Estimated time 1:45

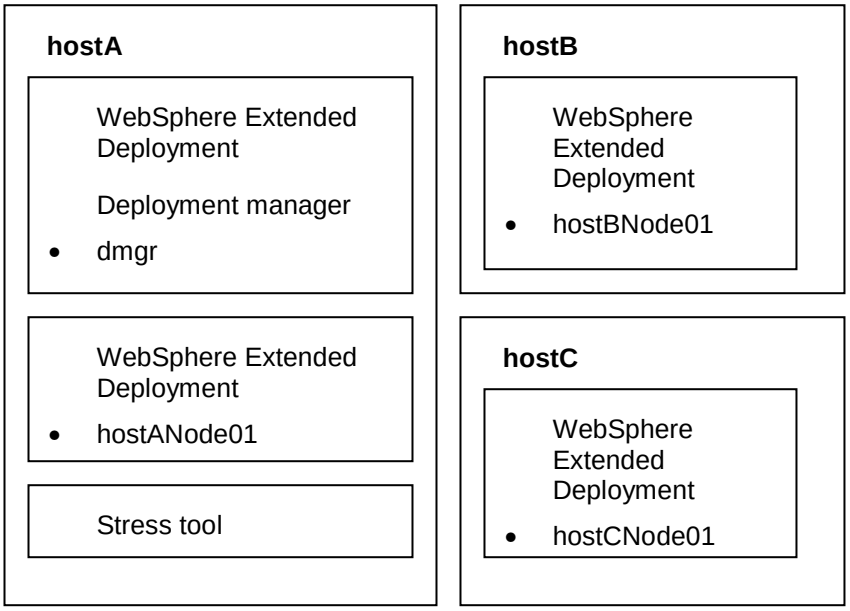
WebSphere Virtual Enterprise:
Dynamic operations for WebSphere endpoints

What this exercise is about

The objective of this lab is to provide you with an understanding of how to configure Extended Deployment for dynamic application placement.

Lab requirements

This lab assumes that this setup is complete before starting the lab. If you do not have this environment set up, first complete the Installation lab exercise, and then run the scripts specified in Part 1 of this exercise:



- The lab requires three machines: hostA, hostB, and hostC
- Deployment manager, on-demand router (ODR) node, ODR and the stress tool are installed on hostA
- HostB and HostC each contain a managed node that has been federated into HostA's cell.
- In a production environment the deployment manager should not be on the same node as the on-demand router. It will normally be on a machine by itself, though it could be co-located with an application server node.

What you should be able to do

At the end of this lab you should be able to:

- Configure WebSphere Extended Deployment to perform application placement
    - Configure node groups, dynamic clusters, service policies, transaction classes
- Test application server placement using a stress tool and verify it by studying the visualization charts in the administrative console

Introduction

Application Server placement is a powerful feature of WebSphere Extended Deployment. Extended Deployment allows applications to be virtually present in a 'cluster', much like the virtual memory in an operating system

Once the application server is defined so that applications are completely mobile, the placement of applications is influenced by operational policies and node processor utilization, and the work will be routed to the application by an intelligent workload manager. A policy is a collection of expressions that inform a decision maker of the criteria to be used in order to make decisions. In Extended Deployment, operational policy consists of two main classes: service policies and transaction classes, which are used to categorize work. The work, before being performed, has its operation policy read by the on demand router in order to determine the proper flow of work for completion, given the available server resource. Service policies are the main building blocks of the operational policy.

Visualization in Extended Deployment allows you to see a visual representation of the operations occurring in the system environment. You can drill down to more specific views from the operation center on your desktop. By configuring filters you can create customized charting, and navigate your chart views depending on your preference settings.

In this lab, you will install a sample application with four Web modules. The mapping that you will create between the Web modules, dynamic clusters, service policies and transaction classes is shown in table below:

Dynamic cluster	Web module	Transaction class	Service policy
StockTrade_DC	StockTrade	StockTrade_TC	Platinum_SP
StockTrade_DC	StockQuery	StockQuery_TC	Bronze_SP
AccountManagement_DC	AccountManagement	AccountManagement_TC	Silver_SP
FinancialAdvice_DC	FinancialAdvice	FinancialAdvice_TC	Gold_SP

The goals that you will create for the service policies are shown below. Note that the Bronze service policy has the worst response time goal and is mapped to the StockQuery Web module. The Platinum service policy which is mapped to StockTrade Web module has the best response time goal.

Service Policy	Goal	Importance
Platinum_SP	1250ms	highest
Gold_SP	1500ms	high
Silver_SP	2 sec	medium
Bronze_SP	3 sec	low

Exercise instructions

This exercise assumes you have created a deployment manager, the application server nodes, the HostANode01, and the ODR server within the HostANode01, using this course's installation lab. If your environment is different, you may adjust the instructions to match your installation (for example, host and node names).

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

Reference variable	Windows location	AIX® or UNIX® location
<WAS_HOME>	C:\WebSphere\AppServer	/usr/WebSphere/AppServer /opt/WebSphere/AppServer
<LAB_FILES>	C:\LabFilesXD	/tmp/LabFilesXD
<LAB_NAME>	PlacementLab	PlacementLab

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:\LabFilesXD\ would be replaced by C:/LabFilesXD/

Part 1: Create an on-demand router

The “Lab requirements” section of this lab shows a multi-machine environment that is required to complete the exercise. This section will walk you through creating such an environment, provided that you have already completed the installation lab exercise.

____ 1. Start the Deployment Manager.

__ a. On **hostA**, open a command prompt.

__ b. Change directories to **C:\WebSphere\AppServer\profiles\dmgr\bin.**

__ c. Enter this command to start the Deployment Manager: **startManager.**

__ d. Wait for the deployment manager to start. Verify that this line appears in the Command Prompt window.

```
ADMU3000I: Server dmgr open for e-business; process id is XXXX
```

____ 2. Start the HostANode01’s node agent.

__ a. Change directories to **C:\WebSphere\AppServer\profiles\HostANode01\bin.**

__ b. Enter this command to start the node agent on the ODR node: **startNode**

____ 3. WebSphere Extended Deployment provides a script (createodr.jacl) that automatically creates an on-demand router named ‘odr’. Run it to create an on-demand router for this lab exercise.

__ a. On **hostA**, Open a command prompt.

__ b. Change directories to **C:\WebSphere\AppServer\bin.**

__ c. Enter this command to create an on-demand router server on node HostANode01:

wsadmin –f createodr.jacl hostANode01

```
C:\WebSphere\AppServer\bin>wsadmin -f createodr.jacl HostANode01
WASX7209I: Connected to process "dmgr" on node wsbeta156CellManager01 using SOAP
 connector;  The type of process is: DeploymentManager
WASX7303I: The following options are passed to the scripting environment and are
 available as argument that is stored in the argv variable: "[HostANode01]"
createodr: checking for existence of node HostANode01
createodr: checking to see if server odr is already configured on node HostANode01
createodr: checking to see if the nodeagent server mbean is available
createodr: Node type verified as an XD node
createodr: checking for the existence of a NodeSync MBean on node HostANode01
createodr: creating a server odr .....
createodr: saving the configuration
createodr: Invoking synchronization for node WebSphere:platform=common,cell=wsbe
ta156Cell01,version=6.0.2.5,name=nodeSync,mbeanIdentifier=nodeSync,type=NodeSync
,node=HostANode01,process=nodeagent because serverStartupSyncEnabled is set to
false
createodr: Done with synchronization.
Createodr: done.
```

Note: This script will create an on-demand router that listens for incoming HTTP requests on port 80. Ensure that your system is not running a Web server or other process that is also listening on port 80.

If a server named odr already exists on this node, you will see the message:

```
createodr: checking for existence of node HostANode01
createodr: checking to see if server odr is already configured on node
HostANode01
createodr: Error -- Server odr already configured on node HostANode01
```

Part 2: Start the server processes

You can start the remote node agents using the procedures below, or by using the procedures described in Appendix A – Starting a middleware node from the administrative console on page 47.

____ 4. Start the hostANode01's node agent, if it is not already running. (it should already be running.)

__ a. On **hostA**, change directories to **C:\WebSphere\AppServer\profiles\hostANode01\bin.**

__ b. Enter this command to start the node agent on the ODR node: **startNode**

____ 5. Start the on-demand router (ODR) server.

__ a. On **hostA**, change directories to **C:\WebSphere\AppServer\profiles\HostANode01\bin.**

__ b. Enter this command to start the on-demand router on the ODR node: **startServer odr**

____ 6. Start the node agent on hostBNode01, if it is not already running. (it should already be running.)

__ a. On **hostB,** open a command prompt.

__ b. Change directories to **C:\WebSphere\AppServer\profiles\hostBNode01\bin**

__ c. Enter this command to start the node agent : **startnode**

__ d. Wait for the node agent to start. Verify that this line appears in the Command Prompt window.

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

____ 7. Start the node agent on hostCNode01, if it is not already running (it should already be running.)

__ a. On **hostC,** open a command prompt

__ b. Change directories to **C:\WebSphere\AppServer\profiles\hostCNode01\bin**

__ c. Enter this command to start the node agent : **startnode**

__ d. Wait for the node agent to start. Verify that this line appears in the Command Prompt window.

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

Part 3: Create node group and configure dynamic clusters

____ 8. Open the administrative console.

__ a. On **hostA**, open a Web browser.

__ b. Enter the URL: **http://localhost:9060/ibm/console.**

__ c. Enter a user ID of your choice and click **Log In.**

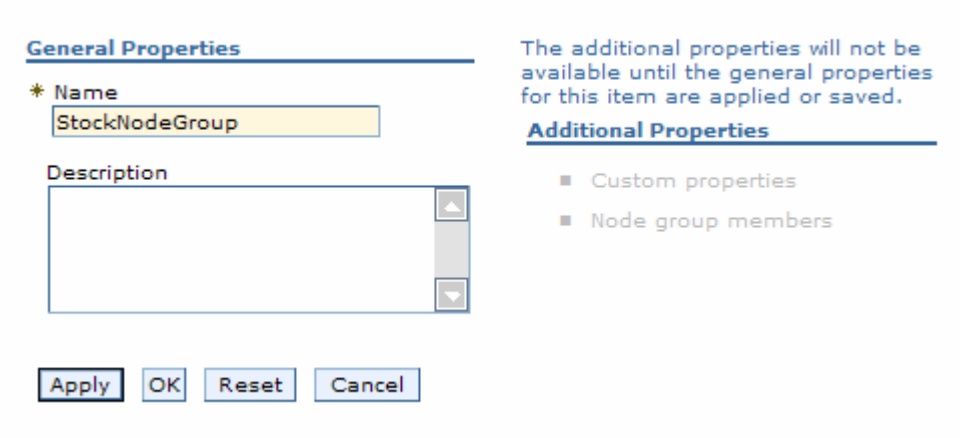
____ 9. Create a node group.

