unless you are planning to connect to a zOS database. If so, verify that `${DB2UNIVERSAL_JDBC_DRIVER_PATH}` field is pointing at the correct directory for your system. For example, it should point at the directory containing the DB2 Connect license jar, `db2jcc_license_cisuz.jar` provided by IBM for zOS connectivity;
9. Click **Next** and then **Finish** to confirm the changes.

A.2.4.3 Set up the Database Driver DataSource

About this task

The following steps should be repeated for each of the Data Sources, substituting `curamdb`, `curamsibdb` and `curamimerdb` for `<DataSourceName>` (without the angle brackets):

Procedure

1. Select the **DB2 Universal JDBC Driver Provider (XA)** now displayed on the list of **JDBC Providers**. This will open the configuration screen for the provider;
2. Select the **Data sources** link under **Additional Properties**;
3. Click **New** to add a new data source;
4. Set the fields as follows:
Data source name : `<DataSourceName>`
JNDI name : `jdbc/<DataSourceName>`
5. Click **Next** to continue;
6. Set the fields as follows:
Driver type : 2 or 4 as required;
Database name : The name of the DB2 database;
Server name : The name of the DB2 database server;
Port number : The DB2 database server port;
Leave all other fields untouched unless a specific change is required and click **Next**;
7. Set the **Component-managed authentication alias** drop down value to: `<valid for database>`;
Set the **Mapping-configuration alias** drop down value to: `DefaultPrincipalMapping`
Set the **Container-managed authentication alias** drop down value to: `<valid for database>`;
where the `<valid for database>` alias used is the one set up in A.2.3, "Creating the Data Source Login Alias," on page 23;
Leave all other fields untouched unless a specific change is required and click **Next** to continue.
8. Click **Finish** to confirm the changes and continue;
9. Select the newly created `DataSourceName` data source from the displayed list;
10. Select the **Custom Properties** link under **Additional Properties**;
11. Select the `fullyMaterializeLobData` entry;
12. Set the value to be `false`;
13. Click **OK** to confirm the change.

A.2.5 Configure an Oracle Data Source

A.2.5.1 Set up Oracle Environment Variable

Procedure

1. Navigate to **Environment > WebSphere variables**;
2. Select the `ORACLE_JDBC_DRIVER_PATH` link from the list of environment variables. This will open the configuration screen for this variable;
3. Set the **Value** field to point to the directory containing the Type 4 driver. This is the drivers directory of the SDEJ installation, e.g. `D:\Curam\CuramSDEJ\drivers`;
4. Click **OK** to confirm the changes.

A.2.5.2 Setup the XA Database Driver Procedure

1. Navigate to **Resources > JDBC > JDBC providers**;
2. *Note:* The appropriate scope where the data source is to be defined should be selected at this point.
3. Click **New** to add a new driver. This will open a configuration screen;
4. Select the **Oracle** from the list in the **Database type** drop down supplied;
5. Select the **Oracle JDBC Driver** from the list in the **Provider type** drop down supplied;
6. Select the **XA data source** from the list in the **Implementation type** drop down supplied;
7. Set the **Name** field to be Oracle JDBC Driver (XA), if not filled in automatically;
8. Click **Next** to continue;
9. Review the **Class path** and ensure the ORACLE_JDBC_DRIVER_PATH environment variable is correct. Click **Next** to continue;
10. Review the properties on the configuration screen that opens. There should be no need to change any of them;
11. Click **Finish** to confirm the changes.

A.2.5.3 Setup the Non-XA Database Driver Procedure

1. Navigate to **Resources > JDBC > JDBC providers**;
2. Click **New** to add a new driver. This will open a configuration screen;
3. Select **Oracle** from the the list in the **Database type** drop down supplied;
4. Select **Oracle JDBC Driver** from the list in the **Provider type** drop down supplied;
5. Select the **Connection pool data source** from the list in the **Implementation type** drop down supplied;
6. Set the **Name** field to be Oracle JDBC Driver, if not filled in automatically;
7. Click **Next** to continue;
8. Review the **Class path** and ensure the ORACLE_JDBC_DRIVER_PATH environment variable is correct. Click **Next** to continue;
9. Review the properties on the configuration screen that opens. There should be no need to change any of them;
10. Click **Finish** to confirm the changes.

A.2.5.4 Set up the XA Database Driver DataSources About this task

The following steps should be repeated twice, substituting *<DatasourceName>* (without the angle brackets) with thecuramdb and thecuramsibdb.

Procedure

1. Select the Oracle JDBC Driver (XA) now displayed on the list of existing providers. This will open the configuration screen again;
2. Select the **Data sources** link under **Additional Properties**;
3. Click **New** to add a new data source;
4. Set the fields as follows:
Data source name : *<DatasourceName>*
JNDI Name : *jdbc/<DatasourceName>*
Click **Next**;
5. Set the **URL Value** field to:

jdbc:oracle:thin:@//serverName:port/databaseServiceName, to connect to database using Oracle service name.

or

jdbc:oracle:thin:@serverName:port:databaseName, to connect to database using Oracle SID name.

Where,

serverName is the name of the server hosting the database;

port is the port number the database is listening on;

databaseName is the SID of the database; and

databaseServiceName is the service name of the database.

