

# WebSphere Lab Jam

## Application Infrastructure

### WebSphere Application Server V8 Administration

*Lab Exercise*





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## Lab 1      **WebSphere Application Server V8 Installation and Configuration**

The objective of this lab is to provide you with an understanding of the basic WebSphere Application Server and WebSphere Application Server – Network Deployment infrastructure. Within the constraints of the machine image available for the exercise you'll configure a typical WAS environment comprised of an HTTP server, WebSphere Application Server, DB2 database server and LDAP server for application use. You'll then add a WAS-ND Deployment Manager and federate the application server environment into WAS-ND to adding scalability, failover, and centralized management to your environment.

This lab is provided **AS-IS**, with no formal IBM support.

### 1.1      **Lab requirements**

WebSphere Application Server – Network Deployment Version 8.0

### 1.2      **What you should be able to do**

At the end of this lab you should be able to

- Install WebSphere Application Server using IBM Installation Manager and configure WebSphere Application Server for a departmental deployment on a single server
- Configure a WebSphere Application Server – Network Deployment cluster for a departmental deployment on a single server
- Configure WAS and WAS –ND to use DB2 for application data
- Configure a Federated Repository for WAS and WAS-ND to use an LDAP server for user authentication.

## 1.3 Introduction

This lab is intended as a primer on the basic configuration of WebSphere Application Server for those not already familiar with it, or a refresher for those already skilled in WebSphere Application Server.

The aim of the lab is to walk through the steps that a systems administration would perform for a typical WebSphere Application Server (and WAS-ND) deployment, using the information typically provided or dictated by organizational standards; e.g. installation location, database configuration, LDAP configuration.

## 1.4 Exercise instructions

Some instructions in this lab may be Linux<sup>®</sup> operating-system specific. If you plan on running the lab on an operating-system other than Linux<sup>®</sup>, you will need to execute the appropriate commands, and use appropriate files ( .sh vs. .bat) for your operating system. The directory locations are specified in the lab instructions using symbolic references, as follows:

Reference variable	Windows <sup>®</sup> location	Linux <sup>®</sup> or UNIX <sup>®</sup> locations
<WAS_HOME>	C:\IBM\WebSphere\AppServer	/usr/WebSphere/AppServer /opt/WebSphere/AppServer
<PROFILE_HOME>	C:\IBM\WebSphere\AppServer\profiles\AppSrv01	/usr/WebSphere/AppServer/profiles/AppSrv01 /opt/WebSphere/AppServer/profiles/AppSrv01
<RAD_HOME>	C:\Program Files\IBM\SDP	/opt/IBM/SDP
<LAB_FILES>	C:\Labfiles80	/Labfiles80
<TEMP>	C:\temp	/tmp

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**Note for Windows users:** When directory locations are passed as parameters to a Java program such as EJBdeploy or wsadmin, it is necessary to replace the backslashes with forward slashes to follow the Java convention. For example, C:\Labfiles80\ would be replaced by C:/Labfiles80/

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## 1.5 Deploying a WebSphere Application Server Departmental Solution.

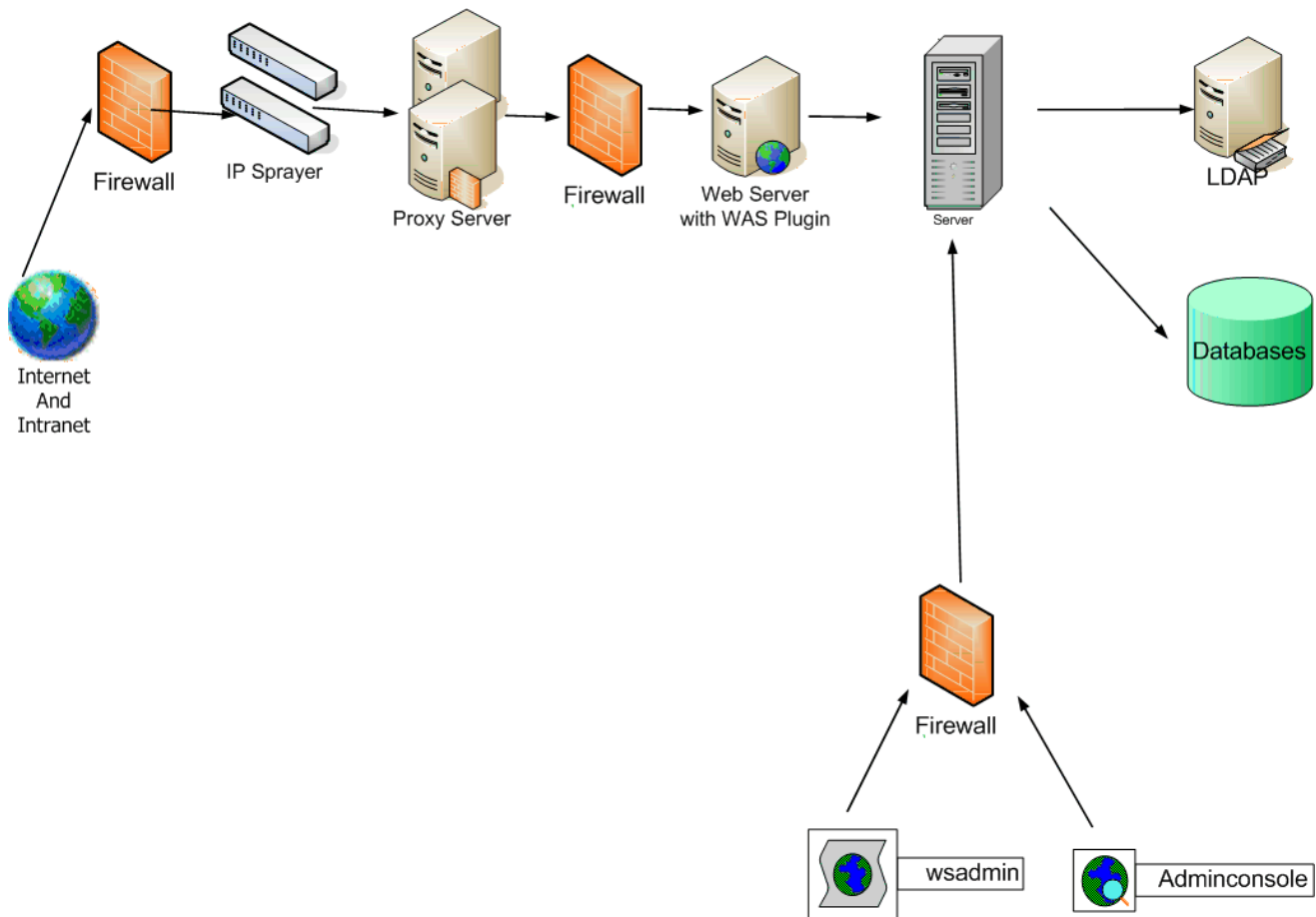
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This lab will assume that an departmental application infrastructure; consisting of an HTTP Server and WebSphere Application Server instance, needs to be deployed and configured to use LDAP, and a DB2 database, needs to be deployed in an environment as depicted below.

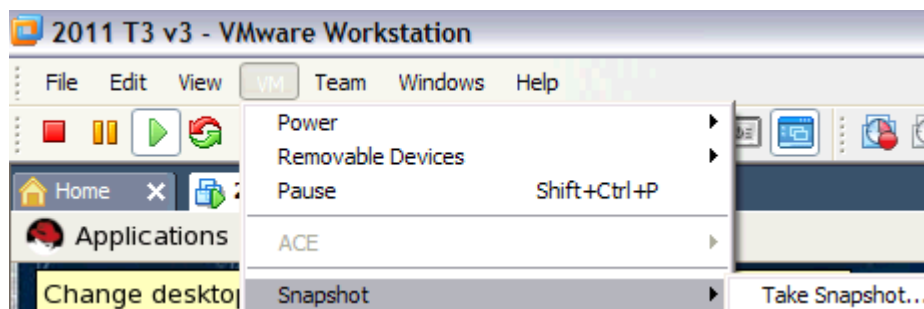
Since the enterprise is providing a proxy server in the DMZ in order to provide for security we will be configuring the HTTP server to run on the same server as the application server and will thus be able to safely and securely leverage the WebSphere Application Server capability to manage IBM HTTP Server.

As is often the case in many enterprises, much of the infrastructure is outside the domain of the application server administration team. While most often the LDAP server and Database server are located on external servers, for the purposes of this lab both will be located on the same server as the application server, though the actual administration of LDAP and DB2 performed by others, while the WAS configuration to use these services will be part of this exercise.

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- \_\_\_ 1. Take a VM snapshot (to insure you have a recovery point) , provide a meaningful name such as “starting image”



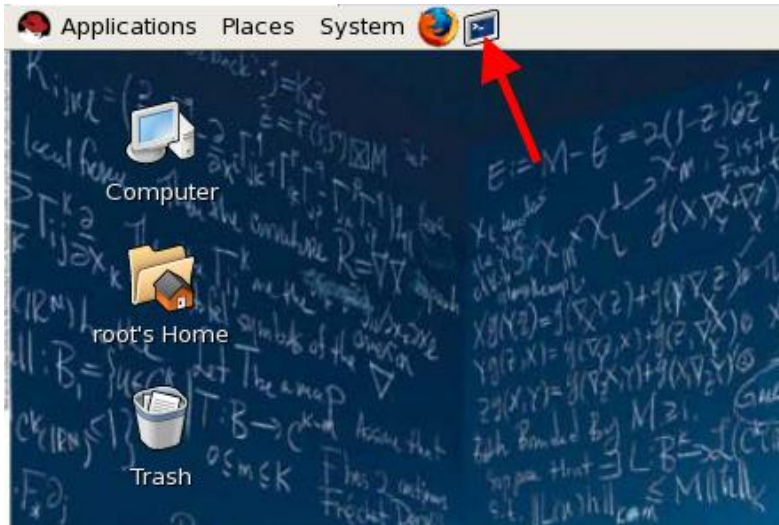
- \_\_\_ 2. Start the Virtual Machine image
  - \_\_\_ a. Log in using “root” with the password “password”



Typically you wouldn't log in using "root." Since most of the lab is administrative activities, it makes sense to log in as "root" in this environment. Please don't use root for regular access on your servers.

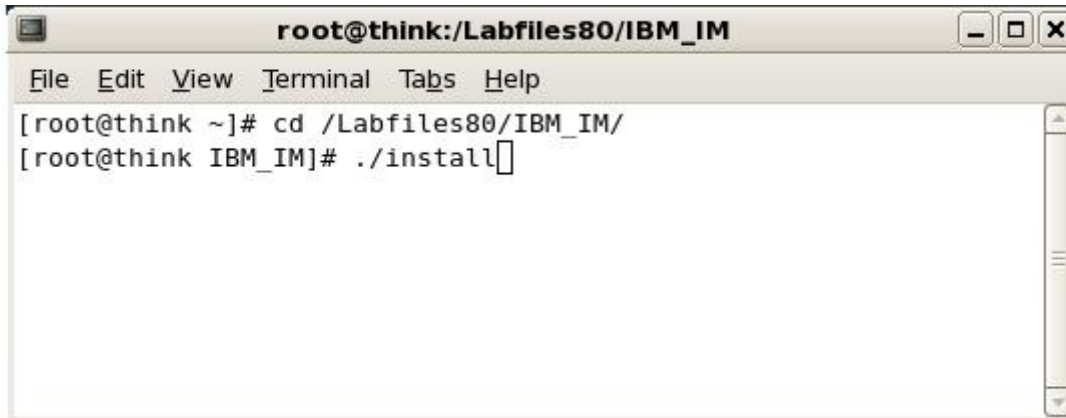
- \_\_\_ 3. WAS V8 has a new installer, called the "IBM Install Manager". The Install Manager must first be installed, before installing WAS itself. The following instructions will show you how to install the IBM Install Manager.

- \_\_\_ b. Open a command window



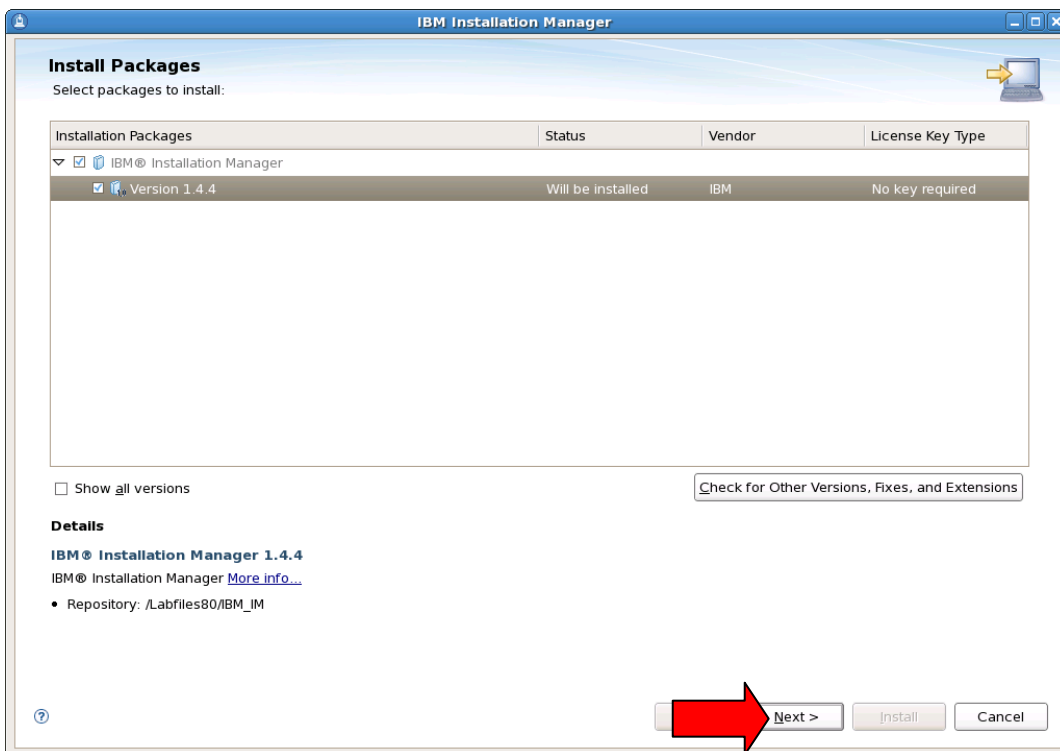
\_\_\_ c. Navigate to the directory with the install image of Install Manager # **cd /Labfiles80/IBM\_IM**

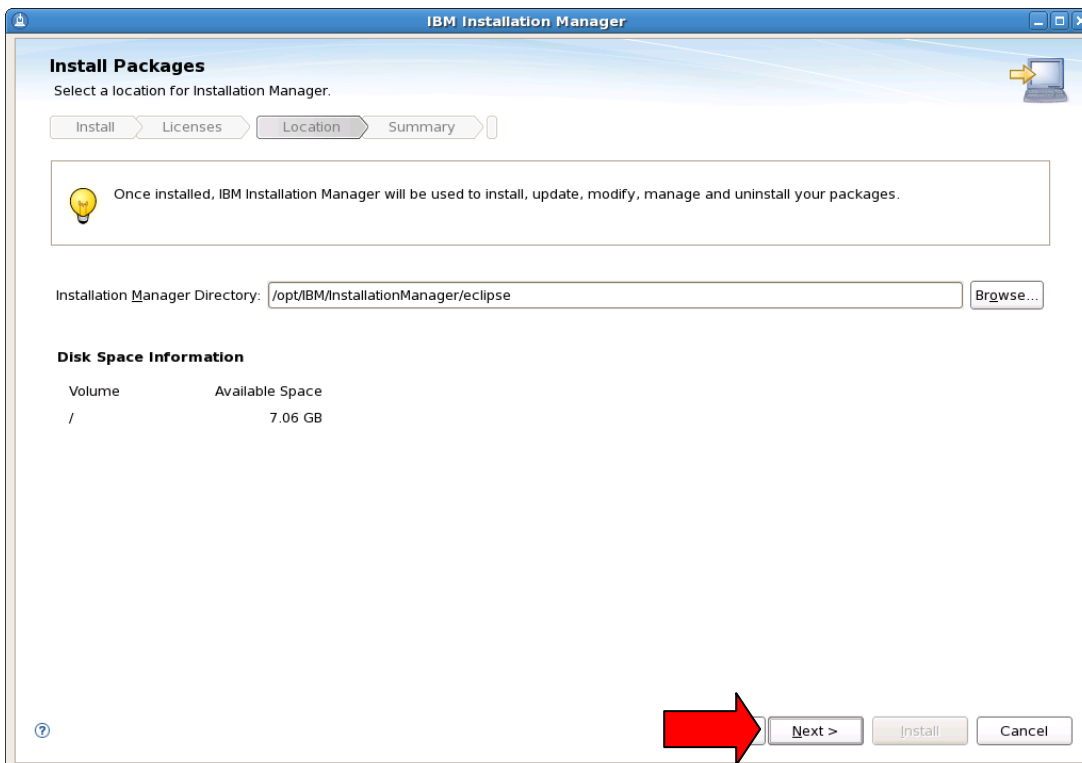
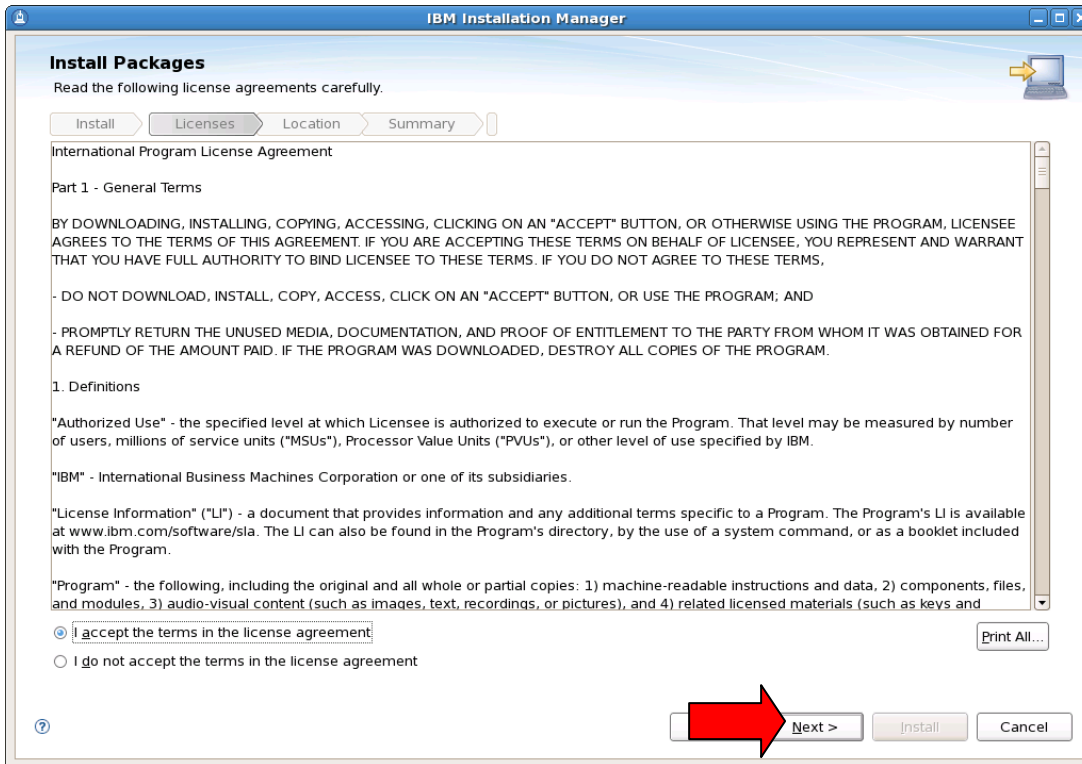
\_\_\_ d. Run the Install Manager install # **./install**

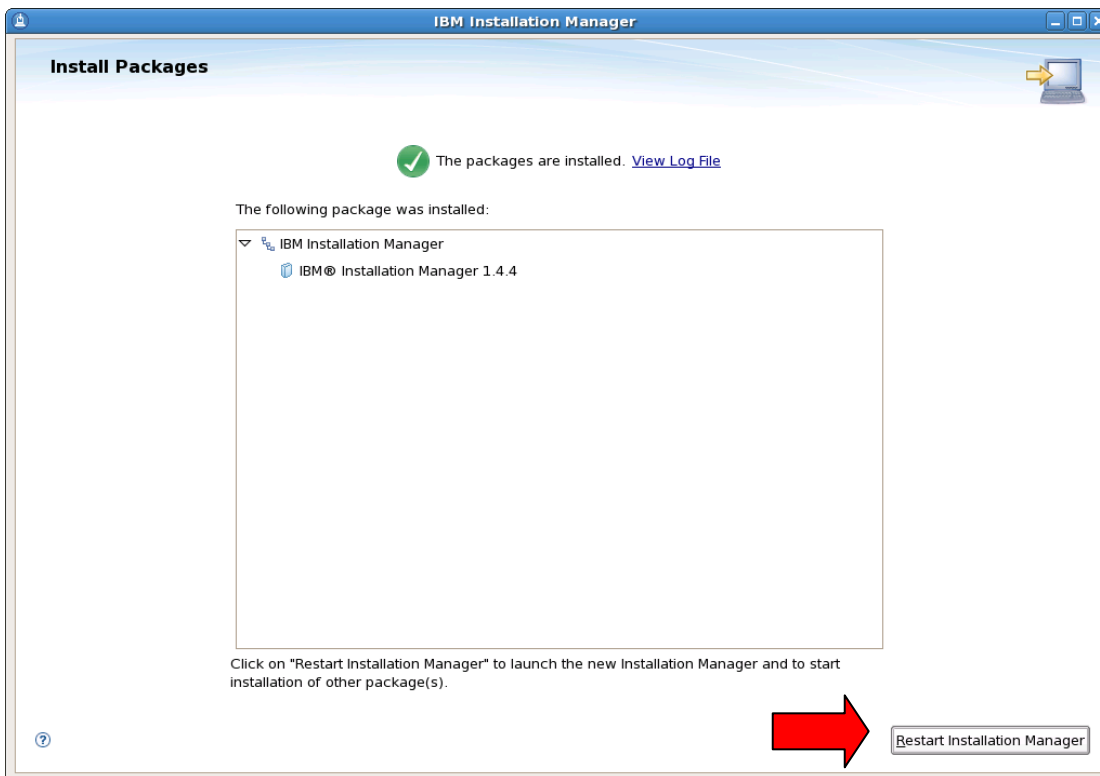
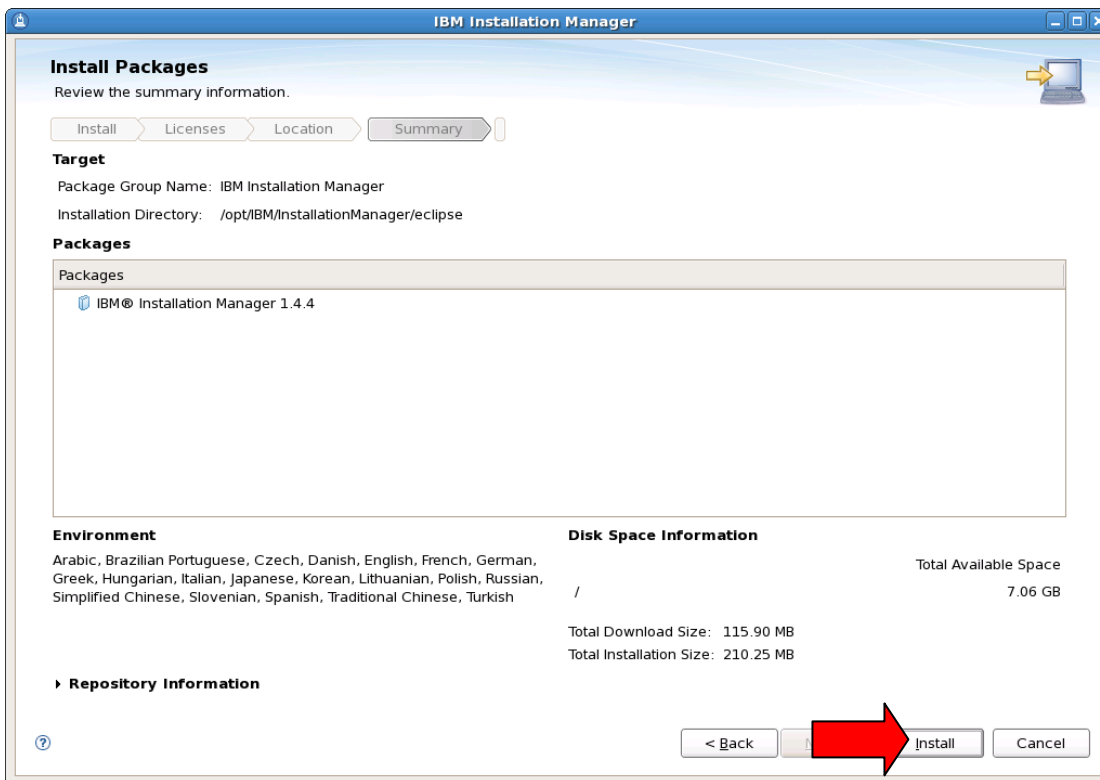


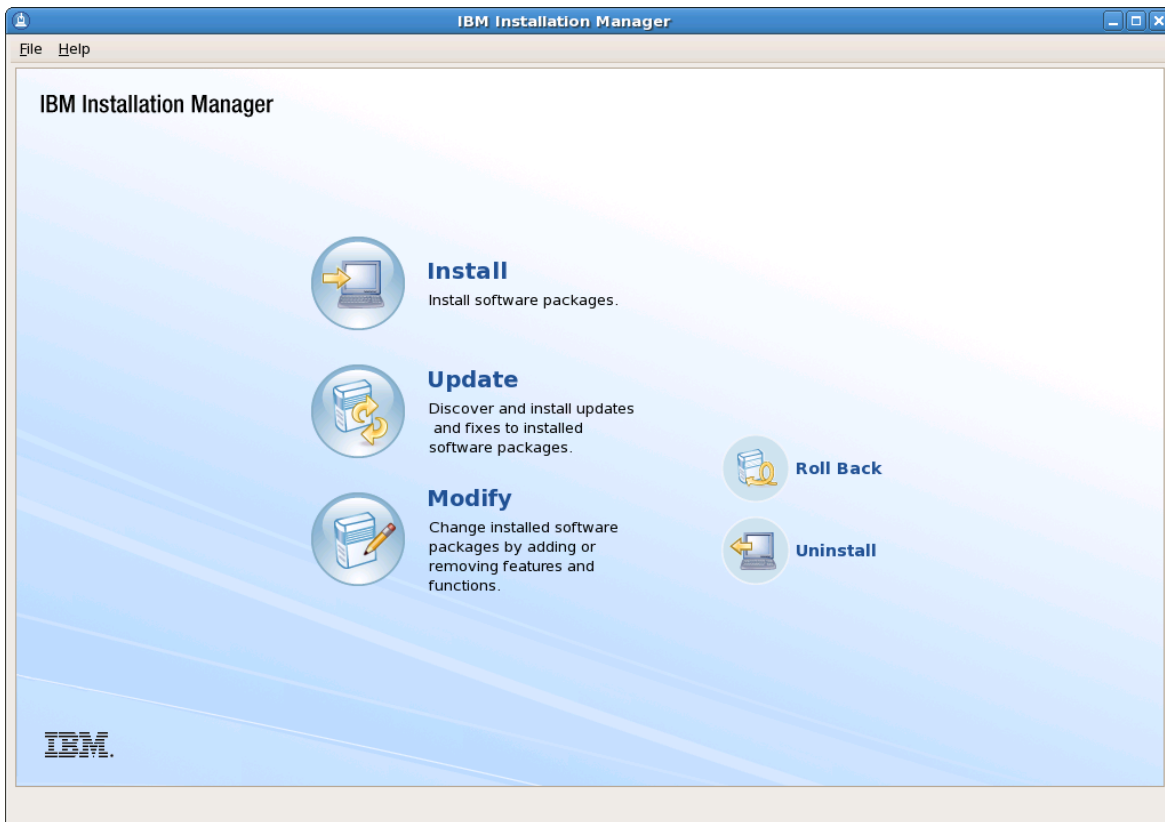
```
root@think:/Labfiles80/IBM_IM
File Edit View Terminal Tabs Help
[root@think ~]# cd /Labfiles80/IBM_IM/
[root@think IBM_IM]# ./install
```

You'll see the following screens. Take the defaults as illustrated in the images below

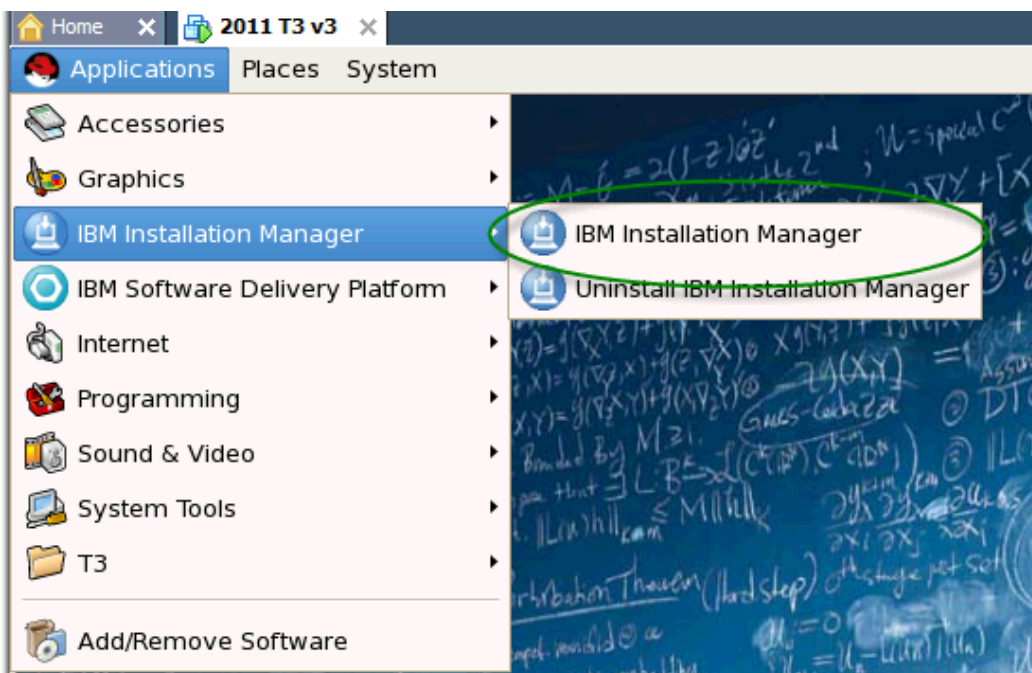








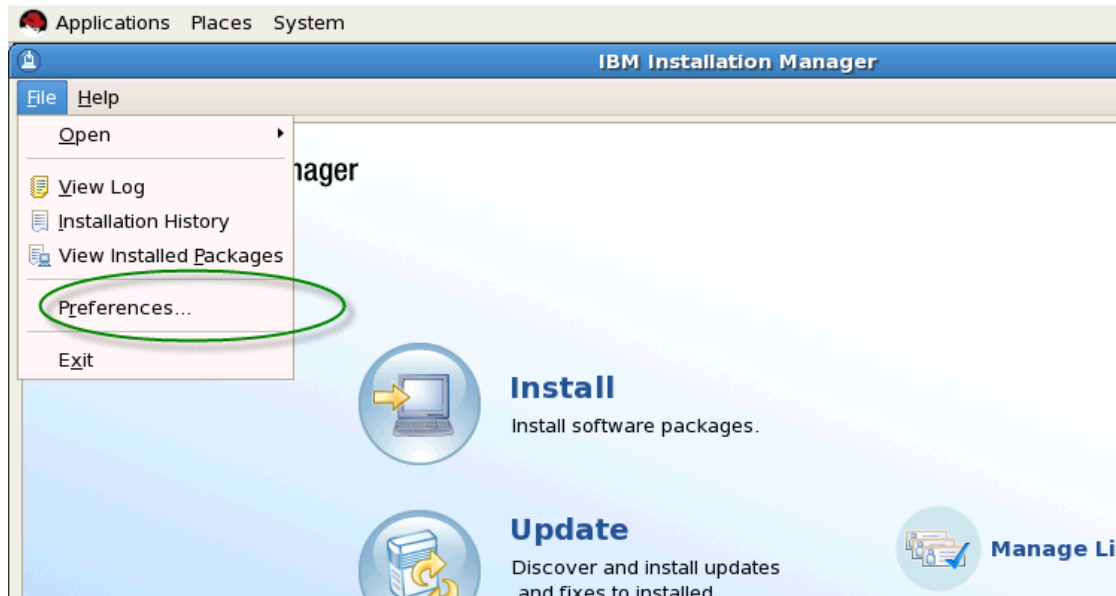
After it is installed you can also launch Install Manager as shown below:



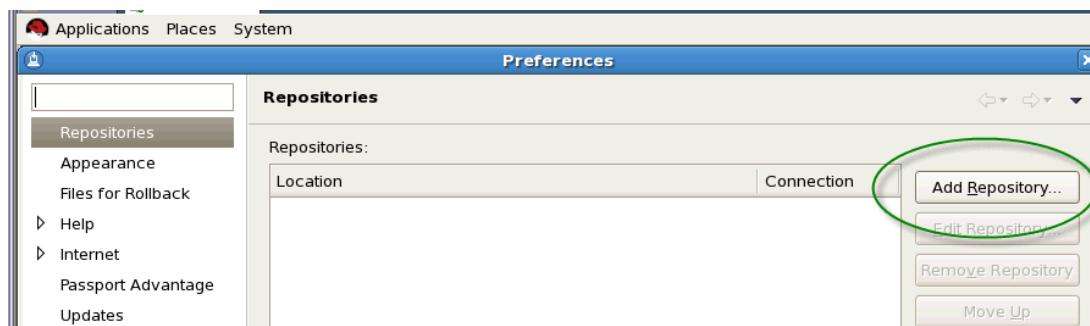
Now that Install Manager is in place you can start installing a wide range of IBM products. Install manager does need to know where to find the install images. The images are

stored in a repository. The next steps will show how to configure Install Manger to access a repository that has been built for you for this lab.