__ a. In the administrative console, expand **System Administration**

__ b. Click **Node Groups.**

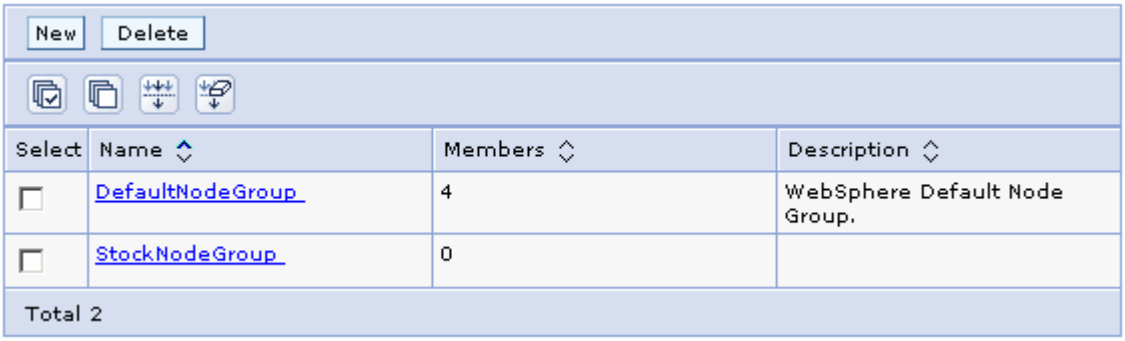
__ c. Click **New.**

__ d. Enter a name of **StockNodeGroup.**



__ e. Click **OK.**

__ f. The new node group should now appear in your list of node groups.



__ g. Click **StockNodeGroup** to edit the properties of your new Node Group.

__ h. Under **Additional properties**, click **Node group members**.

__ i. Click the **Add** button.

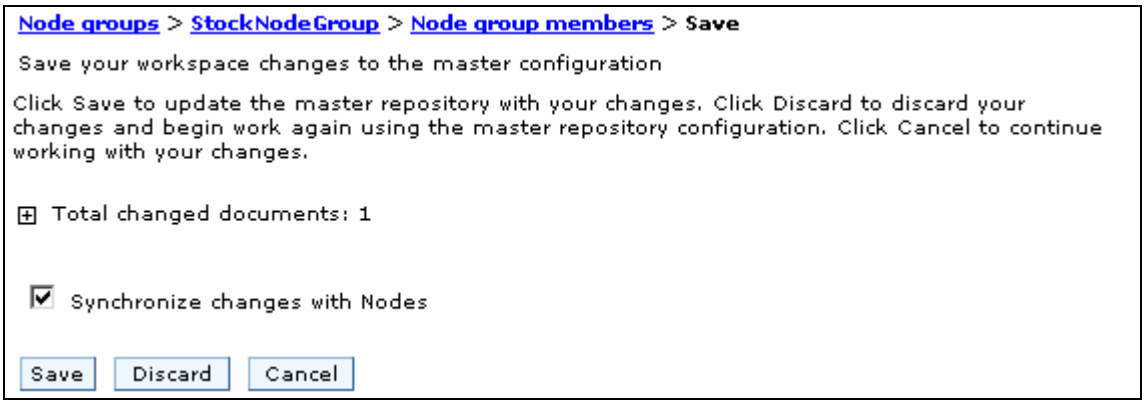
__ j. Check the boxes next to **hostBNode01** and **hostCNode01** from the Available Node list and click **Add** to make them members of StockNodeGroup.

____ 10. Save the changes

__ a. Click **Review** in the messages area (or under the System Administration menu).

__ b. On the Save panel, select the check box **Synchronize changes with Nodes.**

__ c. Click **Save.**



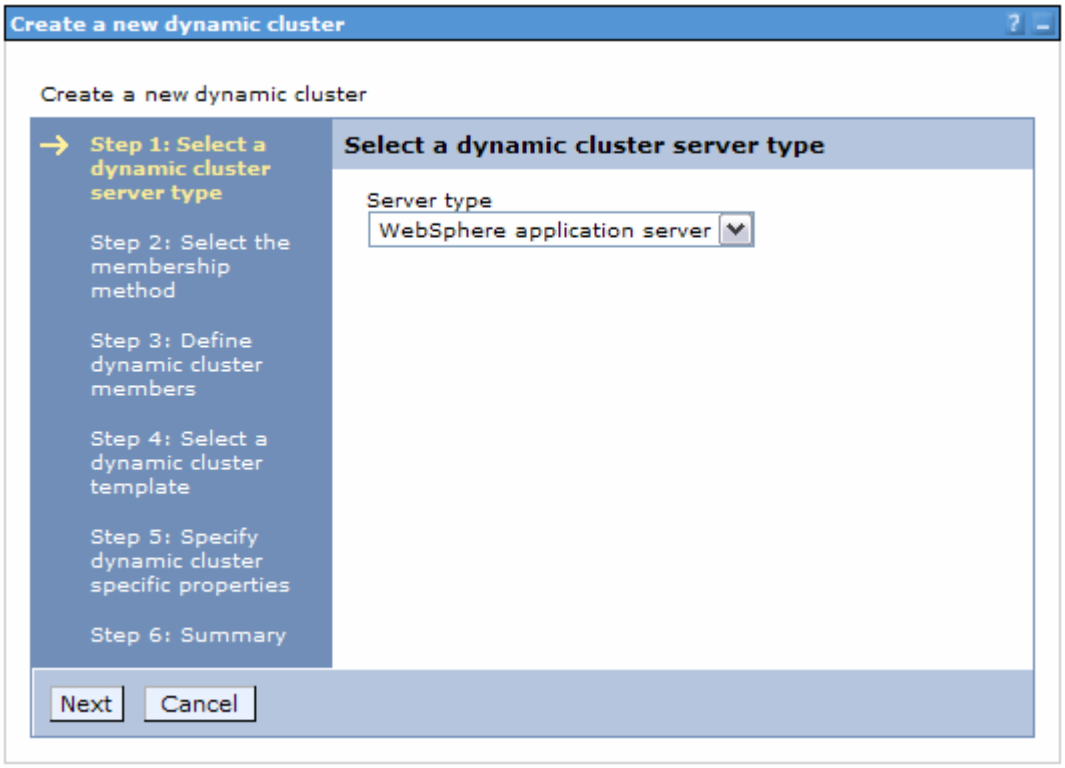
__ d. Click **OK** when the synchronization operation completes.

____ 11. Create three dynamic clusters: StockTrade_DC, AccountManagement_DC and FinancialAdvice_DC, mapped to the node group that was created in the previous step. First, create the dynamic cluster StockTrade:

__ a. Expand **Servers**. Click **Dynamic clusters.**

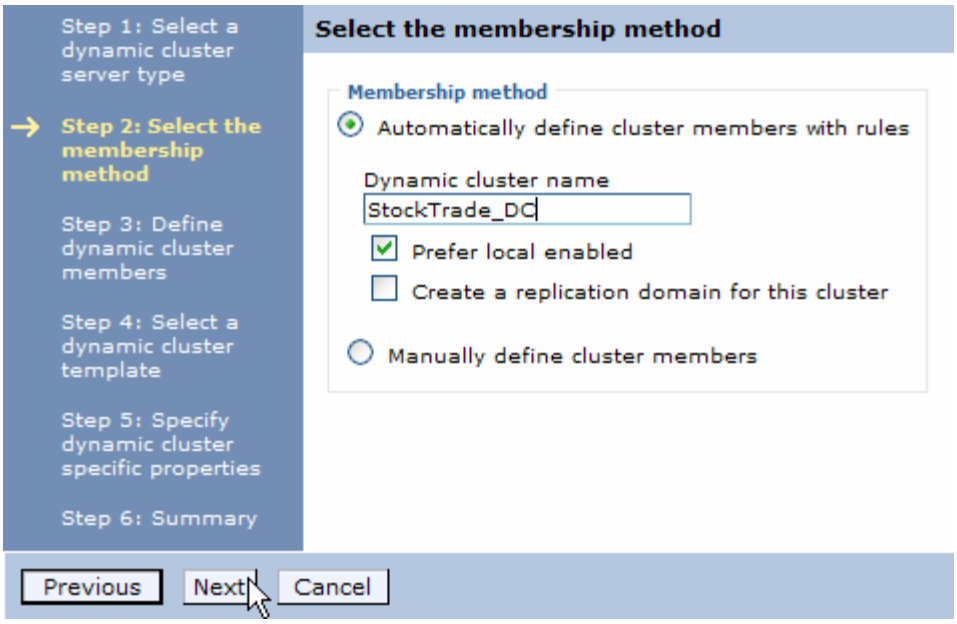
__ b. Click **New.**

__ c. In Step 1, accept default server type WebSphere Application Server



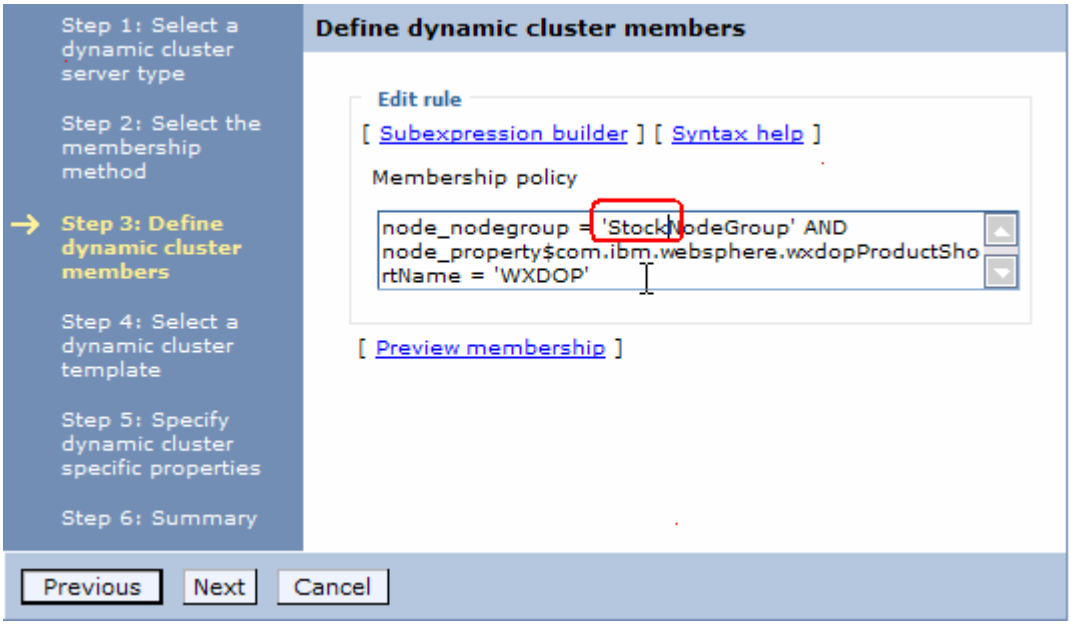
__ d. Click NEXT

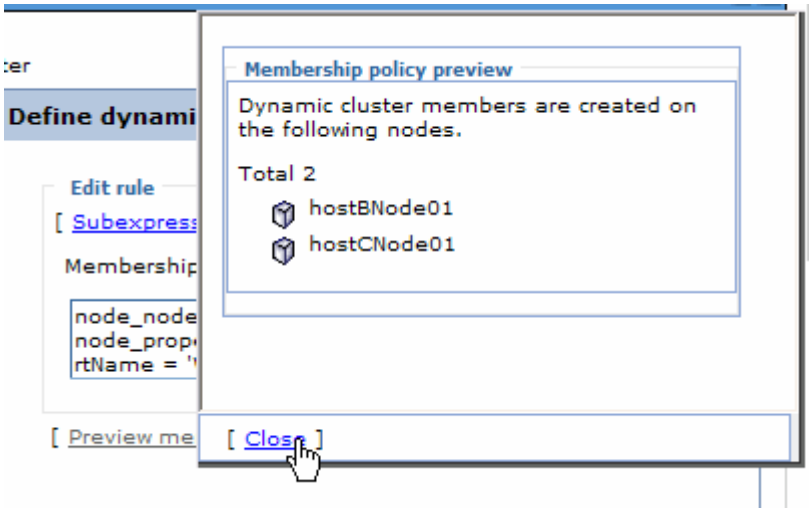
__ e. In Step 2 Enter the name **StockTrade_DC**.