Set the **Data store helper class name** to be Oracle 11g data store helper;

Leave all other fields untouched unless a specific change is required and click **Next**;

Note: Oracle recommends using the **URL** format `jdbc:oracle:thin:@//serverName:port/databaseServiceName` to connect to Oracle database using service name. But this **URL** format (extra '/' before the '@' in the **URL**) is not supported by the WebSphere Application Server admin console. So, the Oracle service name **URL** described above (without extra '/' before the '@' in the **URL**) should be used while configuring Oracle data source from admin console, to connect to Oracle database using service name.

6. Set the **Authentication alias for XA recovery** : *<valid for database>*

Set the **Component-managed authentication alias** drop down value to: *<valid for database>*;

where the *<valid for database>* alias used is the one set up in A.2.3, "Creating the Data Source Login Alias," on page 23;

Leave all other fields untouched unless a specific change is required and click **Next**;

7. Click **Finish** to confirm the changes and continue.

A.2.5.5 Set up the Non-XA Database Driver DataSource Procedure

1. Select the Oracle JDBC Driver now displayed on the list of existing providers. This will open the configuration screen again;

2. Select the **Data sources** link under **Additional Properties**;

3. Click **New** to add a new data source;

4. Set the fields as follows:

Data source name : curamtimerdb

JNDI Name : jdbc/curamtimerdb

Click **Next**;

5. Set the **URL** Value field to:

jdbc:oracle:thin:@//serverName:port/databaseServiceName, to connect to database using Oracle service name.

or

jdbc:oracle:thin:@serverName:port:databaseName, to connect to database using Oracle SID name.

Where,

serverName is the name of the server hosting the database.

port is the port number the database is listening on.

databaseName is the SID of the database.

databaseServiceName is the service name of the database.

Set the **Data store helper class name** to be Oracle 11g data store helper;

Leave all other fields untouched unless a specific change is required and click **Next**;

Note: Oracle recommends to use the URL format `jdbc:oracle:thin:@//serverName:port/databaseServiceName` to connect to Oracle database using service name. But this URL format (extra '/' before the '@' in the URL) is not supported by WebSphere administrative console. So, the Oracle service name URL described above (without extra '/' before the '@' in the URL) should be used while configuring Oracle data source from admin console, to connect to Oracle database using service name.

6. Set the **Component-managed authentication alias** drop down value to: *<valid for database>*;
where the *<valid for database>* alias used is the one set up in A.2.3, "Creating the Data Source Login Alias," on page 23;
Leave all other fields untouched unless a specific change is required and click **Next**;
7. Click **Finish** to confirm the changes and continue.

A.2.6 Save the Master Configuration

A *Save* can be performed by clicking the **Save** link in the **Message(s)** box. This box is displayed only after configuration changes have been made.

A.2.7 Configure Administration Security

About this task

The default user registry used is the default WebSphere Application Server file-based user registry.

Procedure

1. Navigate to **Security > Global security**;
2. Set the **Available realm definitions** to be **Federated repositories** and click the **Configure** button;
3. Set the **Primary administrative username** to be `websphere`;
4. Select the **Automatically generated server identity** radio button;
5. Select **Ignore case for authorization** and click **OK**;
6. Enter the password for the default administrative user, e.g. `websphere`, enter the confirmation and click **OK** to confirm the changes;
7. Set the **Available realm definitions** to be **Federated repositories** and click the **Set as current** button;
8. Select **Enable administrative security**;
9. Select **Enable application security**;
10. Select **Use Java 2 security to restrict application access to local resources and Warn if applications are granted custom permissions**;
11. Click the **Apply** button to confirm the changes;
12. Navigate to **Security > Global security**;
13. Select the **Custom Properties** link;
14. Click **New** and set the name and value as follows:
Name= `com.ibm.ws.security.web.logoutOnHTTPSessionExpire`
Value= `true`
15. Click **OK** to add the new property.
16. Navigate to **Security > Global security**;
17. Select **Web and SIP Security > Single sign-on (SSO)**;
18. Check the **Requires SSL** check box;
19. Click **OK** to confirm the change.
20. Navigate to **Security > Global Security**;
21. Select **Custom properties**;
22. Add `com.ibm.ws.security.addHttpOnlyAttributeToCookies` with value `true`;
23. Click **OK** to confirm the change.

24. Save the changes to the master configuration.

A.2.8 Restart the Application Server

This step is compulsory. The server must be restarted for the security changes to take effect and to add additional required users. The server can be stopped using the `stopServer.bat` file in the `profiles/AppSrv01/bin` directory of the WebSphere Application Server installation. This is similar to starting the server described in A.1, “Introduction,” on page 21.

Before restarting the application server (e.g. `server1`), it is necessary to make the registry and cryptography JAR files available to WebSphere Application Server. The registry JAR file contains classes necessary for the security configuration and the cryptography JAR file contains necessary configuration settings and data for password security.

The `Registry.jar` file is located in the `lib` directory of the SDEJ installation. Copy this file into the `lib` directory of the WebSphere Application Server installation.

The default `CryptoConfig.jar` file is located in the `<SERVER_DIR>/project/properties` directory of the Curam installation. Copy this file into the `Java jre/lib/ext` directory. If you require customizations to the Curam cryptographic configuration see the *Curam Security Handbook* for more information.