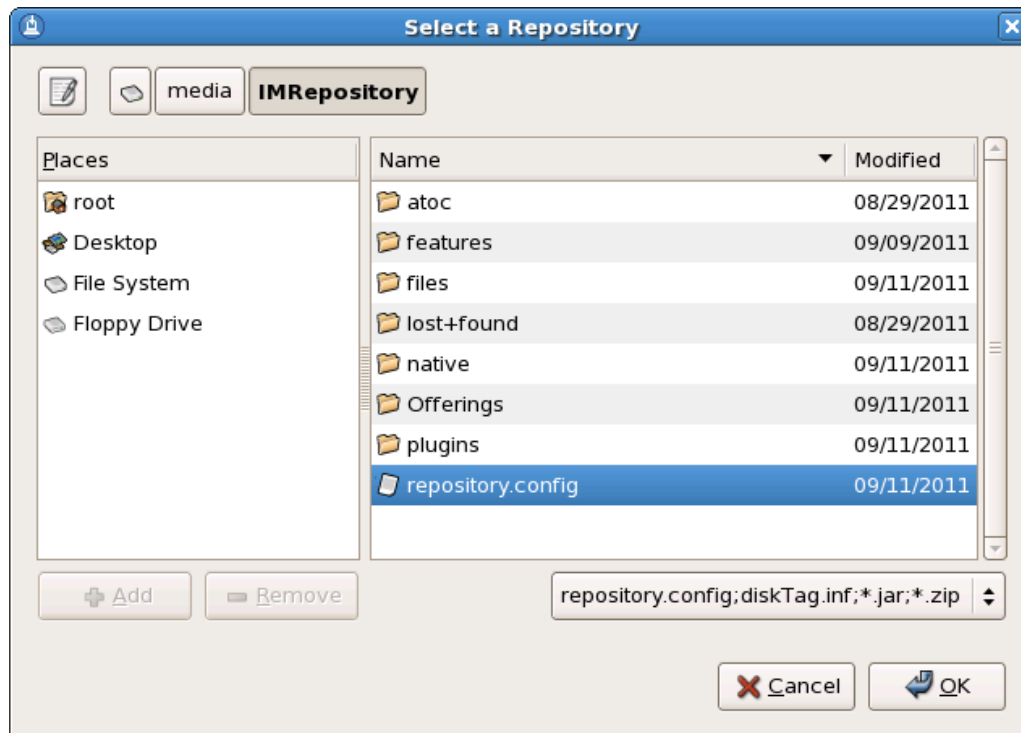
- \_\_\_ e. Click **File -> Preferences** for the IBM Installation Manager Preferences as shown below



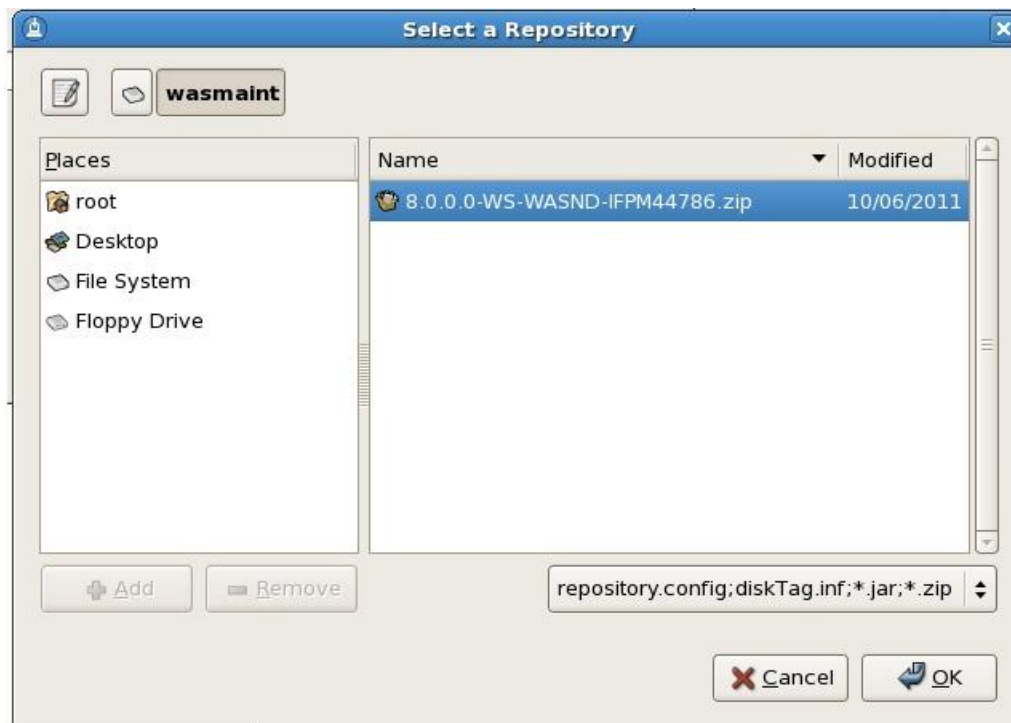
- \_\_\_ f. Click “ **Add Repository** “



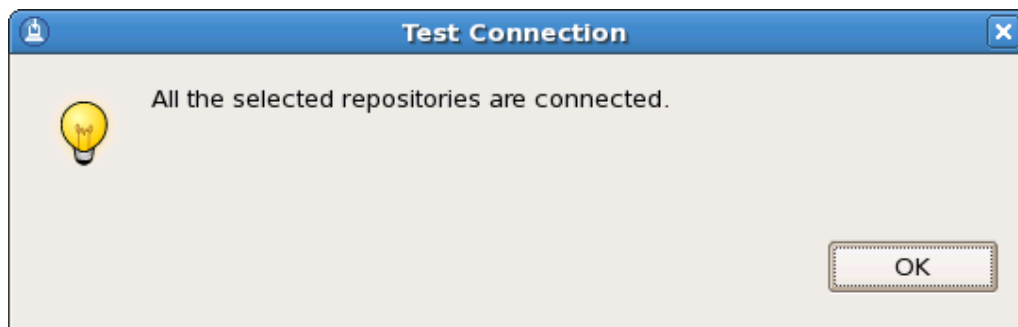
- \_\_\_ g. Browse to the **/opt/media/IMRepository** directory, and select the **repository.config** file, and click “OK”



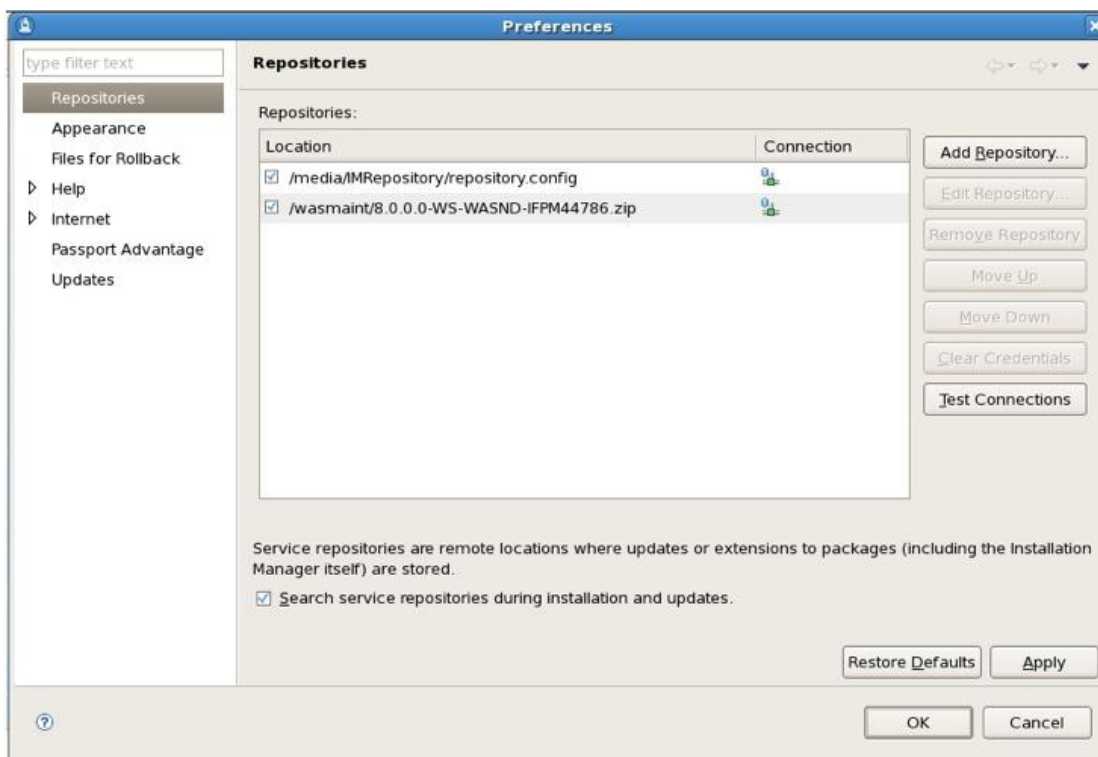
- \_\_\_ h. Repeat the previous step to add a repository for iFix. Browse to the **/wasmaint** directory, select the **8.0.0.0-WASND-IFPM44786.zip** file, and click **OK**



- \_\_\_ i. Test the connection to the repository with the “**Test Connection**” button



- \_\_\_ j. Your Installation Manager screen should now look like the image below. At this point we are ready to start installing software that exists in the repository.



- \_\_\_ k. Click “**OK**” to return to the Install Manager home.

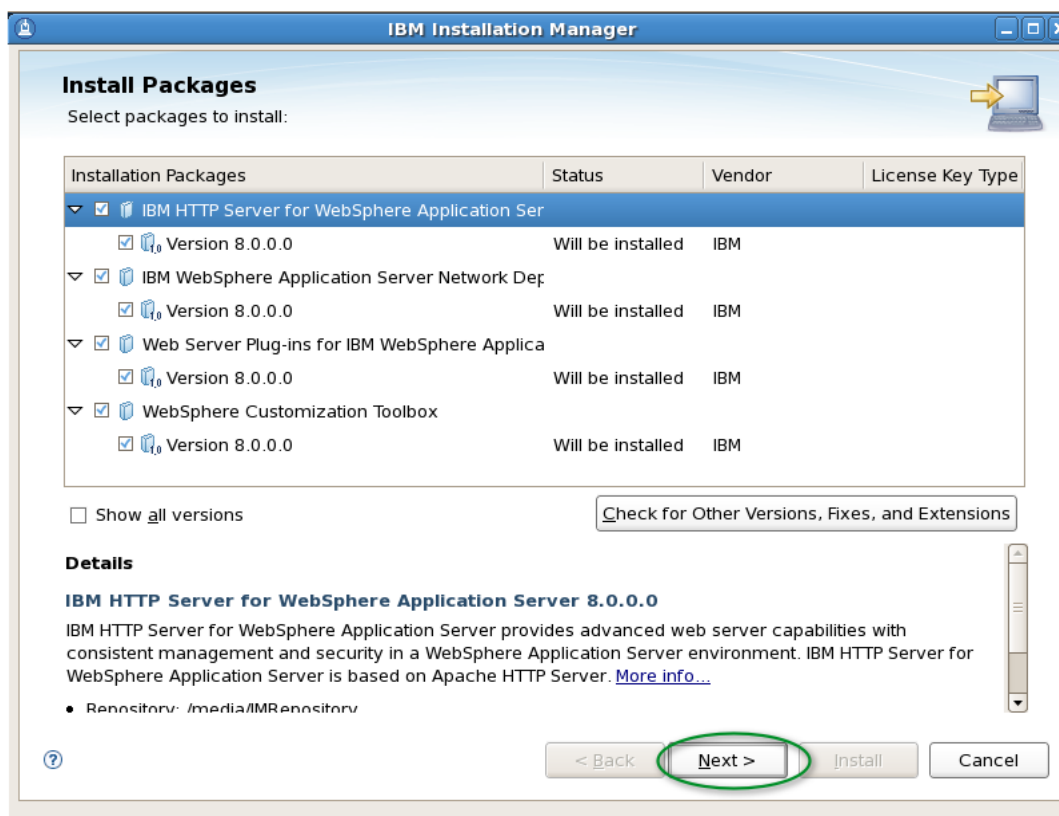


\_\_\_ 4. Install WebSphere Application Server

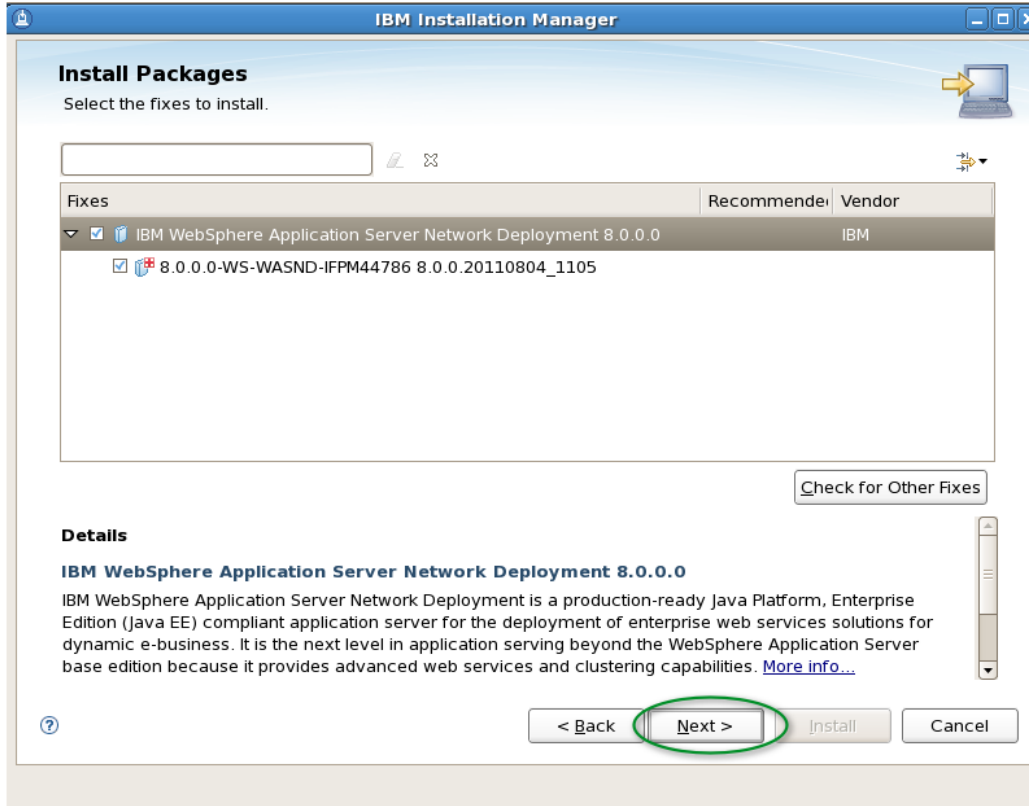
\_\_\_ I. Click **Install** from the Installation Manager



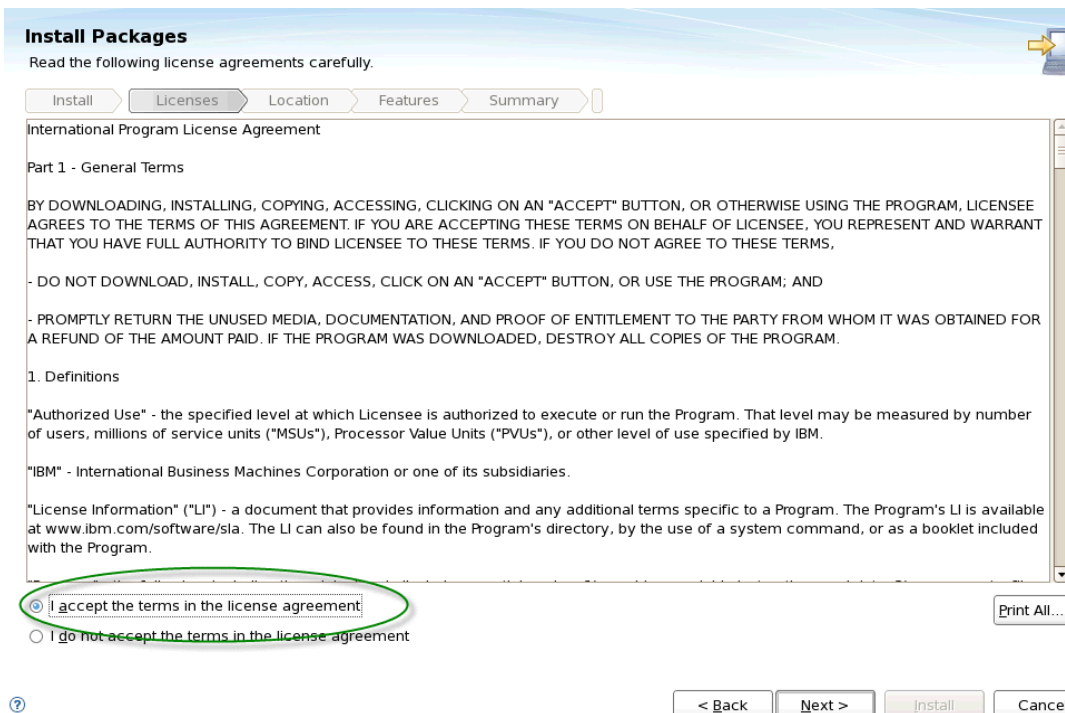
\_\_\_ m. Select the software to install as show below then click **Next**.



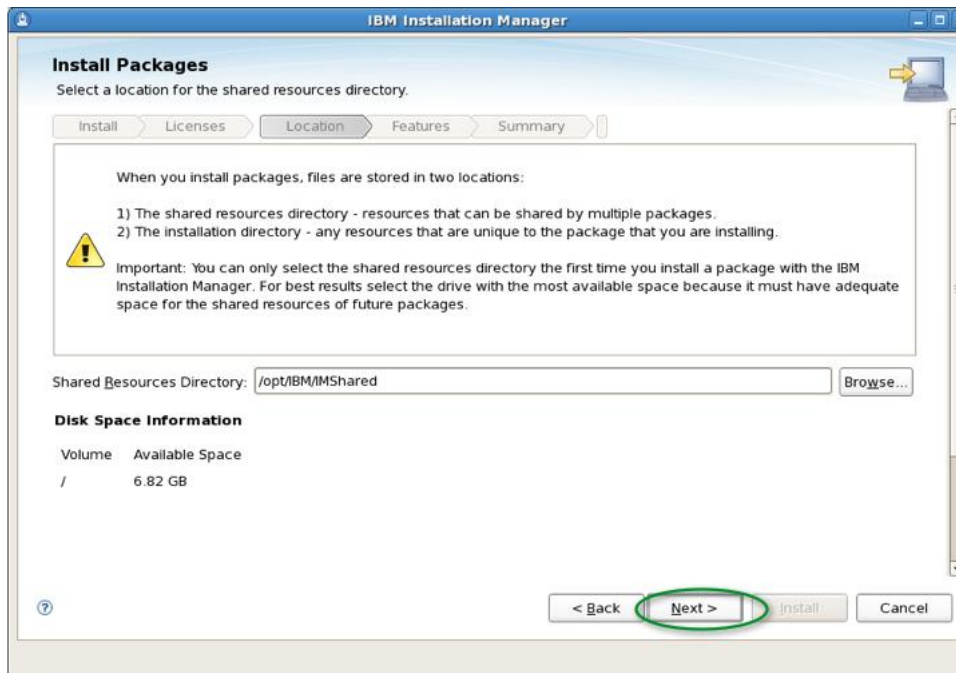
\_\_\_ n. Select the fix and click **OK**.



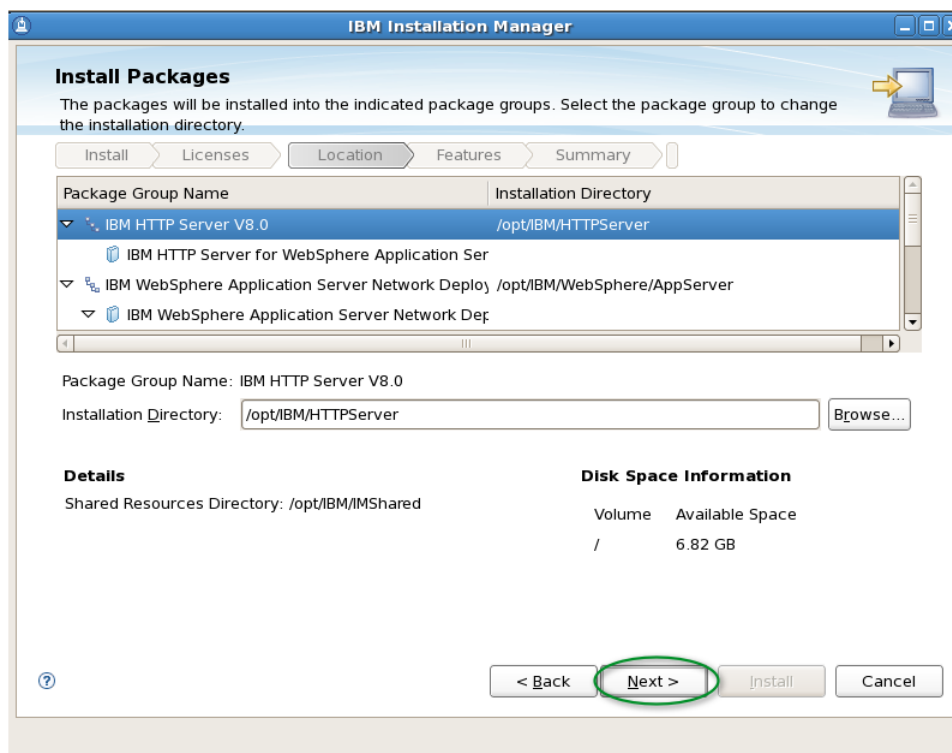
\_\_\_ o. **Select Accept the License and Click Next**



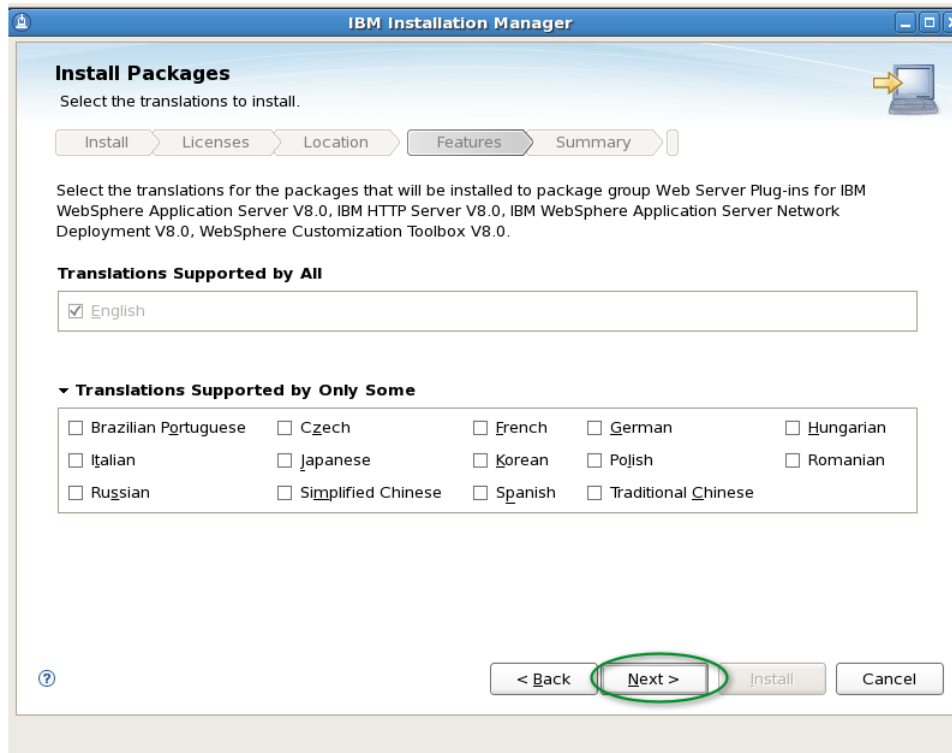
\_\_ p. Select Shared Resources Directory **/opt/IBM/IMShared** and click **Next**.



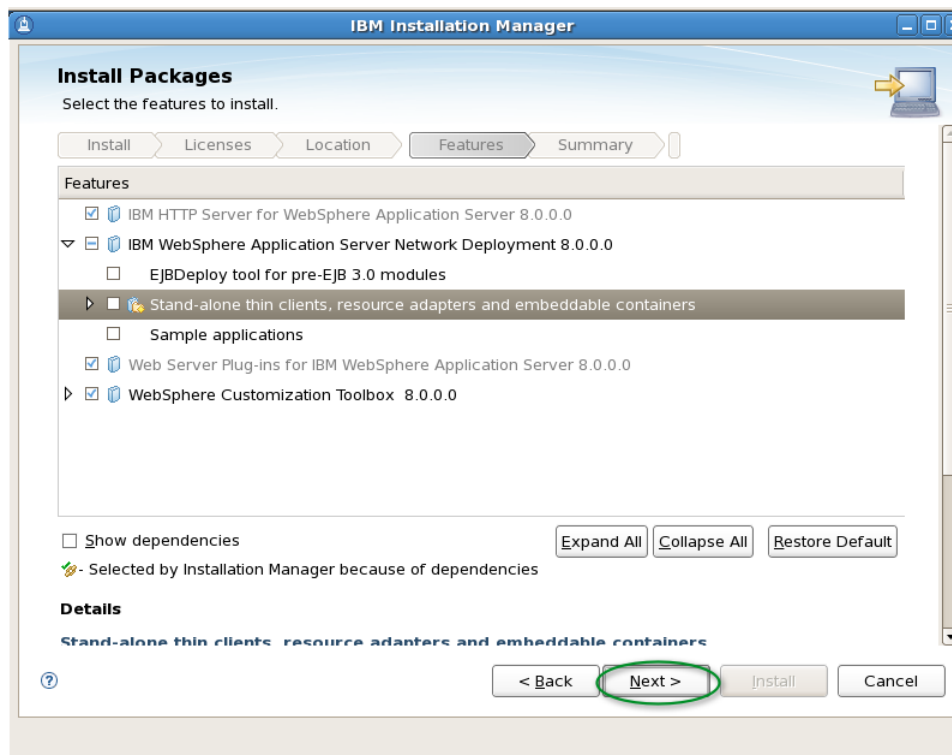
\_\_ q. Accept the default for the package group installation and directory. Click **Next**.



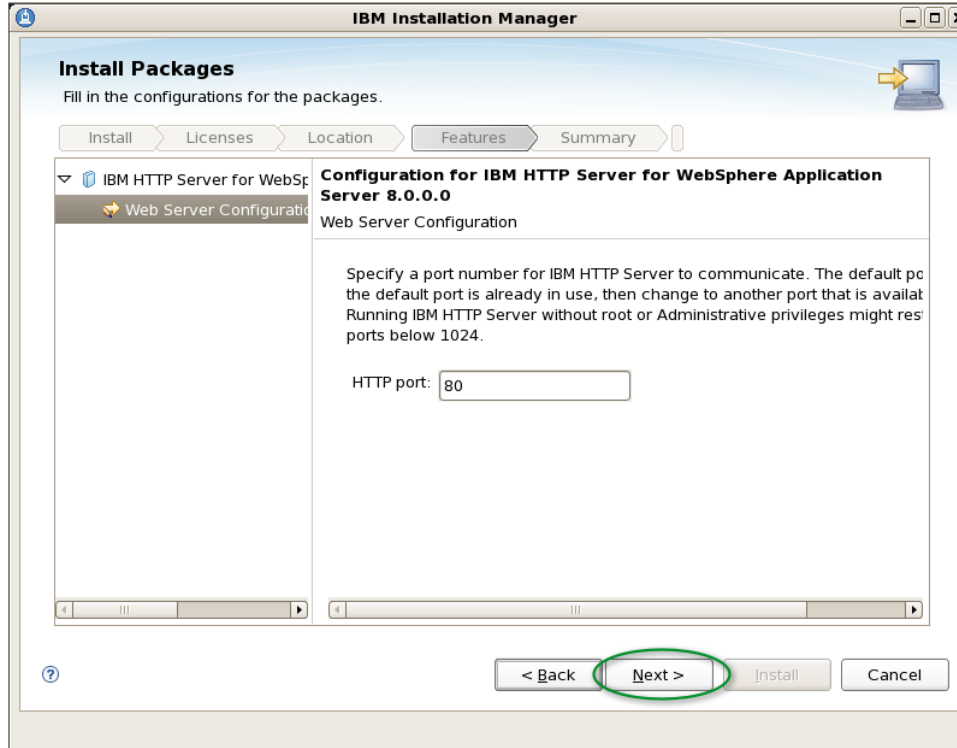
\_\_ r. Accept the default for Language and click **Next**.



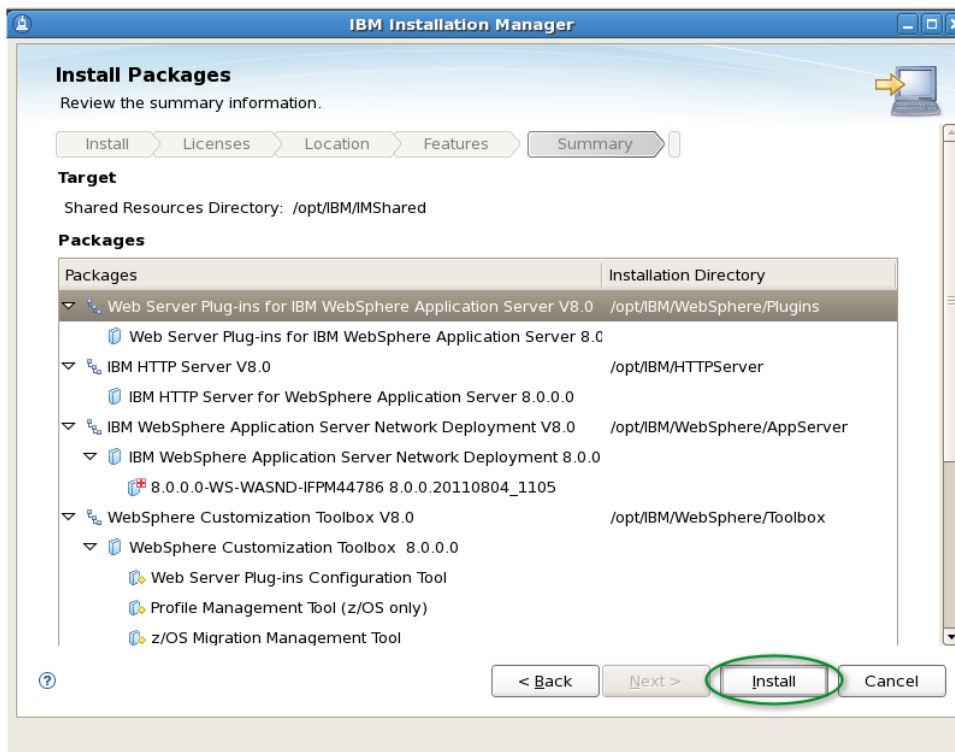
\_\_ s. Select the packages to install as shown below and click **Next**.



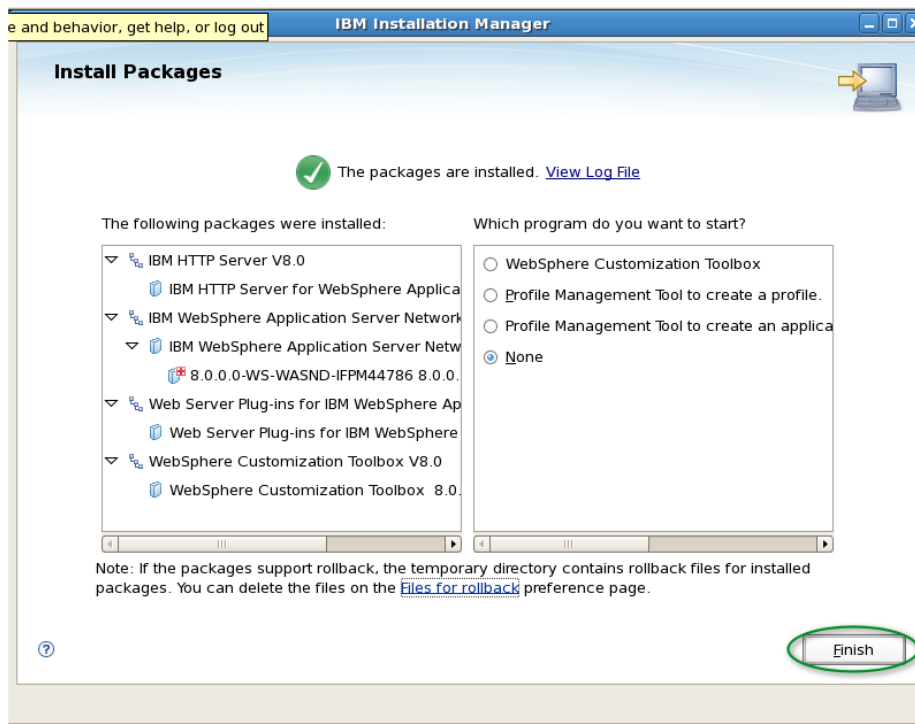
\_\_\_ t. Select port 80 for the Web Server



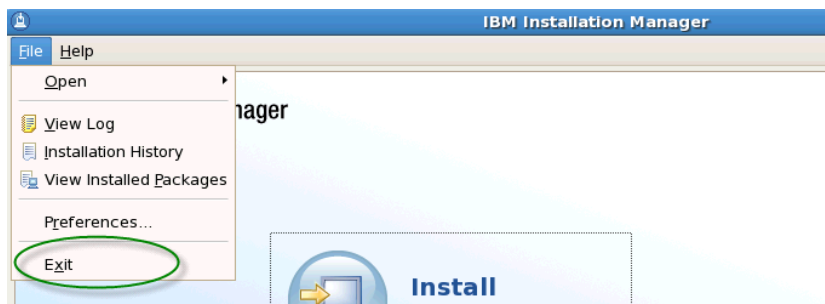
\_\_\_ u. Review the install package list, which shows both WAS and the ifix and click **Install**



- \_\_\_ v. Once the install has completed you should see the dialog below. Select “**None**” for the “Which Program do you want to start?” Option (**Do Not** Start the Profile Management Tool) and Click **Finish**



- \_\_\_ w. Exit the Installation Manager using **File -> Exit**

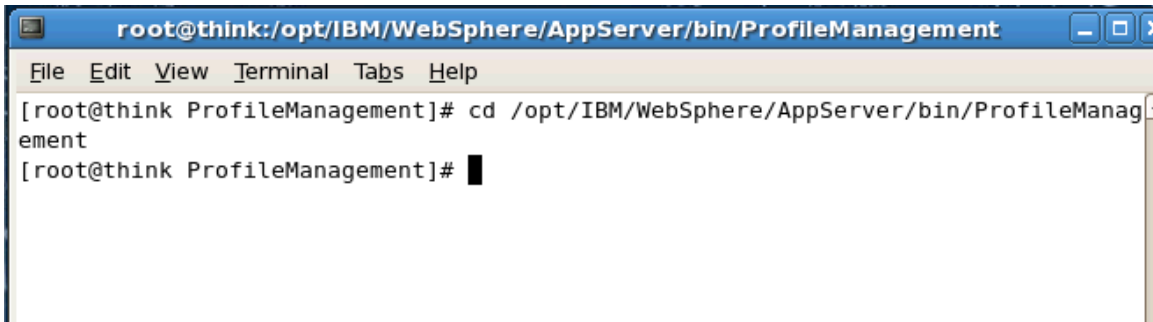


**Note: You installed WAS, HIS, and an ifix, demonstrating a “one pass install”.**

\_\_\_\_ 5. Create an application server profile

- \_\_\_ a. In a terminal window change directories to **/opt/IBM/WebSphere/AppServer/bin/ProfileManagement** using the command

**cd /opt/IBM/WebSphere/AppServer/bin/ProfileManagement** as shown below

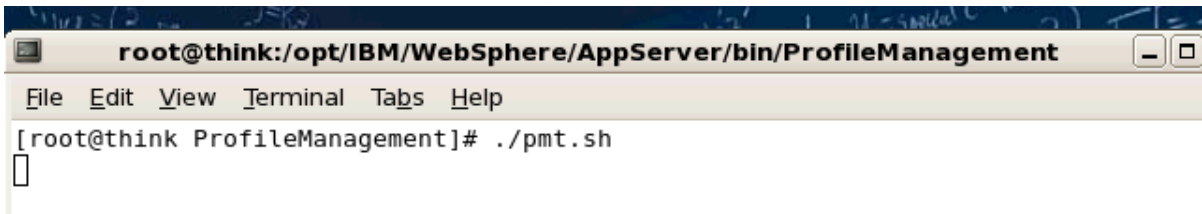


```

root@think:/opt/IBM/WebSphere/AppServer/bin/ProfileManagement
File Edit View Terminal Tabs Help
[root@think ProfileManagement]# cd /opt/IBM/WebSphere/AppServer/bin/ProfileManagement
[root@think ProfileManagement]#

```

- \_\_\_ b. Launch the WebSphere Customization Toolkit (formerly the Profile Management Tool ) using the command **./pmt.sh**



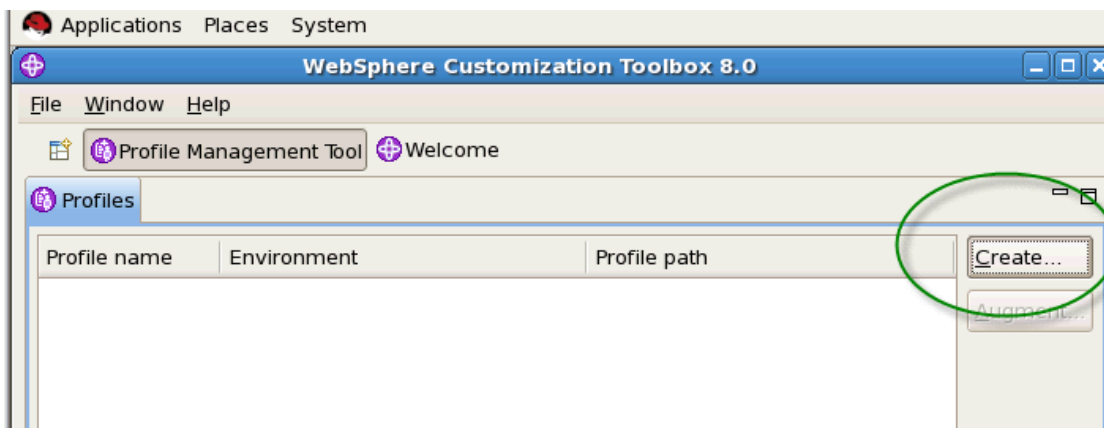
```

root@think:/opt/IBM/WebSphere/AppServer/bin/ProfileManagement
File Edit View Terminal Tabs Help
[root@think ProfileManagement]# ./pmt.sh

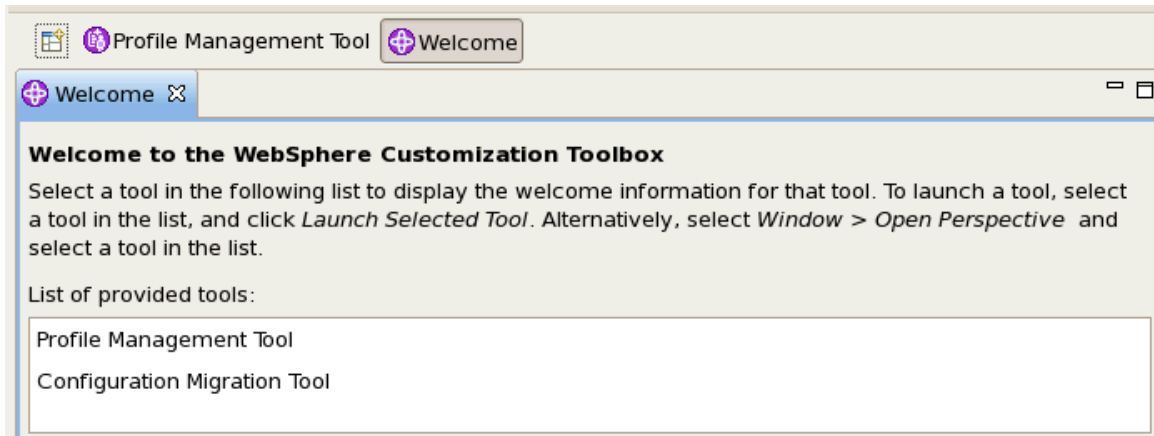
```

\_\_\_\_ 6. Create a WebSphere Application Server Profile, installing the adminconsole and sample application, configuring administrative security with the user “wasadmin” and password “wasadmin”.