__ f. Click **Next**.

__ g. Overtype the “DefaultNodeGroup” setting with **“StockNodeGroup”.** Click **Preview membership** to verify you have typed the information correctly and then click **Close** on the preview window.





__ h. Click **Next** on the next three windows.

__ i. Click **Finish** on the Summary panel.

____ 12. Now, create the dynamic clusters: AccountManagement and FinancialAdvice.

__ a. Click **New** to create the AccountManagement dynamic cluster.

__ b. In Step 1, accept default server type WebSphere Application Server

__ c. In Step 2, Enter the name as **AccountManagement_DC.**

__ d. In Step 3, ensure the Membership policy is

- “node_nodegroup=’StockNodeGroup’”

__ e. Click **Next** on this panel and subsequent two panels (take defaults).

__ f. Click **Finish** on the Summary panel.

__ g. Click **New** to create the FinancialAdvice dynamic cluster.

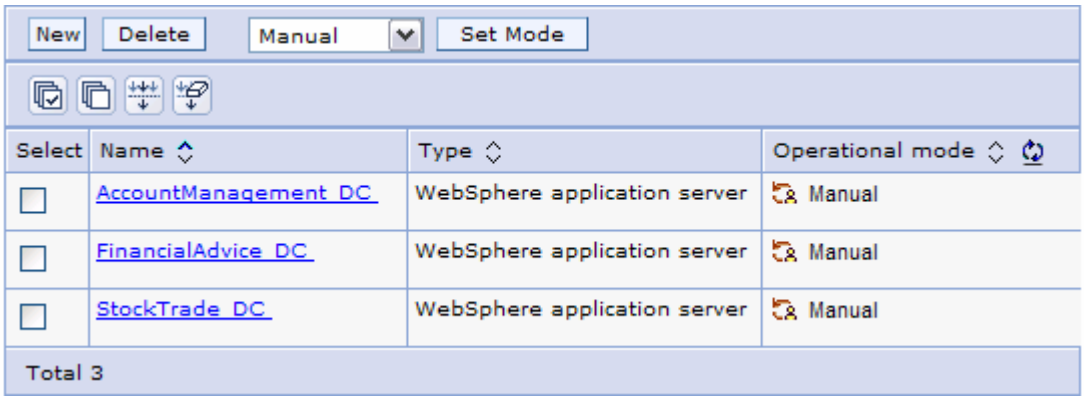
__ h. In Step 1, accept default server type WebSphere Application Server

__ i. In Step 2, Enter the name as **FinancialAdvice_DC.**

__ j. In Step 3, ensure the Membership policy is
- "node_nodegroup='StockNodeGroup'"

__ k. Click **Next** on this panel and subsequent two panels (take defaults).

__ l. Click **Finish** on the Summary panel. Notice that the node groups all default to manual operational mode. That means Extended Deployment will take no action on its own or make any recommendations. Later you will change this to Automatic.



____ 13. Save the changes.

__ a. Click **Review** in the Messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

__ c. Click **Save.**

__ d. Click **OK** when the sync operation completes.

____ 14. WebSphere Extended Deployment uses a conservative algorithm to determine how many servers will fit on a particular machine. To minimize the possibility of swapping, the placement controller assumes twice the maximum memory defined for a given server. The lab machines may have less RAM than is ideal for this exercise. To ensure that the servers can all be started on each machine, you need to change the maximum heap size for the dynamic cluster server templates to 128M. Changes made to a dynamic cluster template are automatically propagated to all servers in the dynamic cluster. First change the maximum heap size for the StockTrade dynamic cluster's server template. Also set Initial Heap size to 128.

__ a. Expand **Servers**. Click **Dynamic Clusters.**

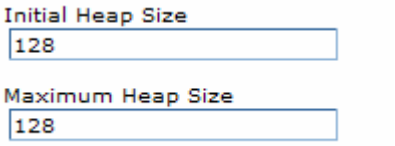
__ b. Click **StockTrade_DC.**

__ c. Under Additional Properties, click **Server Template.**

__ d. Under Server Infrastructure, expand **Java and Process Management**, click **Process Definition.**

__ e. Under Additional Properties, click **Java Virtual Machine.**

__ f. In the Configuration Page, set the **Initial Heap Size** and **Maximum Heap Size** to **128.**



__ g. Click **OK.**

____ 15. Now, you need to change the heap sizes for the AccountManagement_DC and FinancialAdvice_DC dynamic clusters' server templates.

__ a. From the administrative console, select **Dynamic Clusters > AccountManagement_DC >Server Template > Java and Process Management > Process Definition >Java Virtual Machine.**

__ b. In the configuration page, change the initial heap size and maximum heap size to **128.** Click **OK**.

__ c. From the administrative console, select **Dynamic Clusters > FinancialAdvice_DC >Server Template > Java and Process Management > Process Definition >Java Virtual Machine.**

__ d. In the configuration page, change the initial heap size and maximum heap size to **128.** Click **OK**.

____ 16. Save the changes.

__ a. Click **Review** in the messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

__ c. Click **Save.**

__ d. Click **OK** when the sync operation completes.

Part 4: Install the XDStock application

____ 17. Install the XDStock application.

__ a. In the Navigation panel, expand **Applications** and click **Install new application**.

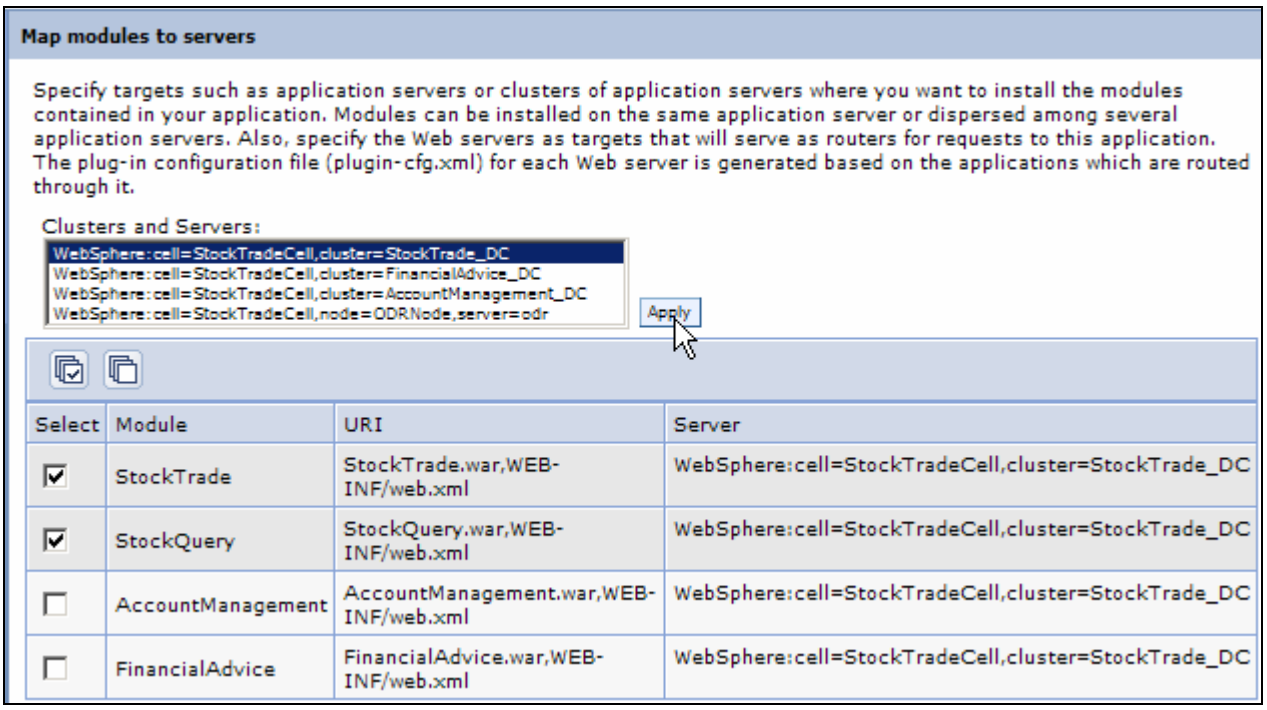
__ b. Next to Local file system, click **Browse** to open **c:\LabFilesXD\PlacementLab\XDStock.ear**.