Now start the application server (e.g. `server1`) and open the Administrative Console to continue with the configuration steps. Since the security configuration is complete and the scripting changes have been made, it is now possible to use the SDEJ scripts to restart the WebSphere Application Server. See 3.5, “Starting and Stopping WebSphere Servers,” on page 14 for more details on restarting the server.

The Administrative Console should now be opened to continue with the configuration. Now that global security is enabled, you will be required to login to the console with the username and password credentials set up previously.

A.2.9 Configure Users

About this task

As detailed in 3.3, “Security Configuration,” on page 11, the configured WebSphere Application Server user registry is used for authentication of administrative users and the database user. The WebSphere administrative users and the database user must be manually added to the user registry as follows.

Procedure

1. Navigate to **Users and Groups > Manage Users**;
2. Click the **Create** button;
3. Fill in the details for the WebSphere administrative user and click the **Create** button.
4. Repeat the steps for the database user.

Results

Note: If WebSphere administrative security was enabled when creating the profile the administrative user may already be defined in the registry.

A.2.10 Set up the System JAAS Login Module

Application security uses a JAAS (Java Authentication and Authorization Service) Login Module for authentication. This login module must be configured for the `DEFAULT`, `WEB_INBOUND` and `RMI_INBOUND` configurations. Repeat the below steps for each of these configurations.

A.2.10.1 Add the Login Module Procedure

1. Navigate to **Security > Global security**;
2. Expand **Java Authentication and Authorization Service** entry in the **Authentication** section and select **System logins**;
3. Select the relevant Alias from the list. The login module should be configured for the DEFAULT, WEB_INBOUND and RMI_INBOUND aliases;
4. Click **New** to configure a new Login Module;
5. Set the **Module class name** field to be `curam.util.security.CuramLoginModule`;
6. Check the **Use login module proxy** option;
7. Select **REQUIRED** in the **Authentication strategy** field;
8. Enter into **Custom properties** table Name/Value pairs for any required properties as listed below, pressing **New** as needed.

Table 1. CuramLoginModule Custom Properties

Name	Example Value	Description
exclude_usernames	websphere, db2admin	Required. A list of usernames to be excluded from authentication. The default delimiter is a comma, but may be overridden by <code>exclude_usernames_delimiter</code> . This list should include the WebSphere administration users and the database user. Any users listed here should be defined in the WebSphere Application Server user registry.
exclude_usernames_delimiter		<i>Optional.</i> A delimiter for the list of usernames provided in <code>exclude_usernames</code> . A delimiter other than the default comma can be useful when usernames have embedded commas as with LDAP users.
login_trace	true	<i>Optional.</i> This property should be set to true to debug the authentication process. If set to true the invocation of the login module will result in tracing information being added to the WebSphere Application Server <code>SystemOut.log</code> file.
module_name	DEFAULT, WEB_INBOUND or RMI_INBOUND	<i>Optional.</i> This property should be set to one of DEFAULT, WEB_INBOUND or RMI_INBOUND depending on the configuration the login module is being defined for. It is used only when <code>login_trace</code> is set to true for tracing purposes.

Table 1. CuramLoginModule Custom Properties (continued)

Name	Example Value	Description
check_identity_only	true	<i>Optional.</i> If this property is set to true the login module will not perform the usual authentication verifications. Instead it will simply ensure that the user exists on the database table. In this case the configured WebSphere Application Server user registry will not be by-passed and will be queried after the login module. This option is intended where LDAP support is required or an alternative authentication mechanism is to be used. Note: If you are specifying identity only and using LDAP you may need to perform additional configuration steps; please see 3.3.1, "Special Configuration Steps When Using Identity Only and LDAP," on page 11.
user_registry_enabled	true	<i>Optional.</i> This property is used to override the behavior of by-passing the user registry. If this property is set to true the WebSphere Application Server user registry will be queried during the authentication process. If this property is set to false, the WebSphere Application Server user registry will not be queried.
user_registry_enabled_types	EXTERNAL	<i>Optional.</i> This property is used to specify a comma-delimited list of external user types that will be processed against the WebSphere Application Server user registry (e.g. LDAP). See 3.3.2, "WebSphere Application Server User Registry," on page 12 for more information on the processing of the WebSphere Application Server user registry.
user_registry_disabled_types	EXTGEN,EXTAUTO	<i>Optional.</i> This property is used to specify a comma-delimited list of external user types that will not be processed against the WebSphere Application Server user registry (e.g. LDAP). See 3.3.2, "WebSphere Application Server User Registry," on page 12 for more information on the processing of the WebSphere Application Server user registry.

9. Click **OK** to confirm the addition of the new login module;

A.2.10.2 Reorder the Login Module Procedure

1. Navigate to **Security > Global security**;
2. Expand **Java Authentication and Authorization Service** in the **Authentication** section and select **System logins**;
3. Select the relevant Alias from the list. The login module should be reordered for the **DEFAULT**, **WEB_INBOUND** and **RMI_INBOUND** aliases;
4. Click the **Set Order** button;
5. Select **curam.util.security.CuramLoginModule** and click the **Move Up** button. Repeat this until the CuramLoginModule entry is the top entry in the list;

6. Click **OK** to confirm the modifications to the order.

A.2.10.3 Disable Cross Cluster Authentication

About this task

This property determines the behavior of a single sign-on LTPA Token2 login. The property `com.ibm.ws.security.webChallengeIfCustomSubjectNotFound` is set to `false` to ensure that web sessions can seamlessly transfer between two servers in a cluster (for example, in a fail over scenario) without being asked for security credentials.