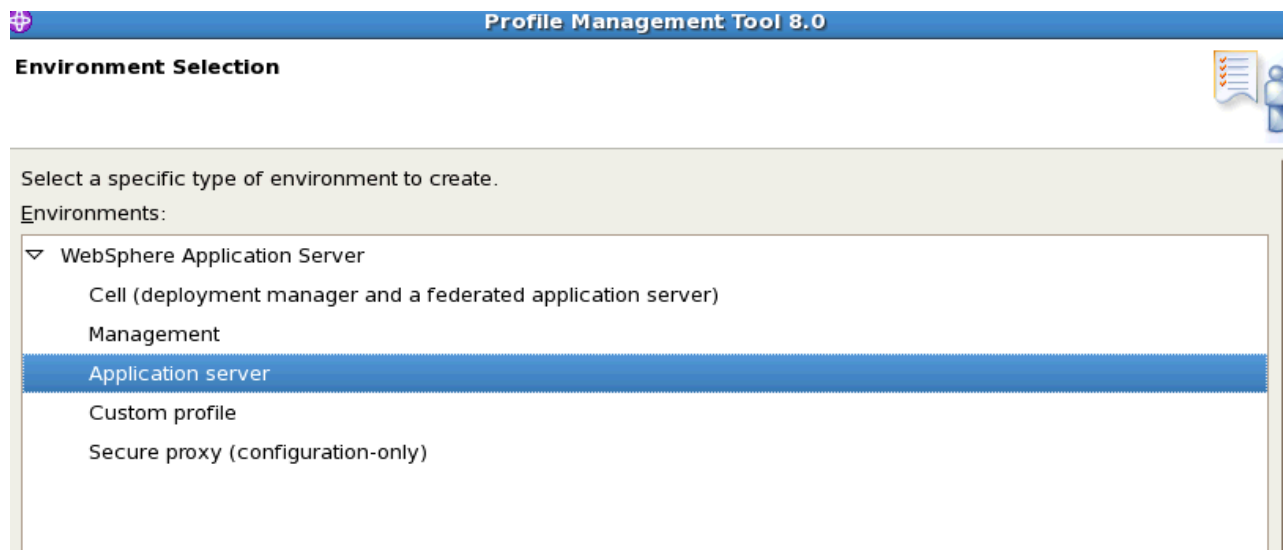
- \_\_\_ a. Select “**Create**” to start the profile creation process



**Note:** Even though you launched the Profile Management Tool with the command `/pmt.sh`, you'll notice that the WebSphere Customization Toolbox launched. A subset of this new toolbox is installed with WAS which includes the Profile Management Tool and the Configuration Migration Tool.



\_\_ b. Highlight “**Application Server**” and click “**Next**” as shown below.





\_\_\_ c. Select “Advanced Profile Creation”

**Profile Creation Options**

Choose the profile creation process that meets your needs. Pick the Typical option to allow the Profile Management Tool assign a set of default configuration values to the profile. Pick the Advanced option to specify your own configuration values for the profile.

Typical profile creation


Create an application server profile that uses default configuration settings. The Profile Management Tool assigns unique names to the profile, node, and host. The tool also assigns unique port values. The administrative console and the default application will be installed. You can optionally select whether to enable administrative security. The tool might create a system service to run the application server depending on the operating system of your machine and the privileges assigned to your user account.

**Note:** Default personal certificates expire in one year. Select Advanced profile creation to create a personal certificate with a different expiration.

**Advanced profile creation**

Create application server using default configuration settings or specify your own values for settings such as the location of the profile and names of the profile, node, and host. You can assign your own port values. You can optionally choose whether to deploy the administrative console and Sample applications, and create a Web server definition. You might have the option to run the application server as a system service depending on the operating system.

\_\_\_ d. Continue through the panels accepting all the defaults by clicking on “Next” until you reach the “Administrative Security” panel, then specify “wasadmin” for the user and “wasadmin” for the password .

**Administrative Security** 

Choose whether to enable administrative security. To enable security, supply a user name and password for logging into administrative tools. This administrative user is created in a repository within the application server. After profile creation finishes, you can add more users, groups, or external repositories.

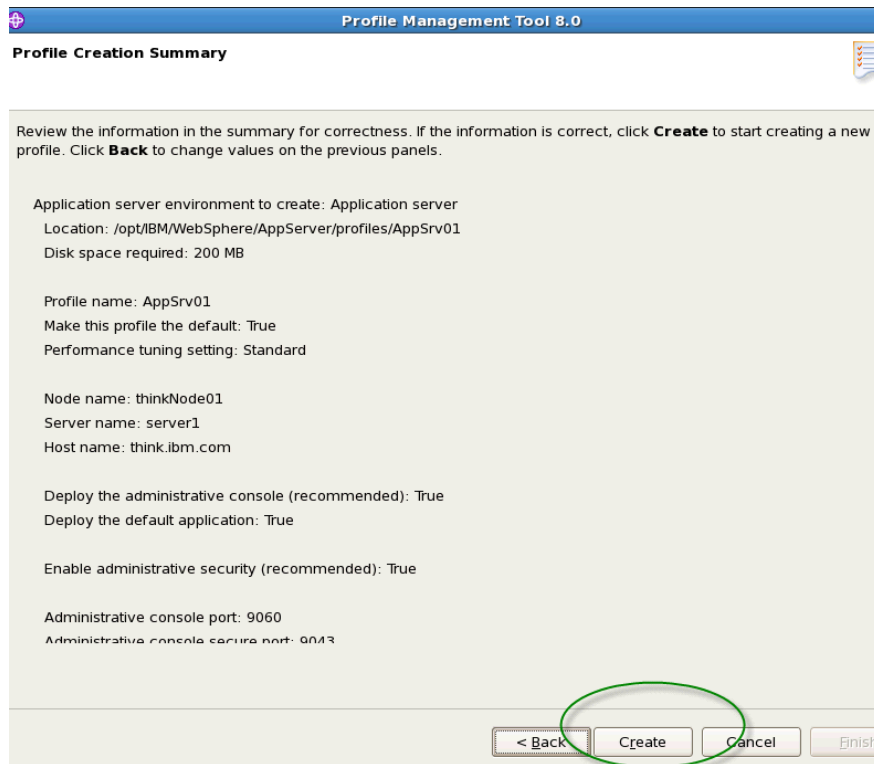
Enable administrative security

User name:

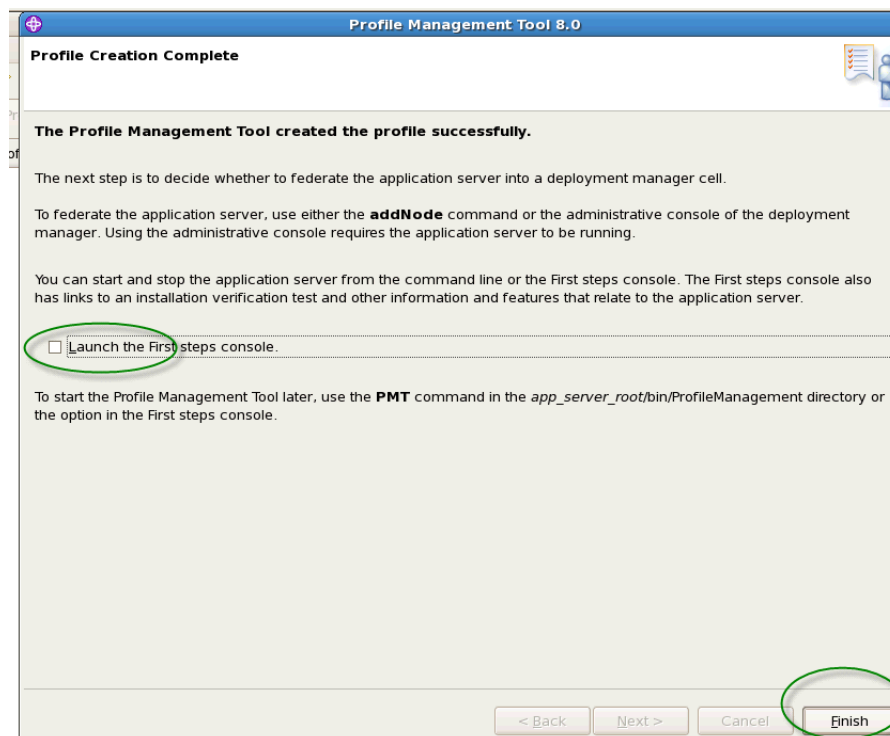
Password:

Confirm password:

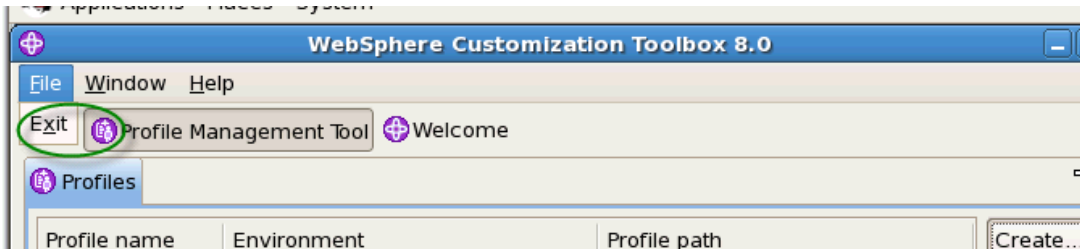
- \_\_\_ e. Again continue though all the panels accepting all the defaults by clicking “**Next**” until you reach the panel shown below. Create the profile by clicking “**Create**”



- \_\_\_ f. Unselect the “**First Steps**” dialog, click “**Finish**”

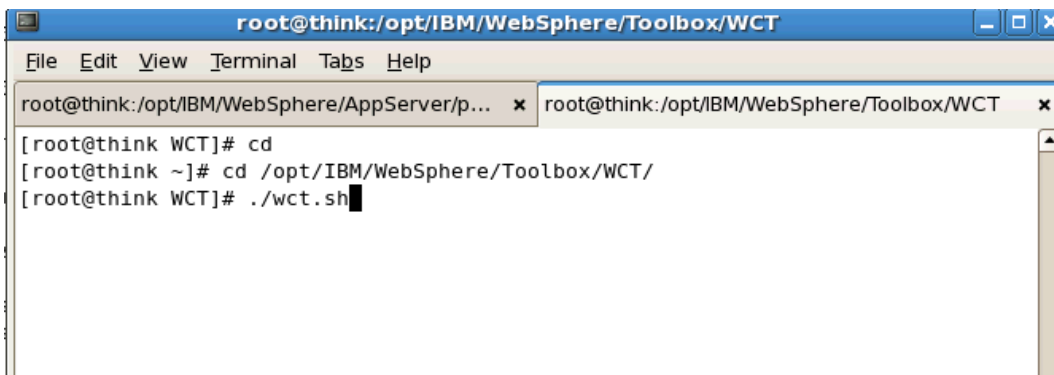


\_\_\_ g. Exit the WCT (WebSphere Customization Toolbox) by clicking **File ->Exit**

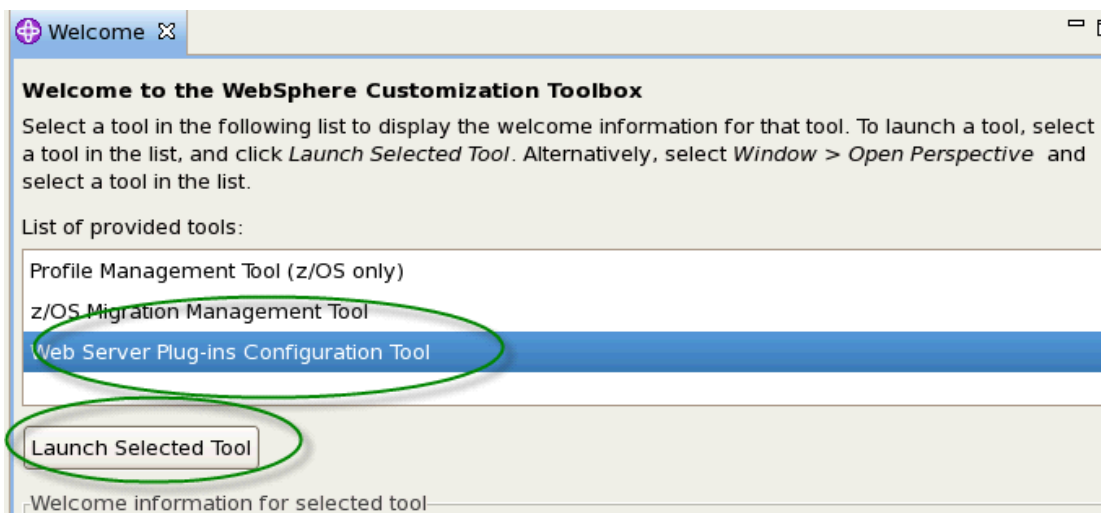


\_\_\_ 7. Launch WebSphere Customization Toolbox (WCT) to Configure the HTTP Server Plugin

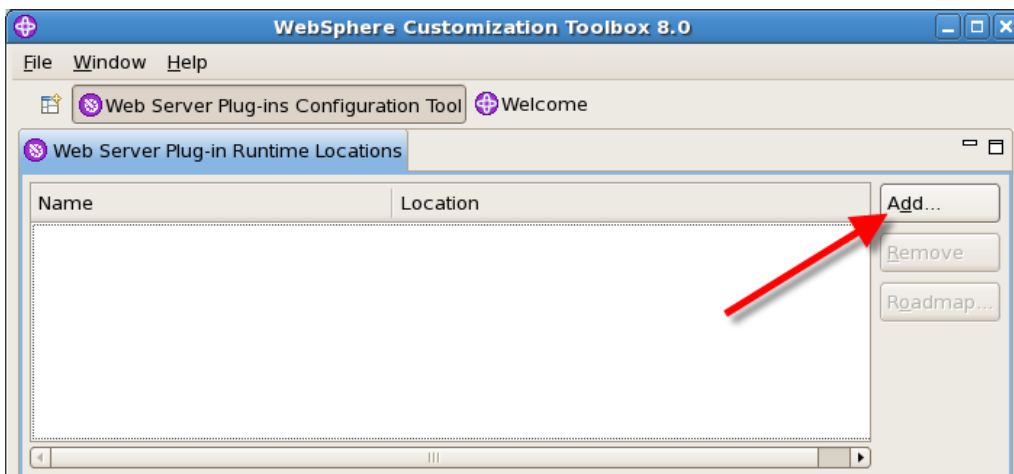
\_\_\_ a. As shown below change directories to **/opt/IBM/WebSphere/Toolbox/WCT/** then enter **./wct.sh**



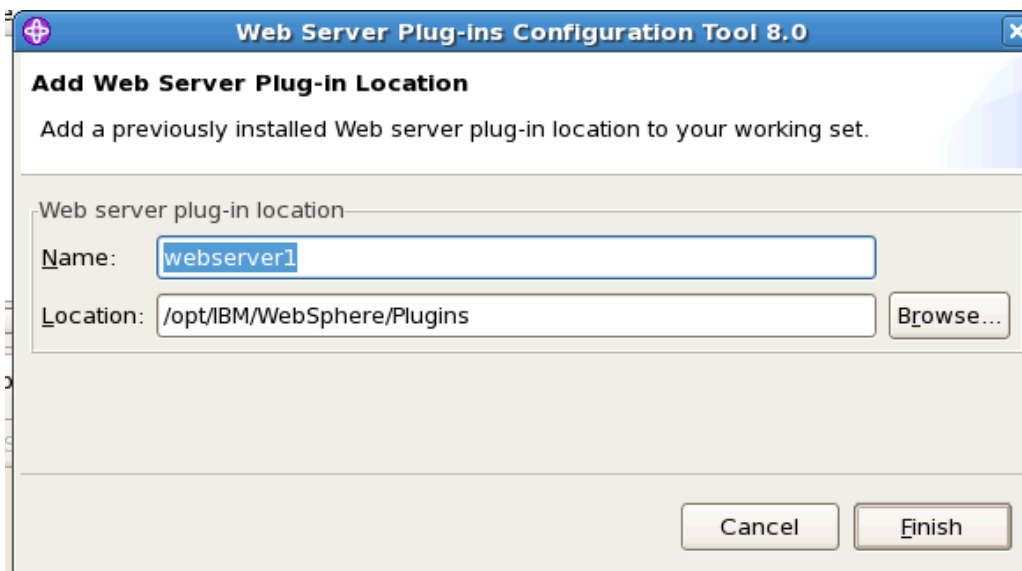
\_\_\_ b. Specify **Web Server Plug-ins Configuration Tool** and Click **Launch Selected Tool**



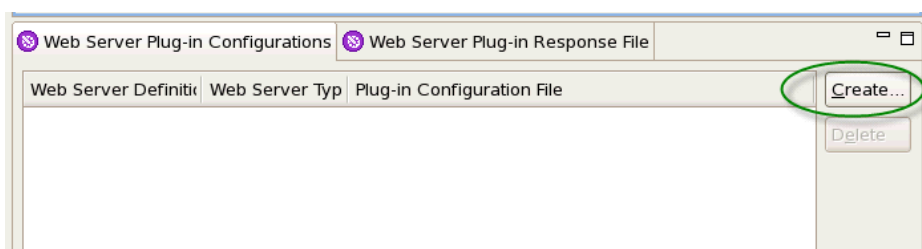
\_\_\_ c. Click the **Add** button



\_\_\_ d. Enter **webserver1** and **/opt/IBM/WebSphere/Plugins** as shown below, and click **Finish**



\_\_\_ e. Click Create



- \_\_\_ f. Select **IBM HTTP Server V8** and click **Next**
- \_\_\_ g. Enter **/opt/IBM/HTTPServer/conf/httpd.conf** and click **Next**
- \_\_\_ h. Create an userid **ihsadmin**, with a password of **ihsadmin**, as shown and click **Next**

**Web Server Plug-ins Configuration Tool 8.0**

**Setup IBM HTTP Server Administration Server**

Optionally configure an administrative server to administer the Web server. You can manage the Web server from a WebSphere Application Server administrative console by using the IBM HTTP Server administrative server to control the communication between them.

**Setup IBM HTTP Server Administration Server**

Specify a port number for IBM HTTP Server administration server to communicate. The default port is 8008. If the default port is already in use, then change to another port that is available. Running IBM HTTP Server administration server without root or Administrative privileges might restrict use of ports below 1024.

HTTP Administration Port:

Optionally create a user ID and password to authenticate to the IBM HTTP Server Administration Server from the WebSphere Application Server administrative console. The user ID and password is encrypted and stored in the cor admin.passwd file. You can create additional user IDs after the configuration by using the htpasswd utility.

**Create a user ID for IBM HTTP Server Administration Server authentication**

User ID:

Password:

Confirm password:

- \_\_\_ i. Enter **ihsrun** and **ihsgrp** as shown and select **“Create a new system user ID.....”**, as shown below then click **Next**

**Web Server Plug-ins Configuration Tool 8.0**

**Setup IBM HTTP Server Administration Server**

Specify a system user ID and group. The user ID is granted write access to IBM HTTP Server, IBM HTTP Serve Administration Server and web server plug-in configuration files. If the user ID or group does not exist on the then choose to create a new system user and group with the credentials.

User ID:

Group:

**Create a new unique system user ID and group using the credentials.**

\_\_\_ j. Specify **webserver1** for the web server name and click **Next**

**Web Server Plug-ins Configuration Tool 8.0**

**Web Server Definition Name**

Use a Web server definition to manage a Web server through the WebSphere Application Server administrative console or the wsadmin tool. The definition name must be unique because this name is used to identify this Web server in the administrative console.

Specify a unique Web server definition name:

The Web server definition name must not be empty and it must not contain the following special characters or space:

/ \ \* , . ; = + ? | < > & % ' " [ ] > # \$ ^ { }

Note: a period (.) is not valid if it is the first character.

\_\_\_ k. Check **local** and enter **/opt/IBM/WebSphere/AppServer** then click **Next**

**Web Server Plug-ins Configuration Tool 8.0**

**Configuration Scenario Selection**

Configure the Web server plug-ins to the computer where the Web server exists. When the Web server and application server are not on the same computer, choose the remote configuration scenario. When both Web server and application server are on the same computer, choose the local configuration scenario. In the local scenario, the Web server definition you create in this wizard is defined automatically in the application server.

Configuration scenario

(Remote) Host name or IP address of the application server

(Local) Installation location of WebSphere Application Server

For the remote configuration scenario, the host name must be accessible on the network through one of the following address formats:

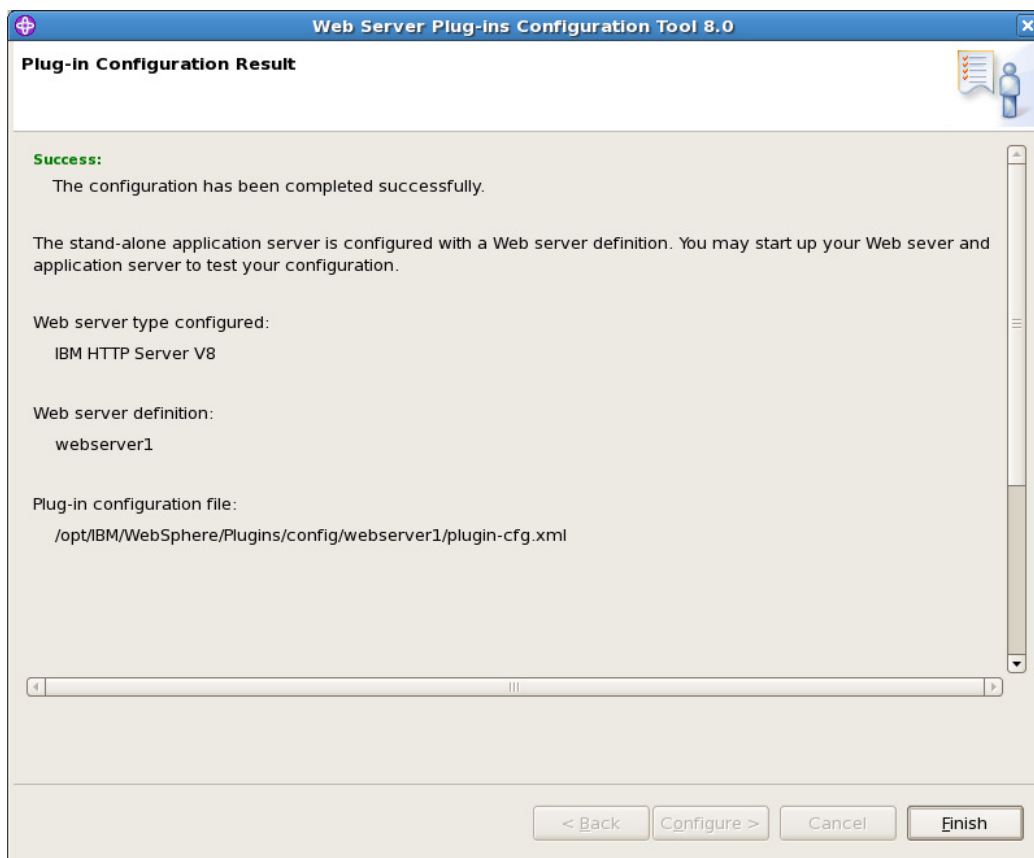
- Fully qualified domain name system (DNS) host name
- The default short DNS host name
- Numeric IP address

\_\_\_ l. Select the **AppSrv01** profile and click **Next**



\_\_\_ m. Click **Configure**

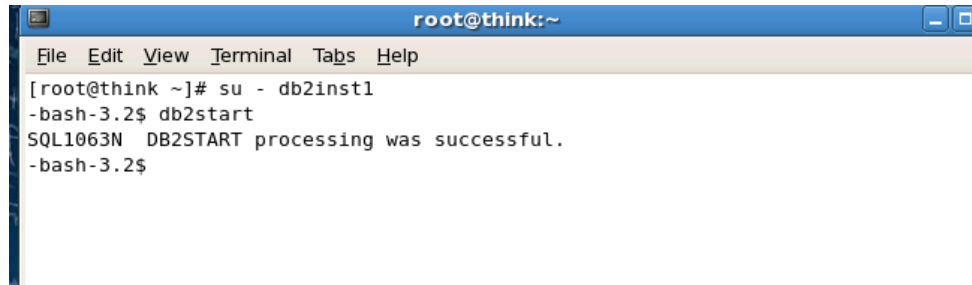
\_\_\_ n. Click **Finish**



\_\_\_ o. Exit the WCT when plugin configuration is complete

\_\_\_ 8. Configure WebSphere Application Server to use DB2.

\_\_\_ a. DB2 is not running as a service, so you will need to start DB2 by opening a terminal window and entering “**su – db2inst1**” which will change you from the user root to db2inst1 then enter the command **db2start** as and wait for the message “**SQL1063N DB2START processing was successful**” as shown below.



```

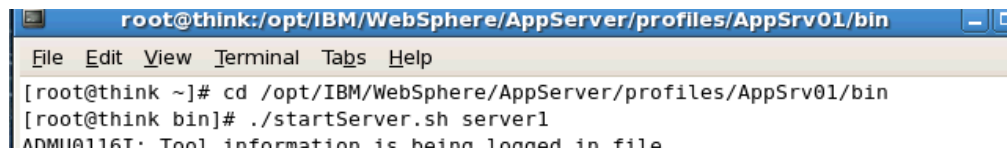
root@think:~
File Edit View Terminal Tabs Help
[root@think ~]# su - db2inst1
-bash-3.2$ db2start
SQL1063N DB2START processing was successful.
-bash-3.2$

```

\_\_\_ b. Open a terminal window and change to the directory

**opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin**

\_\_\_ c. Start the server with the command “**./startServer server1**” as shown below



```

root@think:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin
File Edit View Terminal Tabs Help
[root@think ~]# cd /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin
[root@think bin]# ./startServer.sh server1
ADMU0116T: Tool information is being logged in file

```

\_\_\_ d. Wait until you see the message

**ADMU3000I: Server server1 open for e-business; process id is xxx**


\_\_\_ e. Open a browser on your host machine and enter the URL

<http://localhost:9060/ibm/console/>

**Note: If you receive a warning about the SSL certificate being presented click “Continue to the website “to accept the certificate. This occurs because you are using a self-signed certificate from WAS for which a certificate does not already exist in the browser**

**The warning below is from Internet Explorer.**





**There is a problem with this website's security certificate.**

---


The security certificate presented by this website was not issued by a trusted certificate authority.  
The security certificate presented by this website was issued for a different website's address.

Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.

**We recommend that you close this webpage and do not continue to this website.**

- [Click here to close this webpage](#)
- [Continue to this website \(not recommended\).](#)
- [More information](#)

The warning from Firefox is shown below



**This Connection is Untrusted**

You have asked Firefox to connect securely to **10.10.10.101:9043**, but we can't confirm that your connection is secure.

Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.

**What Should I Do?**

If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.

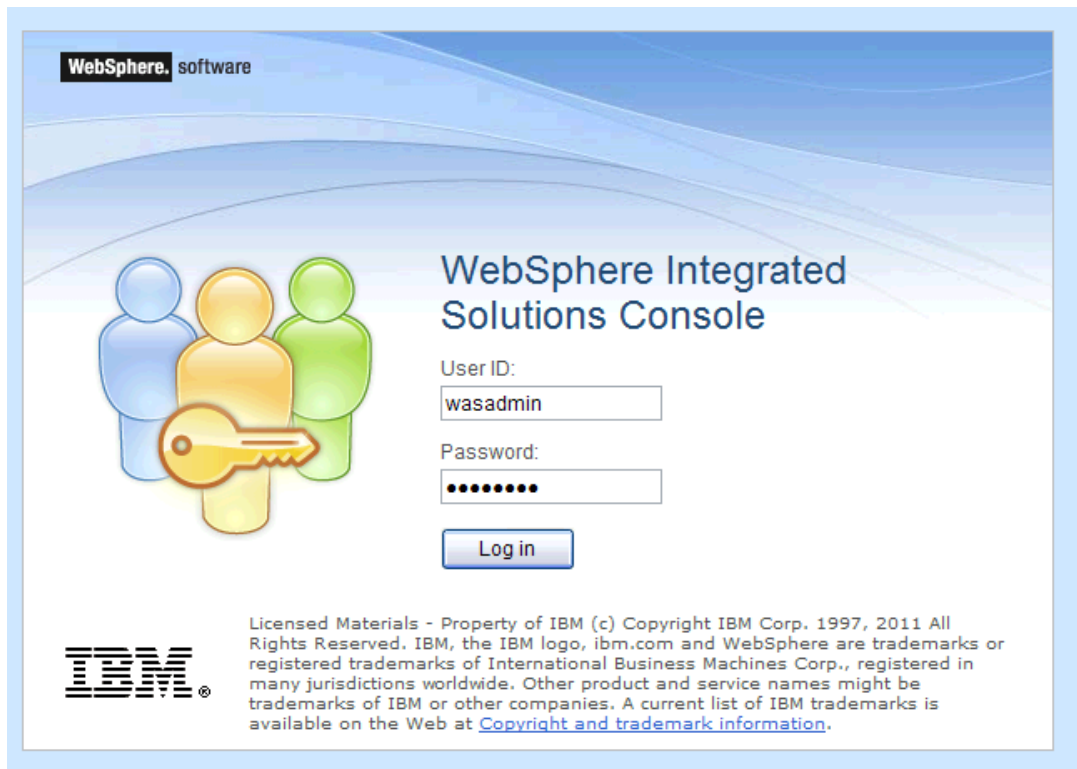
► **Technical Details**

▼ **I Understand the Risks**

If you understand what's going on, you can tell Firefox to start trusting this site's identification. **Even if you trust the site, this error could mean that someone is tampering with your connection.**

Don't add an exception unless you know there's a good reason why this site doesn't use trusted identification.

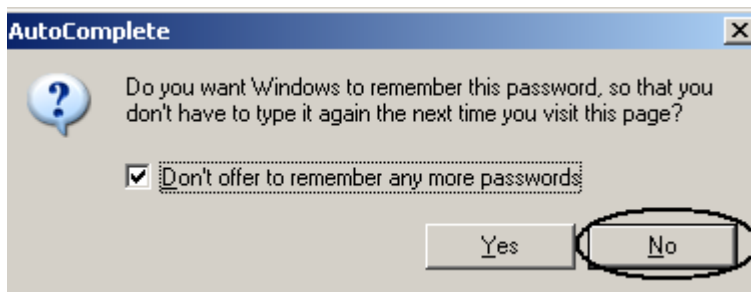
- \_\_\_ f. Since WAS administrative security is enabled this will redirect to <https://localhost:9043/ibm/console/login.do?action=secure> Enter **wasadmin** for user ID and **wasadmin** for the password



---

**Note:** When you open the browser you will receive one or two security alerts.

If prompted to remember passwords, **DISABLE** this function as shown below.



**Password remembering functions can compromise security, so this function should not be used.**

---

- \_\_\_ g. Once inside the console Navigate to **Resources -> JDBC Providers** ,Change the scope to **Node=thinkNode01** then select **New**

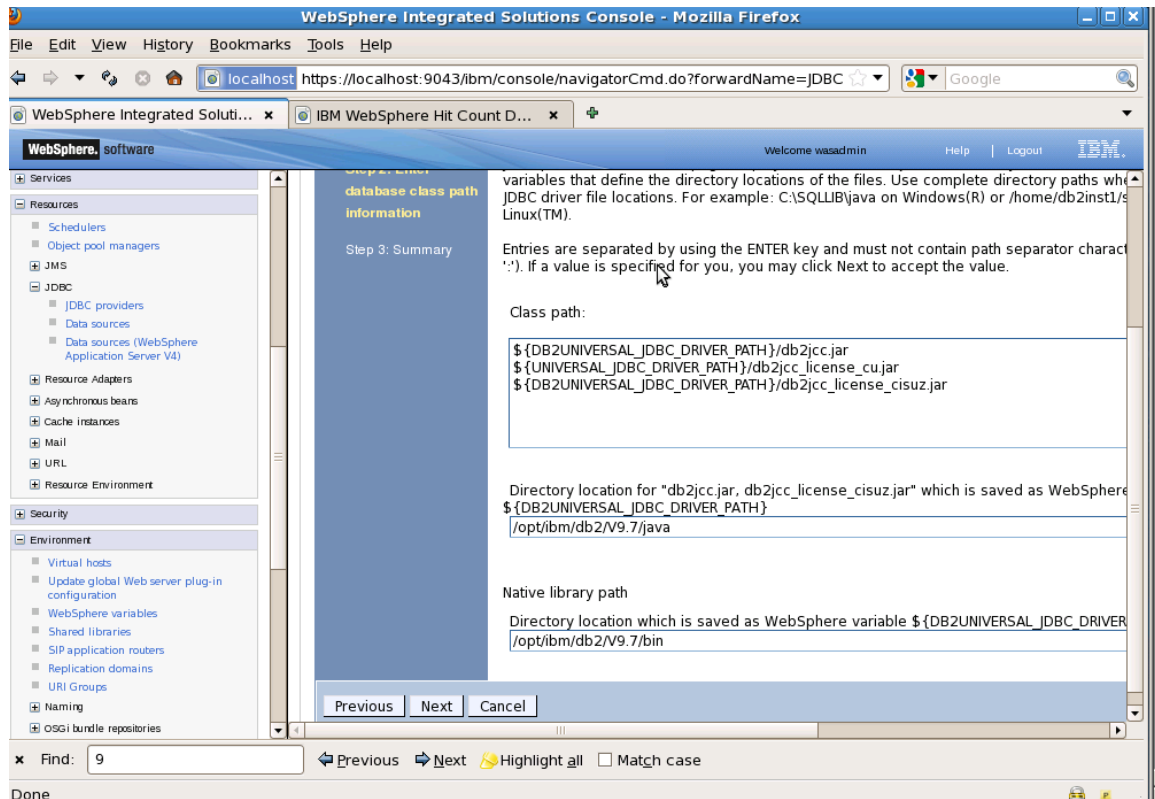
The screenshot shows the 'JDBC providers' configuration page. The 'Scope' dropdown is set to 'Node=thinkNode01'. Below it, the 'Preferences' section contains a 'New...' button and a 'Delete' button. The table below shows a single entry with 'None' as the scope and 'Total 0' as the count.

Select	Name	Scope	Description
	None		
Total 0			

- \_\_\_ h. Click on **JDBC Providers** to start the dialog to create a DB2 JDBC Provider with the settings shown below (note the resource scope of "thinkNode01") . Then click **Next**

The screenshot shows the 'Create a new JDBC Provider' wizard. The 'Scope' field is filled with 'cells:thinkNode01Cell:nodes:thinkNode01'. The 'Database type' is 'DB2', 'Provider type' is 'DB2 Universal JDBC Driver Provider', and 'Implementation type' is 'XA data source'. The 'Name' field is 'DB2 Universal JDBC Driver Provider (XA)' and the 'Description' is 'Two-phase commit DB2 JCC provider that supports JDBC 3.0. Data sources that use this provider support the use of XA to perform 2-phase commit processing. Use of driver type 2 on the application server for z/OS is not supported for data sources created under this provider.'

- \_\_\_ i. Configure the classpath to **/opt/ibm/db2/V9.7/java** and a native library path to **/opt/ibm/db2/V9.7/bin**



- \_\_\_ j. Click **Next**, Review the Summary Panel Then click **Finish**.
- \_\_\_ k. **Save** your changes.
- \_\_\_ l. Click on the **DB2 Universal JDBC Driver Provider (XA)**.

Select	Name	Scope	Description
<input type="checkbox"/>	<a href="#">DB2 Universal JDBC Driver Provider (XA)</a>	Node=thinkNode01	Two-phase commit DB2 JCC provider that supports JDBC 3.0. Data sources that use this provider support the use of XA to perform 2-phase commit processing. Use of

\_\_\_ m. Click on **Data sources**

**JDBC providers > DB2 Universal JDBC Driver Provider (XA)**

Use this page to edit properties of a Java Database Connectivity (JDBC) provider. The JDBC provider object encapsulates the specific JDBC driver implementation class for access to the specific vendor database of your environment.