__ c. Click **Next**.

__ d. On the Select Installation Options panel, click **Next**.

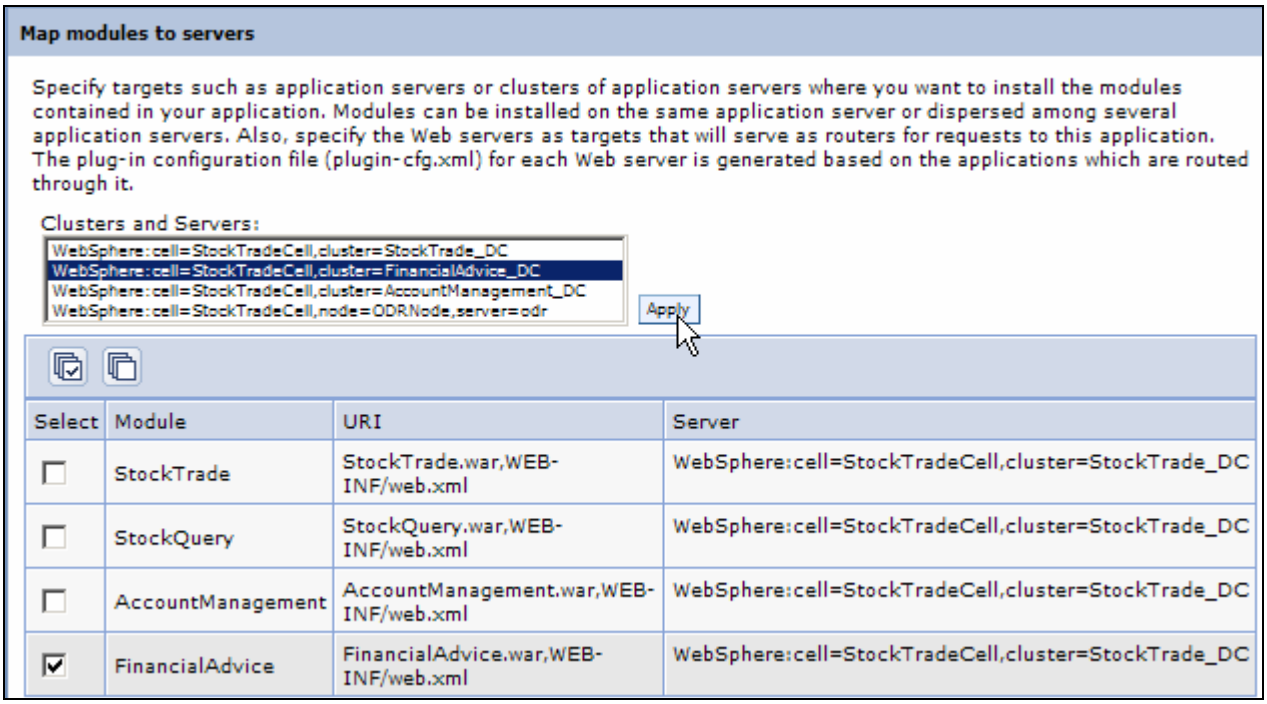
__ e. Click **Step 2 Map modules to servers**.

__ f. From the Clusters and Servers list, select the cluster **StockTrade_DC.** From the Module list, select the modules **StockTrade** and **StockQuery**.



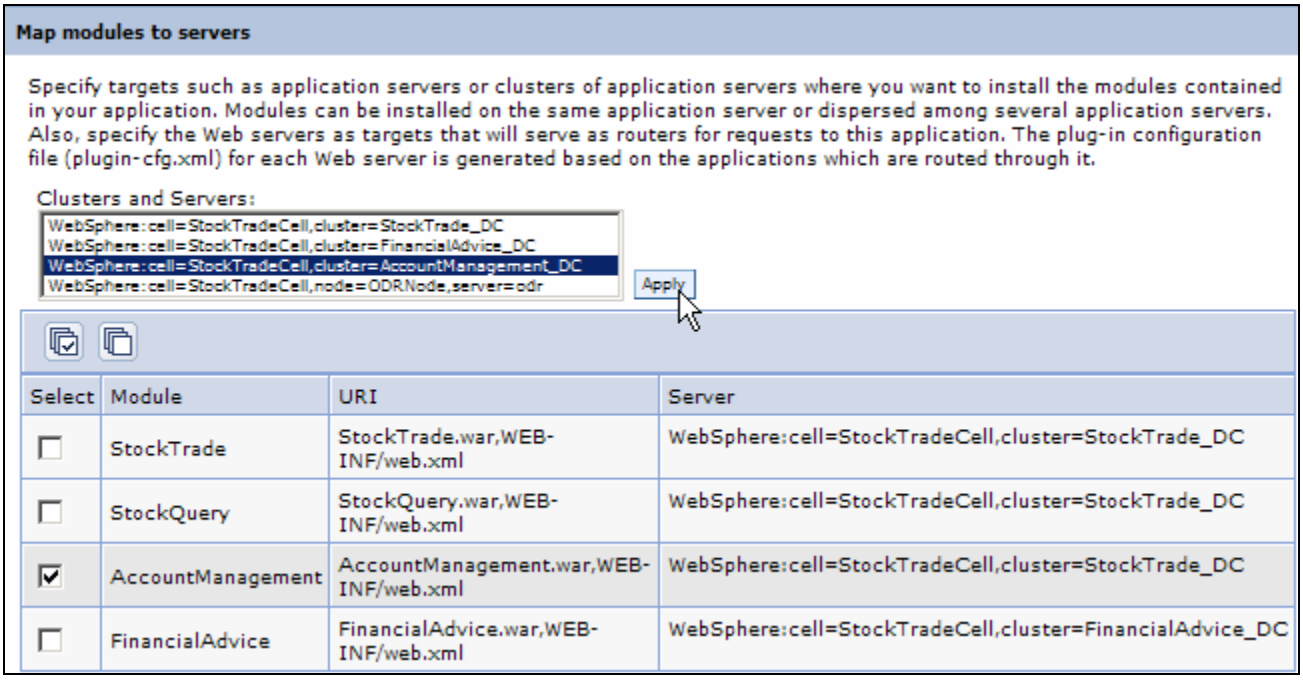
__ g. Click **Apply**.

__ h. From the Cluster list, select the cluster **FinancialAdvice_DC**. From the Module list, select the module **FinancialAdvice**.



__ i. Click **Apply**.

__ j. From the Cluster list, select the cluster **AccountManagement_DC**. From the Module list, select the module **AccountManagement**.



__ k. Click **Apply**.

__ l. Verify that your modules mapping table looks like the screen capture below.

Select	Module	URI	Server
☐	StockTrade	StockTrade.war,WEB-INF/web.xml	WebSphere:cell=StockTradeCell,cluster=StockTrade_DC
☐	StockQuery	StockQuery.war,WEB-INF/web.xml	WebSphere:cell=StockTradeCell,cluster=StockTrade_DC
☐	AccountManagement	AccountManagement.war,WEB-INF/web.xml	WebSphere:cell=StockTradeCell,cluster=AccountManagement_DC
☐	FinancialAdvice	FinancialAdvice.war,WEB-INF/web.xml	WebSphere:cell=StockTradeCell,cluster=FinancialAdvice_DC

__ m. Click **Step 7 Summary**.

__ n. On the Summary panel, click **Finish**.

__ o. Once the installation completes, click **Review.**.

__ p. Make sure that **Synchronize changes with nodes** is selected and click **Save**.

__ q. Click **OK** when the sync operation completes.

Part 5: Create operational policies

Next, you will create operational policies, which drives the decisions of the on-demand router (proxy server). Operational policies are made up of service policies and transaction classes. These policies determine how requests are managed by WebSphere. For this lab exercise, you will create service policies and transaction classes. The mapping between the transaction classes and Web modules is depicted in table below. The mapping between service policies and transaction classes is also depicted in the table.

Dynamic cluster	Web module	Transaction class	Service policy
StockTrade_DC	StockTrade	StockTrade_TC	Platinum_SP
StockTrade_DC	StockQuery	StockQuery_TC	Bronze_SP
AccountManagement_DC	AccountManagement	AccountManagement_TC	Silver_SP
FinancialAdvice_DC	FinancialAdvice	FinancialAdvice_TC	Gold_SP

You will now create the service policies Platinum_SP, Gold_SP, Silver_SP and Bronze_SP. The service policy goals are depicted in table below:

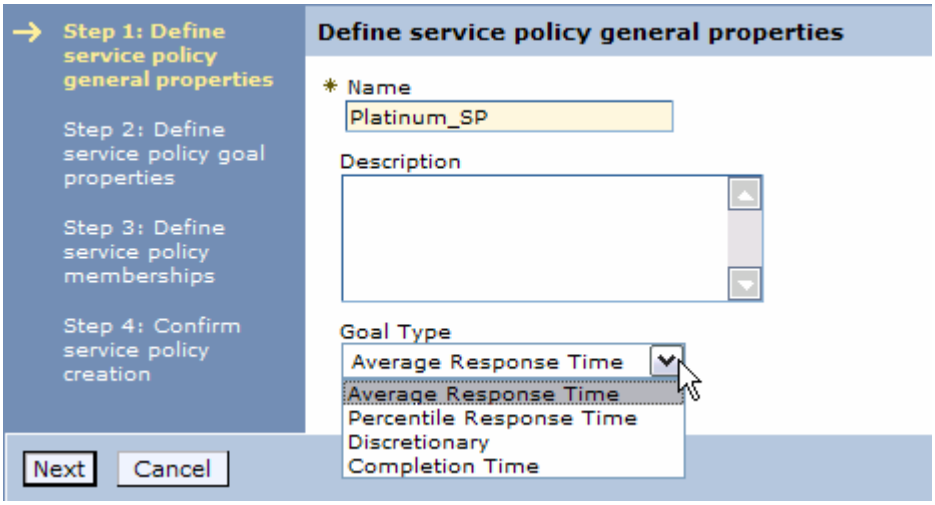
Service policy	Goal	Importance
Platinum_SP	1250ms	highest
Gold_SP	1500ms	high
Silver_SP	2 sec	medium
Bronze_SP	3 sec	low

____ 18. Create the Service policy Platinum_SP.

__ a. In the Navigation panel, expand **Operational policies** and click **Service policies**.

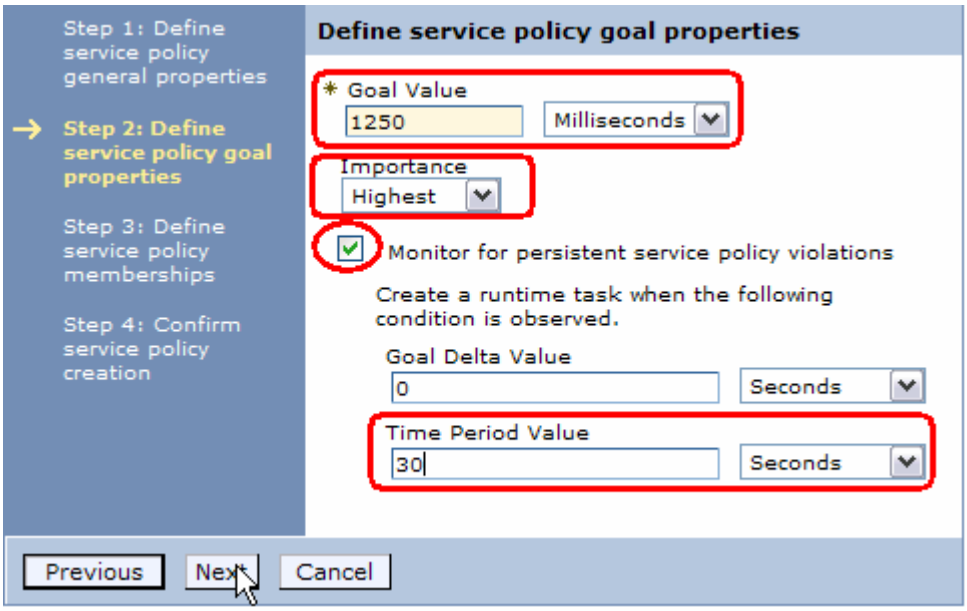
__ b. Click **New** to create a new service policy.