Procedure

1. Navigate to **Security > Global security**;
2. Click on **Custom properties** and select `com.ibm.ws.security.webChallengeIfCustomSubjectNotFound` property from the list of available properties.
3. Under **General Properties**, change the value of the `com.ibm.ws.security.webChallengeIfCustomSubjectNotFound` property to *false*
4. Click **OK** to confirm the addition;

A.2.10.4 Save the Changes

Save the changes to the master configuration as described in A.2.6, “Save the Master Configuration,” on page 27.

A.2.11 Server Configuration

A.2.11.1 Configure your JNDI lookup port

Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the relevant server from the list, e.g. `server1`;
3. Expand **Ports** in the **Communications** section and click the **Details** button;
4. Select the `BOOTSTRAP_ADDRESS` entry and set the **Port** to match the value of the property `curam.server.port` in your `AppServer.properties` file;
5. Click **OK** to apply changes;
6. Save the changes made to the master configuration using the **Save** option as before.

A.2.11.2 Configure your ORB Pass By Reference

Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the relevant server from the list, e.g. `server1`;
3. Expand **Container Services** in the **Container Settings** section and click the **ORB service** link;
4. Select the **Pass by reference** option from the **General Properties** section.
5. Click **OK** to apply changes;
6. Save the changes made to the master configuration using the **Save** option as before.

A.2.11.3 Configure your Java Virtual Machine

Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the appropriate server from the list;
3. In the **Server Infrastructure** section expand **Java and Process Management**;
4. Select the **Process definition** link;
5. In the **Additional Properties** section Select the **Java Virtual Machine** link;
6. Set the fields as follows:

Initial heap size :1024

Maximum heap size :1024

Click **Apply** to set the values;

7. In the **Additional Properties** section Select the **Custom Properties** link;

8. Click **New** and set the properties as follows:

Name : com.ibm.websphere.security.util.authCacheCustomKeySupport

Value : false

Click **OK** to add the property;

9. *The following step is only required on non-Windows platforms.*

Click **New** and set the properties as follows:

Name : java.awt.headless

Value : true

Click **OK** to add the property;

10. Save the changes made to the master configuration using the **Save** option as before.

A.2.11.4 Configure your Timer Service Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the appropriate server from the list;
3. In the **Container Settings** section expand **EJB Container Settings**;
4. Select the **EJB timer service settings** link;
5. In the Scheduler Type panel Select the **Use internal EJB timer service scheduler instance** option;
6. Set the fields as follows:

Data source JNDI name :jdbc/curamtimerdb

Data source alias : <valid for database>

where the alias used is the one set up in A.2.3, "Creating the Data Source Login Alias," on page 23;

7. Click **OK** to confirm the changes;
8. Save the changes made to the master configuration using the **Save** option as before.

A.2.11.5 Set up the Port Access Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the appropriate server from the list;
3. Select the **Ports** link in the **Communications** section;
4. Click the **details** button;
5. Click **New** and set the following fields for the Client TCP/IP port:
User-defined Port Name : CuramClientEndPoint
Host : *
Port : 9044
Click **OK** to apply the changes;
6. Click **New** and set the following fields for the WebServices TCP/IP port:
User-defined Port Name : CuramWebServicesEndPoint
Host : *
Port : 9082
Click **OK** to apply the changes;
7. Navigate to **Servers > Server Types > WebSphere application Servers**;

8. Select the relevant server from the list;
9. Expand the **Web Container Settings** branch in the **Container Settings** section;
10. Select the **Web container transport chains** link;
11. Click **New** and set the following fields for the Client transport chain:
 - Name** : CuramClientChain
 - Transport Chain Template** : WebContainer-Secure
 - Click **Next**
 - Use Existing Port** : CuramClientEndPoint
 - Click **Next** and **Finish**
12. Click **New** and set the following fields for the WebServices transport chain:
 - Name** : CuramWebServicesChain
 - Transport Chain Template** : WebContainer
 - Click **Next**
 - Use Existing Port** : CuramWebServicesEndPoint
 - Click **Next** and **Finish**
13. Select the newly created **CuramClientChain**;
14. Select the **HTTP Inbound Channel** link;
15. Ensure the **Use persistent keep alive connections** check box is checked;
16. Click **OK** to confirm the addition;
17. Navigate to **Environment > Virtual hosts**;
18. Click **New** to add a new Virtual Host by setting the following fields;
 - Name** = *client_host*
 - Repeat this step using the replacing *client_host* with *webservices_host*;
19. Select the **client_host** link from the list of virtual hosts;
 - Select the **Host Aliases** link in the **Additional Properties** section;
 - Click **New** to add a new Alias by setting the following fields;
 - Host Name** = *
 - Port** = *9044*

where *9044* is the port used in step 5. Repeat this step for the other Virtual Host and port used (e.g. *webservices_host*, 9082);
20. Click **OK** to confirm the addition;
21. Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.11.6 Configure Session Security Integration Procedure

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the relevant server from the list;
3. Click the **Session management** in the **Container Settings** section
4. Select the **Security integration**, *un-check*. *Note: Please make sure security integration is un-checked.*
5. Click **OK** to apply changes;
6. Save the changes made to the master configuration using the **Save** option as before.