Configuration

General Properties	Additional Properties
<p>* Scope  <input type="text" value="cells:thinkCell01:nodes:thinkNode01"/></p> <p>* Name  <input type="text"/></p>	<ul style="list-style-type: none"> <li>■ <a href="#">Data sources</a></li> <li>■ <a href="#">Data sources (WebSphere)</a></li> </ul>

\_\_\_ n. Click **New**

\_\_\_ o. Configure a Data source with following settings

- 1) DataSource Name **WAS V8 Datasource for DB2**
- 2) JNDI Name **jdbc/WAS97DB\_DS**
- 3) Database Name **WAS97DB**
- 4) Server name **think**
- 5) Port **50000**
- 6) the settings shown below, and **Save**

**Create a data source**

Create a data source

Step 1: Enter basic data source information

Step 2: Enter database specific properties for the data source

Step 3: Setup security aliases

→ **Step 4: Summary**

**Summary**

Summary of actions:

Options	Values
Scope	cells:thinkNode01Cell:nodes:thinkNode01
Data source name	WAS V8 Datasource for DB2
JNDI name	jdbc/WAS97DB_DS
Select an existing JDBC provider	DB2 Universal JDBC Driver Provider (XA)
Implementation class name	com.ibm.db2.jcc.DB2XADataSource
Driver type	4
Database name	WAS97DB
Server name	think
Port number	50000
Use this data source in container managed persistence (CMP)	true
Authentication alias for XA recovery	(none)
Component-managed authentication alias	(none)
Mapping-configuration alias	(none)
Container-managed authentication alias	(none)

- \_\_\_ p. After configuring the Data source you will need to create a JAAS–J2C Authentication Alias. Select the data source you just configured, then click the link **JAAS-J2C authentication data** as shown below.

Configuration

[Test connection](#)

**General Properties**

\* Scope  
cells:thinkNode01.Cell:nodes:thinkNode01

\* Provider  
DB2 Universal JDBC Driver Provider (XA)

\* Name  
WAS V8 Datasource for DB2

JNDI name  
jdbc/WAS97DB\_DS

Use this data source in container managed persistence (CMP)

Description  
DB2 Universal Driver ~~Datasource~~

**Additional Properties**

- [Connection pool properties](#)
- [WebSphere Application Server data source properties](#)
- [Custom properties](#)

**Related Items**

- [JAAS - J2C authentication data](#)

- \_\_\_ q. Select **New** and create an alias with the name **db2alias**, the user ID of **db2inst1** and password of **password**. Click **OK**. Then **Save** the changes.

Specifies a list of user identities and passwords for Java[1]

**General Properties**

\* Alias  
db2alias

\* User ID  
db2inst1

\* Password  
●●●●●●

Description

[Apply](#) [OK](#) [Reset](#) [Cancel](#)

- \_\_\_ r. Navigate to the data source, and change the security settings to use a container-managed authentication alias, using the alias you just created. Select **db2alias** from the drop-down list

**Security settings**

Select the authentication values for this resource.

Authentication alias for XA recovery

Component-managed authentication alias

Mapping-configuration alias

Container-managed authentication alias

Select the authentication values for this resource.

**Common and required data source properties**

Name	Value
* Driver type	<input type="text" value="4"/>
* Database name	<input type="text" value="WASV97DB"/>
* Server name	<input type="text" value="think"/>
* Port number	<input type="text" value="50000"/>

- \_\_\_ s. Select **OK**. Save your configuration by clicking **Save**

☐ Messages

⚠ Changes have been made to your local configuration. You can:

- [Save](#) directly to the master configuration.
- [Review](#) changes before saving or discarding.

⚠ The server may need to be restarted for these changes to take effect.

\_\_\_ 9. Change the data source mapping for the Default Application

\_\_\_ a. Navigate to **Applications -> Application Types -> WebSphere Enterprise Applications**

\_\_\_ b. Stop the **Default Application**

The screenshot shows the management console for Enterprise Applications. At the top, there is a toolbar with buttons: Start, Stop (highlighted with a red box), Install, Uninstall, Update, Rollout Update, Remove File, Export, Export DDL, and Export File. Below the toolbar are icons for selection and refresh. The main area has a table with columns 'Select', 'Name', and 'Application Status'. The table contains three rows: 'DefaultApplication' (checked), 'ivtApp', and 'query'. The 'DefaultApplication' row has a green status icon, while the others have green status icons with a plus sign. A 'Total 3' summary is at the bottom.

Select	Name	Application Status
<input checked="" type="checkbox"/>	<a href="#">DefaultApplication</a>	➔
<input type="checkbox"/>	<a href="#">ivtApp</a>	➔
<input type="checkbox"/>	<a href="#">query</a>	➔

Total 3

\_\_\_ c. Click on the application **DefaultApplication** to drill down into the application settings

#### Enterprise Applications

Use this page to manage installed applications. A single application can be deployed onto multiple servers.

⊞ Preferences

The screenshot shows the management console for Enterprise Applications. At the top, there is a toolbar with buttons: Start, Stop, Install, Uninstall, Update, Rollout Update, Remove File, Export, Export DDL, and Export File. Below the toolbar are icons for selection and refresh. The main area has a table with columns 'Select', 'Name', and 'Application Status'. The table contains three rows: 'DefaultApplication' (unchecked), 'ivtApp', and 'query'. The 'DefaultApplication' row has a red status icon, while the others have green status icons with a plus sign. A 'Total 3' summary is at the bottom.

Select	Name	Application Status
<input type="checkbox"/>	<a href="#">DefaultApplication</a>	✖
<input type="checkbox"/>	<a href="#">ivtApp</a>	➔
<input type="checkbox"/>	<a href="#">query</a>	➔

Total 3



\_\_\_ d. Click on “**Map data sources for all 2.x CMP beans**”

**Enterprise Applications** > **DefaultApplication**

Use this page to configure an enterprise application. Click the links to access pages for further configuring of the application or its modules.

Configuration

**General Properties**

\* Name  
DefaultApplication

Application reference validation  
Issue warnings

**Detail Properties**

- [Target specific application status](#)
- [Startup behavior](#)
- [Application binaries](#)
- [Class loading and update detection](#)
- [Request dispatcher properties](#)
- [Security role to user/group mapping](#)
- [View Deployment Descriptor](#)
- [Last participant support extension](#)

**References**

**Modules**

- [Manage Modules](#)

**Web Module Properties**

- [Session management](#)
- [Context Root For Web Modules](#)
- [JSP and JSF options](#)
- [Virtual hosts](#)

**Enterprise Java Bean Properties**

- [Default messaging provider references](#)
- [Application profiles](#)
- [Map data sources for all 2.x CMP beans](#)
- [Provide default data source mapping for modules containing 2.x entity beans](#)
- [EJB JNDI names](#)

**Database Profiles**

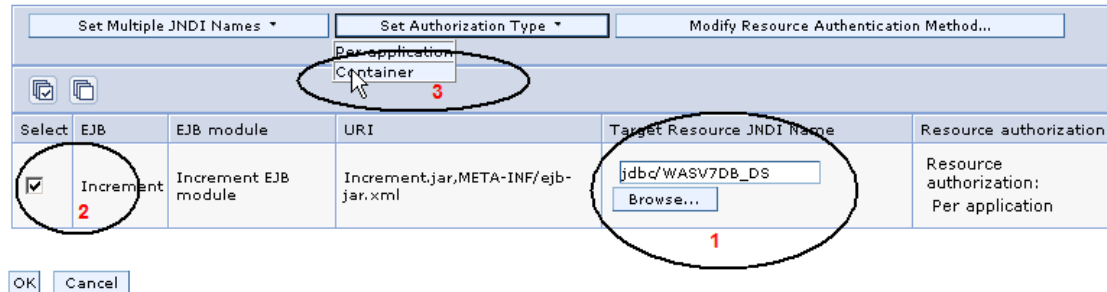
\_\_\_ e. Change the Data Source settings as described below

- 1) Browse to **jdbc/WAS97DB\_DS** as the target resource JNDI name, and select **Apply**
- 2) Select the Increment EJB and click **Set Authorization Type**, specify **Container** for the Authorization Type
- 3) Click **OK**

[Enterprise Applications](#) > [DefaultApplication](#) > **Map data sources for all 2.x CMP beans**

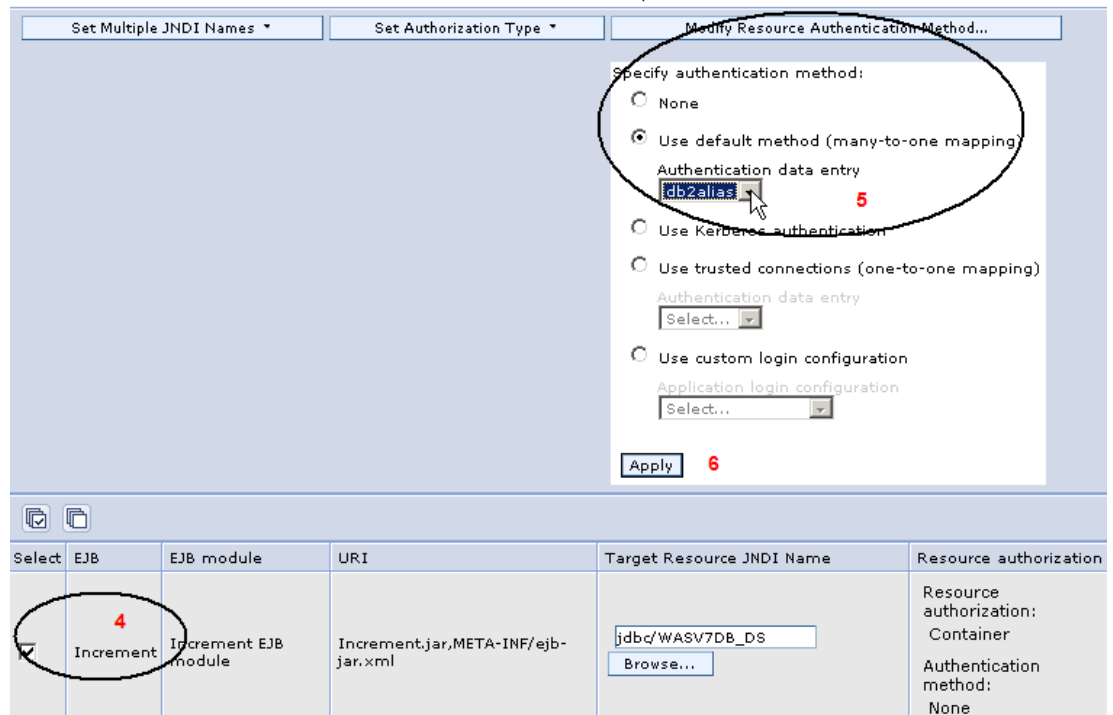
Map data sources for all 2.x CMP beans

Specify an optional data source for each 2.x container-managed persistence (CMP) bean. Mapping a specific data source to a CMP bean overrides the default data source for the module that contains the enterprise bean.



- 4) Select the Increment EJB and click **Modify Resource Authentication Method**
- 5) Select **Use default method** and browse to **db2alias** as the Authentication data entry
- 6) Click **Apply**

bean overrides the default data source for the module that contains the enterprise bean.



\_\_\_ f. Verify the settings indicated below and click **OK**

the default data source for the module that contains the enterprise bean.

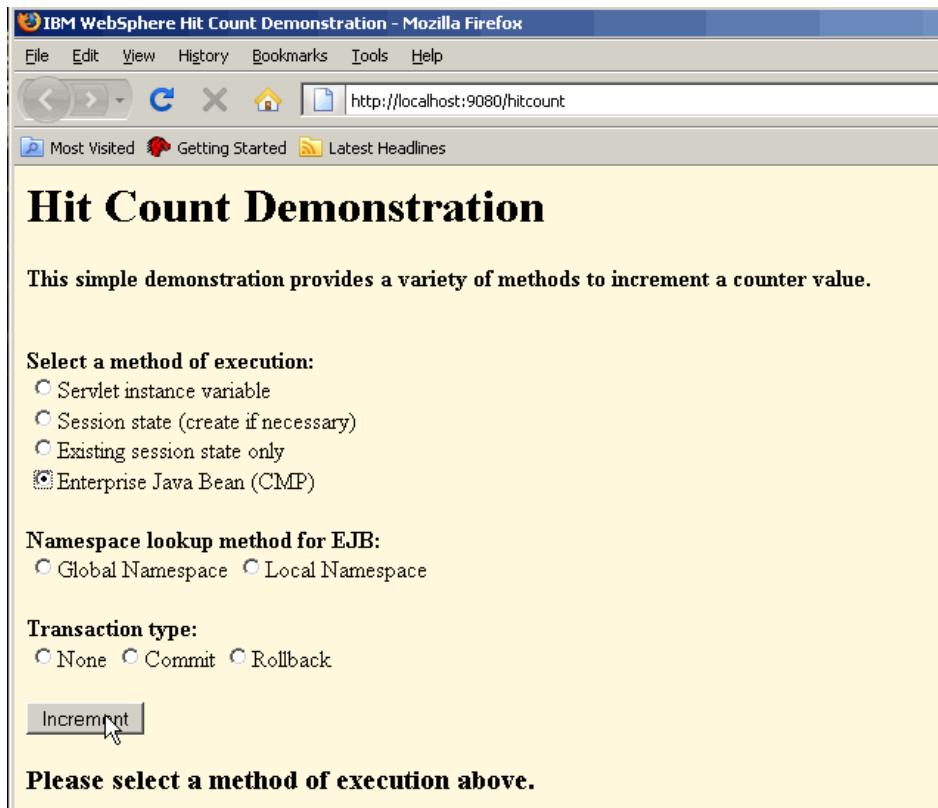
Set Multiple JNDI Names ▾		Set Authorization Type ▾		Modify Resource Authentication Method...	
<input type="checkbox"/>	Increment	Increment EJB module	Increment.jar, META-INF/ejb-jar.xml	jdbc/WASV97DB_DS <input type="button" value="Browse..."/>	Resource authorization: Container Authentication method: DefaultPrincipalMapping Authentication data entry: thinkNode01/db2alias

\_\_\_ g. **Save** your changes.

\_\_\_ h. Start the **DefaultApplication**

<input checked="" type="button" value="Start"/>	<input type="button" value="Stop"/>	<input type="button" value="Install"/>	<input type="button" value="Uninstall"/>	<input type="button" value="Update"/>	<input type="button" value="Roll out Update"/>	<input type="button" value="Remove File"/>	<input type="button" value="Export"/>	<input type="button" value="Export DDL"/>	<input type="button" value="Export File"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select	Name ↕	Application Status ↻							
You can administer the following resources:									
<input checked="" type="checkbox"/>	<a href="#">DefaultApplication</a>	➔							
<input type="checkbox"/>	<a href="#">iviApp</a>	➔							
<input type="checkbox"/>	<a href="#">query</a>	➔							
Total 3									

- \_\_\_ i. Open Firefox with the url <http://localhost:9080/hitcount> and select “Enterprise Bean” as the execution method and click on “Increment” as shown below



- \_\_\_ j. If you have successfully configured the datasource to use DB2 you'll see the value increment each time you click the **Increment** button (remember to set the "Enterprise Java Bean" radio button).

## Hit Count Demonstration

This simple demonstration provides a variety of methods to increment a counter value.

**Select a method of execution:**

- Servlet instance variable
- Session state (create if necessary)
- Existing session state only
- Enterprise Java Bean (CMP)

**Namespace lookup method for EJB:**

- Global Namespace
- Local Namespace

**Transaction type:**

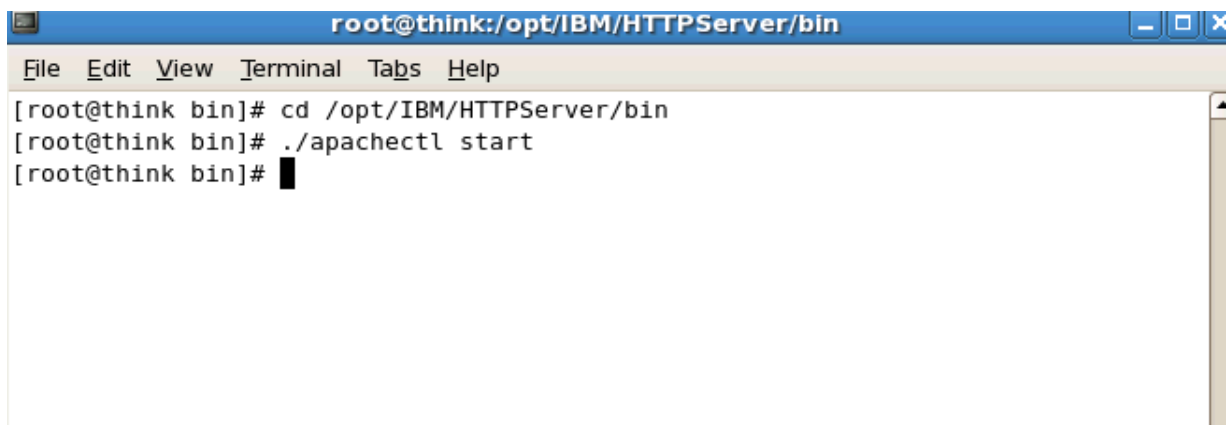
- None
- Commit
- Rollback

Increment

**Hit Count value for (Increment EJB):** 3

### \_\_\_ 10. Configure IBM HTTP Server for use with WAS

- \_\_\_ a. Start both **IBM HTTP Server**
- 1) In a command window, cd to **/opt/IBM/HTTPServer/bin**
  - 2) run **./apachectl start**

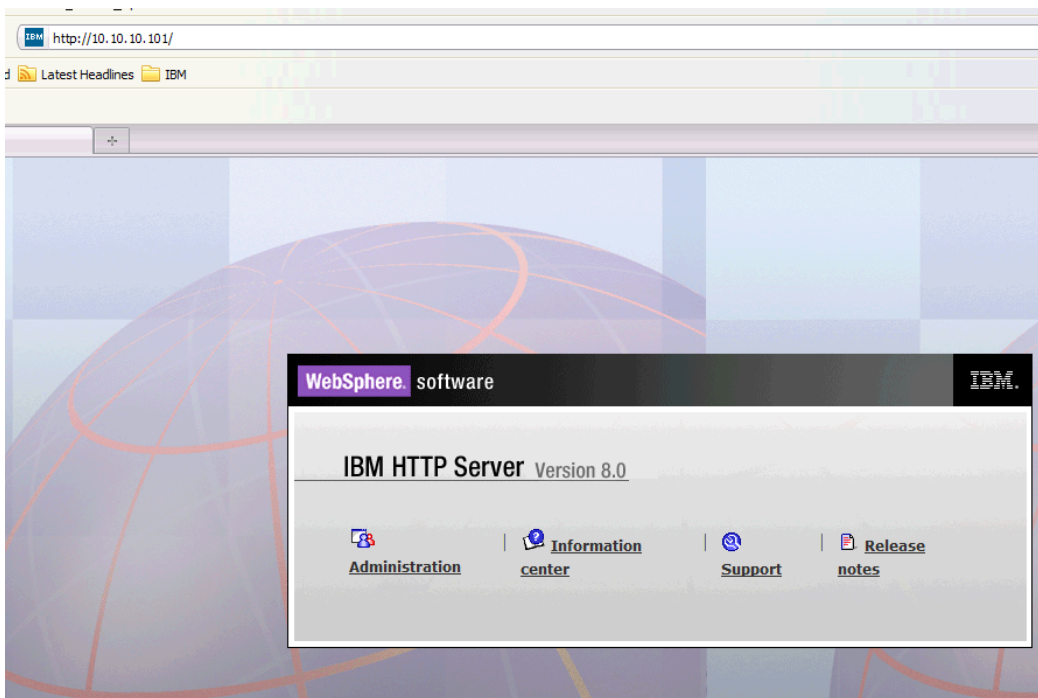


```

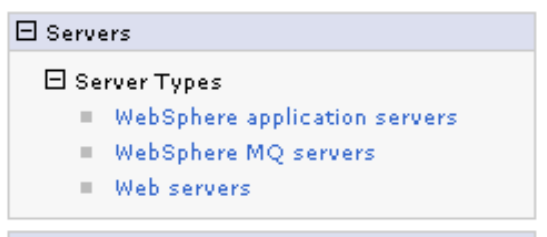
root@think:/opt/IBM/HTTPServer/bin
File Edit View Terminal Tabs Help
[root@think bin]# cd /opt/IBM/HTTPServer/bin
[root@think bin]# ./apachectl start
[root@think bin]#

```

- \_\_\_ b. Test that IHS is running by entering <http://localhost>. You should see the following

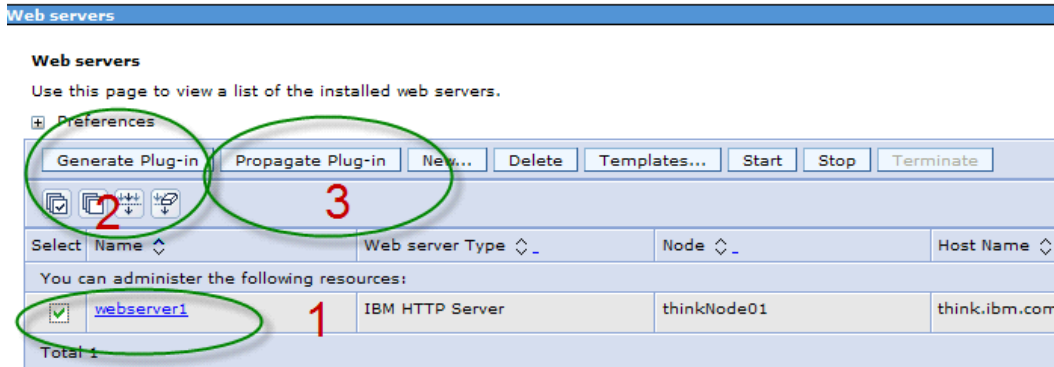


\_\_\_ c. In the WAS admin console navigate to **Server Types -> Web Servers**

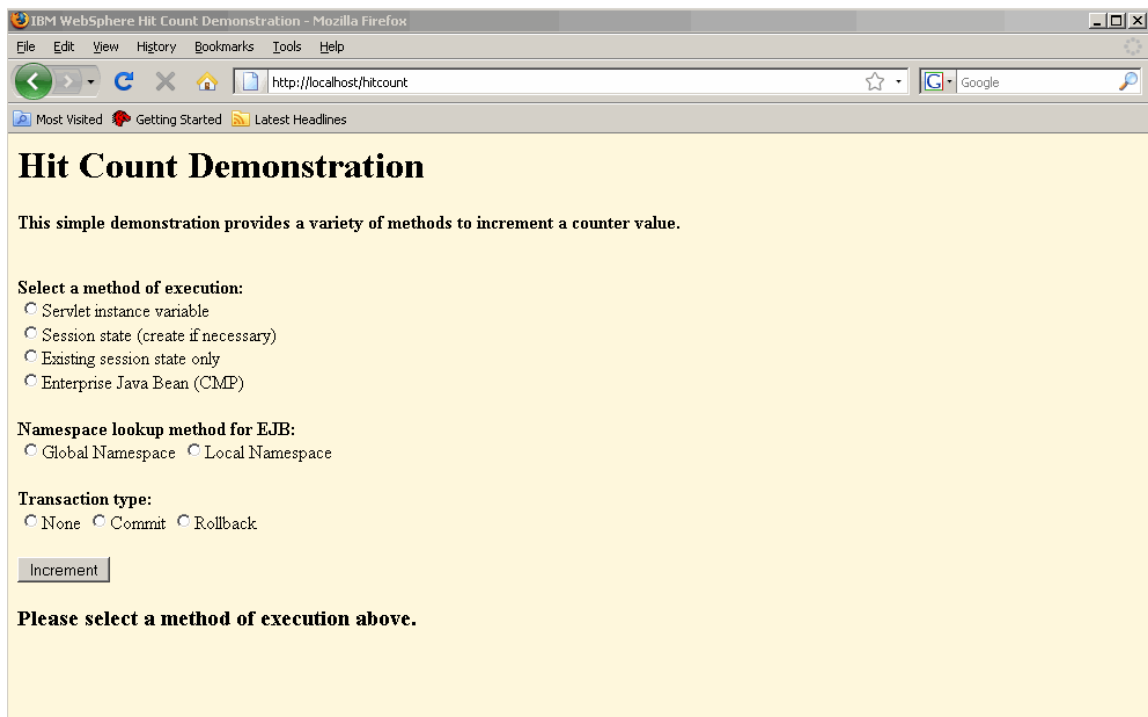


\_\_\_ d. Note that webserver1 was created using the WebSphere Customization Toolkit earlier. Now that the webserver is created generate and propagate the plugin configuration file as shown below

- 1) **Select** the web server (1), and then click **Generate Plug-in** (2),
- 2) **Select** the web server (1), and then click **Propagate Plug-in** (3).



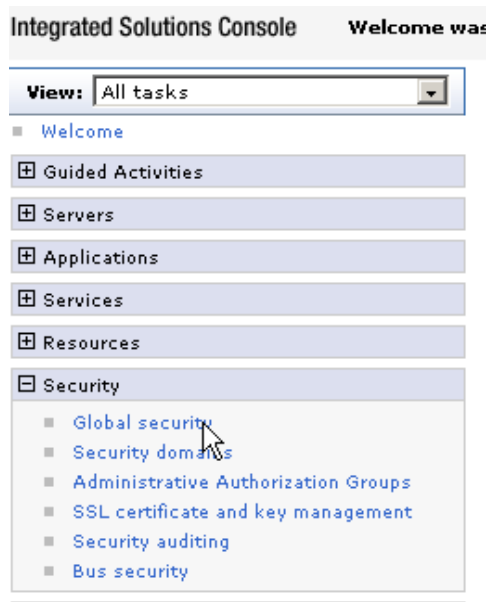
\_\_\_ e. Go to Firefox and enter <http://localhost/hitcount>. Exercise the application as before selecting “Enterprise Java Bean” and clicking **Increment**



\_\_\_ f. You may also want to invoke <http://localhost/snoop> and examine the results. You can see that the HTTP server is being used as well as the WAS server's embedded HTTP server (on port 9080).

\_\_\_\_\_ 11. Configure WebSphere Application Server to use an LDAP as a user registry.  
OpenLDAP has been installed and configured with a small user user population on the lab image.

\_\_\_ a. Navigate to **Security** in the WAS admin console, and click **Global Security**.





\_\_ b. On the Global Security dialog, click **Configure**

**Global security**

Use this panel to configure administration and the default application security policy. This security configuration applies to the security policy functions and is used as a default security policy for user applications. Security domains can be defined to override and customize the security applications.

Security Configuration Wizard      Security Configuration Report

**Administrative security**

- Enable administrative security
  - [Administrative user roles](#)
  - [Administrative group roles](#)
  - [Administrative authentication](#)

**Application security**

- Enable application security

**Java 2 security**

- Use Java 2 security to restrict application access to local resources
  - Warn if applications are granted custom permissions
  - Restrict access to resource authentication data

**User account repository**

Current realm definition  
Federated repositories

Available realm definitions  
Federated repositories      **Configure...**      Set as current

**Authentication**

Authentication mechanisms and expiration

- LTPA
- Kerberos and LTPA  
(This function is currently disabled. See the IBM Support possible future updates.)  
[Kerberos configuration](#)
- SWAM (deprecated): No authenticated communication

[Authentication cache settings](#)

- Web and SIP security
- RMI/IIOP security
- Java Authentication and Authorization Service
- Use realm-qualified user names

- [Security domains](#)
- [External authorization providers](#)

\_\_ c. Click **Add Base Entry to Realm**

Cell=thinkNode01Cell, Profile=AppSrv01

**Global security** > **Federated repositories**

By federating repositories, identities stored in multiple repositories can be managed in a single, virtual realm. The realm can consist of identities in the file-based repository that is built into the system, in one or more external repositories, or in both the built-in repository and one or more external repositories.

**General Properties**

- \* Realm name: defaultWIMFileBasedRealm
- \* Primary administrative user name: wasadmin

**Server user identity**

- Automatically generated server identity
- Server identity that is stored in the repository
  - Server user ID or administrative user on a Version 6.0.x node
  - Password

Ignore case for authorization

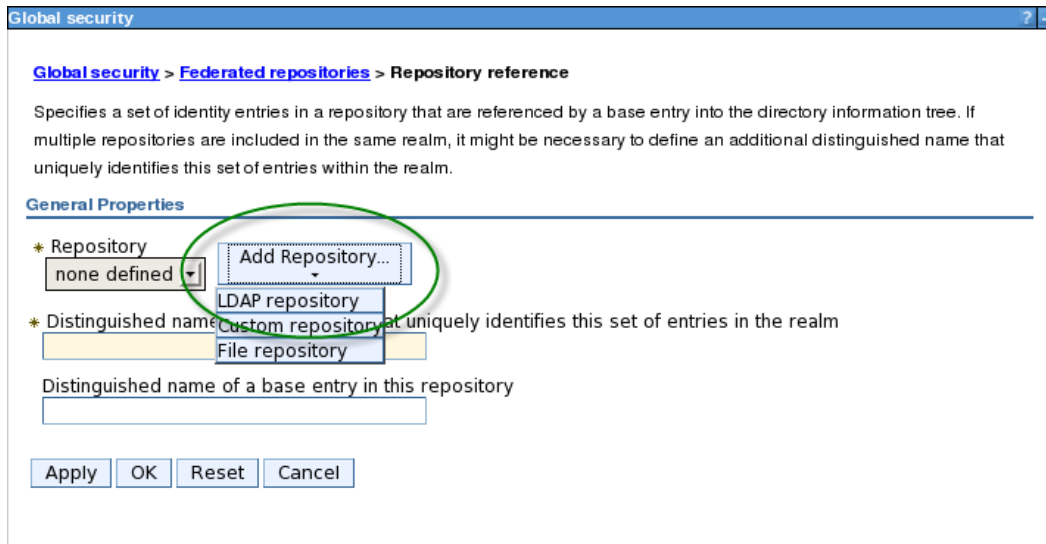
Repositories in the realm:

**Add Base entry to Realm...**      Use built-in repository      Remove

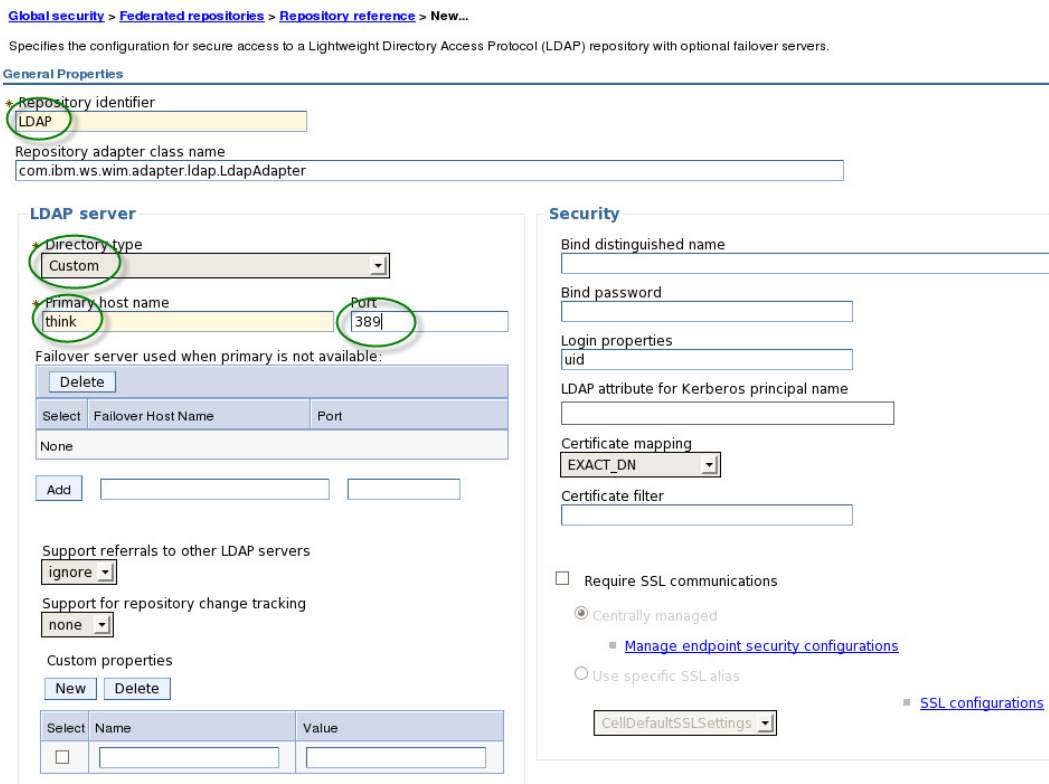
Select	Base Entry	Repository Identifier	Repository Type
<input type="checkbox"/>	o=defaultWIMFileBasedRealm	InternalFileRepository	File

You can administer the following resources:

d. Click **Add Repository**, and select **LDAP repository** form the drop-down list



e. Enter **LDAP** for the Repository Identifier, **Custom** for the Directory Type and **think** for the Primary Host Name, and **389** for the port. Then, click **Apply**.



\_\_\_ f. Click on **Group attribute definition**, under Additional Properties

**Note:** Until you click **Apply** the **Group Attribute Definition** is not accessible. If you accidentally click **OK** instead of Apply, you end up on the **Manage Repositories** panel. To return panel shown below simply “drill down” into **LDAP** repository from the **Manage Repositories** panel

Additional Properties

- Performance
- LDAP entity types
- LDAP attributes
- Group attribute definition**

Apply OK Reset Cancel

\_\_\_ g. Enter **guid** for the **Name of the group membership attribute** as shown below and click **OK**. Then, **Save** your changes

General Properties

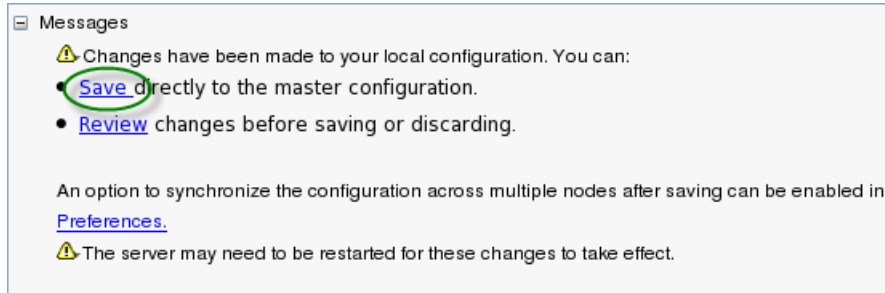
Name of group membership attribute  
guid

Scope of group membership attribute

- Direct - Contains only immediate members of the group without members of subgroups
- Nested - Contains direct members and members nested within subgroups of this group
- All - Contains all direct, nested, and dynamic members

Apply OK Reset Cancel

\_\_\_ h. Click **Save**, to save you changes



\_\_\_ i. Enter **o=LDAP** for Distinguished name of the base entry for the realm and **dc=ibm,dc=com** for the Distinguished name of the base entry for this repository. Click **OK** . Then **Save** your changes

[Global security](#) > [Federated repositories](#) > **o=LDAP**

Specifies a set of identity entries in a repository that are referenced by a base entry into the directory information tree. If multiple repositories are included in the same realm, it might be necessary to define an additional distinguished name that uniquely identifies this set of entries within the realm.