__ c. Enter the name as **Platinum_SP**. Select **Average Response Time** from the Goal Type box.



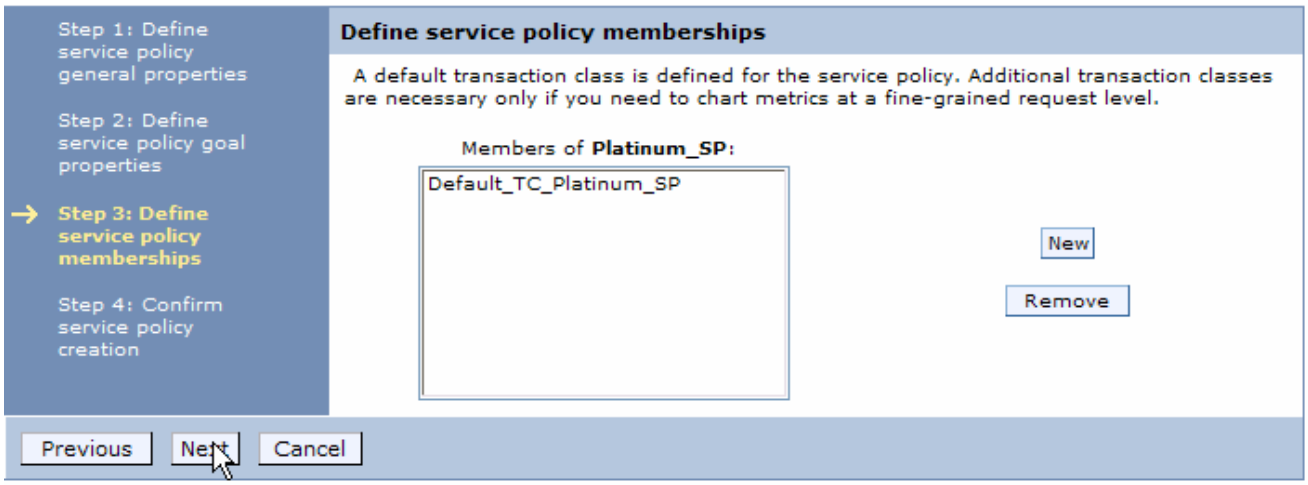
__ d. Click **Next**

__ e. Enter the Goal Value as **1250 milliseconds.** Select the Importance as **Highest**. Check "Monitor for persistent service policy violations". Set Time Period Value to **30 Seconds**, which indicates to Dynamic Operations that service policy violations must occur for 30 seconds consecutively before a policy violation task is generated.

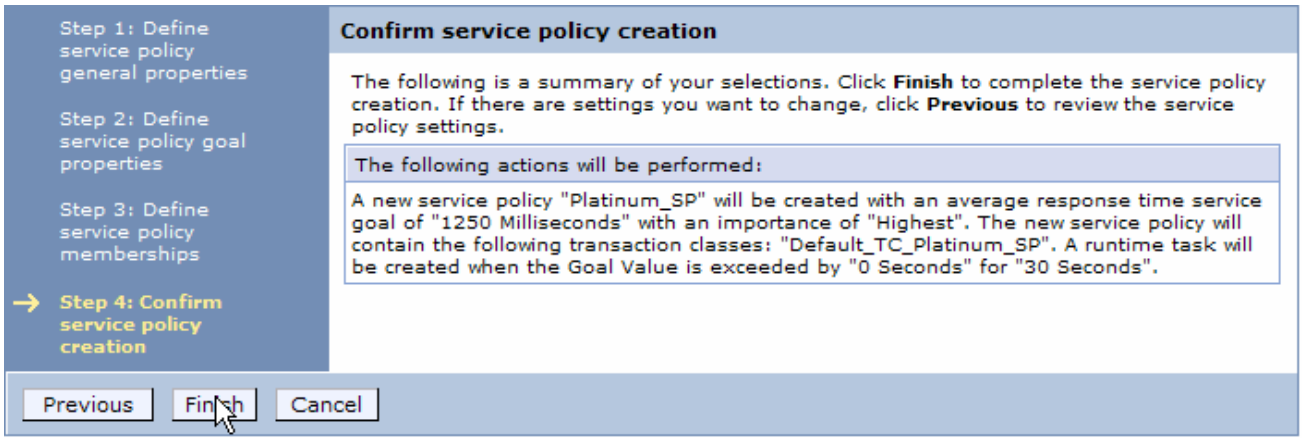


__ f. Click **Next**.

__ g. In the Memberships panel, note there is a default transaction class that appears, and it cannot be removed; you will add a specific transaction class later. For now, click **Next** to accept the default.



__ h. In the Confirmation panel, click **Finish**.



____ 19. Create the Gold_SP, Silver_SP, and Bronze_SP service policies.

__ a. Click **New** to create a new service policy.

__ b. Enter the name as **Gold_SP**. Select **Average Response Time** from the Goal Type box.

__ c. Click **Next.**

__ d. Enter the Goal Value as **1500 milliseconds.** Enter the Importance as **High.** Check “Monitor for persistent service policy violations”. Set Time Period Value to **30 Seconds**

__ e. Click **Next**.

__ f. In the Memberships panel, select **Next.**

__ g. In the Confirmation panel, click **Finish**.

__ h. Click **New** to create a new service policy.

__ i. Enter the name as **Silver_SP**. Select **Average Response Time** from the Goal Type box.

__ j. Click **Next.**

__ k. Enter the Goal Value as **2 seconds.** Enter the Importance as **Medium.** Check “Monitor for persistent service policy violations”. Set Time Period Value to **30 Seconds**

__ l. Click **Next**.

__ m. In the Memberships panel, select **Next.**

__ n. In the Confirmation panel, click **Finish**.

__ o. Click **New** to create a new service policy.

__ p. Enter the name as **Bronze_SP**. Select **Average Response Time** from the Goal Type box.

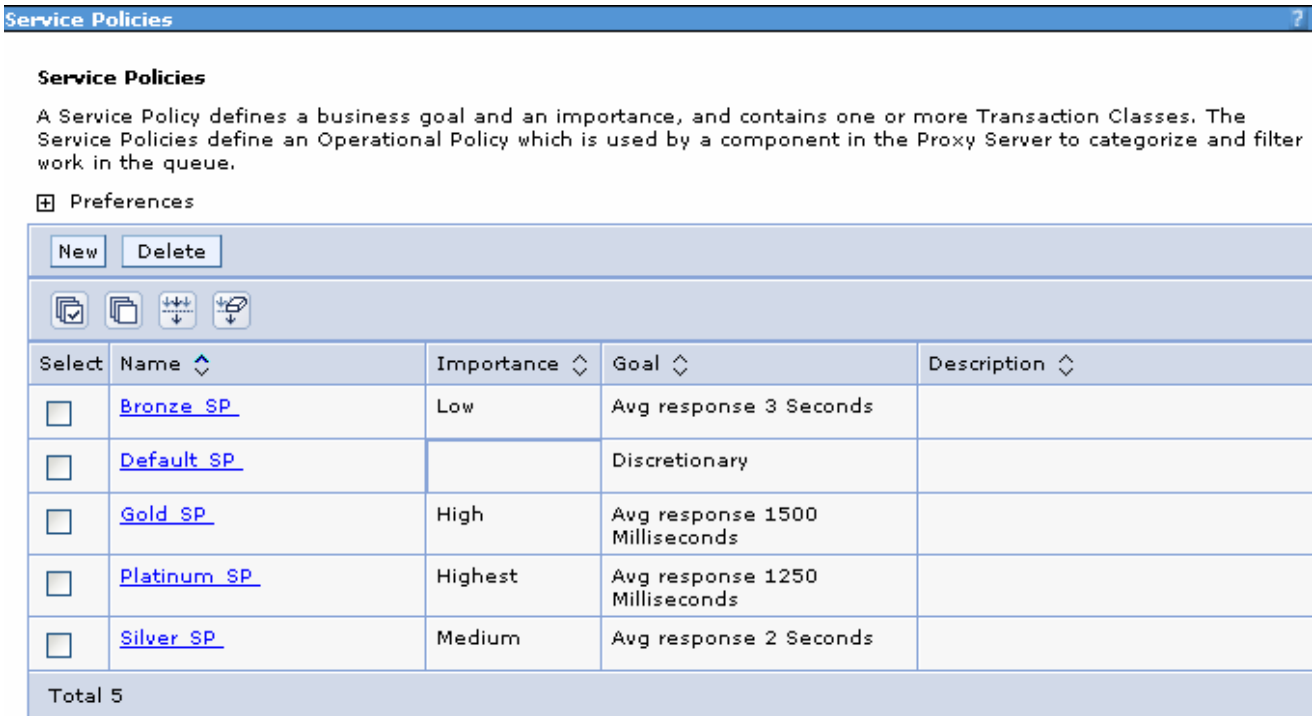
__ q. Click **Next.**

__ r. Enter the Goal Value as **3 seconds.** Enter the Importance as **Low.** Check “Monitor for persistent service policy violations”. Set Time Period Value to **30 Seconds**

__ s. Click **Next**.

__ t. In the Memberships panel, select **Next.**

__ u. In the Confirmation panel, click **Finish**.



____ 20. Save the changes.

__ a. Click **Review** in the messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

__ c. Click **Save.**

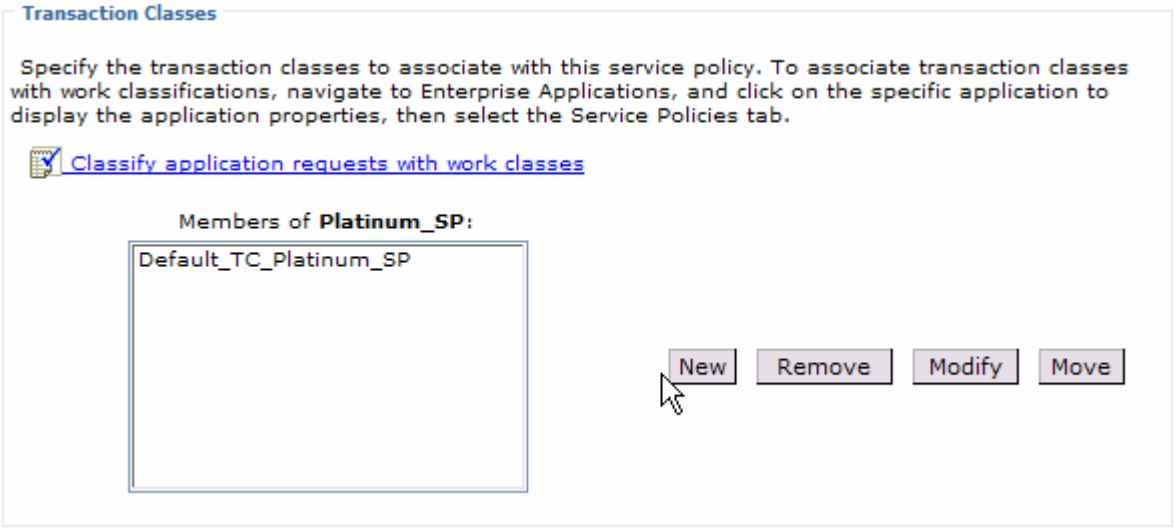
__ d. After the save completes, click **OK**.