Note:

This above setting is required for IBM Cúram Social Program Management web applications.

A.2.12 Bus Configuration

A.2.12.1 Setup the Service Integration Bus Procedure

1. Navigate to **Service integration > Buses**;
2. Click **New** and in **Step 1** set the following field:
Name : CuramBus
Leave everything else as the default and click **Next**;
3. Entering the **Configure bus security** Wizard, Step 1.1, click **Next**;
In **Step 1.2** of the **Configure bus security** Wizard take the default setting and click **Next**;
In **Step 1.3** of the **Configure bus security** Wizard take the default setting, as appropriate, and click **Next**;
In **Step 1.4** of the **Configure bus security** Wizard review your settings and click **Next**;
4. In Step 2 click **Finish** to apply the changes.
5. Select the **CuramBus** now displayed on the list of Buses. This will open the configuration screen;
6. Select **Bus members** in the **Topology** section;
7. Click **Add** to open the **Add a New Bus Member** Wizard;
8. Select the server to add to the Bus and click **Next**;
9. Select **Data store** and click **Next**;
10. Select the option to **use existing data source** and set the options as follows:
Data source JNDI name = jdbc/curamsibdb
Schema name = *username*
Where *username* is the database username.
Deselect the **Create tables** option;
Leave everything else as the default and click **Next**;
11. Take the default tuning parameters as appropriate and click **Next**;
12. Click **Finish** to complete and exit the Wizard;
13. Navigate to **Service integration > Buses**;
14. Select the **CuramBus** now displayed on the list of Buses. This will open the configuration screen;
15. Select **Security** in the **Additional Properties** section;
16. Select **Users and groups in the bus connector role** in the **Authorization Policy** section;
17. Click **New** to open the **SIB Security Resource** Wizard;
18. Select the **The built in special groups** radio button and click **Next**;
19. Select the **Server** and **AllAuthenticated** check boxes and click **Next**;
20. Click **Finish** to complete and exit the Wizard.
21. Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.13 JMS Configuration

A.2.13.1 Setup the JMS Connection Factories Procedure

1. Navigate to **Resources > JMS > JMS providers**;
2. *Note*: The appropriate scope where the JMS resources are to be defined should be selected at this point.
3. Select the **Default messaging provider** link;
4. Select the **Connection factories** link in the **Additional Properties** section;

5. Click **New** and set the following fields:
 - Name** : CuramQueueConnectionFactory
 - JNDI Name** : jms/CuramQueueConnectionFactory
 - Description** : The factory for all connections to application queues.
 - Bus Name** : CuramBus
 - Authentication alias for XA recovery** : Same as for the jdbc/curamdb data source (e.g. <SERVERNAME> /dbadmin)
 - Mapping-configuration alias** : DefaultPrincipialMapping
 - Container-managed authentication alias** : Same as for the Authentication alias for XA recovery.
 Leave everything else as the default and click **OK** to apply the changes;
6. Click **New** and set the following fields:
 - Name** : CuramTopicConnectionFactory
 - JNDI Name** : jms/CuramTopicConnectionFactory
 - Description** : The factory for all connections to application queues.
 - Bus Name** : CuramBus
 - Authentication alias for XA recovery** : Same as for the jdbc/curamdb data source (e.g. <SERVERNAME> /dbadmin)
 - Mapping-configuration alias** : DefaultPrincipialMapping
 - Container-managed authentication alias** : Same as for the jdbc/curamdb data source (e.g. <SERVERNAME> /dbadmin)
 Leave everything else as the default and click **OK** to apply the changes;
7. Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

Results

Note: With the above manual configuration steps it is not possible to correctly configure security for the queue and topic connection factories. To complete this part of the configuration you must use the wsadmin tool. To do so follow these steps:

1. Identify the queue and topic connection factory entries in the WebSphere Application Server configuration resources.xml file. This file resides in the %WAS_HOME%\profiles\<profile_name>\config file system hierarchy depending on your naming conventions and the scope where you defined your JMS resources. For instance, using a node-level scope with a profile name of AppSrv01, a cell name of MyNodeCell and a node name of MyNode you would find this file here: C:\WebSphere\profiles\AppSrv01\config\cells\MyNodeCell\nodes\MyNode\resources.xml. In this file you must find the <factories> entities for the CuramQueueConnectionFactory and CuramTopicConnectionFactory and make note of the ID for each that begins J2CConnectionFactory_ followed by a numeric (e.g. 1264085551611).
2. Invoke the wsadmin WebSphere script. In these examples the language is JACL, so the *-lang jacl* argument may need to be specified along with login credentials, etc. depending on your local configuration.
3. In wsadmin invoke the following commands; again, assuming node-scope definitions, a cell name of MyNodeCell, and a node name of MyNode, the resource IDs will be different in your environment.
 - a. \$AdminConfig getid /Node:MyNode
 - b. \$AdminTask showSIBJMSConnectionFactory CuramQueueConnectionFactory(cells/MyNodeCell/nodes/MyNode|resources.xml#J2CConnectionFactory_1264085551611)
 Here you should verify that authDataAlias is not set (e.g. authDataAlias=), else you're done, as shown in this sample wsadmin output:

```
{password=, logMissingTransactionContext=false,
readAhead=Default, providerEndpoints=,
shareDurableSubscriptions=InCluster,
targetTransportChain=, authDataAlias=, userName=,
targetSignificance=Preferred,
shareDataSourceWithCMP=false,
nonPersistentMapping=ExpressNonPersistent,
persistentMapping=ReliablePersistent, clientID=,
jndiName=jms/CuramQueueConnectionFactory,
manageCachedHandles=false,
consumerDoesNotModifyPayloadAfterGet=false,
category=, targetType=BusMember, busName=CuramBus,
description=None,
xaRecoveryAuthAlias=crouch/databaseAlias,
temporaryTopicNamePrefix=, remoteProtocol=,
producerDoesNotModifyPayloadAfterSet=false,
connectionProximity=Bus, target=,
temporaryQueueNamePrefix=,
name=CuramQueueConnectionFactory}
```

- c. \$AdminTask modifySIBJMSConnectionFactory CuramQueueConnectionFactory(cells/MyNodeCell/nodes/MyNode|resources.xml#J2CConnectionFactory_1264085551611) {-authDataAlias crouch/databaseAlias}
- d. \$AdminConfig save
- e. You can re-show the resource to verify the change.
- f. Repeat the steps for the CuramTopicConnectionFactory.
- g. Restart the application server.

A.2.13.2 Setup the Required Queues

About this task

Perform the following steps, substituting `<QueueName>` (without the angle brackets) with each of the following queue names: DPEnactment, DPError, CuramDeadMessageQueue, WorkflowActivity, WorkflowEnactment and WorkflowError.

Procedure

1. Navigate to **Service integration > Buses > CuramBus**;
2. Select the **Destinations** link in the **Destination resources** section;
3. Click **New** to open the “Create new destination” wizard;
4. Select **Queue** as the destination type and click **Next**;
5. Set the following queue attributes:
Identifier : SIB_ `<QueueName>`
 Leave everything else as the default and click **Next**;
6. Use the **Selected Bus Member** and click **Next**;
7. Click **Finish** to confirm the queue creation.
8. Select the newly added SIB_ `<QueueName>` queue now displayed on the list of existing providers. This will open the configuration screen again;
9. Use the following table to set the Exception Destination via the **Specify** radio button and associated text filed;

Table 2. Exception Destination Settings

Queue Name	Exception Destination
SIB_CuramDeadMessageQueue	System
SIB_DPEnactment	SIB_DPError

Table 2. Exception Destination Settings (continued)

Queue Name	Exception Destination
SIB_DPError	SIB_CuramDeadMessageQueue
SIB_WorkflowActivity	SIB_WorkflowError
SIB_WorkflowEnactment	SIB_WorkflowError
SIB_WorkflowError	SIB_CuramDeadMessageQueue

10. Click **OK** to apply the changes.
11. Navigate to **Resources > JMS > JMS providers**;
12. Select the **Default messaging provider** link;
13. Select the **Queues** link in the **Additional Properties** section;
14. Click **New** and set the following fields:
 - Name** : <QueueName>
 - JNDI Name** : jms/ <QueueName>
 - Bus Name** : CuramBus
 - Queue Name** : SIB_ <QueueName>
 - Delivery Mode** : Persistent
 Leave everything else as the default and click **OK** to apply the changes.

Results

Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.13.3 Setup the Required Topics Procedure

1. Navigate to **Resources > JMS > JMS providers**;
2. Select the **Default messaging provider** link;
3. Select the **Topics** link in the **Additional Properties** section;
4. Click **New** and set the following fields:
 - Name** : CuramCacheInvalidationTopic
 - JNDI Name** : jms/CuramCacheInvalidationTopic
 - Description** : Cache Invalidation Topic
 - Bus name** : CuramBus
 - Topic space** : Default.Topic.Space
 - JMS Delivery Mode** : Persistent
 Leave everything else as the default and click **OK** to apply the changes.
5. Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.13.4 Setup the Required Queue Activation Specifications About this task

As with the setting up of queues, perform these steps, substituting <QueueName> (without the angle brackets) with each of the following queue names: DPEnactment, DPError, CuramDeadMessageQueue, WorkflowActivity, WorkflowEnactment and WorkflowError.

Procedure

1. Navigate to **Resources > JMS > JMS providers**;
2. Select the **Default messaging provider** link;
3. Select the **Activation specifications** link in the **Additional Properties** section;
4. Create a new specification by clicking **New** and set the following fields:
 - Name** : <QueueName>
 - JNDI name** : eis/ <QueueName> AS
 - Destination Type** : Queue
 - Destination JNDI name** : jms/ <QueueName>
 - Bus Name** : CuramBus
 - Authentication Alias** : Same as for the jdbc/curamdb data source (e.g. <SERVERNAME> /dbadmin)Leave everything else as the default and click **OK** to add the port.