#### General Properties

\* Repository

LDAP

\* Distinguished name of a base entry that uniquely identifies this set of entries in the realm

o=LDAP

Distinguished name of a base entry in this repository

dc=ibm,dc=com

Apply

OK

Reset

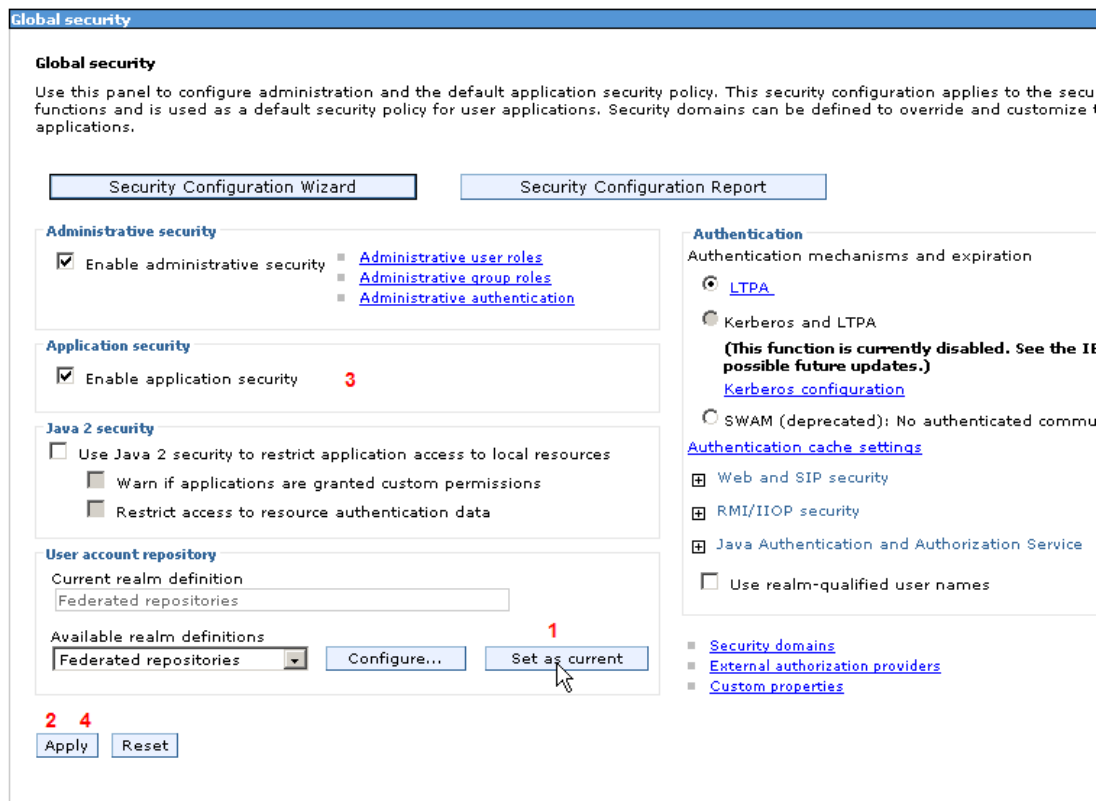
Cancel

\_\_\_ j. Navigate to **Security** in the WAS admin console, and click **Global Security**



\_\_\_ k. As shown below on the Global Security Panel

- 1) Click **Set as current**,
- 2) Click **Apply**
- 3) Select **Enable Application Security**
- 4) Click **Apply**
- 5) Then **Save your changes**



- \_\_\_ I. In order for the changes to be reflected you will need to stop and start the server.
- 1) Logout from the admin console
  - 2) Stop the server from the terminal window you started it in with the command:

```
./stopServer.sh server1 -username wasadmin -password wasadmin
```

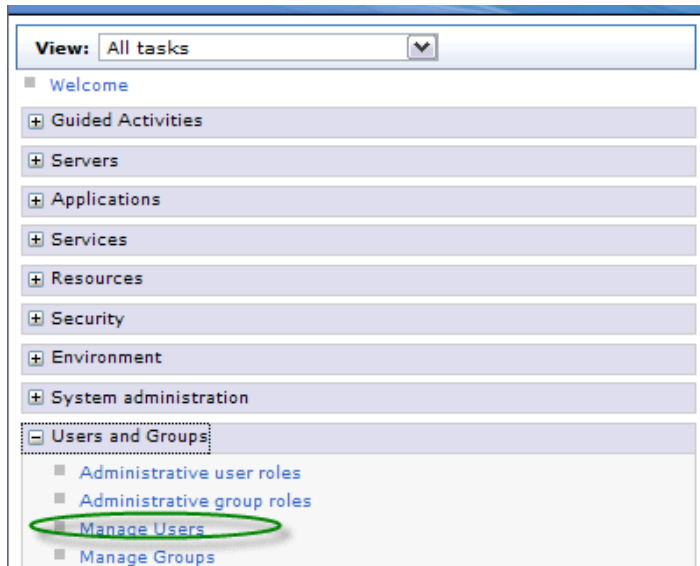
- 3) Wait until you see the message

```
ADMU4000I: Server server1 stop completed.
```

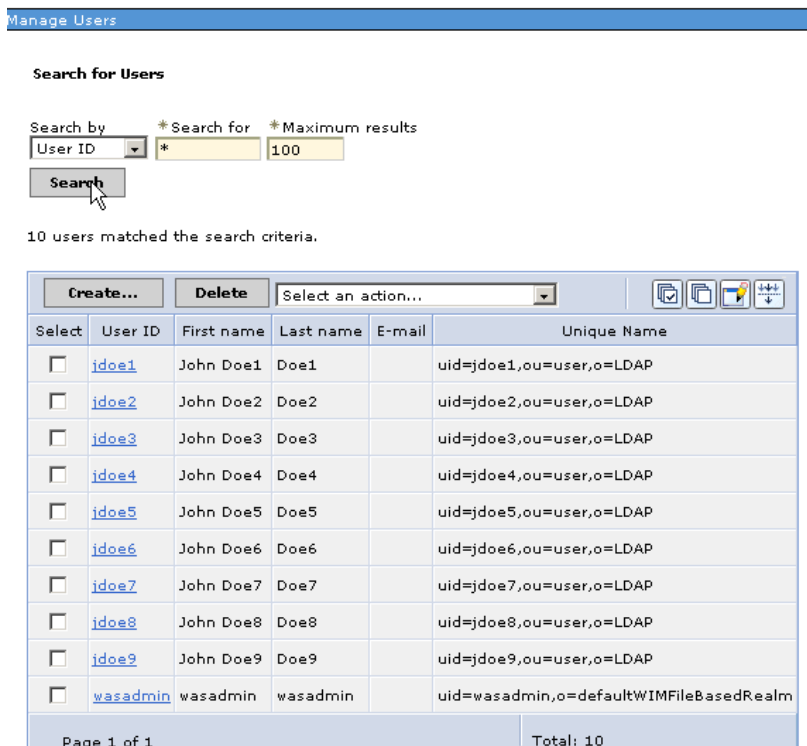
- 4) Start the server from the LINUX shell with the command:

```
./startServer server1
```

- \_\_\_ m. Once the server has started, log back into the WAS admin console. Navigate to **Users and Groups** and click **Manage Users**

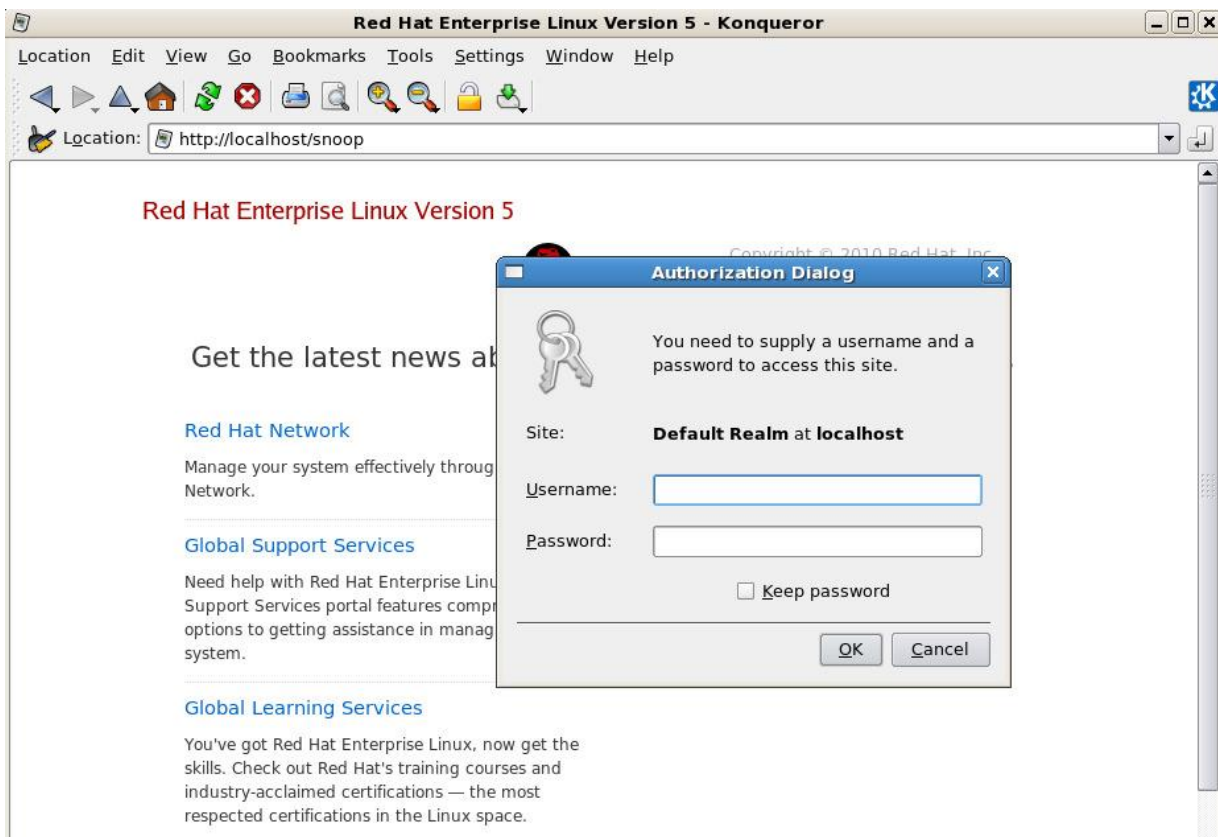


- \_\_\_ n. In the **Search for Users** dialog click **Search**. You should see the user entries from LDAP as well as for wasadmin user, in the file based registry.



- o. Open a Konqueror browser (Applications -> Internet -> Konqueror) and enter the URL <http://localhost/snoop>. You should be prompted for a Username and Password, as shown below. Enter **jd** for the Username and **jd** for the password

**Note: You need to use Konqueror because Firefox is already open for the admin console, and as a result, Firefox has a valid LTPA token (cookie). Thus if you simply open another Firefox instance you will not be prompted to login since the LTPA cookie used to authenticate wasadmin to the admin console, will be present in the browser. So, no authentication prompt will occur**



**Congratulations**, your application infrastructure is now ready to serve applications through the HTTP server -> HTTP server plug-in -> WebSphere Application Server -> DB2.

Before starting the next part of the lab, do the following;

- 1) Log out of the admin console
- 2) Stop WebSphere Application Server by entering the following command from the LINUX command



window where you started the application server.

```
./stopServer.sh server1 -username wasadmin -password wasadmin
```

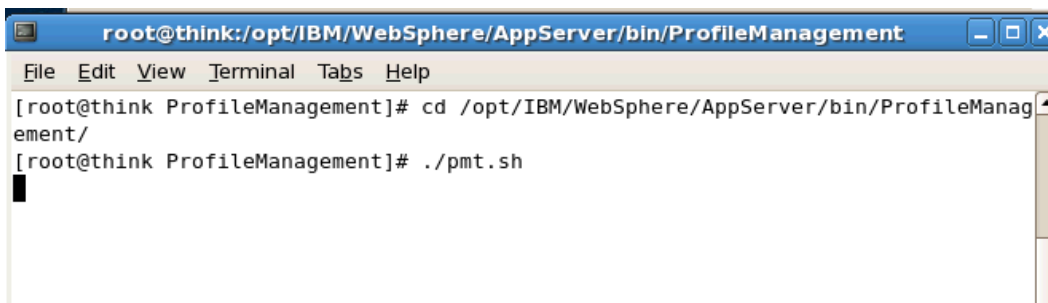
Once you see the message;

ADMU4000I: Server server1 stop completed.  
You're ready to proceed to part 1.6

## 1.6 Adding Clustering to the Departmental Deployment

\_\_\_ 1. Create the Deployment Manager profile

\_\_\_ p. Start the graphical Profile Management Tool (PMT) with the command **./pmt.sh** from a terminal shell in the directory **/opt/IBM/WebSphere/AppServer/bin/ProfileManagement**



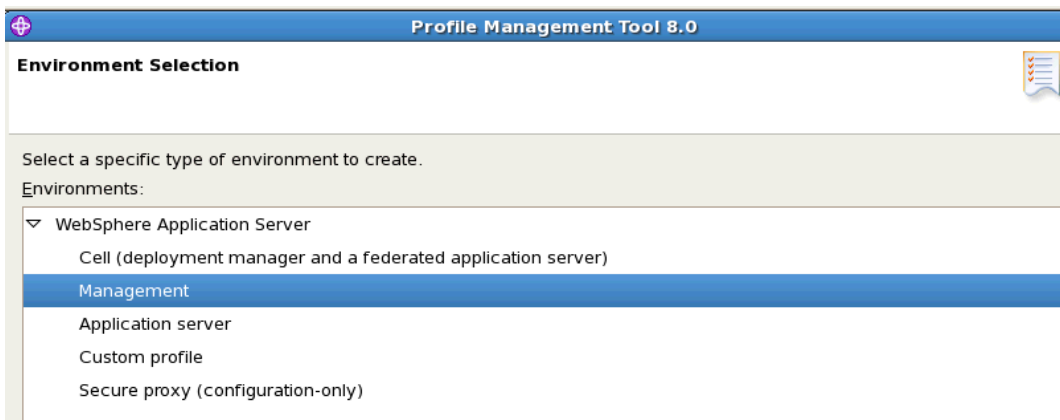
```

root@think:/opt/IBM/WebSphere/AppServer/bin/ProfileManagement
File Edit View Terminal Tabs Help
[root@think ProfileManagement]# cd /opt/IBM/WebSphere/AppServer/bin/ProfileManagement/
[root@think ProfileManagement]# ./pmt.sh

```

\_\_\_ q. Click **Create**

\_\_\_ r. Highlight **Management** as the Environment Selection as shown below, then click **Next**



\_\_\_ s. Select **Deployment Manager**, then click **Next**

The screenshot shows the 'Profile Management Tool 8.0' window with the 'Server Type Selection' panel. The panel contains the following text and options:

Select the type of server to be created within this management profile

- Administrative agent  
An administrative agent provides management capability for multiple stand-alone application servers. An administrative agent can manage only the application servers that exist within the same installation on one machine.
- Deployment manager  
A deployment manager provides management capability for multiple federated nodes. A deployment manager can manage nodes that span multiple systems and platforms. The nodes that are managed by a deployment manager can only be managed by a single deployment manager and must be federated to the cell of that deployment manager.

\_\_\_ t. As you did in part 1, select **Advanced Profile Creation** on the next panel, then click **Next**

\_\_\_ u. Accept the defaults, clicking **Next**, until you get to the Administrative Security Panel. Then enter “**wasadmin**” for the user ID and “**wasadmin**” for the password.

The screenshot shows the 'Administrative Security' panel. It contains the following text and form fields:

Choose whether to enable administrative security. To enable security, supply a user name and password for logging into administrative tools. This administrative user is created in a repository within the application server. After profile creation finishes, you can add more users, groups, or external repositories.

Enable administrative security

User name:  
wasadmin

Password:  
●●●●●●

Confirm password:  
●●●●●●

- \_\_\_ v. Continue to accept the PMT provide defaults until you reach the Port Value Assignment. Select **Default Port Values** as shown below (we'll take steps to insure no conflicts exist)

**Profile Management Tool 8.0**

**Port Values Assignment**

⚠ Activity was detected on these ports: 9060, 9043, 9401, 9403, 9402, 9100

The values in the following fields define the ports for the deployment manager and do not conflict with other profiles in installation. Another installation of WebSphere Application Server or other programs might use the same ports. To avoid time port conflicts, verify that each port value is unique.

Default Port Values     Recommended Port Values

Administrative console port (Default 9060):	9060
Administrative console secure port (Default 9043):	9043
Bootstrap port (Default 9809):	9809
SOAP connector port (Default 8879):	8879
Administrative interprocess communication port (Default 9632)(X):	9632
SAS SSL ServerAuth port (Default 9401):	9401
CSIv2 ServerAuth listener port (Default 9403):	9403
CSIv2 MultiAuth listener port (Default 9402):	9402
ORB listener port (Default 9100):	9100
Cell discovery port (Default 7277)(6):	7277
High availability manager communication (DCS) port (Default 9352):	9352
DataPower appliance manager secure inbound port (Default 5555):	5555

- \_\_\_ w. As before in Part 1 when configuring the application server do NOT select “**Run the deployment manager process as a Linux service**”, and click **Next**
- \_\_\_ x. Click **Create** to create the profile,
- \_\_\_ y. **Unselect** “First Steps” then click **Finish** .
- \_\_\_ z. Exit the PMT as you did in part 1 by selecting **File -> Exit** in the upper left corner of the PMT

## \_\_\_ 12. Start the Deployment Manager

- \_\_\_ a. Open a LINUX command shell and navigate to  
**/opt/IBM/WebSphere/AppServer/profiles/Dmgr01/bin**
- \_\_\_ b. Enter the command **./startManager.sh** and wait until you see the message;

**ADMU3000I: Server dmgr open for e-business; process id is xxxx**

## \_\_\_ 13. Federate the Application Server

- \_\_\_ a. Return to the LINUX command shell that you used to start and stop the Application Server (if you closed the shell the directory is **/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin**)
- \_\_\_ b. Enter the command

**./addNode localhost –includeapps –username wasadmin –password wasadmin**

This tells WAS to add a node by connecting to the deployment manager running on the localhost, to include the existing applications that are deployed on the application server and to use wasadmin as the administrative userid and password.

- \_\_\_ c. Wait for the message **ADMU0003I: Node thinkNode01 has been successfully federated**

## \_\_\_ 14. Configure a WAS-ND Cluster

- \_\_\_ a. Log into the admin console using Internet Explorer, with the URL <http://localhost:9060/ibm/console/> Since WAS administrative security is enabled this will redirect to <https://localhost:9043/ibm/console/login.do?action=secure> Enter “**wasadmin**” for user ID and password as you did before.
- \_\_\_ b. Navigate to **Servers -> Clusters** and click **WebSphere Application Server clusters** in the console as shown below.



\_\_\_ c. Click **New** to create a new cluster

\_\_\_ d. Enter **MyCluster** for a Cluster name as shown below, then click **Next**

The screenshot shows a dialog box titled "Create a new cluster" with a progress indicator on the left. The main area is titled "Enter basic cluster information".

- Cluster name:** MyCluster
- Prefer local. Specifies whether enterprise bean requests will be routed to the node on which the client resides when possible.
- Configure HTTP session memory-to-memory replication

Buttons at the bottom: Next, Cancel.

\_\_\_ e. In order to use our existing server configuration and application we are going to select **create the cluster member by converting an existing application server**. Then click **Next**

The screenshot shows the "Create first cluster member" step of the "Create a new cluster" dialog box.

The first cluster member determines the server settings for the cluster members. A server configuration template is created from the first member and stored as part of the cluster data. Additional cluster members are copied from this template.

- Member name:** server1
- Select node:** thinkNode01(ND 8.0.0.0)
- Weight:** 2 (0..20)
- Generate unique HTTP ports
- Select how the server resources are promoted in the cluster:** Cluster
- Select basis for first cluster member:**
  - Create the member using an application server template. (default)
  - Create the member using an existing application server as a template. (thinkCell01/thinkNode01(ND 8.0.0.0)/server1)
  - Create the member by converting an existing application server. (thinkCell01/thinkNode01(ND 8.0.0.0)/server1)
  - None. Create an empty cluster.

Buttons at the bottom: Previous, Next, Cancel.

- \_\_\_ f. Enter **server2** as the server name for the next cluster member. Click **Add Member**. Then, enter **server3** as a server name and click **Add Member**. At this point, you should have 3 servers in the cluster; server1, server2 and server3. Once you do, click **Next**

Create a new cluster

Create a new cluster

Step 1: Enter basic cluster information

Step 2: Create first cluster member

→ Step 3: Create additional cluster members

Step 4: Summary

**Create additional cluster members**

Enter information about this new cluster member, and click Add Member to add this cluster member to the member list. A server configuration template is created from the first member, and stored as part of the cluster data. Additional cluster members are copied from this template.

\* Member name  
server2

Select node  
thinkNode01(ND 8.0.0.0)



\* Weight  
2 (0..20)

Generate unique HTTP ports

Add Member

Use the Edit function to modify the properties of a cluster member in this list. Use the Delete function to remove a cluster member from this list. You are not allowed to edit or remove the first cluster member.

Edit Delete

Select	Member name	Nodes	Version	Weight
<input type="checkbox"/>	server1	thinkNode01	ND 8.0.0.0	2
Total 1				

- \_\_\_ g. Review the settings, then click **Finish** to create the cluster members
- \_\_\_ h. Now navigate to **Servers -> Server Types \_> WebSphere Application Servers**, select server1 and click **delete**

---

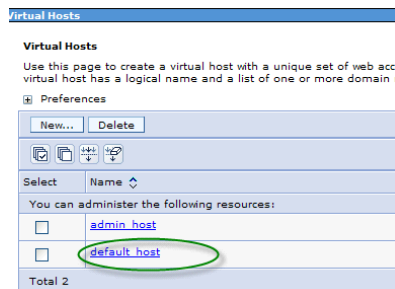
**Note: Server1 is being deleted to remove the port conflicts were mentioned previously during profile creation. Alternatively one could have changed the port number settings for server1, but simply removing the server from our configuration is the quickest means remove the conflicts.**

---

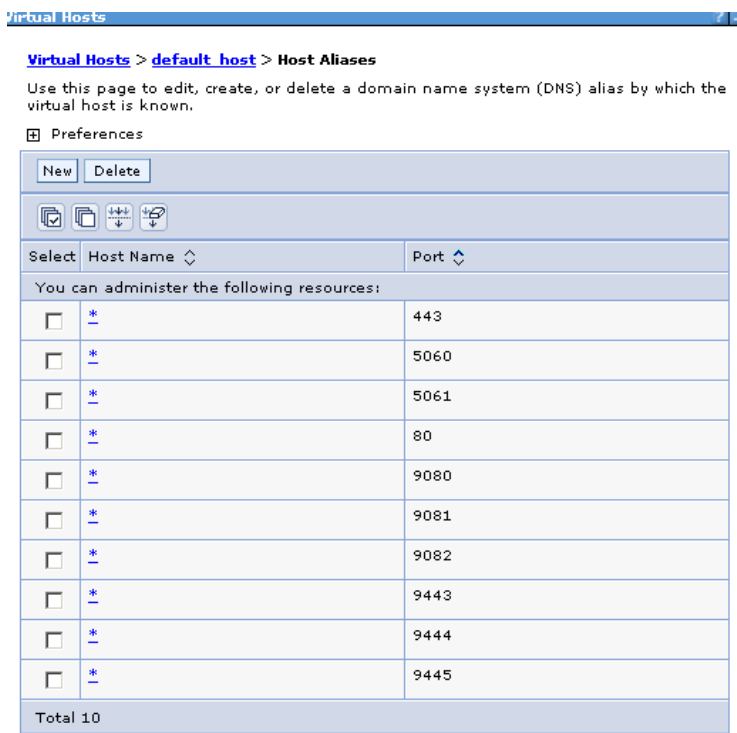
- \_\_\_ i. You can choose to save your changes at this time if you wish. But we have one more configuration change to make. Navigate to **Environment -> Virtual Hosts**



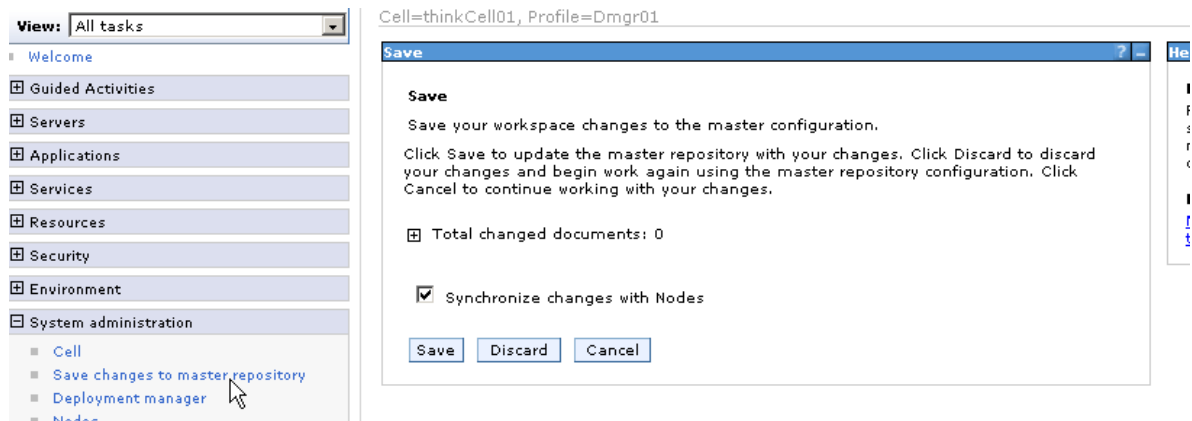
- \_\_\_ j. Click **default\_host**



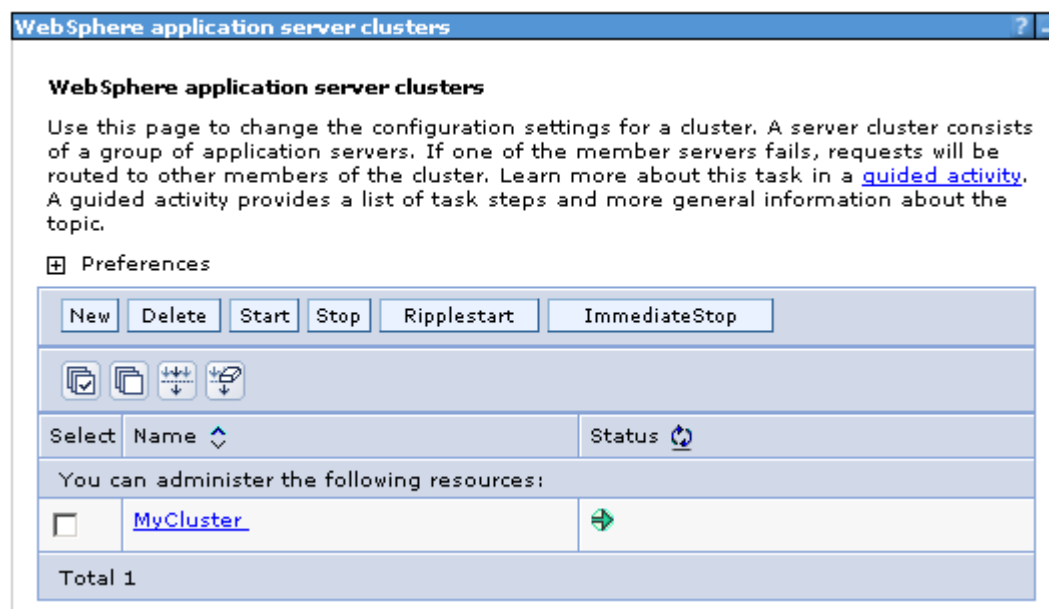
- \_\_\_ k. Check to make sure that port numbers **9081** and **9444** (for server 2), and port numbers **9082** and **9445** (for server3), are defined. Add them if needed (they should already be listed).



- \_\_\_ l. **Save** your changes if you've not already done so
- \_\_\_ m. Just to make sure all our changes have been pushed out to the node agent, we're going to save and synchronize as shown below.



- \_\_\_ n. Once the synchronization is complete, you will need to regenerate and propagate the HTTP server plug-in. Navigate to Servers → Web Servers, selecting webserver1 and clicking Generate Plug-in.
- \_\_\_ o. You can now start your application server cluster by navigating to ; **Servers -> Clusters -> WebSphere Application Server Clusters** , selecting **MyCluster** and clicking **start**. Once the cluster can now start your application server cluster by navigating to **Servers -> Clusters -> WebSphere Application Server Clusters**. Select **MyCluster** and click **Start**. Once the cluster is started, you can enter <http://localhost/snoop> in a Firefox browser instance, and if you examine it's output, you'll see that some requests are served from port 9081 (server2) and some from port 9082 (server3).



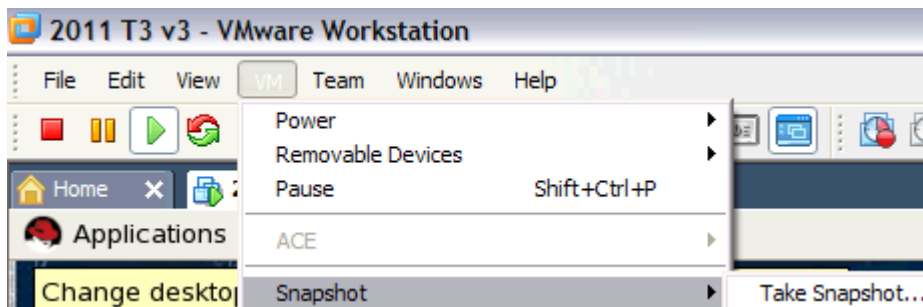


---

**Note:** You may have noticed that you were not prompted to login when you accessed the application, this is because the Global Security settings a standalone WAS instance is not migrated during federation into a WAS-ND cell. While we could repeat step 6 from part 1 (above) we're not going to do so. A later lab will introduce WAS multiple security realm support and we'll use that feature for configuring application security.

---

15. Take a VM snapshot (to insure you have a recovery point). Provide a meaningful name such as " Lab 1 End"



## Lab 2 Administering an OSGi Application

### 2.1 Before you begin

This exercise guides you through the administration of a modular application using a strategic technologies: OSGi, the modular system for Java.

You will use the IBM® WebSphere® Application Server (WAS) version 8.0 cluster you configured in Lab 1.

Upon completing this exercise you should have gained a basic understanding of the value and basic concepts of OSGi,

You should possess basic knowledge of the IBM® WebSphere® Application Server (WAS) version 8.0 administration console.

To follow this exercise, you will require:

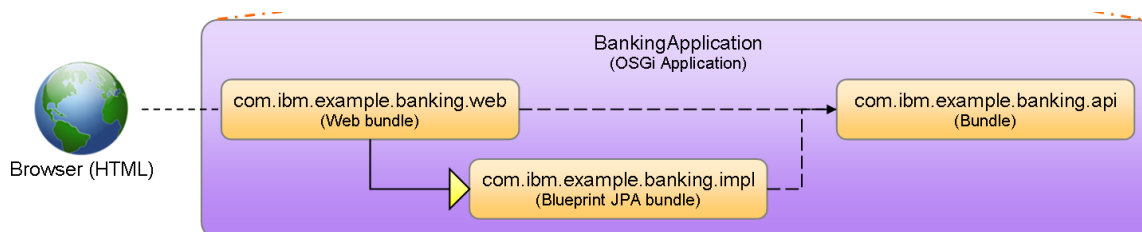
- This document.
- The OSGi bundle files that accompany this exercise.
- IBM® WebSphere® Application Server Version 8.0 Environment (henceforth “WAS”) installed and configured with a cluster defined as in Lab 1.

### 2.2 About the application you will deploy

You will deploy a web application that manages bank accounts. The web application consists of a single OSGi composition which consists of three OSGi bundles.

1. The **BankingApplication** OSGi application provides operations to open, close, deposit to, withdraw from and access bank accounts. It also provides operations to work with bank account owners. It includes a front-end JSP Web application for working with bank accounts and their owners.

This diagram depicts the overall design of the OSGi web application:



### 2.3 A closer look at the OSGi application

The “BankingApplication” OSGi application is a deployable unit containing three bundles that work together to provide banking services including management of accounts and account owners.

- The API bundle, `com.ibm.example.banking.api`, contains a Java interface and two data classes that together define the public API of the banking application. There is no business logic within the bundle.
- The implementation bundle, `com.ibm.example.banking.impl`, contains the main Java implementation class that implements the Java interface in the API bundle, and has the business logic that does all the internal work of creating, storing, accessing, updating and deleting bank accounts and bank account owners.

The bundle also defines the implementation class as an OSGi Blueprint bean, and defines an OSGi Blueprint service based upon the bean and described by the implementation's parent interface from the API bundle.

- The Web bundle, `com.ibm.example.banking.web`, contains a JSP Web application for working with the bank accounts and account owners. The Web application consults the WAS JNDI service to locate the Blueprint service registered by the implementation bundle so that it can invoke operations without requiring a direct dependency on the implementation bundle or the implementation class within it.

## 2.4 Conventions

The **bold typeface** is used for text you need to enter or controls or objects such as push buttons and tree nodes that you need to interact with.

The *italic typeface* is used for dialog titles, control labels and other information displayed by the tools.

A few “variables” are used in this exercise to represent host names, port numbers and other configurable aspects of WAS. The values shown here match the configuration of the VMware images accompanying the exercise. If you are following this exercise on your own installation, you may need to substitute different values.

Variable	Value	Explanation
<FILES>	/Labfiles 80	The directory containing files needed to complete the exercise.
<HOST>	Think	The local host name.
<HTTP-PORT>	9080	The WAS HTTP port number. This is used in the URLs of the OSGi application's JSP Web front end in the <code>com.ibm.example.banking.web</code> bundle.

## 2.5 Part 1: Start the WAS Environment

In this part of the exercise you will start the WAS Environment if it is not already started and import and deploy the BankingApplication OSGi application. If the WAS Environment is already started, skip to Part 2.

\_\_\_ 1. Start WAS.

\_\_\_ p. Start the Deployment Manager

- 1) Select **Applications → IBM Websphere → IBM WebSphere Application Server Network Deployment → Profiles → Dmgr01 → Start the deployment manager**
- 2) Wait for the start process to complete

\_\_\_ q. Start the nodeagent

- 1) Start a terminal window by right clicking anywhere on the open desktop and select **Open Terminal**.
- 2) Change directory to the AppSrv01 profile bin directory by entering the command **"cd /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin"**
- 3) Start the nodeagent by entering the command **"/startNode.sh"** Be sure to note the **"/"** which prefaces the command. This signals to the OS command processor that this command is in the local directory.
- 4) Wait for the messages that indicate that the nodeagent has successfully been started. You should see output that looks like the following example. The process id will vary

ADMU0116I: Tool information is being logged in file

/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/nodeagent/startServer.log

ADMU0128I: Starting tool with the AppSrv01 profile

ADMU3100I: Reading configuration for server: nodeagent

ADMU3200I: Server launched. Waiting for initialization status.

ADMU3000I: Server nodeagent open for e-business; process id is 5615

\_\_\_ r. Start the MyCluster cluster using one of the following methods. Option 1 is to use the wsadmin command line administration tool. The other option is to use the web browser based Admin Console GUI. Use one of the two options below.

- 1) Invoke the wsadmin command from a terminal window(enter exactly as shown including the quotes on a single command line)

```
/opt/IBM/WebSphere/AppServer/profiles/Dmgr01/bin/wsadmin.sh -lang  
jython -C "AdminClusterManagement.startSingleCluster('MyCluster')"
```

The system will display a prompt window requesting your credentials. Login with User and Password values of **"wasadmin"** You will see the following output in the terminal screen, indicating that the cluster was successfully started:

WASX7209I: Connected to process "dmgr" on node thinkCellManager01 using SOAP connector; The type of process is: DeploymentManager

```
-----
AdminClusterManagement:      Start a cluster
Cluster name:                 MyCluster
Usage: AdminClusterManagement.startSingleCluster("MyCluster")
Return: If the command is successful, a value of 1 is returned.
-----
```

Start cluster:

```
WebSphere:name=MyCluster,process=dmgr,platform=common,node=thinkCellManager01,version=8.0.0.0,type=Cluster,mbeanIdentifier=MyCluster,cell=thinkCell01,spec=1.0
```

```
OK: startSingleCluster('MyCluster', 'false');
```

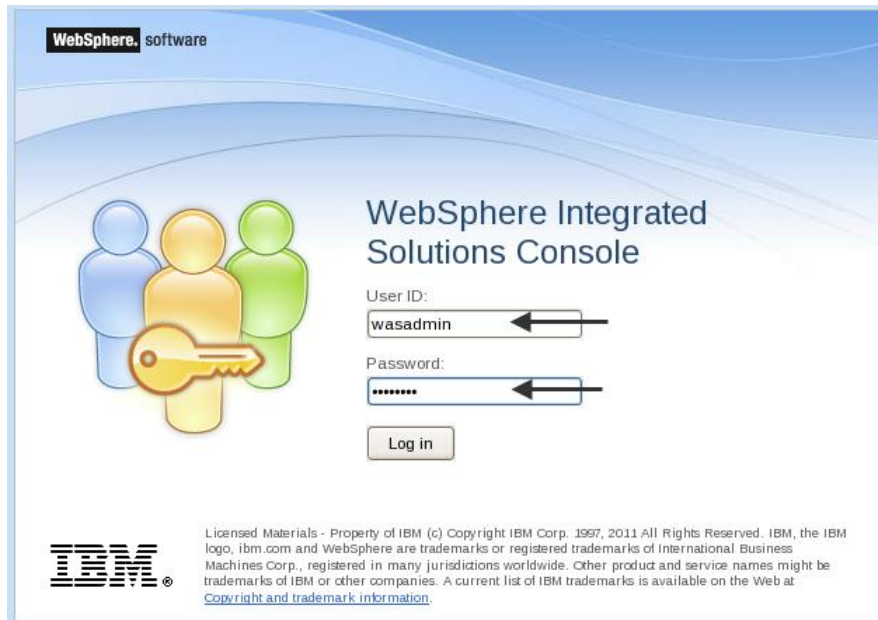
\_\_\_\_ 16. Close the terminal window by entering the command "exit".