____ 21. Next you will create the Transaction classes. First, create the Transaction class StockTrade_TC and map it to the Web module StockTrade:

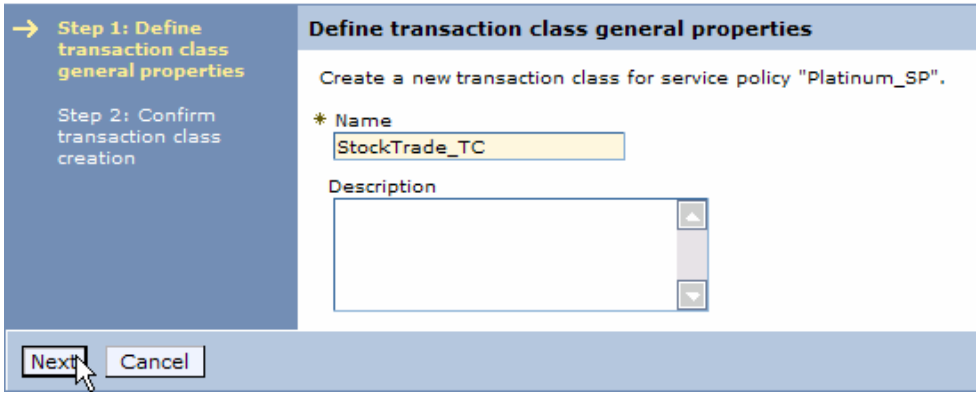
__ a. In the Navigation panel, expand **Operational Policies** and click **Service Policies**.

__ b. Click **Platinum_SP**.

__ c. In the transaction classes area, click **New** to create a new transaction class. (Note that a default transaction class already appears in the window and can be ignored.)

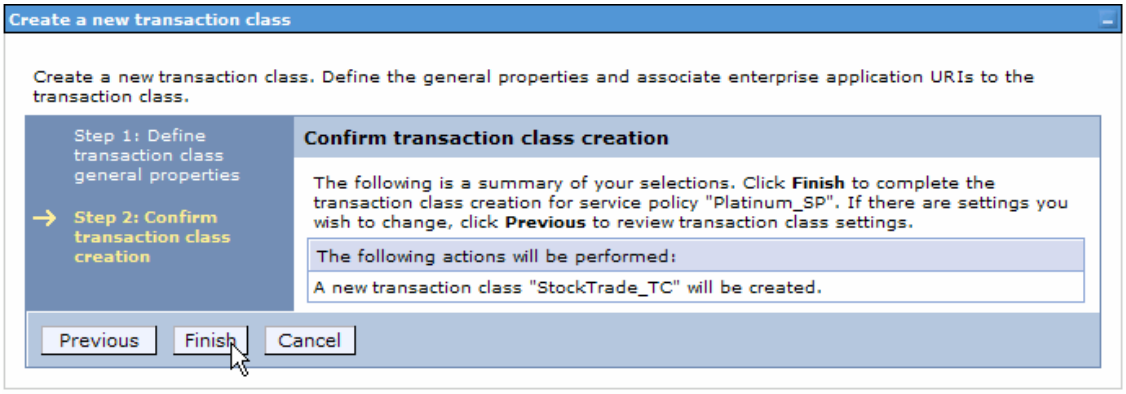


__ d. Enter **StockTrade_TC** as the Name.

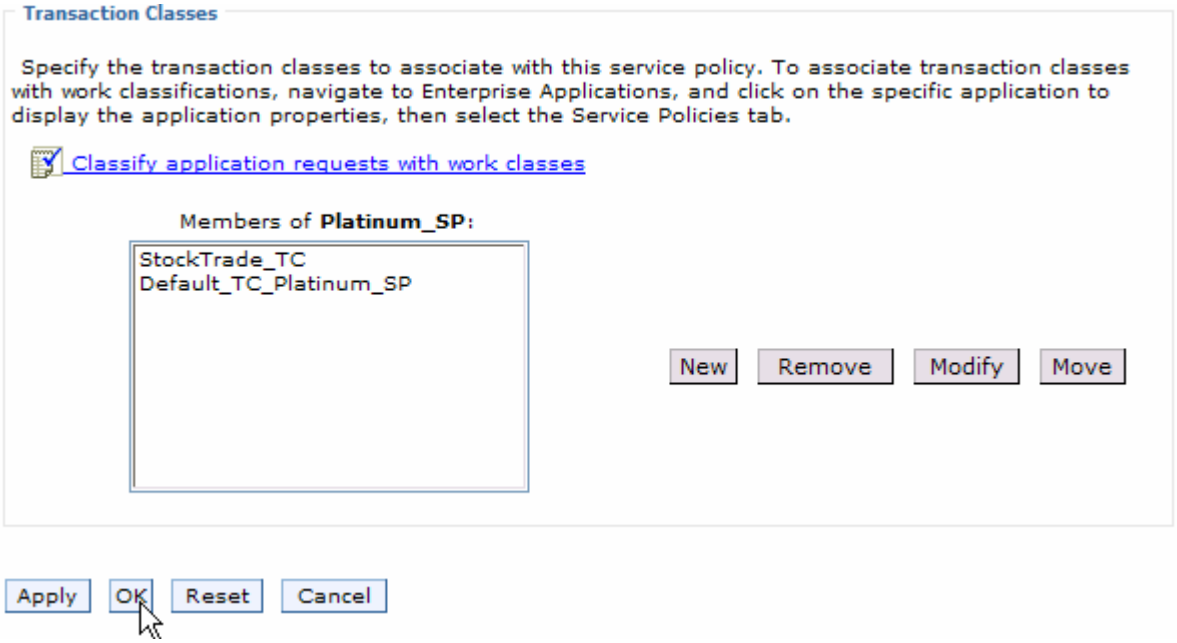


__ e. Click **Next**.

__ f. On the confirmation panel, click **Finish**



__ g. Click **OK** on the Platinum_SP Service Policy Configuration page.



____ 22. Create transaction classes for StockQuery_TC, AccountManagement_TC and FinancialAdvice_TC Web modules.

__ a. Click on the **Bronze_SP** service policy.

__ b. In the Memberships area, click **New** to create a new transaction class.

__ c. Enter **StockQuery_TC** as the Name and click **Next**.

__ d. On the Confirmation panel, click **Finish**.

__ e. Click **OK** on the Bronze_SP Service Policy Configuration.

__ f. Click on the **Silver_SP** service policy.

__ g. In the Memberships area, click **New** to create a new transaction class.

__ h. Enter **AccountManagement_TC** as the Name and click **Next**.

__ i. On the Confirmation panel, click **Finish**.

__ j. Click **OK** on the Silver_SP Service Policy Configuration.

__ k. Click on the **Gold_SP** service policy.

__ l. In the Memberships area, click **New** to create a new transaction class.

__ m. Enter **FinancialAdvice_TC** as the Name and click **Next**.

__ n. On the Confirmation panel, click **Finish**.

__ o. Click **OK** on the Gold_SP Service Policy Configuration.

____ 23. Save the changes.

__ a. Click **Review** in the messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

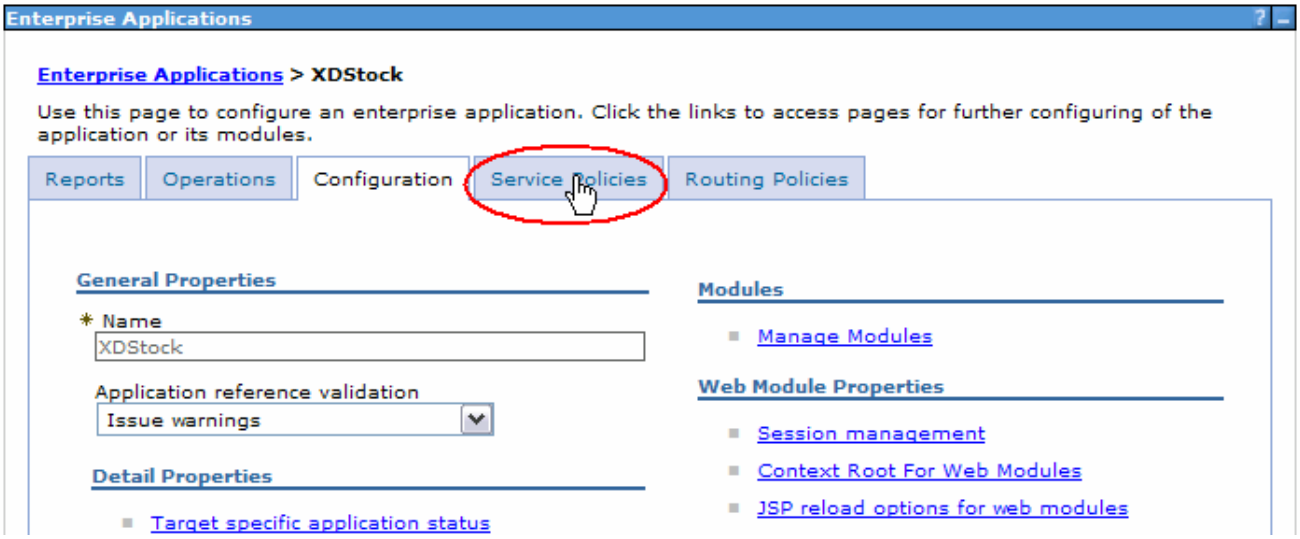
__ c. Click **Save**.

____ 24. Define the **StockTrade_WC** work class.

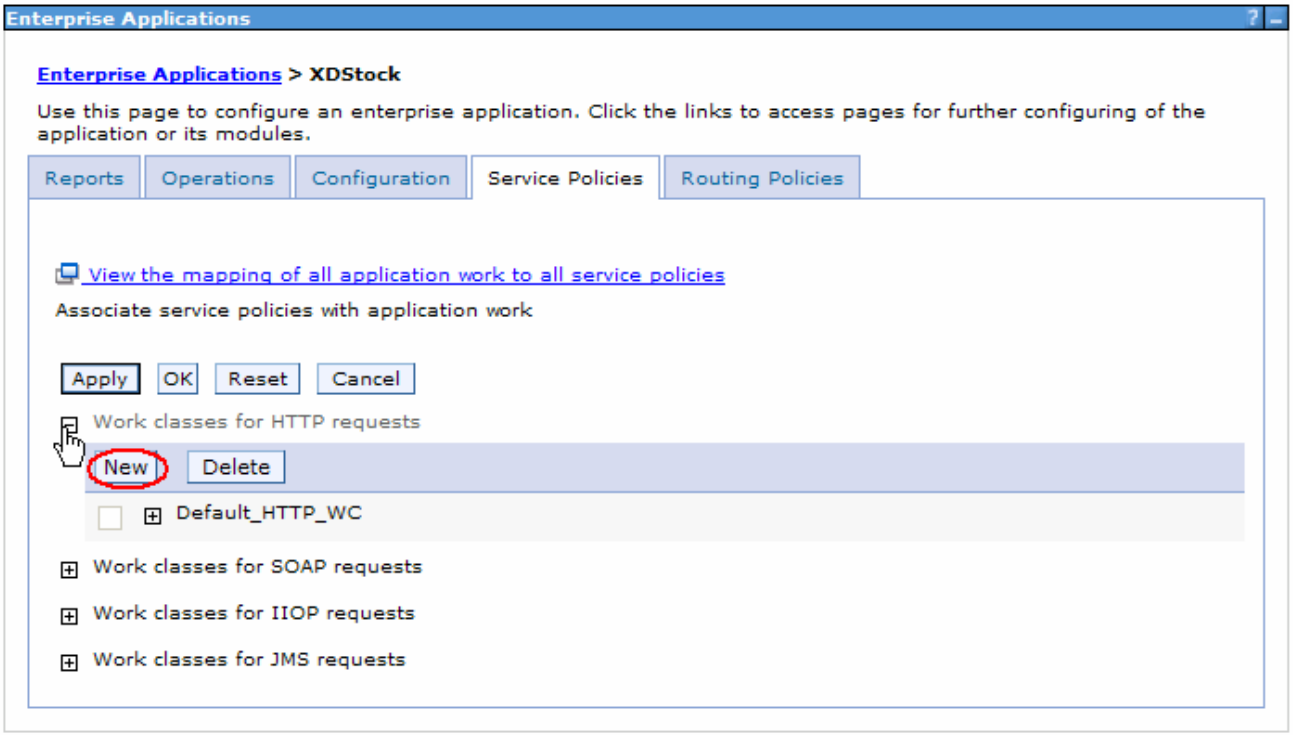
__ a. In the Navigation panel, expand **Applications** and click **Enterprise Applications**