Results

Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.13.5 Setup the Required Topic Activation Specifications

Procedure

1. As with the Queue Activation Specifications in the previous section, add a new Activation Specification and set the following fields:
 - Name** : CuramCacheInvalidationTopic
 - JNDI name** : eis/CuramCacheInvalidationTopicAS
 - Destination Type** : Topic
 - Destination JNDI name** : jms/CuramCacheInvalidationTopic
 - Bus Name** : CuramBus
 - Authentication Alias** : Same as for the jdbc/curamdb data source (e.g. <SERVERNAME> /dbadmin)
2. Leave everything else as the default and click **OK** to apply the changes.
3. Save the changes to the master configuration as described in A.2.6, "Save the Master Configuration," on page 27.

A.2.14 Configure Historical Log Files

It is possible to configure the maximum number of historical log files maintained by a particular server. To do this

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the relevant server from the list of servers;
3. Select **Logging and Tracing** from the **Troubleshooting** section;
4. Select **JVM Logs** from the **General Properties** list;
5. Change the **Maximum Number of Historical Log Files** field to 30 for both the System.out and System.err files;
6. Click **OK** to apply the changes;
7. Save the changes to the master configuration.

A.2.15 Post Configuration

A.2.15.1 Service Integration Bus Database Tables

After setup, it is necessary to manually create database tables required for the Service Integration Bus. WebSphere Application Server provides a utility to generate the SQL for creating these tables, the SIB DDL Generator.

The generator can be run by executing the following command:

```
WAS_HOME /bin/sibDDLGenerator.bat
-system
system -platform
platform -schema
username -database
database_name -user
username -statementend ; -create
```

Where

- *system* is the database that is to be used, e.g. oracle or db2;
- *platform* is the operating system, such as windows, unix or zos;
- *username* is the username required for accessing the database;
- *database_name* is the name of the database to be used.

For example:

```
c:/Websphere/AppServer/bin/sibDDLGenerator.bat
-system db2 -platform windows
-schema db2admin -database curam -user db2admin
-statementend ; -create
```

This command will output some SQL statements and this output should then be executed on the target database.

A.2.15.2 Timer Service Database Tables

After setup, it is necessary to manually create the database tables required for the Timer Service. WebSphere Application Server provides the DDL for these tables in its WAS_HOME /Scheduler directory.

The DDL files that should be run are the *createTablespaceXXX.ddl* and *createSchemaXXX.ddl* in that order, where XXX is your target database product name.

Each DDL file contains instructions appropriate for running against your target database.

A.2.16 Completion

The application server is now configured and ready to install an IBM Cúram Social Program Management application on it. Log out of the Administration Console and restart the WebSphere application server using the targets description in 3.5, "Starting and Stopping WebSphere Servers," on page 14.

A.3 Manual Application Deployment

To install an enterprise application in WebSphere Application Server, the Administration Console can be used. The steps below describe how to install an application, EJB component, or Web module using the Administrative Console.

Note: Once the install has been started, the **Cancel** button must be used to exit if the installation of the application is aborted. It is not sufficient to simply move to another Administrative Console page without first clicking **Cancel** on an application installation page.

1. Navigate to **Applications > New Application**;
2. Select **New Enterprise Application**;
3. Click the appropriate radio button and specify the full path name of the source application file or EAR file, optionally via the **Browse** button, in the Path to the new application panel and click **Next**;
The default location for the application EAR files is:
`%SERVER_DIR%/build/ear/WAS/Curam.ear`
4. Select the **Fast Path - Prompt only when additional information is required** radio button in the How do you want to install the application? panel and click **Next**;
5. Leave the defaults as they are for step 1, *Select installation options* and click **Next**;
6. In step 2, **Map modules to servers**, for every module listed, select a target server or a cluster from the **Clusters and Servers** list. To do this, tick the check box beside the particular module(s) and then select the server or cluster and click **Apply**.
7. Click **Next** and then **Finish** to complete the installation. This step may take a few minutes and should finish with the message *Application Curam installed successfully*.
8. Save the changes to the Master Configuration. (See A.2.6, "Save the Master Configuration," on page 27 for more details.)
9. Navigate to **Applications > Application Types > WebSphere enterprise applications** and select the newly installed application.
10. Select the **Class loading and update detection** option from the **Detail Properties** section.
11. Set the **Class loader order** to be **Classes loaded with local class loader first (parent last)**.
12. Set the **WAR class loader policy** to be **Single class loader for application**.
13. Click **OK**.
14. Navigate to **Users and Groups -> Manage Users**. Click **Create...** and enter a User ID, Password, First Name and Last Name. Then click on **Create**.
See 4.2.2, "Change SYSTEM Username," on page 18 for information regarding the credentials expected here by the application and changing them.
15. Return back to the enterprise application (**Applications > Application Types > WebSphere enterprise applications**, select the newly installed application) and select the **Security role to user/group mapping** option from the **Detail Properties** section and map the mdbuser role to a username and password as per these steps:

Note: The username you use to map to the mdbuser role must already be defined in your user registry.