\_\_\_ s. OR use the Admin Console

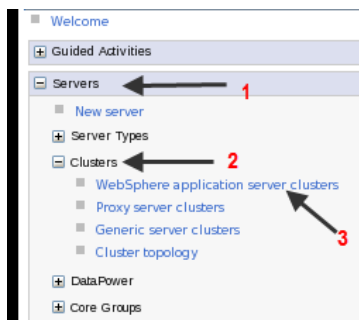
1. Open a Mozilla Firefox web browser window
2. Open a session with the Deployment Manager admin interface
3. enter the URL <http://localhost:9060/admin>



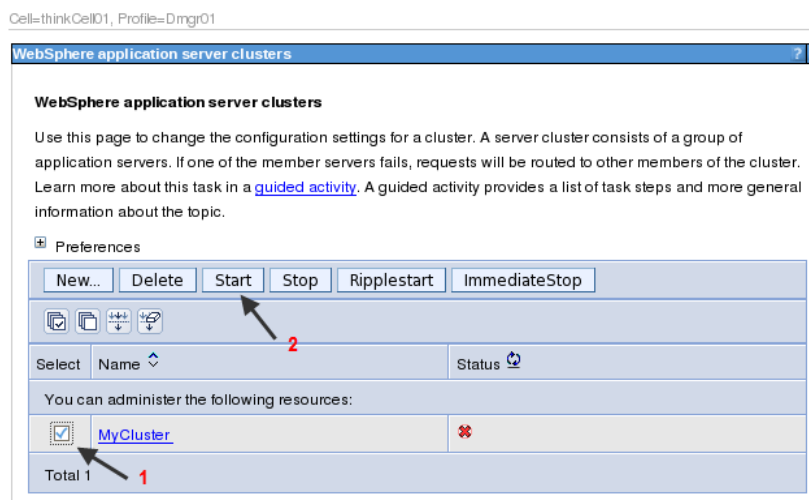
4. Login with UserID and Password of "**wasadmin**"



5. Expand **Servers** → **Clusters**
6. Select **WebSphere application server clusters**



7. Select the **MyCluster** entry and click on the **Start** button




After a short time, the Status will turn into a green arrow to indicate that it successfully started.

Cell=thinkCell01, Profile=Dmgr01





WebSphere application server clusters ? -


**WebSphere application server clusters**

Use this page to change the configuration settings for a cluster. A server cluster consists of a group of application servers. If one of the member servers fails, requests will be routed to other members of the cluster. Learn more about this task in a [guided activity](#). A guided activity provides a list of task steps and more general information about the topic.

 Preferences

New... Delete Start Stop Ripplestart ImmediateStop

Select	Name	Status
You can administer the following resources:		
<input type="checkbox"/>	<a href="#">MyCluster</a>	

Total 1

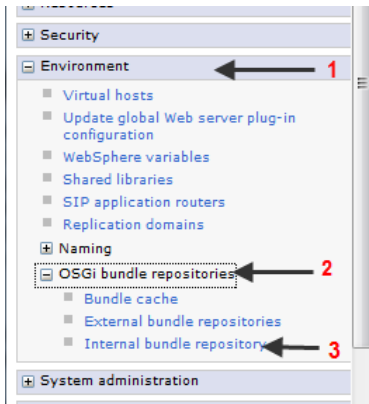
8. Continue to the next section.

## 2.6 Part 2: Deploy the OSGi BankingApplication Web app

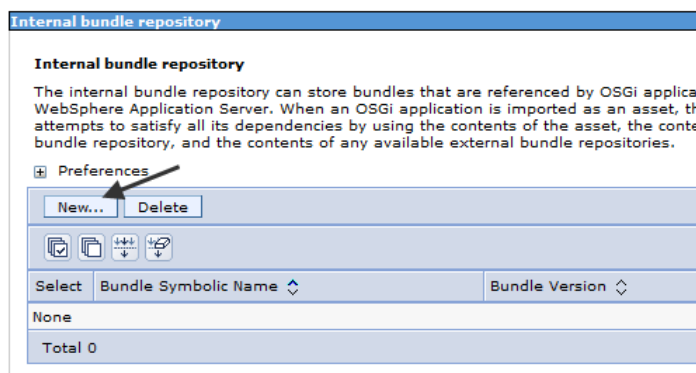
In this part of the exercise, you will take several java archive files which are packaged as OSGi bundles. You will import them into the WAS internal bundle repository from where they can be made accessible to an OSGi application. The repository may contain multiple versions of a bundle and each OSGi application can utilize the desired version based. This mechanism allows for multiple versions of the same java class to be loaded in the WAS jvm and be used at the appropriate version by the requesting application.

\_\_\_\_ 1. Import the BankingApplication OSGi bundles.

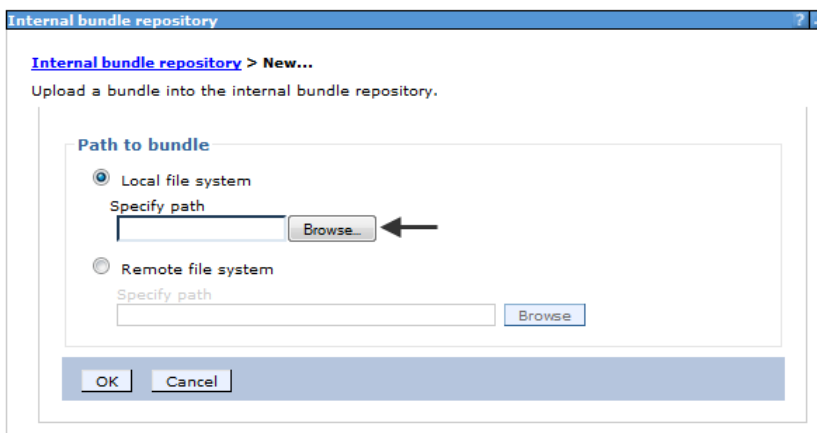
- a) Log on to the WAS Admin Console.
- b) Expand **Environment**
- c) Expand **OSGi bundle repositories**
- d) Select Internal bundle repository



- e) Click on the **New...** button

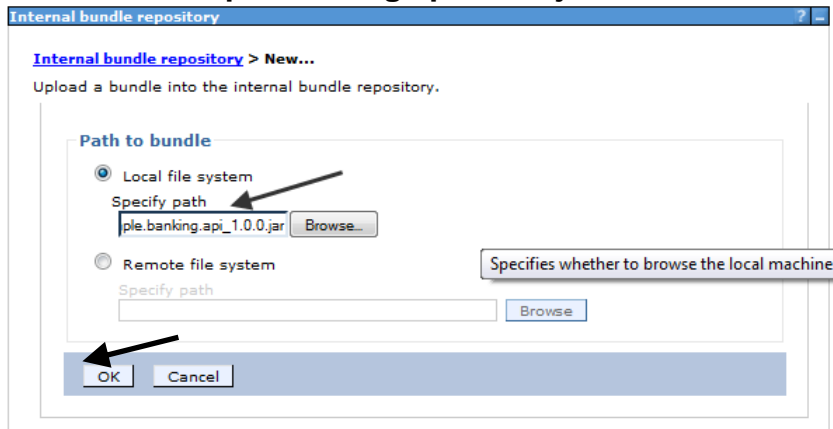


- f) Click on the **Browse...** button





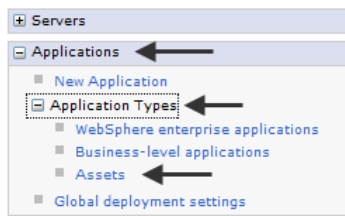
- g) Navigate to the **/Labfiles80/OSGiApplication** folder and select the **com.ibm.example.banking.api\_1.0.0.jar** file and click the **OK** button.



- h) Repeat steps (f) and (g) for the following two additional jar files
1. **com.ibm.example.banking.impl\_1.0.0.jar**
  2. **com.ibm.example.banking.web\_1.0.0.jar**

\_\_\_ 2. Import the BankingApplication enterprise bundle application (EBA)

- a) Within the Navigation frame on the left side, expand **Applications**
- b) Expand **Application Types**
- c) Select **Assets**



- d) Click on the **Import** button
- e) Click on the Browse... button
- f) Navigate to the **/Labfiles80/OSGiApplication** folder and select the **BankingApplication\_1.0.0.eba** file.

- i) Click on the **Next** button.
- j) Click on Next through Steps 1 and 2. Ignore any warnings that might appear.
- k) On Step 3: Summary, Click on the **Finish** button.

You should soon see the result that the asset has been successfully added.

```
10/7/11 1:59:32 AM EDT Completed res=[WebSphere:assetname=BankingApplication_1.0.0.eba]
```

```
Operation completed successfully.
```

\_\_\_\_ 3. Create the BankingApplication business level application (BLA)

- a) Within the Navigation frame on the left side, Select **Business-level applications**
- b) Click on the **New...** button
- c) Type **“Banking Application”** in the Name field. Also type a suitable description such as **“OSGi banking application”** into the Description field and click on the **Apply** button

Business-level applications > New...

Use this page to manage the composition units in the business-level application.

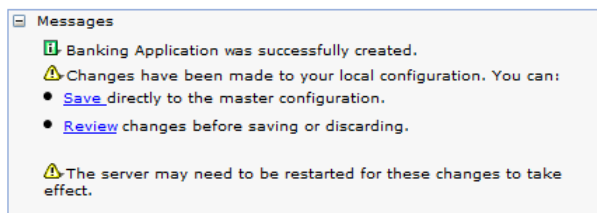
**General Properties**

Name  
Banking Application

Description  
OSGi banking application

Apply Reset Cancel

- d) Click on the **Add** button in the “Deployed Assets” section
- e) Click on the **Add Asset** selection



**Business-level applications > Banking Application**

Use this page to manage the composition units in the business-level application.

**General Properties**

Name  
Banking Application

Description  
OSGi banking application

**Deployed assets**

Add Delete

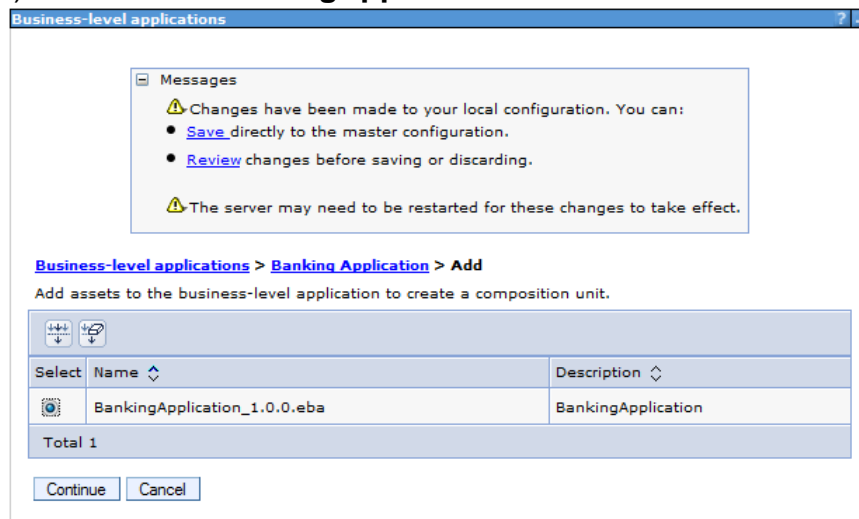
Add Asset  
Add Shared Library

Select	Name	Description	Type	Status
None				

**Business-level applications**

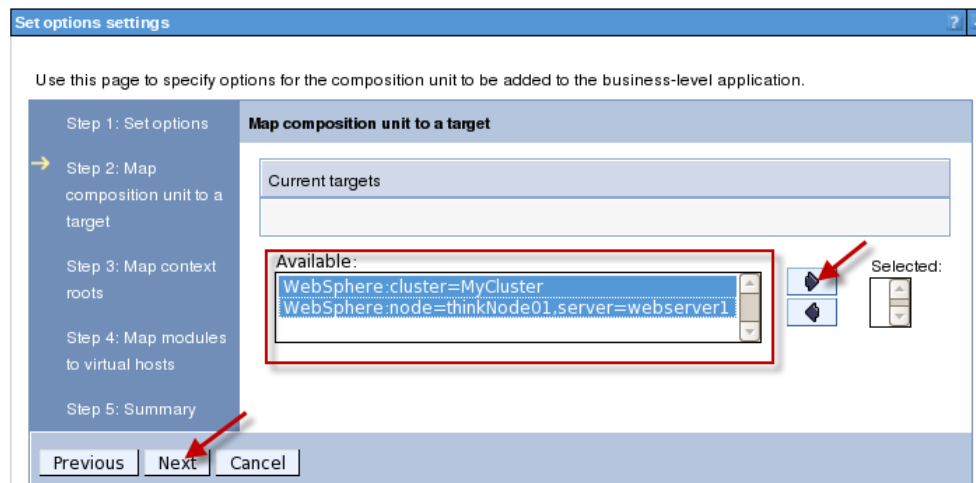
Add Delete

f) Select the **BankingApplication\_1.0.0.eba** asset and click on the **Continue** button

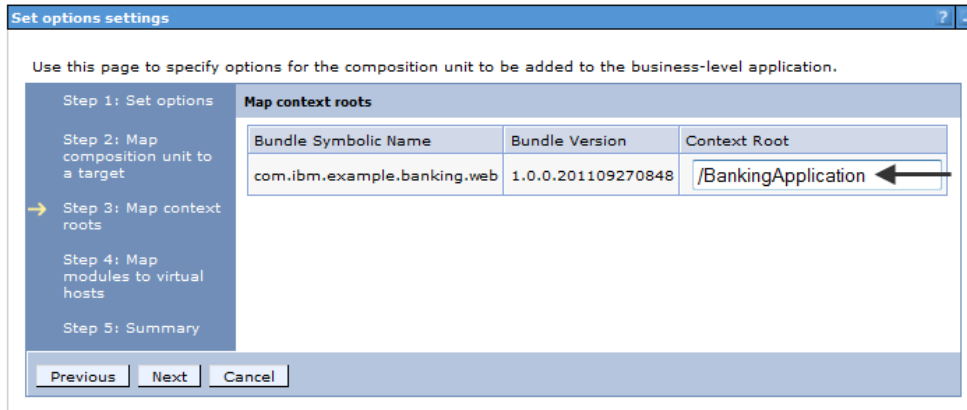


g) Accept the defaults for Step 1 by clicking on the **Next** button.

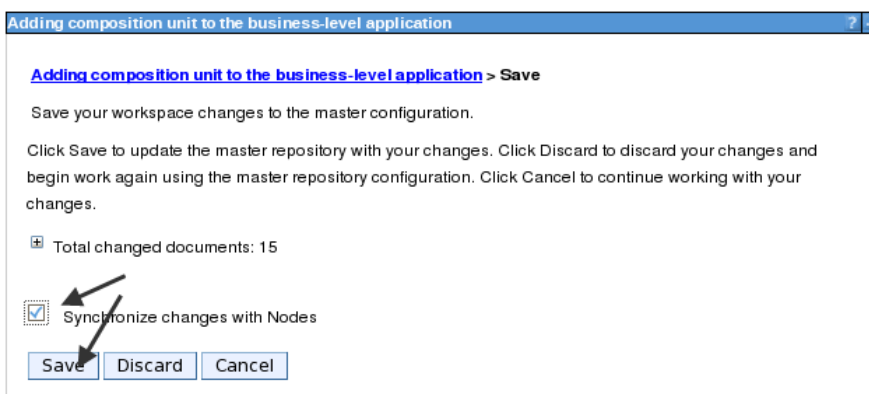
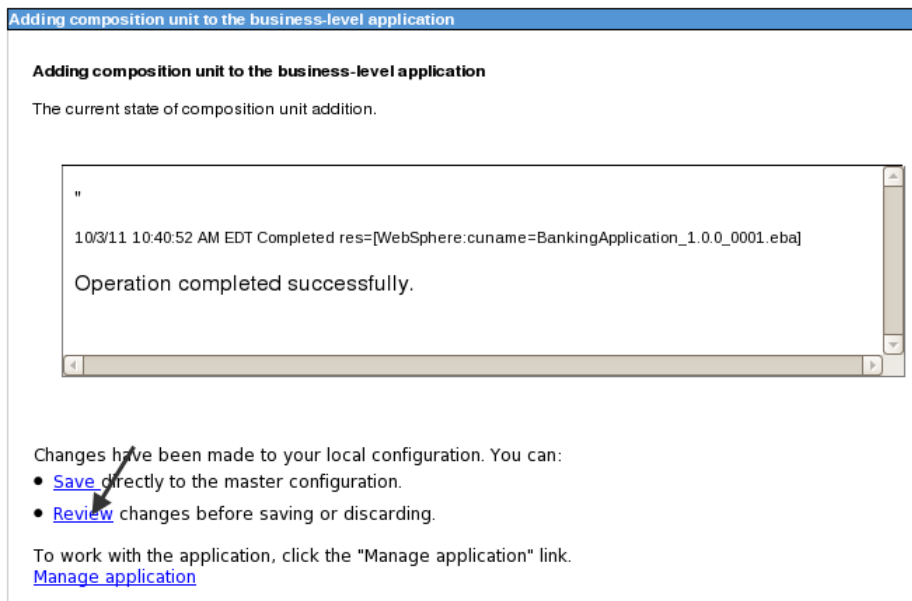
h) For Step 2: Map composition unit to a target, be sure to select both the MyCluster cluster and the webserver1 and click on the arrow pointing to the right. This will deploy the application to both the cluster and instruct WAS to configure the webserver plugin correctly. Click on the **Next** button to continue.



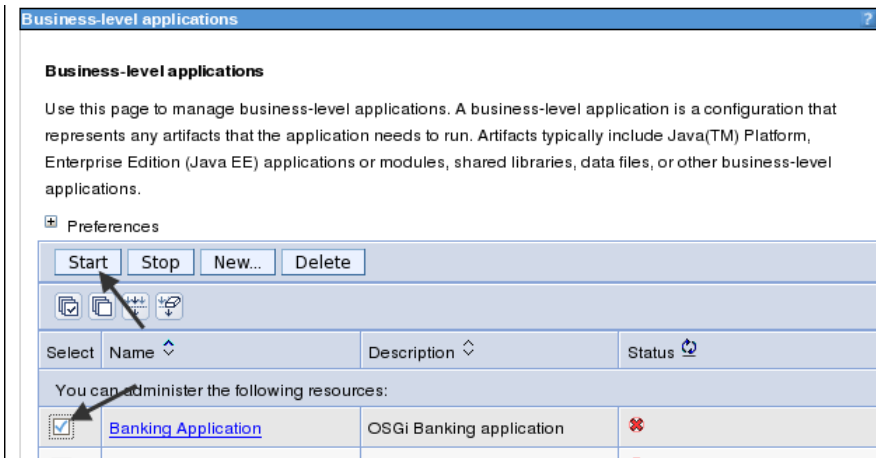
i) Enter **"/BankingApplication"** into the Context Root field and click on the **Next** button.



- j) On Step 4: Map modules to virtual hosts, click on the **Next** and then the **Finish** button to complete the definition.
- k) Be sure to review and save the changes to the configuration and synchronize the changes to the cell.



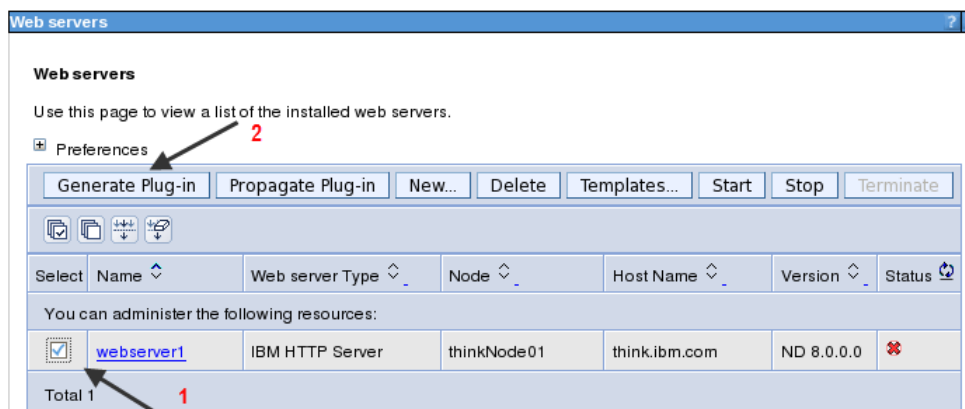
- l) Since the default is to not start the application upon distribution, you will need to manually start the application. Select the **Banking Application** which you just created and click on the **Start** button.



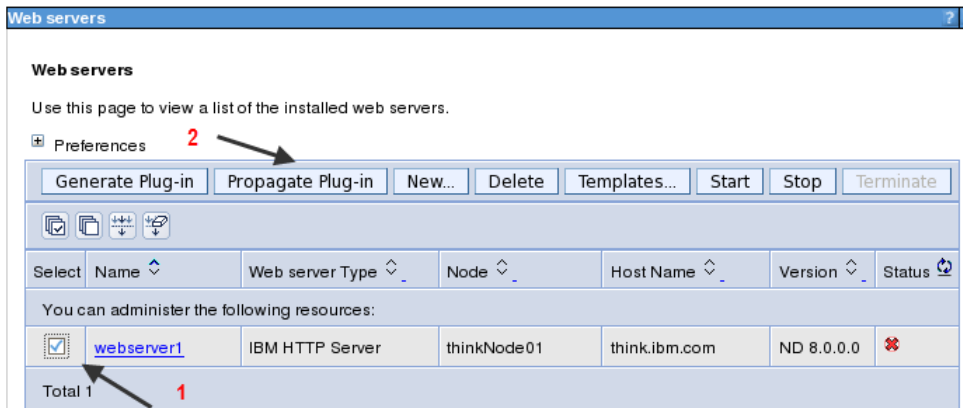
4. Configure the webserver so it can route requests to the newly deployed application. Expand the Servers then Server Types in the navigation panel. Then click on the Web servers link



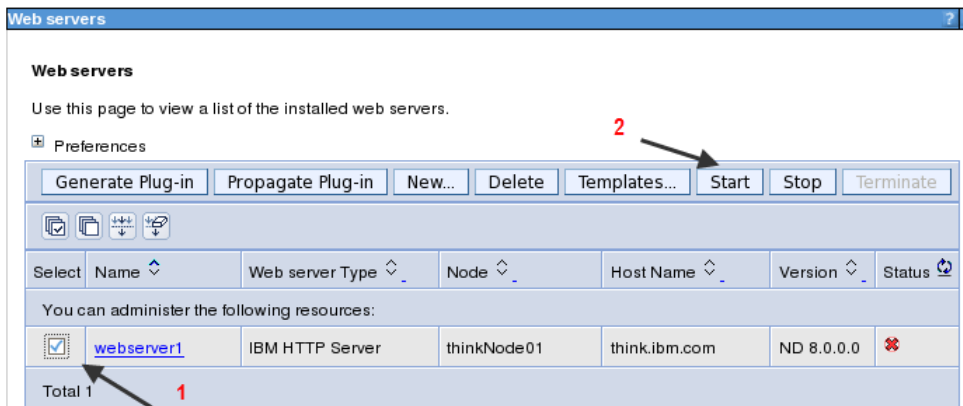
5. Select **webserver1** and click on the **Generate Plug-in** button.



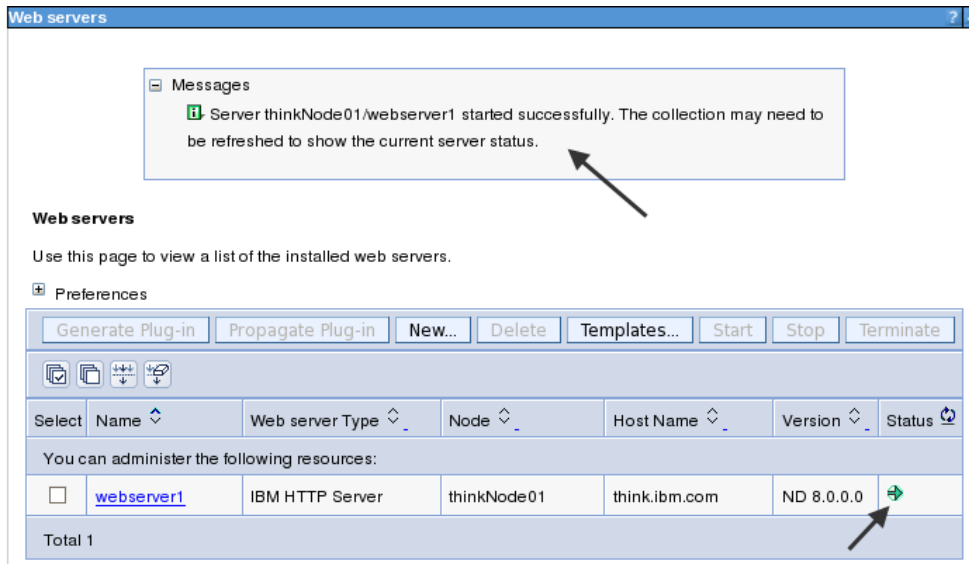
\_\_\_\_ 6. Reselect **webserver1** and click on the **Propagate Plug-in** button



\_\_\_\_ 7. Lastly, start the Web server by reselecting **webserver1** and click on the **Start** button.



- \_\_\_\_ 8. Ensure that the Status for webserver1 turns green to indicate that it has successfully started. You may also notice a message in the top of the panel.

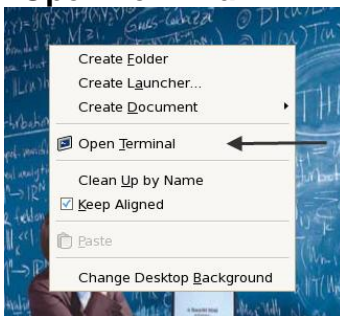


*In this part of the exercise you started the WAS Environment, imported, deployed, and started the Java EE “BankingApplication” OSGi application. You also generated an updated webserver plugin configuration to support the new application.*

### 2.7 Part 3: Use the OSGi BankingApplication Web app

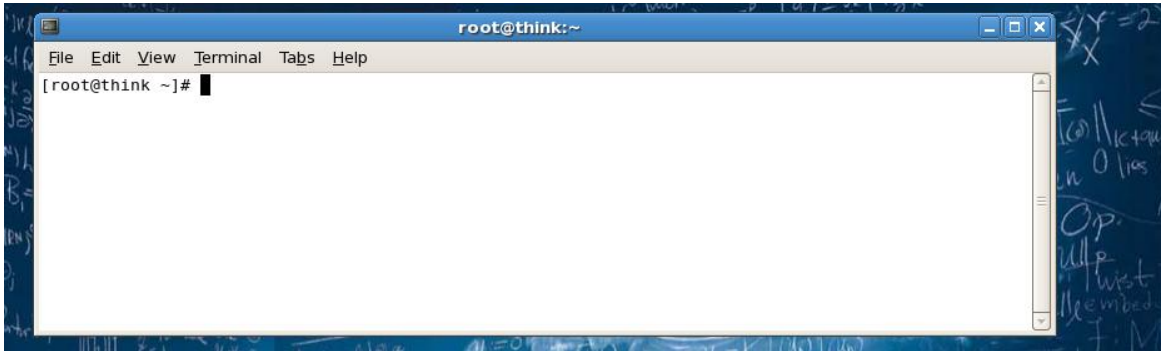
In this part of the exercise you will use the Web front-end of the OSGi application to create an account owner, open a bank account and deposit some funds. You will also monitor the WAS **SystemOut.log** files for both servers in the cluster to validate that the application is working as desired.

- \_\_\_\_ 1. Monitor the **SystemOut.log** file
- a) Start a terminal window by right clicking anywhere on the open desktop and select **Open Terminal**.

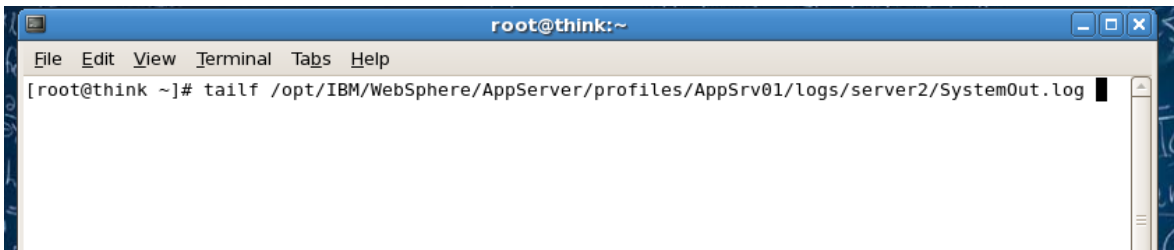




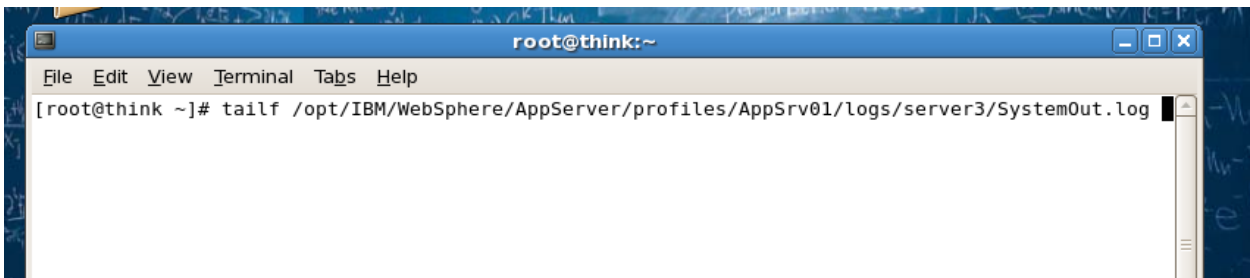
- b) Resize the window by dragging a corner so that it covers most of the width of the screen, but only about  $\frac{1}{4}$  of the height of the screen.



- c) Enter the command **"tailf /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2/SystemOut.log"**

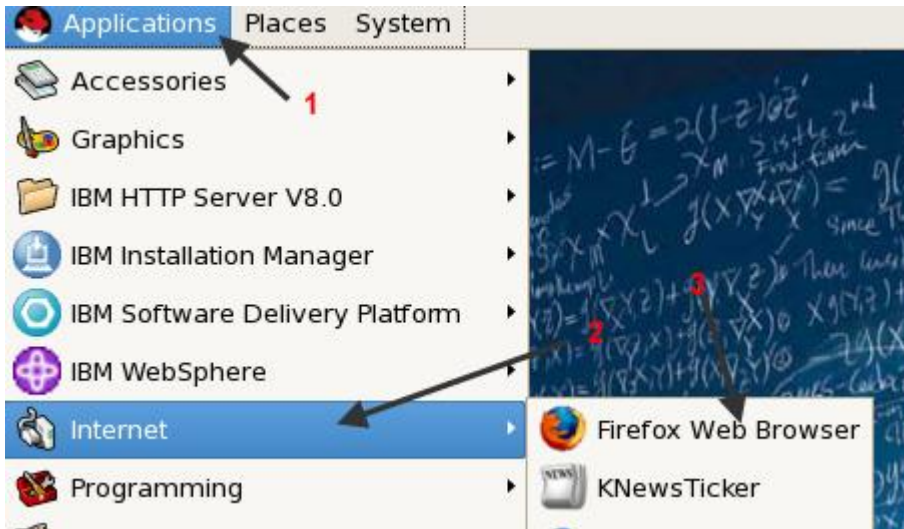


- d) Start another terminal window by right clicking anywhere on the open desktop and select **Open Terminal**.
- e) Resize the window by dragging a corner so that it covers most of the width of the screen, but only about  $\frac{1}{4}$  of the height of the screen.
- f) Enter the command **"tailf /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server3/SystemOut.log"**



\_\_\_\_ 17. Launch the Web application in the Mozilla Firefox browser.

- a) Select **Applications** → **Internet** → **Firefox web browser**



- b) Open <http://localhost/BankingApplication/index.jsp>  
 c) You should see the **International Bank of Bundles Web** application page like below.

## International Bank of Bundles

---

### Access Accounts

**Balance:** Account number

**Deposit:** Account number  \$

**Withdraw:** Account number  \$

---

### Administer Clients

Client ID  First Name  Last Name

**Add new client:** First name  Last name

---

### Administer Accounts

Account Number  Balance  Owner

**Add new account:** Client ID

---

\_\_\_\_\_ 18. Create an account owner.

- a) In the *Administer Clients* section of the Web application, enter the following names into the **First name** and **Last name** fields, then press **Add new client**.
  1. First name = John
  2. Last name = Doe
- b) The status message “*Owner 100 added successfully*” should appear in the grey status area.
- c) Inspect both of the **SystemOut.log** tails. In one of the windows, you should see several lines of output produced by `System.out.println(...)` calls that are instrumented throughout the Java implementation classes of the application. For instance, after step [a] above, the last few lines of the console should read as follows:

```
com.ibm.ws.webcontainer.servlet.ServletWrapper init SRVE0242I:...
[OSGi] AccountManagerImpl.getOwners() = []
[OSGi] AccountManagerImpl.getAccounts() = []
[JSP] index.jsp: owners = []
[JSP] index.jsp: accounts = []
com.ibm.ws.webcontainer.servlet.ServletWrapper init SRVE0242I:...
[Servlet] AddAOwnerServlet(...)
[Servlet] AddAccountServlet(...) firstName=John
[Servlet] AddAccountServlet(...) lastName=Doe
[OSGi] AccountManagerImpl.createOwner(Doe,John) = 100
[OSGi] AccountManagerImpl.getOwners() =
    [Owner{id=100,firstName=John,lastName=Doe}]
[OSGi] AccountManagerImpl.getAccounts() = []
[JSP] index.jsp: owners =
    [Owner{id=100,firstName=John,lastName=Doe}]
[JSP] index.jsp: accounts = []
```

\_\_\_\_\_ 19. Create an account.

- a) In the *Administer Accounts* section of the Web application, enter the client number **100** into the Client ID field, then press **Add new account**.
- b) The status message “*Account 1000 opened successfully*” should appear in the grey status area.
- c) Again, inspect the two **SystemOut.log** displays.

\_\_\_\_\_ 20. Deposit funds into the account.

- a) In the *Access Accounts* section of the Web application, enter account number **1000** into the **Deposit: Account number** field, enter **10000** into the **\$** field, then press **Deposit**.

- b) The status message “*Funds in the amount \$10,000.00 deposited to account 1000. The new balance s \$10,000.00.*” should appear in the grey status area.
- c) Again, inspect the two **SystemOut.log** displays.

\_\_\_\_ 21. Keep both of the terminal windows open and maintain the tailf commands.

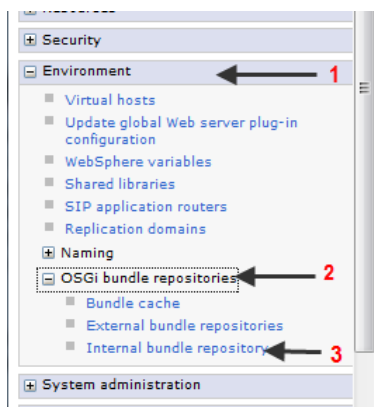
*In this part of the exercise you used the OSGi Web application to create a new account owner (or client) and a new bank account. You deposited funds into the bank account which will be important if you are going to buy any stock in the next part of the exercise. You also monitored the SystemOut.log files to determine which server instance handled the request.*

## 2.8 Part 4: Deploy an update to the OSGi BankingApplication Web app

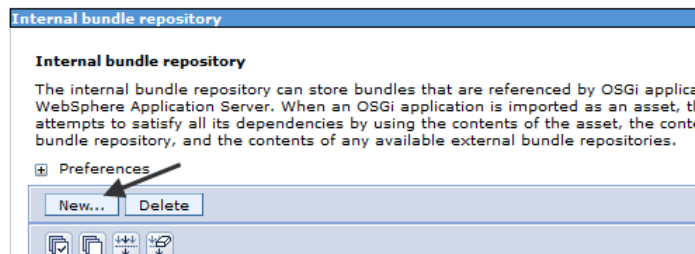
In this part of the exercise, you will be provided an update OSGi bundle file which is provided as a java archive file. During the initial testing of the application, it was discovered that the starting value for clientIDs and account numbers was wrong. Instead of 100, the starting value for client IDs is supposed to be 200. The starting account number is also supposed to be 2000 instead of 1000. As a result, the development team has generated an updated implementation bundle and you need to import and activate this update for the next round of testing. You will import this bundle into the WAS internal repository from where it can be made be used to update the deployed OSGi BankingApplication. As you will see, the repository may contain multiple versions of a bundle. As long as the OSGi Composition permits, the System Administrator will determine which version will be the desired version based. This allows a System Administrator to be able to load and test updates (or roll back changes) quickly and efficiently.

\_\_\_\_ 1. Import the updated BankingApplication OSGi bundle.