__ b. Click on **XDStock.**

__ c. Note the Service Policies tab at the top of the General Properties panel. Click on the **Service Policies** tab.

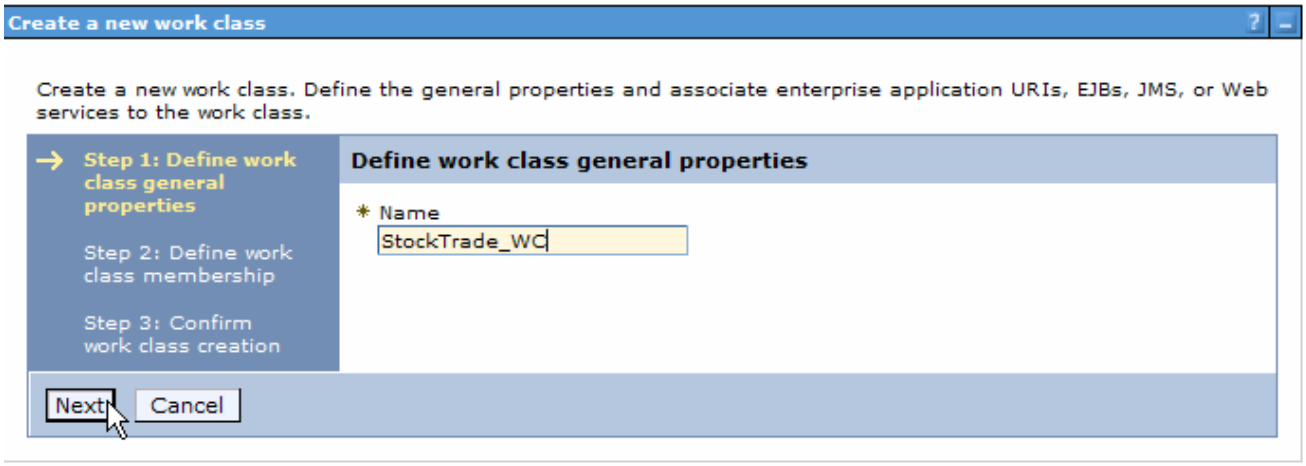


__ d. Expand **Work Classes For HTTP Requests.**

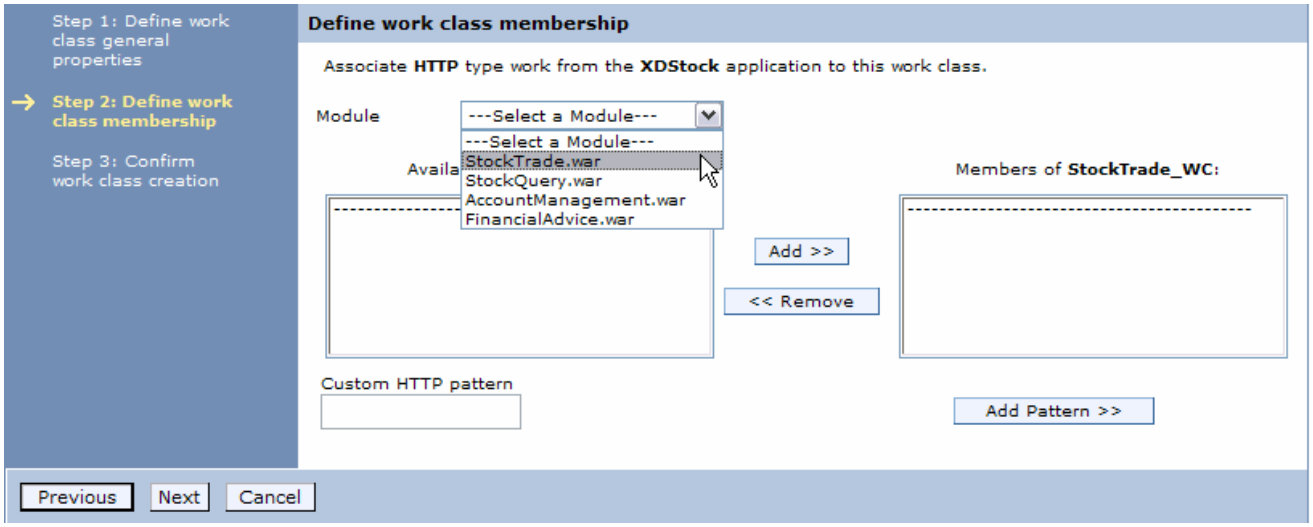


__ e. Click **New** to create a new HTTP work class.

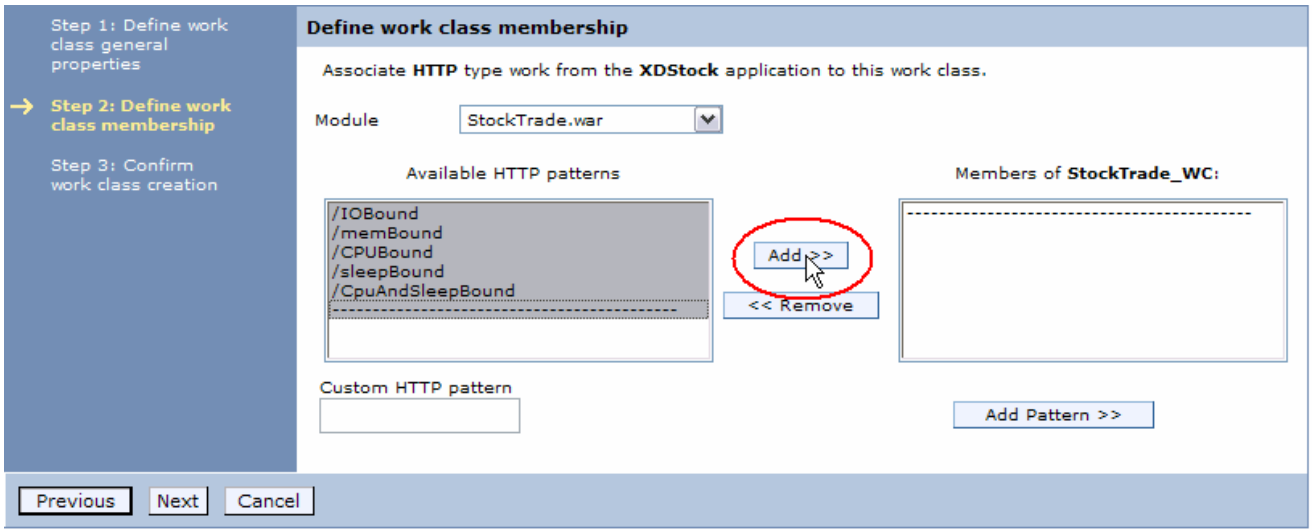
__ f. Type in the name **StockTrade_WC** and click **Next.**



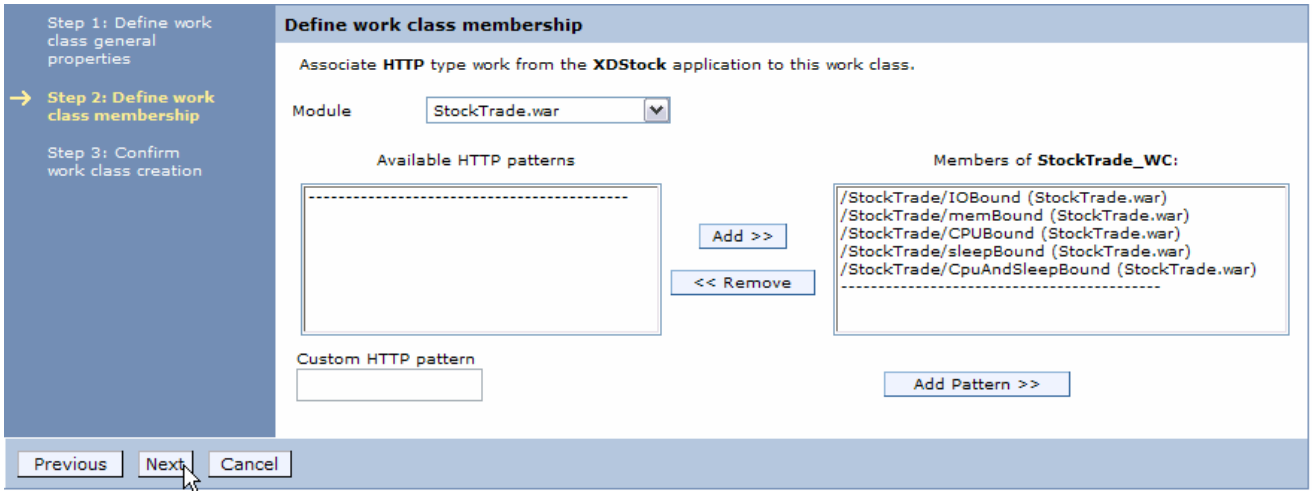
__ g. Using the “Module” drop-down menu, select **StockTrade.war**.



__ h. An HTTP selection list will appear. Make a multiple selection within the HTTP selection list: select the first available item in the box, press the Shift key, and then select the last item. Click **Add** to add the members.