- a. Check **Select** for the mdbuser role and click **Map Users...**;
 - b. Enter the appropriate username in the **Search String** field and click **Search**;
 - c. Select the ID from the **Available:** list and click **>>** to add it to the **Selected:** list and click **OK**.
 - d. Click **OK**.
16. Having mapped the mdbuser role you can now update the user RunAs role by selecting the **User RunAs roles** option from the **Detail Properties** section.
 17. Enter an appropriate username and password in the **username** and **password** fields, respectively. Check **Select** for the mdbuser role and click **Apply**.

18. Click **OK**.
19. Save the changes to the master configuration.
20. After deployment it is necessary to start the application before it can be used. Navigate to **Applications > Application Types > WebSphere enterprise applications**, tick the check box for the newly installed application, and click the **Start** button. This step may take a few minutes and should finish with the application status changing to indicate it has been started.
21. Finally, test the application deployment. For example, point a Web browser at the URL for the deployed application e.g. `https://localhost:9044/Curam`.

A.4 WebSphere Network Deployment

IBMs WebSphere Application Server Network Deployment offers advanced deployment services, including clustering, edge services and high availability for distributed configurations. The *Cúram Third Party Tools Installation Guide* should be consulted for more information on the installation of WebSphere Network Deployment.

A.4.1 Creating the Profiles

After installing WebSphere Network Deployment, it is necessary in most cases to create at least two profiles. One will act as the deployment manager for the node and the others as the federated servers.

This is done via the Profile Creation Wizard, which is started via the `pct<hardware platform>` file from the `bin/ProfileCreator` directory of the WebSphere Application Server installation.

The first choice of note during this wizard is to either create:

1. A deployment manager profile;
2. An Application Server profile.

The second is the choice to enable administrative security. It is recommended that administrative security is enabled on profile creation. These settings can be changed later.

A.4.2 Federating a Node

The federation of an application server profile requires the targeted Deployment Manager to be started.

The Deployment Manager can be started by running the following command from the `profiles/<deployment manager profile name>/bin` directory of the WebSphere Network Deployment installation:

```
startServer dmgr
```

To add your application server profile to the Deployment Manager node the following command is used from the `profiles/<Application Server profile name>/bin` directory of the WebSphere Application Server installation:

```
addNode <deploymgr host> <deploymgr port>
```

Where the `<deploymgr host>` and `<deploymgr port>` are the listen host and port for the Deployment Manager's SOAP Connector. The SOAP Connector details can be found in the Deployment Manager Administrative Console under:

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Select the relevant server from the list;
3. Expand **Ports** in the **Communications** section and press the **Details** button;
4. The required details are listed as the **Host** and **Port** for the **SOAP_CONNECTOR_ADDRESS**.

A.4.3 Configuration of Node

Before deploying an application on the registered node, the server must first be configured. This is done through the Deployment Manager Administration Console and the configuration is then synchronized with the node's federated servers.

The Node Agent, which enables communication between the Deployment Manager and its federated servers, is required to be started. This must be done via the `startNode.bat` or `startNode.sh` command in the `profiles/<federated profile name>/bin` directory of the WebSphere Application Server installation.

After the Node Agent is started, all control is handed over to the Deployment Manager for this Node's servers. To start or stop a server in the Deployment Manager Administration Console:

1. Navigate to **Servers > Server Types > WebSphere application servers**;
2. Check the server to be started/stopped from the list and click the **Start** or **Stop** button as required.

The next step in the process is to configure the federated servers. As mentioned before, all configuration is done through the Deployment Manager Administrative Console. A.2, "Manual WebSphere Application Server Configuration," on page 21 describes the manual WebSphere Application Server configuration for a basic installation, and should be followed with the differences identified below. When saving the master configuration ensure you manually force synchronization via the Administrative Console:

1. Navigate to **System Administration > Save Changes to Master Repository**;
2. Check the **Synchronize changes with Nodes** check box;
3. Click the **Save** button. The synchronization may take some time;
4. Check the system and/or WebSphere Application Server logs for synchronization completion. These messages may vary by WebSphere Application Server release, but you are looking for something like:

```
ADMS0208I: The configuration synchronization complete for cell.
```

Once synchronization is complete, review the server status and various WebSphere Application Server logs to ensure success;

A.2.7, "Configure Administration Security," on page 27 details the security setup required during manual configuration. This setup requires the `Registry.jar` to be copied to a directory within the WebSphere Application Server installation. The `Registry.jar` should be copied from `CuramSDEJ/lib` to the `lib` directory of the Deployment Manager installation and any federated installations.

Note: Before building the `Curam.ear` for deployment it is worth noting the `BOOTSTRAP_ADDRESS` of the server that these will be installed onto. The `BOOTSTRAP_ADDRESS` is located in the same list of ports as the `SOAP_CONNECTOR_ADDRESS` described previously.

By default the `BOOTSTRAP_ADDRESS` expected by the application is 2809. To solve this issue either change this address or alternatively change the relevant property in your `AppServer.properties` file.

The property that should be changed is the `curam.server.port` value in the `AppServer.properties` file. Changing this affects the port value in the `web.xml` file when building an EAR file. For more information on the `web.xml` file consult the *Curam Web Client Reference Manual*.

A.4.4 Deploying on the Node

Finally, A.3, "Manual Application Deployment," on page 40 should be followed to manually deploy the applications on the required server. Applications can then be started or stopped using the Deployment Manager Administration Console.

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