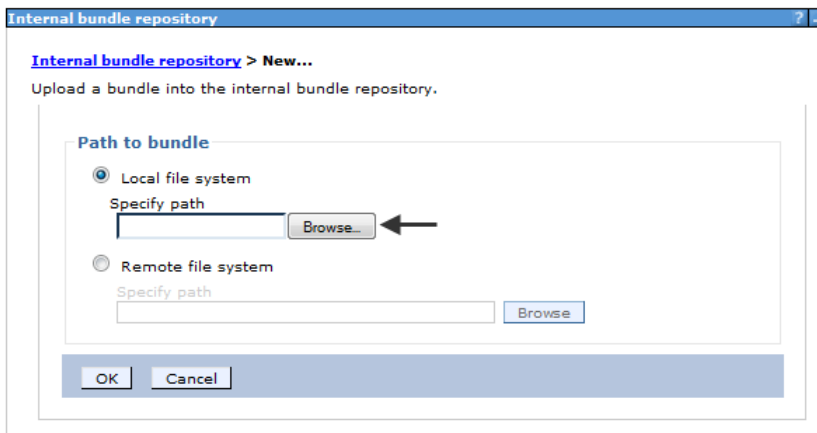
- a) Log on to the WAS Admin Console.
- b) Expand **Environment**
- c) Expand **OSGi bundle repositories**
- d) Select Internal bundle repository



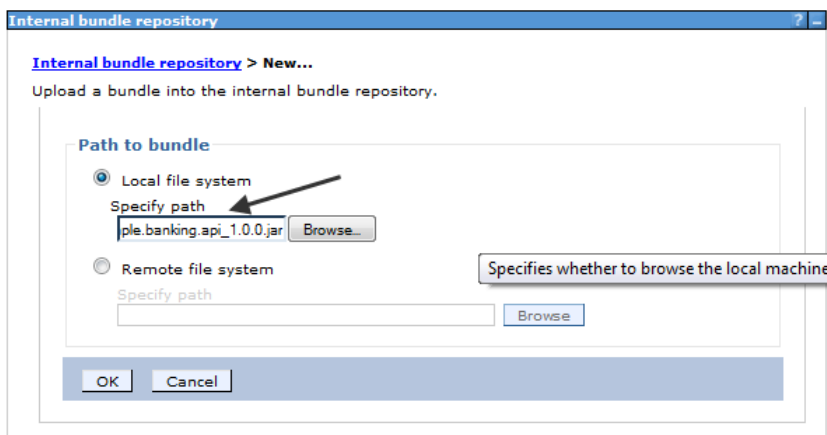
- e) Click on the **New...** button



- f) Click on the **Browse...** button



- g) Navigate to the **/Labfiles80/OSGiApplication/Updates** folder and select the **com.ibm.example.banking.impl\_1.0.1.jar** file.

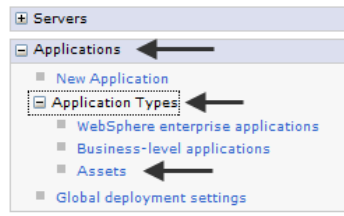


- h) Save and synchronize changes.

\_\_\_\_ 1. Update the BankingApplication enterprise bundle application (EBA)

- a) Within the Navigation frame on the left side, expand **Applications**

- b) Expand **Application Types**  
 c) Select **Assets**



- d) Select the **BankingApplication\_1.0.0.eba** asset.

Cell=thinkCell01, Profile=Dmgr01

**Assets**

Use this page to manage assets in the asset repository. Assets represent physical binaries. Examples of assets include compressed (zip) files, Enterprise JavaBean (EJB) Java(TM) archive (JAR) files, EAR files, Service Component Architecture (SCA) composite JAR files, mediation JAR files, shared library JAR files, and non-Java EE contents such as PHP applications.

Preferences

Import Delete Update Export

Select Name Description

You can administer the following resources:

Select	Name	Description
<input type="checkbox"/>	<a href="#">BankingApplication_1.0.0.eba</a>	BankingApplication

Total 1

- e) On the far right hand section of the primary panel, under Additional Properties, select **Update bundle versions in this application**

Enterprise JavaBean (EJB) Java(TM) archive (JAR)  
 ents such as PHP applications.

**Additional Properties**

- [Export the deployment manifest from this application](#)
- [Import a deployment manifest into this application](#)
- [Update bundle versions in this application](#)

- f) Click on the pulldown for the **com.ibm.example.banking.impl** bundle and select the **1.0.1.201109270848** version. Then click on the **Preview** button

**Assets**

[Assets](#) > [BankingApplication\\_1.0.0.eba](#) > **Update bundle versions in this application**

Update the versions of the bundles that comprise this application.

Application bundle content

Symbolic Name	Content Type	Sharing	Deployed Version	New Version
com.ibm.example.banking.api	Bundle	Isolated	1.0.0.201109270848	No preference
com.ibm.example.banking.impl	Bundle	Isolated	1.0.0.201109270744	No preference
com.ibm.example.banking.web	Bundle	Isolated	1.0.0.201109270848	No preference 1.0.0.201109270744 <b>1.0.1.201109270848</b> 1.0.1.201109282146

Preview Cancel

- g) Notice the informational message. Although the application definition has been updated, it will not take effect until the BLA is updated to use the new deployment. This will occur the next time the application is restarted, or when an Administrative action to perform the update has been performed. Click on the **Create** button to generate the updated deployment.

**Assets**

[Assets](#) > [BankingApplication\\_1.0.0.eba](#) > [Update bundle versions in this application](#) > **Preview**

A preview of the result of the proposed changes to the bundle versions in this application.

The selected bundle versions can be resolved, so you can now create a new deployment with the proposed bundle versions. The new deployment will not affect any composition units for this asset until the composition units are updated to use the new deployment.

Application bundle content

Symbolic Name	Deployed Version	New Version
com.ibm.example.banking.api	1.0.0.201109270848	1.0.0.201109270848
com.ibm.example.banking.impl	1.0.0.201109270744	1.0.1.201109270848
com.ibm.example.banking.web	1.0.0.201109270848	1.0.0.201109270848

Create Cancel

- h) Click on the OK button to complete processing of the **BankingApplication** asset.

**EBA Dependencies**

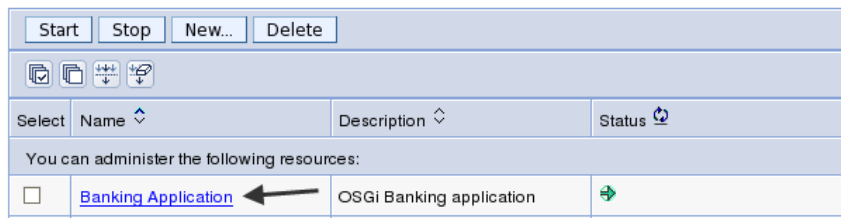
Bundle downloads are complete.

OK Cancel

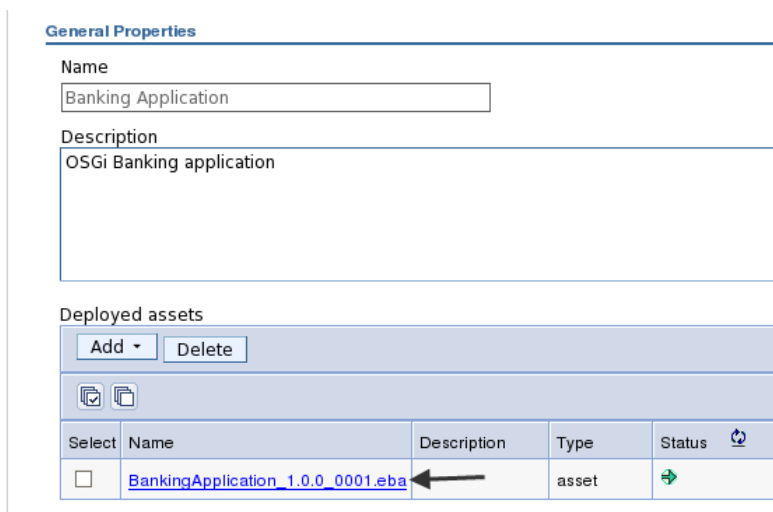
- i) Save and synchronize changes.

## 2. Update the BankingApplication business level application (BLA)

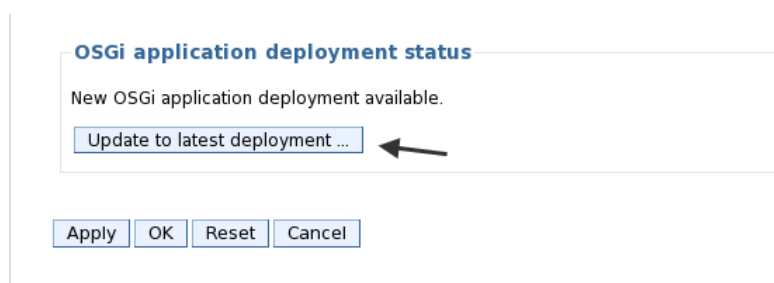
- a) Within the Navigation frame on the left side, Select **Business-level applications**
- b) Within the main frame, select the **Banking Application** BLA.



- c) Click on the **BankingApplication\_1.0.0\_0001.eba** asset link



- d) Click on the **Update to latest deployment ...** button



- e) Review the differences between the currently Deployed Version and the New Version to be sure that they are correct. Then click on the **OK** button



[Business-level applications](#) > [Banking Application](#) > [BankingApplication\\_1.0.0\\_0001.eba](#) >

**Preview**

A preview of the result of the proposed changes to the bundle versions in this application.

Symbolic Name	Deployed Version	New Version
com.ibm.example.banking.api	1.0.0.201109270848	1.0.0.201109270848
com.ibm.example.banking.impl	1.0.0.201109270744	1.0.1.201109270848
com.ibm.example.banking.web	1.0.0.201109270848	1.0.0.201109270848

OK Cancel

f) Click on the **OK** button.

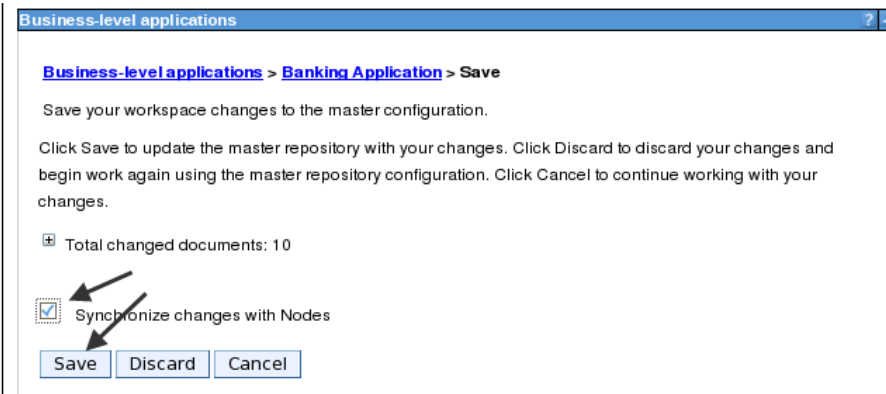
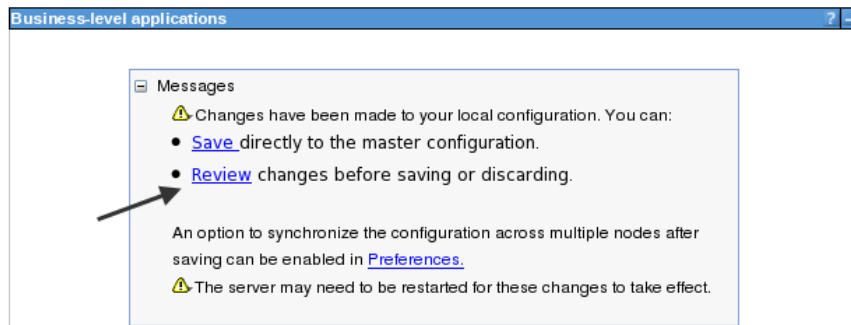
**OSGi application deployment status**

Using latest OSGi application deployment.

Update to latest deployment ...

Apply OK Reset Cancel

g) Be sure to review and save the changes to the configuration and synchronize the changes to the cell.

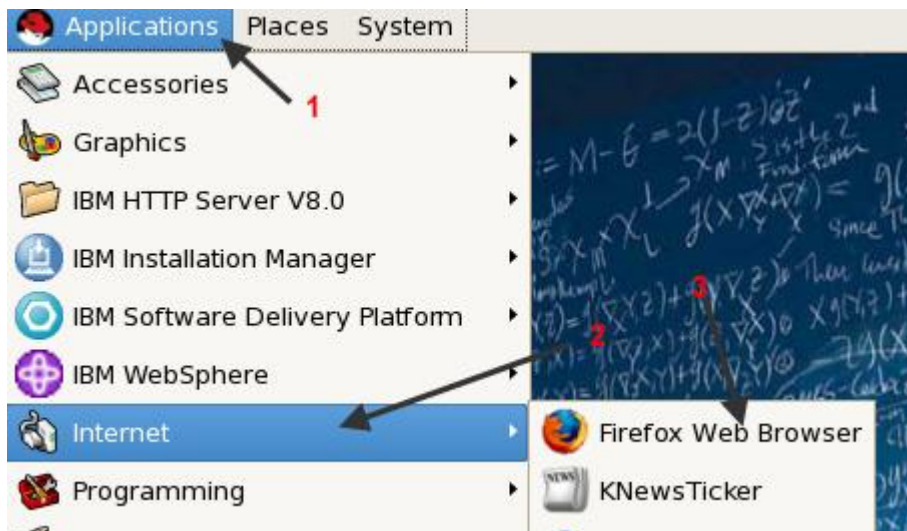


## 2.9 Part 5: Validate the updated OSGi BankingApplication Web app

As before you will use the Web front-end of the OSGi application to create an account owner, open a bank account and deposit some funds.

\_\_\_\_ 1. Launch the Web application in the Mozilla Firefox browser.

a) Select **Applications** → **Internet** → **FireFox web browser**



b) Open <http://localhost/BankingApplication/index.jsp>

c) You should see the **International Bank of Bundles Web** application page like below.

**International Bank of Bundles**

---

**Access Accounts**

**Balance:** Account number

**Deposit:** Account number  \$

**Withdraw:** Account number  \$

---

**Administer Clients**

Client ID	First Name	Last Name
Add new client: First name <input type="text"/> Last name <input type="text"/> <input type="button" value="Add new client"/>		

**Administer Accounts**

Account Number	Balance	Owner
Add new account: Client ID <input type="text"/> <input type="button" value="Add new account"/>		

---

\_\_\_\_ 2. Create an account owner.

- a) In the *Administer Clients* section of the Web application, enter the following names into the **First name** and **Last name** fields, then press **Add new client**.
  1. First name = Jane
  2. Last name = Doe
- b) The status message “*Owner 200 added successfully*” should appear in the grey status area. **This verifies that the updated implementation bundle is being used.**
- c) Inspect both of the **SystemOut.log** tails. In one of the windows, you should see several lines of output produced by `System.out.println(...)` calls that are instrumented throughout the Java implementation classes of the application. For instance, after step [a] above, the last few lines of the console should read as follows:

```
com.ibm.ws.webcontainer.servlet.ServletWrapper init SRVE0242I:...
[OSGi] AccountManagerImpl.getOwners() = []
[OSGi] AccountManagerImpl.getAccounts() = []
[JSP] index.jsp: owners = []
[JSP] index.jsp: accounts = []
```

```

com.ibm.ws.webcontainer.servlet.ServletWrapper init SRVE0242I:...
[Servlet] AddAOwnerServlet(...)
[Servlet] AddAccountServlet(...) firstName=Jane
[Servlet] AddAccountServlet(...) lastName=Doe
[OSGi] AccountManagerImpl.createOwner(Doe, Jane) = 200
[OSGi] AccountManagerImpl.getOwners() =
    [Owner{id=200, firstName=Jane, lastName=Doe}]
[OSGi] AccountManagerImpl.getAccounts() = []
[JSP] index.jsp: owners =
    [Owner{id=200, firstName=Jane, lastName=Doe}]
[JSP] index.jsp: accounts = []

```

\_\_\_\_ 3. Create an account.

- d) In the *Administer Accounts* section of the Web application, enter the client number **200** in the Client ID field, then press **Add new account**.
- e) The status message “*Account 2000 opened successfully*” should appear in the grey status area. ***This verifies that the updated implementation bundle is being used.***
- f) Again, inspect the two **SystemOut.log** displays.

\_\_\_\_ 4. Deposit funds into the account.

- g) In the *Access Accounts* section of the Web application, enter account number **2000** into the **Deposit: Account number** field, enter **10000** into the **\$** field, then press **Deposit**.
- h) The status message “*Funds in the amount \$10,000.00 deposited to account 2000. The new balance s \$10,000.00.*” should appear in the grey status area.
- i) Again, inspect the two **SystemOut.log** displays.

\_\_\_\_ 5. Press **Ctrl+C** in each of the command windows where you have been monitoring the SystemOut.log files. This will terminate the tailf command.

\_\_\_\_ 6. Enter the “**exit**” command in each of the command windows. This will close out the terminal windows.

*In this part of the exercise you used the updated OSGi Web application to create a new account owner (or client) and a new bank account. You verified that the updated module was used to create client IDs and account numbers using the new ranges.*

***CONGRATULATIONS!***

***YOU HAVE REACHED THE END OF THE EXERCISE!***

## 2.10 Conclusions

In this exercise, you the WebSphere Application Server Runtime Environment to import, deploy, run and test a java application packaged using the OSGi models.

You explored the various WAS Admin GUI capabilities for OSGi bundle and application management, including how to import bundles to the local repository and update a running OSGi application.

Optionally, you were able to explore wsadmin scripting equivalents to the administrative tasks you performed through the interactive console.

---

## Lab 3 High Performance Extensible Logging

High Performance Extensible Logging (HPEL) is a new log and trace facility. It provides a convenient mechanism for storing and accessing log, trace, System.err, and System.out information produced by the application server or applications. It is an alternative to the basic log and trace facility, which provides the JVM logs, diagnostic trace, and service log files commonly named SystemOut.log/SystemErr.log, trace.log, and activity.log. HPEL provides a log data repository, a trace data repository, and a text log file.

For more information about HPEL, see the following WebSphere Application Server V8.0 information center topic: **Using HPEL to troubleshoot applications**

This lab is provided **AS-IS**, with no formal IBM support.

### 3.1 Lab requirements

Lab 1 WebSphere Application Server V8 Network Deployment Installation and Configuration completed.

### 3.2 What you should be able to do

At the end of this lab you should be able to

- Enable and configure HPEL.
- Use the HPEL command line log viewer.
- Use the HPEL log viewer included in the WebSphere administrative console.

---

### 3.3 Introduction

This lab is intended as a short primer new High Performance Extensible Logging capability in WAS V8.

The aim of the lab is to walk through the steps that a systems administrator would perform to enable and use HPEL from a command and the WAS V8 administrative console.

---

### 3.4 Exercise instructions

Some instructions in this lab may be Linux<sup>®</sup> operating-system specific. If you plan on running the lab on an operating-system other than Linux<sup>®</sup>, you will need to execute the appropriate commands, and use appropriate files (.sh vs. .bat) for your operating system. The directory locations are specified in the lab instructions using symbolic references, as follows:

Reference variable	Windows <sup>®</sup> location	Linux <sup>®</sup> or UNIX <sup>®</sup> locations
<WAS_HOME>	C:\IBM\WebSphere\AppServer	/usr/WebSphere/AppServer /opt/WebSphere/AppServer
<PROFILE_HOME>	C:\IBM\WebSphere\AppServer\profiles\AppSrv01	/usr/WebSphere/AppServer/profiles/AppSrv01 /opt/WebSphere/AppServer/profiles/AppSrv01
<LAB_FILES>	C:\Labfiles80	/Labfiles80
<TEMP>	C:\temp	/tmp

---

**Note for Windows users:** When directory locations are passed as parameters to a Java program such as EJBdeploy or wsadmin, it is necessary to replace the backslashes with forward slashes to follow the Java convention. For example, C:\Labfiles80\ would be replaced by C:/Labfiles80/

---

### 3.5 Enable and Configure HPEL.

1. Log into the Admin console and inside the console navigate to **Troubleshooting -> Logs and Trace - server2**

The screenshot shows the Admin console interface. On the left is a navigation tree with 'Troubleshooting' expanded to 'Logs and trace'. The main content area is titled 'Logging and tracing' and contains a table of resources. The 'server2' entry is circled in green.

Server	Node	Host Name	Version	Type	Status
dmgr	thinkCellManager01	think.ibm.com	ND 8.0.0.0	servers	
nodeagent	thinkNode01	think.ibm.com	ND 8.0.0.0	servers	
server2	thinkNode01	think.ibm.com	ND 8.0.0.0	servers	
server3	thinkNode01	think.ibm.com	ND 8.0.0.0	servers	
Total 4					

2. Click the **Switch to HPEL Mode** button and **Save** this configuration change. Note enabling HPEL is made to one server at a time. You will need to restart the server for HPEL to take affect. We will restart the server in a later step.

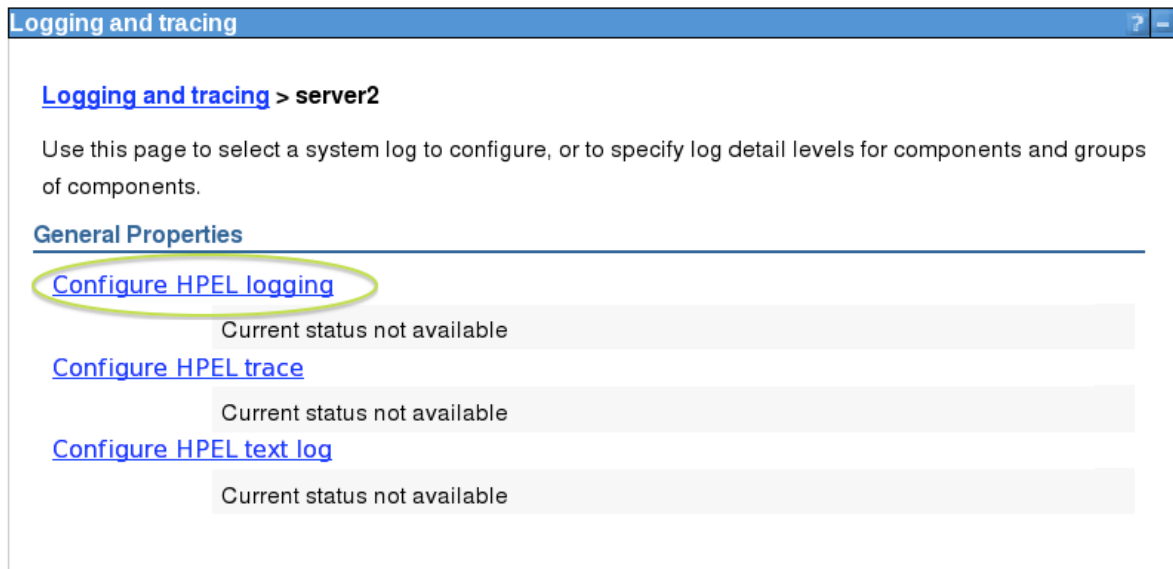
The screenshot shows the 'Logging and tracing > server2' page. It contains a button labeled 'Switch to HPEL Mode' which is circled in green. To the right of the button, the text '(Advised for most installations)' is displayed.

**Switch to HPEL Mode** (Advised for most installations)

3. Click the **OK** button. You will return to the Logging and tracing screen. Chose **server 2** to review and configure the HPEL settings.



\_\_\_\_ 4. Select **Configure HPEL Logging**.



- \_\_\_\_ a. On the **HPEL Log Configuration** page we can customize a variety of logging properties. Review the different logging configuration options on this page. Note the drop down options under **Begin cleanup of oldest records** checkbox option and the **Out of space** action drop down. Change the **Maximum log size** to **20** and the click the **OK** button. Do not **Save** yet.

[Logging and tracing](#) > [server2](#) > HPEL Log Configuration

Use this page to configure High Performance Extensible Logging (HPEL) log options. The HPEL log can be viewed using the logViewer command (in the profile bin directory), or using the View HPEL Logs and Trace link.

Configuration

---

### General Properties

- \* Directory path
- Enable log record buffering
- Start new log file daily at:

### Log record purging policies

- Begin cleanup of oldest records
- Log record age limit  
 Hours old
- Maximum log size  
 Megabytes

- \* Out of space action

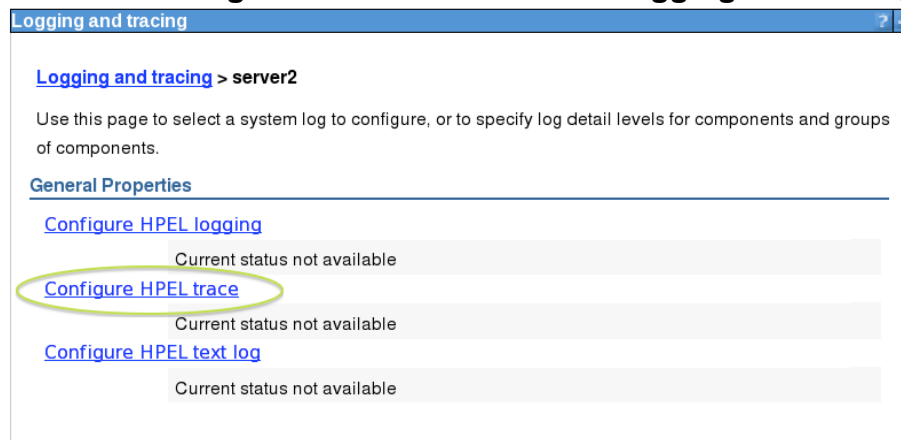
### Additional Properties

- [Change log detail levels](#)

### Related Items

- [View HPEL logs and trace](#)

- \_\_\_\_\_ 5. Next, chose the **Configure HPEL trace** from the **Logging and tracing > server 2**



page.

- \_\_\_\_\_ 6. On the **HPEL Trace Configuration** page we can customize a variety of trace properties. Review the different logging configuration options. Note that we see the same options as on the **HPEL Log configuration page** with one new option, **Trace to a memory buffer**. Also note that the directory for the HPEL traces is also used to dump the memory buffer if **Trace to a memory buffer** is selected. Under the check box **Begin cleanup of oldest records**, chose **when oldest records reach age** limit from the drop down box and the change the **Log record age limit** to **12**. Click the **OK** button. Do not **Save** yet.

Logging and tracing > server2 > HPEL Trace Configuration

Use this page to configure High Performance Extensible Logging (HPEL) trace options. The HPEL trace can be viewed using the logViewer command (in the profile bin directory), or using the View HPEL Logs and Trace link.

Configuration

**General Properties**

Trace to a directory

Enable log record buffering

Start new log file daily at: 12 AM

**Log record purging policies**

Begin cleanup of oldest records when oldest records reach age limit

Log record age limit: 12 Hours old

Maximum log size: 50 Megabytes

\* Out of space action: Purge old records

Trace to a memory buffer

\* Memory Buffer Size: 8 MB

\* Directory to use for tracing and dumping memory buffer: \${SERVER\_LOG\_ROOT}

Apply OK Reset Cancel

**Additional Properties**

[Change log detail levels](#)

**Related Items**

[View HPEL logs and trace](#)

7. . Next chose the **Configure HPEL text log** from the **Logging and tracing > server 2** page.

Logging and tracing > server2

Use this page to select a system log to configure, or to specify log detail levels for components and groups of components.

**General Properties**

[Configure HPEL logging](#)

Current status not available

[Configure HPEL trace](#)

Current status not available

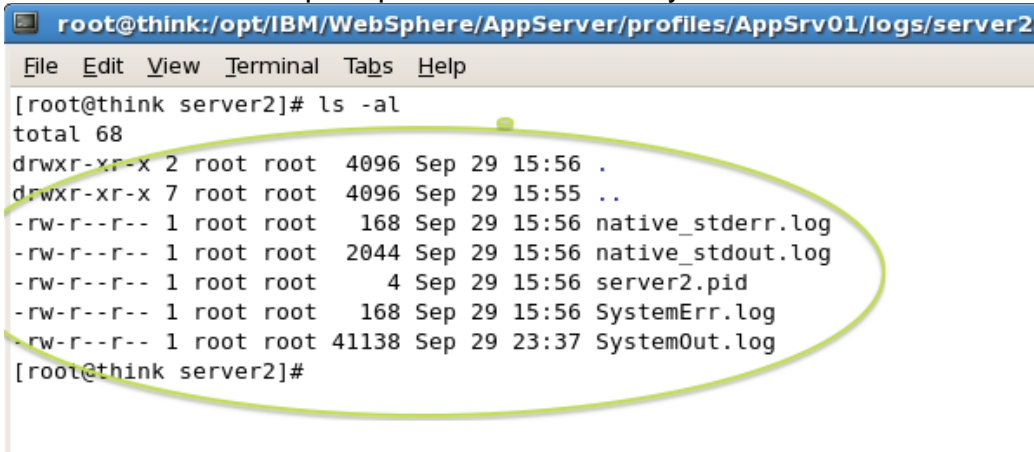
[Configure HPEL text log](#)

Current status not available

- a. On the **HPEL Text Log Configuration** page we can customize a variety of text logging properties. The HPEL text log option allows you to output a traditional text

log file along with the binary HPEL files. For production use, you would want turn off the text logging capability by unchecking the **Enable text log** check box. Review the different logging configuration options. Note we see many of the same options that are found on the **HPEL Log configuration page** with two additional options for choosing the **Text output format** and the option to **Include trace records**. Turn off text logging by unchecking the **Enable text log** check box. Click the **OK** button and **Save** these configuration changes. Click the **OK** button on the **Synchronize Changes with Nodes** screen.

8. Go to terminal window and navigate to the **/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2** directory. Type **ls -al** at the command prompt. Note the directory and file structure.



```

root@think:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
File Edit View Terminal Tabs Help
[root@think server2]# ls -al
total 68
drwxr-xr-x 2 root root 4096 Sep 29 15:56 .
drwxr-xr-x 7 root root 4096 Sep 29 15:55 ..
-rw-r--r-- 1 root root 168 Sep 29 15:56 native_stderr.log
-rw-r--r-- 1 root root 2044 Sep 29 15:56 native_stdout.log
-rw-r--r-- 1 root root 4 Sep 29 15:56 server2.pid
-rw-r--r-- 1 root root 168 Sep 29 15:56 SystemErr.log
-rw-r--r-- 1 root root 41138 Sep 29 23:37 SystemOut.log
[root@think server2]#

```

9. Stop **server2**. Delete all the files in the **/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/server2** directory using **rm \* -f**. Start **server2** for the new HPEL settings to take affect. Note the new log file and

directory structure that is created when running HPEL.

```

root@think:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
File Edit View Terminal Tabs Help
[root@think server2]# ls -al
total 32
drwxr-xr-x 4 root root 4096 Sep 30 23:15 .
drwxr-xr-x 7 root root 4096 Sep 29 15:55 ..
drwxr-xr-x 3 root root 4096 Sep 30 23:15 logdata
-rw-r--r-- 1 root root 168 Sep 30 23:15 native_stderr.log
-rw-r--r-- 1 root root 1886 Sep 30 23:15 native_stdout.log
-rw-r--r-- 1 root root 5 Sep 30 23:15 server2.pid
-rw-r--r-- 1 root root 2434 Sep 30 23:15 startServer.log
drwxr-xr-x 2 root root 4096 Sep 30 23:15 tracedata
[root@think server2]#

```

10. In the Admin Console, navigate to **Troubleshooting -> Logs and Trace -> server2** and note the screen **Logging and tracing > server2** screen now shows the current custom HPEL settings for **server2**.

**Logging and tracing > server2**

Use this page to select a system log to configure, or to specify log detail levels for components and groups of components.

**General Properties**

[Configure HPEL logging](#)

Directory	/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
For cleanup, delete records older than	Disabled
For cleanup, maximum size of logs	20 Megabytes

[Configure HPEL trace](#)

Directory	/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
For cleanup, delete records older than	12 Hours
For cleanup, maximum size of trace	Disabled

[Configure HPEL text log](#)

Current status:	Disabled
-----------------	----------

You're ready to proceed to part 1.6

### 3.6 Use the HPEL command line log viewer

1. Since you enabled HPEL and restarted the server, the legacy WebSphere Application Server logging information is no longer available. The command line HPEL log viewer provides a powerful, yet simple solution for viewing logging information.

The following WebSphere Application Server V8.0 Information Center topic includes a detailed reference of the command line viewer options: **LogViewer command-line tool**

2. Open a terminal window and navigate to the `/opt/IBM/WebSphere/AppServer/bin` directory to launch the HPEL log viewer.
3. At the command prompt, type `./logViewer.sh -help | more` to view the HPEL log viewer command line options.
4. Create a legacy format log file and compare its contents to the output of several HPEL log viewer commands. Run the following command to create a legacy format log file (`legacyFormat.log`) that contains only log records (INFO, WARNING, and SEVERE):

```
./logViewer.sh -outLog ../logs/legacyFormat.log -minLevel INFO -maxLevel SEVERE
```

```
[root@think bin]# ./logViewer.sh -outLog ../logs/legacyFormat.log -minLevel INFO -maxLevel SEVERE
Using /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2 as repository directory.
Operation Complete
Processed 227 records in 0.07 seconds (3,242.857 records per second).
[root@think bin]# █
```

## 5. Type `cat ../logs/legacyFormat.log | more` to view the log file.

```
[root@think bin]# cat ../logs/legacyFormat.log | more
***** Start Display Current Environment *****
WebSphere Platform 8.0.0.0 [ND 8.0.0.0 n118.03] running with process name thinkCell01\thinkNode01\server2 and process id
10620
Host Operating System is Linux, version 2.6.18-238.12.1.el5
Java version = 1.6.0, Java Compiler = j9jit26, Java VM name = IBM J9 VM
was.install.root = /opt/IBM/WebSphere/AppServer
user.install.root = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01
Java Home = /opt/IBM/WebSphere/AppServer/java/jre
ws.ext.dirs = /opt/IBM/WebSphere/AppServer/java/lib:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/classes:/opt/IBM/WebSph
ere/AppServer/classes:/opt/IBM/WebSphere/AppServer/lib:/opt/IBM/WebSphere/AppServer/installedChannels:/opt/IBM/WebSphere/A
ppServer/lib/ext:/opt/IBM/WebSphere/AppServer/web/help:/opt/IBM/WebSphere/AppServer/deploytool/itp/plugins/com.ibm.etools.
ejbdeploy/runtime
Classpath = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/properties:/opt/IBM/WebSphere/AppServer/properties:/opt/IBM/Web
Sphere/AppServer/lib/startup.jar:/opt/IBM/WebSphere/AppServer/lib/bootstrap.jar:/opt/IBM/WebSphere/AppServer/lib/jsf-nls.j
ar:/opt/IBM/WebSphere/AppServer/lib/lmproxy.jar:/opt/IBM/WebSphere/AppServer/lib/urlprotocols.jar:/opt/IBM/WebSphere/AppSe
rver/deploytool/itp/batchboot.jar:/opt/IBM/WebSphere/AppServer/deploytool/itp/batch2.jar:/opt/IBM/WebSphere/AppServer/java
/lib/tools.jar
Java Library path = /opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSphere/AppServer/java/jre/lib/1386/d
efault:/opt/IBM/WebSphere/AppServer/java/jre/lib/1386:/opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSp
here/AppServer/bin:/usr/lib:
Orb Version = IBM Java ORB build orb626fp1-20110419.00
***** End Display Current Environment *****
[9/30/11 23:15:11:116 EDT] 00000000 ManagerAdmin I TRAS0017I: The startup trace state is *=info.
[9/30/11 23:15:11:120 EDT] 00000000 ManagerAdmin I TRAS0111I: The message IDs that are in use are deprecated
[9/30/11 23:15:11:155 EDT] 00000000 ModelMgr I WSVR0800I: Initializing core configuration models
[9/30/11 23:15:11:438 EDT] 00000000 ComponentMeta I WSVR0179I: The runtime provisioning feature is disabled. All compone
nts will be started.
[9/30/11 23:15:11:488 EDT] 00000000 ProviderTrack I com.ibm.ffdc.osgi.ProviderTracker AddingService FFDC1007I: FFDC Provid
er Installed: com.ibm.ffdc.util.provider.FfdcOnDirProvider@16db5643
[9/30/11 23:15:11:494 EDT] 00000000 ProviderTrack I com.ibm.ffdc.osgi.ProviderTracker AddingService FFDC1007I: FFDC Provid
er Installed: com.ibm.ws.ffdc.impl.FfdcProvider@16dbcb11
[9/30/11 23:15:11:615 EDT] 00000000 AdminInitiali A ADMN0015I: The administration service is initialized.
[9/30/11 23:15:11:820 EDT] 00000000 PluginConfigS I PLGC0057I: The plug-in configuration service started successfully.
[9/30/11 23:15:11:833 EDT] 00000000 SSLComponentI I CWPKI0001I: SSL service is initializing the configuration
[9/30/11 23:15:11:837 EDT] 00000000 WSKeyStore W CWPKI0041W: One or more key stores are using the default password.
[9/30/11 23:15:11:842 EDT] 00000000 SSLConfigMana I CWPKI0027I: Disabling default hostname verification for HTTPS URL co
nnections.
[9/30/11 23:15:11:848 EDT] 00000000 SSLDiagnostic I CWPKI0014I: The SSL component's FFDC Diagnostic Module com.ibm.ws.ss
l.core.SSLDiagnosticModule registered successfully: true.
[9/30/11 23:15:11:848 EDT] 00000000 SSLComponentI I CWPKI0002I: SSL service initialization completed successfully
[9/30/11 23:15:11:850 EDT] 00000000 DiagnosticCon I com.ibm.wsspi.rasdiag.DiagnosticConfigHome setStateCollectionSpec RASD
0012I: Updating State Collection Spec from Uninitialized Value to .*:.*=0
[9/30/11 23:15:11:852 EDT] 00000000 PMIImpl A CWPMI1001I: PMI is enabled
[9/30/11 23:15:11:925 EDT] 00000000 WSChannelFram A CHF0021I: Inbound chain WCInboundAdmin has been marked disabled.
[9/30/11 23:15:11:927 EDT] 00000000 WSChannelFram A CHF0021I: Inbound chain WCInboundAdminSecure has been marked disabl
ed.
[9/30/11 23:15:12:024 EDT] 00000000 GAPAgentCompo I CWLRS6000I: GAP (Grid Application Placement) Component has initializ
ed successfully on process ManagedProcess.
[9/30/11 23:15:12:047 EDT] 00000000 SibMessage I [.] CWSIU0000I: Release: WAS80.SIB Level: d1115.28
[9/30/11 23:15:12:086 EDT] 00000000 SecurityDM I SECJ0231I: The Security component's FFDC Diagnostic Module com.ibm.w
--More--
```



6. Run the following command to view only the log records for thread 0: **./logViewer.sh -thread 0** We will only see the log file output for thread 0. We can send the output of the log view thread 0 command to a text file with the addition of the **–outLog <filename>** switch:

**./logViewer.sh -outLog myThread0.log –thread 0.**

View the output with the **cat** or the **more** command .

```
[root@think bin]# ./logViewer.sh -thread 0
Using /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2 as repository directory.
***** Start Display Current Environment *****
WebSphere Platform 8.0.0.0 [ND 8.0.0.0 n1118.03] running with process name thinkCell01\thinkNode01\server2 and process id
10620
Host Operating System is Linux, version 2.6.18-238.12.1.el5
Java version = 1.6.0, Java Compiler = j9jit26, Java VM name = IBM J9 VM
was.install.root = /opt/IBM/WebSphere/AppServer
user.install.root = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01
Java Home = /opt/IBM/WebSphere/AppServer/java/jre
ws.ext.dirs = /opt/IBM/WebSphere/AppServer/java/lib:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/classes:/opt/IBM/WebSph
ere/AppServer/classes:/opt/IBM/WebSphere/AppServer/lib:/opt/IBM/WebSphere/AppServer/installedChannels:/opt/IBM/WebSphere/A
ppServer/lib/ext:/opt/IBM/WebSphere/AppServer/web/help:/opt/IBM/WebSphere/AppServer/deploytool/itp/plugins/com.ibm.etools.
ejbdeploy/runtime
Classpath = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/properties:/opt/IBM/WebSphere/AppServer/properties:/opt/IBM/Web
Sphere/AppServer/lib/startup.jar:/opt/IBM/WebSphere/AppServer/lib/bootstrap.jar:/opt/IBM/WebSphere/AppServer/lib/jsf-nls.j
ar:/opt/IBM/WebSphere/AppServer/lib/lmproxy.jar:/opt/IBM/WebSphere/AppServer/lib/urlprotocols.jar:/opt/IBM/WebSphere/AppSe
rver/deploytool/itp/batchboot.jar:/opt/IBM/WebSphere/AppServer/deploytool/itp/batch2.jar:/opt/IBM/WebSphere/AppServer/java
/lib/tools.jar
Java Library path = /opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSphere/AppServer/java/jre/lib/i386/d
efault:/opt/IBM/WebSphere/AppServer/java/jre/lib/i386:/opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSp
here/AppServer/bin:/usr/lib:
Orb Version = IBM Java ORB build orb626fp1-20110419.00
***** End Display Current Environment *****
[9/30/11 23:15:11:116 EDT] 00000000 ManagerAdmin I TRAS0017I: The startup trace state is *=info.
[9/30/11 23:15:11:120 EDT] 00000000 ManagerAdmin I TRAS0111I: The message IDs that are in use are deprecated
[9/30/11 23:15:11:155 EDT] 00000000 ModelMgr I WSVR0800I: Initializing core configuration models
[9/30/11 23:15:11:438 EDT] 00000000 ComponentMeta I WSVR0179I: The runtime provisioning feature is disabled. All compone
nts will be started.
[9/30/11 23:15:11:488 EDT] 00000000 ProviderTrack I com.ibm.ffdc.osgi.ProviderTracker AddingService FFDC1007I: FFDC Provid
er Installed: com.ibm.ffdc.util.provider.FfdcOnDirProvider@16db5643
[9/30/11 23:15:11:494 EDT] 00000000 ProviderTrack I com.ibm.ffdc.osai.ProviderTracker AddingService FFDC1007I: FFDC Provid
```

7. Run the following command to view only WARNING messages:

**./logViewer.sh -level WARNING**

We can send the output of the log viewer WARNING command to text file like we did in the previous step.

```
[root@think bin]# ./logViewer.sh -level WARNING
Using /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2 as repository directory.
***** Start Display Current Environment *****
WebSphere Platform 8.0.0.0 [ND 8.0.0.0 n1118.03] running with process name thinkCell01\thinkNode01\server2 and process id
10620
Host Operating System is Linux, version 2.6.18-238.12.1.el5
Java version = 1.6.0, Java Compiler = j9jit26, Java VM name = IBM J9 VM
was.install.root = /opt/IBM/WebSphere/AppServer
user.install.root = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01
Java Home = /opt/IBM/WebSphere/AppServer/java/jre
ws.ext.dirs = /opt/IBM/WebSphere/AppServer/java/lib:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/classes:/opt/IBM/WebSph
ere/AppServer/classes:/opt/IBM/WebSphere/AppServer/lib:/opt/IBM/WebSphere/AppServer/installedChannels:/opt/IBM/WebSphere/A
ppServer/lib/ext:/opt/IBM/WebSphere/AppServer/web/help:/opt/IBM/WebSphere/AppServer/deploytool/itp/plugins/com.ibm.etools.
ejbdeploy/runtime
Classpath = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/properties:/opt/IBM/WebSphere/AppServer/properties:/opt/IBM/Web
Sphere/AppServer/lib/startup.jar:/opt/IBM/WebSphere/AppServer/lib/bootstrap.jar:/opt/IBM/WebSphere/AppServer/lib/jsf-nls.j
ar:/opt/IBM/WebSphere/AppServer/lib/lmproxy.jar:/opt/IBM/WebSphere/AppServer/lib/urlprotocols.jar:/opt/IBM/WebSphere/AppSe
rver/deploytool/itp/batchboot.jar:/opt/IBM/WebSphere/AppServer/deploytool/itp/batch2.jar:/opt/IBM/WebSphere/AppServer/java
/lib/tools.jar
Java Library path = /opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSphere/AppServer/java/jre/lib/i386/d
efault:/opt/IBM/WebSphere/AppServer/java/jre/lib/i386:/opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSp
here/AppServer/bin:/usr/lib:
Orb Version = IBM Java ORB build orb626fp1-20110419.00
***** End Display Current Environment *****
[9/30/11 23:15:11:837 EDT] 00000000 W CWPKI0041W: One or more key stores are using the default password.
[9/30/11 23:15:12:657 EDT] 00000000 W WSVR0626W: The ThreadPool setting on the ObjectRequestBroker service
is deprecated.
Operation Complete
Processed 2 records in 0.053 seconds (37.736 records per second).
[root@think bin]# █
```

8. Extract a specified set of log records to a new repository and a text file. Run the following command to extract a repository of just WARNING and SEVERE messages and save the resulting file in a new directory

```
./logViewer.sh -minLevel WARNING
```

```
-maxLevel SEVERE -extractToNewRepository ../logs/newHPELRepository
```

- a. Run the following command to export the contents of the resulting repository to a text format log file

```
./logViewer.sh -repositoryDir ../logs/newHPELRepository -outLog
../logs/newFormat.log
```

- b. Use cat, tail, vi, or a text editor to view the resulting log file, for example: **cat ../logs/newFormat.log**

### 3.7 Use the HPEL log viewer included in the WebSphere administrative console

1. Log in to the administrative console, specifying an appropriate user ID and password if administrative security is enabled. Next, click **TroubleShooting > Logs and Trace > server2**. Then click **View HPEL logs and trace**.

**Logging and tracing** > server2

Use this page to select a system log to configure, or to specify log detail levels for components and groups of components.

**General Properties**

[Configure HPEL logging](#)

Directory	/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
For cleanup, delete records older than	Disabled
For cleanup, maximum size of logs	20 Megabytes

[Configure HPEL trace](#)

Directory	/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
For cleanup, delete records older than	12 Hours
For cleanup, maximum size of trace	Disabled

[Configure HPEL text log](#)

Current status:	Disabled
-----------------	----------

**Related Items**

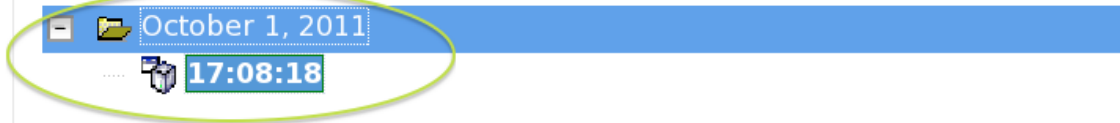
- [View HPEL logs and trace](#)
- [Change log detail levels](#)
- [Change log and trace mode](#)
- [Manage process logs](#)
- [NCSA access and HTTP error logging](#)

2. Expand the **Content and Filtering Details** area of the page. Click each server instance (start time) to view the corresponding log messages. Then collapse the **Content and Filtering Details** area. Since we have only stopped and started the server one time after enabling HPEL, you will probably only see server instance.

## Content and Filtering Details

### Server Instance

Server instances grouped by server start date and time:



3. Click the (early) log message **TRAS0017I** to view explanations, user actions, and so on. Then click **Close** to remove the pop-up window.

TimeStamp	Thread ID	Logger	Level	Message
10/1/11 17:08:18.269	00000000	ManagerAdmin	INFO	<a href="#">TRAS0017I</a> : The startup trace state is *=info.
10/1/11 17:08:18.275	00000000	ManagerAdmin	INFO	<a href="#">TRAS0111I</a> : The message IDs that are in use are deprecated
10/1/11 17:08:18.319	00000000	nfig.ModelMgr	INFO	<a href="#">WSVR0800I</a> : Initializing core configuration models
10/1/11 17:08:18.651	00000000	tMetaDataMgr	INFO	<a href="#">WSVR0179I</a> : The runtime provisioning feature is disabled. All components will be started.
10/1/11 17:08:18.725	00000000	oviderTracker	INFO	com.ibm.ffdc.osgl.ProviderTracker AddingService <a href="#">FFDC1007I</a> : FFDC Provider Installed: com.
10/1/11 17:08:18.732	00000000	oviderTracker	INFO	com.ibm.ffdc.osgl.ProviderTracker AddingService <a href="#">FFDC1007I</a> : FFDC Provider Installed: com.
10/1/11 17:08:18.891	00000000	AdminInitializer	AUDIT	<a href="#">ADMN0015I</a> : The administration service is initialized.

4. Locate a log entry, indicating activity on a thread other than 00000000. Select the entry, and click **Show Only Selected Threads**, to filter the list to include only records generated by the same thread. Finally, click **Show All Threads** to display messages generated by all threads, once again. Note: You may need to scroll through a few pages of the log file to find threads other than 00000000.

2.

fresh View **Show Only Selected Threads** Show All Threads Select Columns ... Export ... Copy to Clipboard Server Instance

Log log records from server instance - October 1, 2011 17:08:18

Number of records to show: 20 First Page Previous Page Next Page

Thread ID	Logger	Level	Message
00000007	l.impl.TCPPort	SEVERE	<a href="#">TCP0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.
00000007	l.impl.TCPPort	SEVERE	<a href="#">TCP0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.
00000006	l.TCPChannel	INFO	<a href="#">TCP0001I</a> : TCP Channel TCP_5 is listening on host * (IPv6) port 9356.
00000006	rameworkImpl	AUDIT	<a href="#">CHF0019I</a> : The Transport Channel Service has started chain DCS.
00000005	rameworkImpl	AUDIT	<a href="#">CHF0019I</a> : The Transport Channel Service has started chain DCS-Secure.
00000016	jRmmAdapter	INFO	<a href="#">DCSV1032I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: Connected a defined member thinkCell01\thinkNode01\server2.
00000016	jRmmAdapter	INFO	<a href="#">DCSV1032I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: Connected a defined member thinkCell01\thinkCellManager01\dr
00000016	jRmmAdapter	INFO	<a href="#">DCSV1032I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: Connected a defined member thinkCell01\thinkNode01\nodeager
00000017	LeaderMerge	INFO	<a href="#">DCSV8054I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: View change in process.
00000016	l.VSyncAlgo1	INFO	<a href="#">DCSV2004I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: View synchronization completed successfully. The View Identifier is (1.0 thinkCell01\thinkNode01\server3). The internal details are None

1.

Thread ID	Logger	Level	Message
00000017	LeaderMerge	INFO	<a href="#">DCSV8054I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: View change in process.
00000017	MBRStateXchg	INFO	<a href="#">DCSV8070I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: Updated HA Manager state. New state version is CoreGr DMGR true, time read 131.7352460699, number coordinators 1, numberPreferred 0, numberProcesses 4, version a7a484391.37464e2f461cc96938
00000017	ComponentImpl	INFO	<a href="#">HMGR0086I</a> : This server is updating its core group configuration. The new document version is CoreGroupConfig: MemberName dmgr, DMGR true, number coordinators 1, numberPreferred 0, numberProcesses 4, version a7a484391.37464e2f461cc96938a78d23101a777.
00000017	CoordinatorImpl	INFO	<a href="#">HMGR0228I</a> : The Coordinator is not an Active Coordinator for core group DefaultCoreGroup. The active coordinator set is [thinkCell01\thinkCellMan
00000017	CoordinatorImpl	INFO	<a href="#">HMGR0218I</a> : A new core group view has been installed. The core group is DefaultCoreGroup. The view identifier is (12.0:thinkCell01\thinkCellMar members in the new view is 4.
00000017	MembershipLayer	INFO	<a href="#">DCSV8050I</a> : DCS Stack DefaultCoreGroup at Member thinkCell01\thinkNode01\server3: New view installed, identifier (12.0:thinkCell01\thinkCell (AV=4, CD=4, CN=4, DF=4)

5. Show only WARNING and higher level messages.
- Expand the Content and Filtering Details area of the page.
  - Uncheck System out and System err.
  - Under **Logs and trace**, set **Minimum level** to **WARNING** and **Maximum level** to **FATAL**.

- \_\_\_ d. Click **Apply** to filter the list. (It may take several seconds for the filtering to be applied). Then, collapse the **Content and Filtering Details** area of the page, and view the resulting messages.

**1. View Contents**

System out  
 System err  
 Logs and trace

**2.** Minimum level:   
 Maximum level:

**3.**

**Filtering**

Wild cards: \*,?,% are allowed  
 Separate multiple entries by a ':'

Include loggers:   
 Exclude loggers:   
 Message contents:

**Event Timing**

From:  On:   
 Until:  On:

Refresh View Show Only Selected Threads Show All Threads Select Columns ... Export ... Copy to Clipboard

Viewing log records from server instance October 1, 2011 17:08:18

Number of records to show:

	Thread ID	Logger	Level	Message
19.186	00000000	g.WSKeyStore	WARNI	<a href="#">CWPKI0041W</a> : One or more key stores are using the default password.
20.169	00000000	idPoolMgrImpl	WARNI	<a href="#">WSVR0628W</a> : The ThreadPool setting on the ObjectRequestBroker service is deprecated.
21.074	00000000	l.impl.TCPPort	SEVER	<a href="#">TCPC0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.
21.075	00000000	rameworkImpl	SEVER	<a href="#">CHFW0034W</a> : The Transport Channel Service detected transport chain DCS failed. The service will retry to start chain DCS every 5,000 milli
21.078	00000000	l.impl.TCPPort	SEVER	<a href="#">TCPC0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.
21.078	00000000	rameworkImpl	SEVER	<a href="#">CHFW0034W</a> : The Transport Channel Service detected transport chain DCS-Secure failed. The service will retry to start chain DCS-Secure e
26.095	00000006	l.impl.TCPPort	SEVER	<a href="#">TCPC0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.

- \_\_\_ 6. Export the filtered view to a binary repository and use the command line log viewer to display the records.
  - \_\_\_ a. Click **Export**.

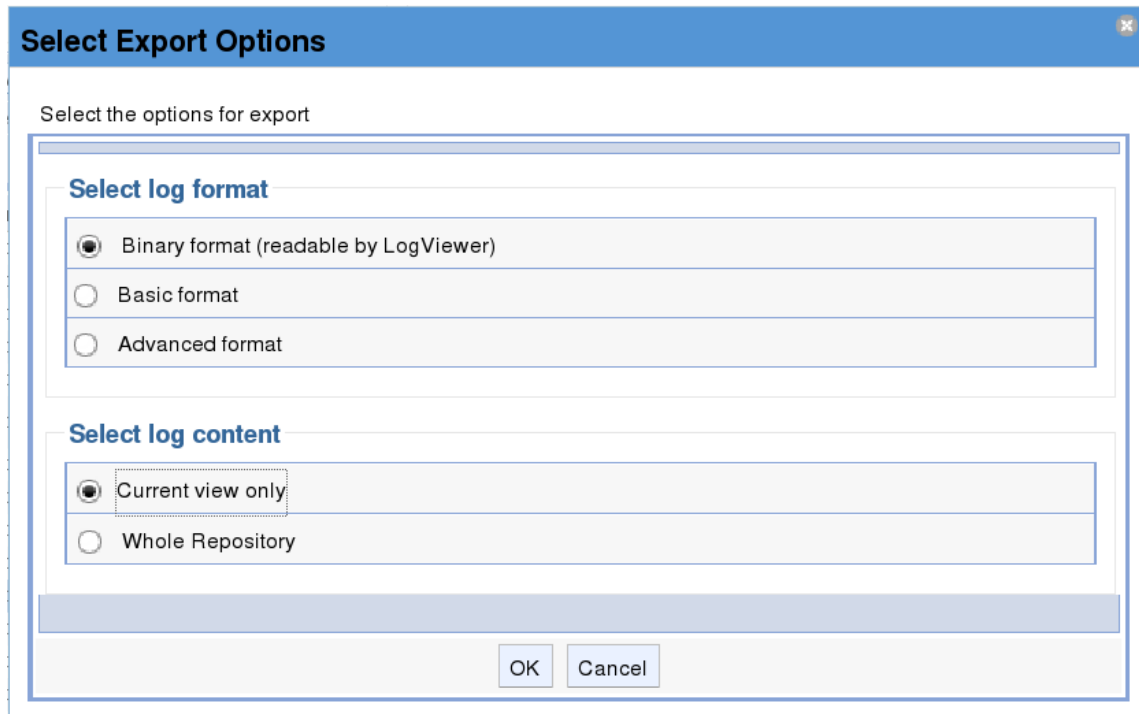
Refresh View Show Only Selected Threads Show All Threads Select Columns ... **Export ...** Copy to Clipboard

Viewing log records from server instance October 1, 2011 17:08:18

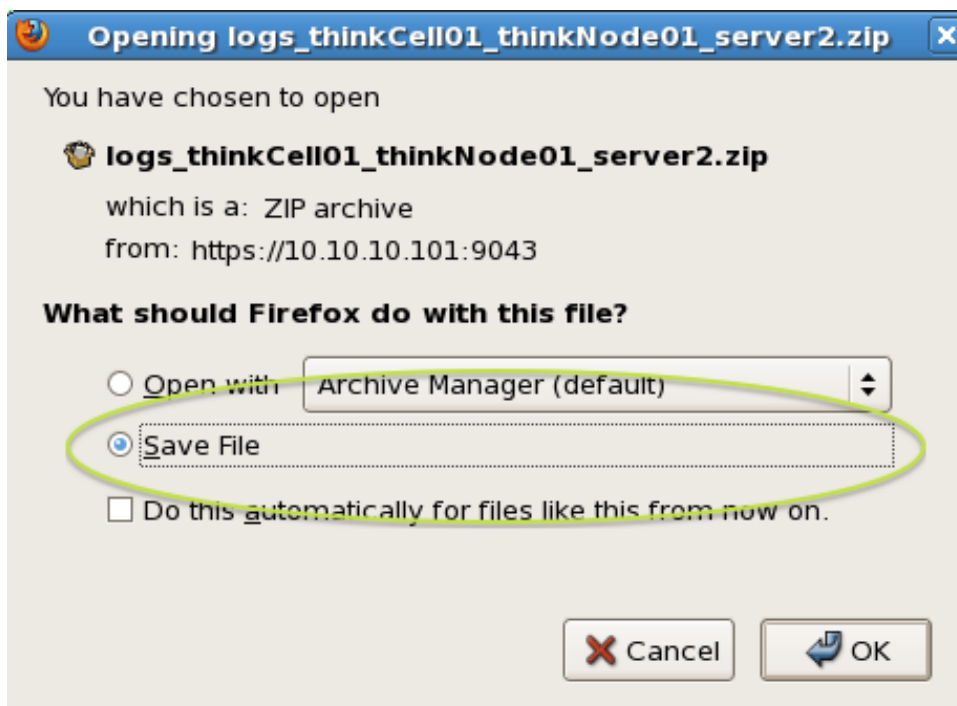
Number of records to show:

	Thread ID	Logger	Level	Message
19.186	00000000	g.WSKeyStore	WARNI	<a href="#">CWPKI0041W</a> : One or more key stores are using the default password.
20.169	00000000	idPoolMgrImpl	WARNI	<a href="#">WSVR0626W</a> : The ThreadPool setting on the ObjectRequestBroker service is deprecated.
21.074	00000000	l.impl.TCPPort	SEVER	<a href="#">TCPC0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.
21.075	00000000	rameworkImpl	SEVER	<a href="#">CHFW0034W</a> : The Transport Channel Service detected transport chain DCS failed. The service will retry to start chain DCS every 5,000
21.078	00000000	l.impl.TCPPort	SEVER	<a href="#">TCPC0003E</a> : TCP Channel TCP_5 initialization failed. The socket bind failed for host * and port 9356. The port may already be in use.

- \_\_\_ b. Within the **Select Export Options** window, set the log format to **Binary format** and the log content to **Current view only**. Then click **OK**.



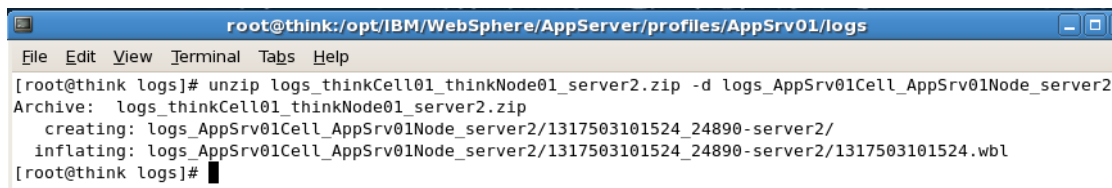
- \_\_\_ c. In the File Download window, select **Save File** then click **OK**.



- \_\_\_ d. d. In the Save As window, select the application server profile logs directory, for example,

```
cd /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server2
```

```
unzip ~/Downloads/logs_thinkCell01_thinkNode01_server2.zip
```

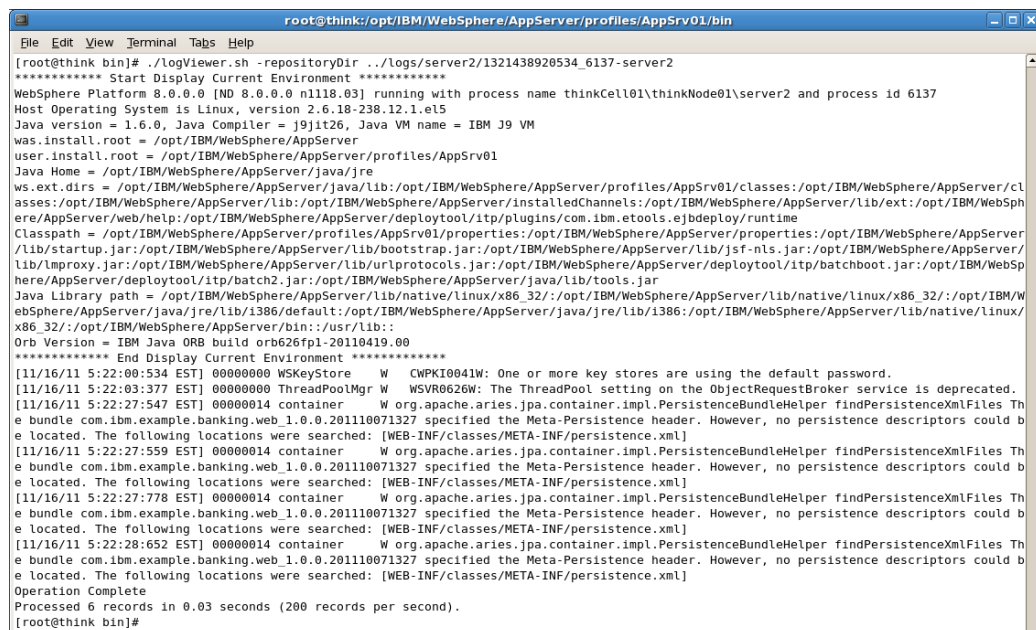


```
root@think:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs
File Edit View Terminal Tabs Help
[root@think logs]# unzip logs_thinkCell01_thinkNode01_server2.zip -d logs_AppSrv01Cell_AppSrv01Node_server2/
Archive: logs_thinkCell01_thinkNode01_server2.zip
  creating: logs_AppSrv01Cell_AppSrv01Node_server2/1317503101524_24890-server2/
  inflating: logs_AppSrv01Cell_AppSrv01Node_server2/1317503101524_24890-server2/1317503101524.wbl
[root@think logs]#
```

- \_\_\_ e. Make note of the new subdirectory name, that was just created, as a result of the unzip command, above. For example, looking at the unzip command above, you can see that a new subdirectory name of **1321438920534\_6137-server2** was created.
- \_\_\_ f. Run the logViewer command, with the `–repositoryDir` option, to view the log messages present in the exported repository. Note: substitute the new subdirectory name for `<NEWSUBDIR>` below. For example;

```
cd /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin
```

```
./logViewer.sh repositoryDir ./logs/server2/<NEWSUBDIR>
```



```
root@think:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin
File Edit View Terminal Tabs Help
[root@think bin]# ./logViewer.sh -repositoryDir ./logs/server2/1321438920534_6137-server2
***** Start Display Current Environment *****
WebSphere Platform 8.0.0.0 [ND 8.0.0.0 n118.03] running with process name thinkCell01\thinkNode01\server2 and process id 6137
Host Operating System is Linux, version 2.6.18-238.12.1.el5
Java version = 1.6.0, Java Compiler = j9jit26, Java VM name = IBM J9 VM
was.install.root = /opt/IBM/WebSphere/AppServer
user.install.root = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01
Java Home = /opt/IBM/WebSphere/AppServer/java/jre
ws_ext_dirs = /opt/IBM/WebSphere/AppServer/lib:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/classes:/opt/IBM/WebSphere/AppServer/cl
asses:/opt/IBM/WebSphere/AppServer/lib:/opt/IBM/WebSphere/AppServer/installedChannels:/opt/IBM/WebSphere/AppServer/lib/ext:/opt/IBM/WebSph
ere/AppServer/web/help:/opt/IBM/WebSphere/AppServer/deploytool/itp/plugins/com.ibm.etools.ejbdploy/runtime
Classpath = /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/properties:/opt/IBM/WebSphere/AppServer/properties:/opt/IBM/WebSphere/AppServer
/lib/startup.jar:/opt/IBM/WebSphere/AppServer/lib/bootstrap.jar:/opt/IBM/WebSphere/AppServer/lib/jsf-nls.jar:/opt/IBM/WebSphere/AppServer
/lib/implproxy.jar:/opt/IBM/WebSphere/AppServer/lib/urprotocols.jar:/opt/IBM/WebSphere/AppServer/deploytool/itp/batchboot.jar:/opt/IBM/WebSp
ere/AppServer/deploytool/itp/batch2.jar:/opt/IBM/WebSphere/AppServer/java/lib/tools.jar
Java Library path = /opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/WebSphere/AppServer/lib/native/linux/x86_32:/opt/IBM/W
ebSphere/AppServer/java/jre/lib/1386/default:/opt/IBM/WebSphere/AppServer/java/jre/lib/1386:/opt/IBM/WebSphere/AppServer/lib/native/linux
/x86_32:/opt/IBM/WebSphere/AppServer/bin:/usr/lib:
Orb Version = IBM Java ORB build orb626fp1-20110419.00
***** End Display Current Environment *****
[[11/16/11 5:22:00:534 EST] 00000000 WKeyStore W CWPki0041W: One or more key stores are using the default password.
[[11/16/11 5:22:03:377 EST] 00000000 ThreadPoolMgr W WSVR0626W: The ThreadPool setting on the ObjectRequestBroker service is deprecated.
[[11/16/11 5:22:27:547 EST] 00000014 container W org.apache.aries.jpa.container.impl.PersistenceBundleHelper findPersistenceXmFiles Th
e bundle com.ibm.example.banking.web.1.0.0.201110071327 specified the Meta-Persistence header. However, no persistence descriptors could b
e located. The following locations were searched: [WEB-INF/classes/META-INF/persistence.xml]
[[11/16/11 5:22:27:559 EST] 00000014 container W org.apache.aries.jpa.container.impl.PersistenceBundleHelper findPersistenceXmFiles Th
e bundle com.ibm.example.banking.web.1.0.0.201110071327 specified the Meta-Persistence header. However, no persistence descriptors could b
e located. The following locations were searched: [WEB-INF/classes/META-INF/persistence.xml]
[[11/16/11 5:22:27:778 EST] 00000014 container W org.apache.aries.jpa.container.impl.PersistenceBundleHelper findPersistenceXmFiles Th
e bundle com.ibm.example.banking.web.1.0.0.201110071327 specified the Meta-Persistence header. However, no persistence descriptors could b
e located. The following locations were searched: [WEB-INF/classes/META-INF/persistence.xml]
[[11/16/11 5:22:28:652 EST] 00000014 container W org.apache.aries.jpa.container.impl.PersistenceBundleHelper findPersistenceXmFiles Th
e bundle com.ibm.example.banking.web.1.0.0.201110071327 specified the Meta-Persistence header. However, no persistence descriptors could b
e located. The following locations were searched: [WEB-INF/classes/META-INF/persistence.xml]
Operation Complete
Processed 6 records in 0.03 seconds (200 records per second).
[root@think bin]#
```

- \_\_\_ 7. Return to the administrative console. Then click **Reset**, followed by **Apply** to remove all filtering.



**View Contents**

System out  
 System err  
 Logs and trace

Minimum level:

Maximum level:

**Filtering**

Wild cards: \*,?,% are allowed  
Separate multiple entries by a ':'

Include loggers:

Exclude loggers:

Message contents:

**Event Timing**

From:  On:

Until:  On:

- \_\_\_ 8. Log out of the administrative console.
- \_\_\_ 9. This completes the lab.



---

## Appendix A. Common Tasks

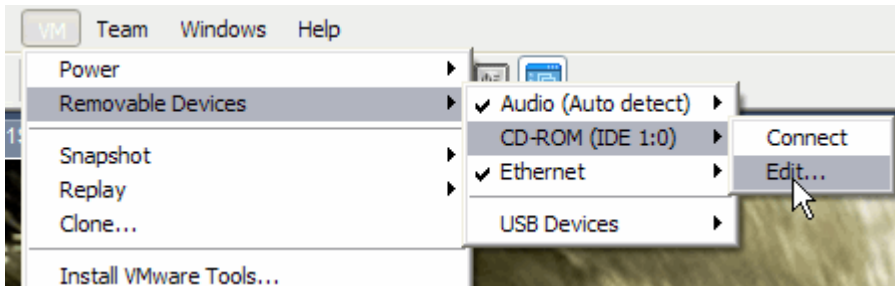
---

Below are some common tasks that you may need to perform several times during this lab

---

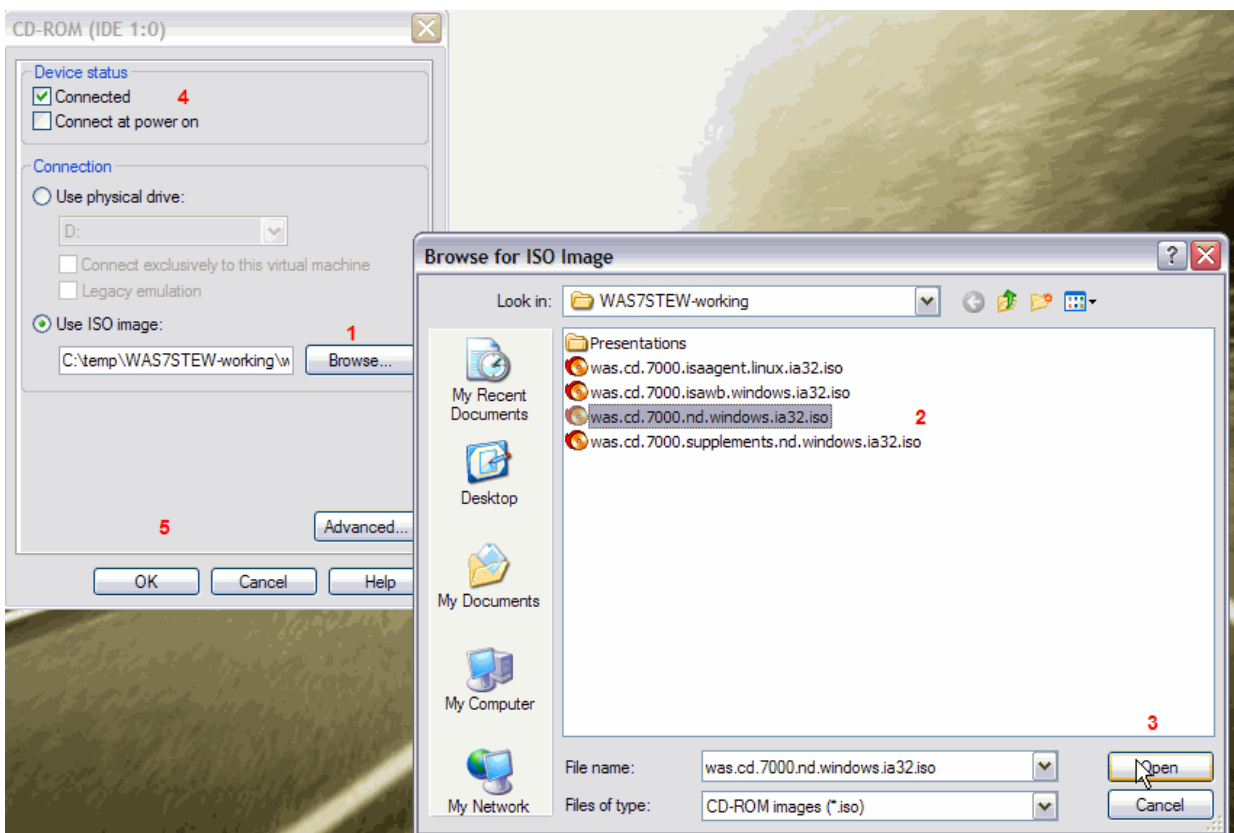
- \_\_\_\_ 1. Starting a WAS (standalone) application server `./startServer <servername>`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin` directory  
**`./startServer server1`**
  
- \_\_\_\_ 10. Stopping a WAS (standalone) application server `./stopServer <servername>`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin` directory  
**`./stopServer server1`**
  
- \_\_\_\_ 11. Starting a WAS-ND Node Agent `startNode`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin` directory  
**`startNode`**
  
- \_\_\_\_ 12. Stopping WAS-ND Node Agent `stopNode`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin` directory  
**`stopNode`**
  
- \_\_\_\_ 13. Starting a WAS-ND Deployment Manager `startManager`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/Dmgr01/bin` directory  
**`startManager`**
  
- \_\_\_\_ 14. Stopping a WAS-ND Deployment Manager `stopManager`  
e.g from the `/opt/IBM/WebSphere/AppServer/profiles/Dmgr01/bin` directory  
**`stopManager`**
  
- \_\_\_\_ 15. Mounting CDs in VMware

\_\_\_ t. As shown below navigate to **VM -> Removable Devices -> CD-ROM (IDE1:0) -> Edit**



\_\_\_ c. As shown below in In the CD-ROM (IDE:1.0) panel

- 1) Click **Browse**
- 2) Select the ISO image desired
- 3) Click **Open**
- 4) Check **Connected**
- 5) Click **OK**



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