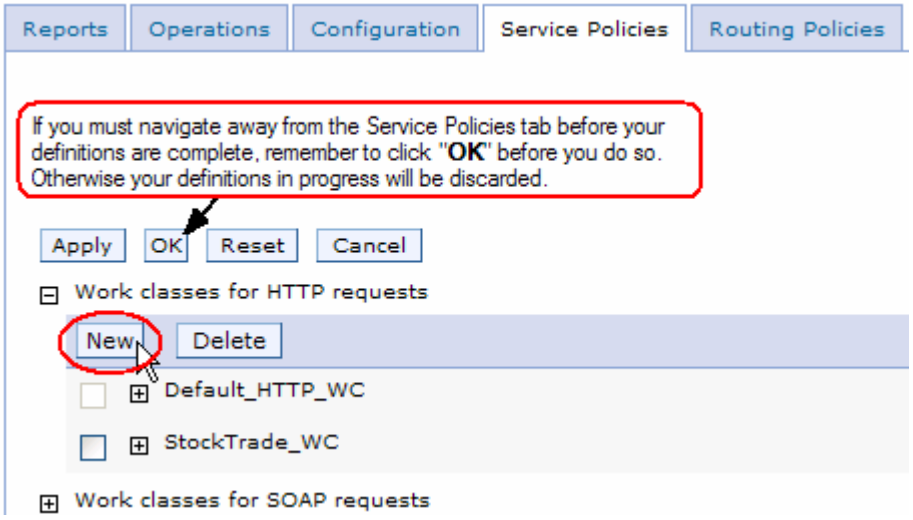


__ i. The HTTP members should appear in the list on the right. Click **Next**.



__ j. Review the information in the Confirm Work Class Creation panel. Click **Finish** .

____ 25. Define the remaining work classes. Warning: If you navigate away from the Service Policies tab without clicking “OK”, your definitions that are in progress will be discarded.



__ a. Click **New** to create a new HTTP work class.

__ b. Type in the name **StockQuery_WC** and click **Next.**

__ c. Using the “Module” drop-down, select **StockQuery.war**.

__ d. An HTTP selection list will appear. Make a multiple selection within the HTTP selection list: select the first available item in the box, press the Shift key, and then select the last item. Click **Add** to add the members.

__ e. The HTTP members should appear in the list on the right. Click **Next**.

__ f. Review the information in the Confirm Work Class Creation panel. Click **Finish**.

__ g. Click **New** to create a new HTTP work class.

__ h. Type in the name **FinancialAdvice_WC** and click **Next.**

__ i. Using the “Module” drop-down menu, select **FinancialAdvice.war**.

__ j. An HTTP selection list will appear. Make a multiple selection within the HTTP selection list: select the first available item in the box, press the Shift key, and then select the last item. Click **Add** to add the members.

__ k. The HTTP members should appear in the list on the right. Click **Next**.

__ l. Review the information in the Confirm Work Class Creation panel. Click **Finish**.

__ m. Click **New** to create a new HTTP work class.

__ n. Type in the name **AccountManagement_WC** and click **Next.**

__ o. Using the “Module” drop-down menu, select **AccountManagement.war**.

__ p. An HTTP selection list will appear. Make a multiple selection within the HTTP selection list: select the first available item in the box, press the Shift key, and then select the last item. Click **Add** to add the members.

__ q. The HTTP members should appear in the list on the right. Click **Next**.

__ r. Review the information in the Confirm Work Class Creation panel. Click **Finish**.

__ s. You will see the panel associated with the Service Policies tab. Press **OK** to accept the changes you have made. **Warning: If you navigate away from the Service Policies tab without clicking “OK”, your definitions will be discarded.**

____ 26. Save the changes.

__ a. Click **Review** in the messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

__ c. Click **Save**.

____ 27. Associate the work classes with the appropriate transaction classes.

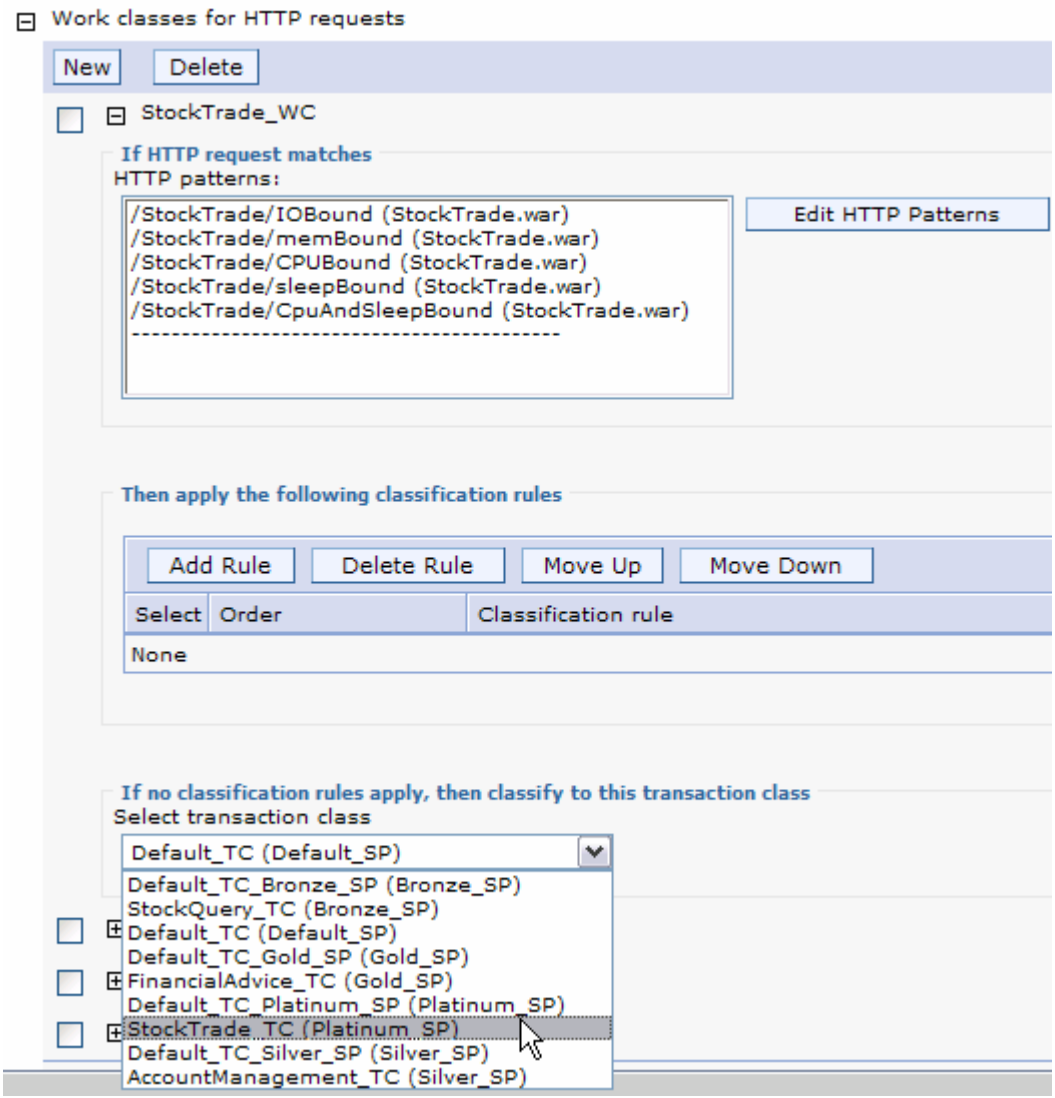
__ a. In the Navigation panel, expand **Applications** and click **Enterprise Applications.**

__ b. Click on **XDStock.**

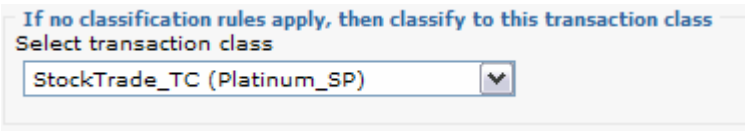
__ c. Click on the **Service Policies** tab.

__ d. Expand **Work Classes For HTTP Requests.**

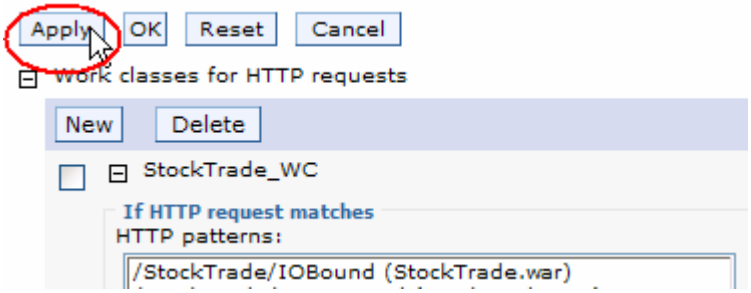
__ e. Expand **StockTrade_WC.** You can now see the details of the workclass.



__ f. Click the drop-down menu below the text "*If no classification rules apply, then classify to this transaction class*", and select **StockTrade_TC(Platinum_SP)**. This means that all requests matching the selected URI patterns will be mapped to this transaction class, since you have not created any other classification rules.



__ g. Click **Apply** at the top of the panel.



__ h. The table below contains a mapping of the work class names and transaction class names. Associate the remaining work classes with the corresponding transaction classes as listed in the table.

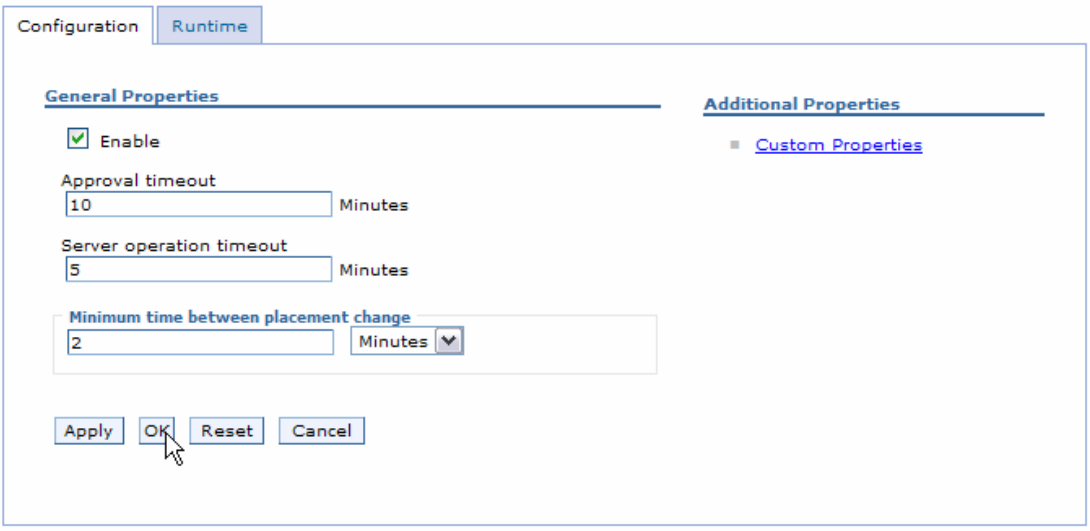
Work class name	Default transaction class name
AccountManagement_WC	AccountManagement_TC (Sliver_SP)
StockTrade_WC	StockTrade_TC (Platinum_SP)
StockQuery_WC	StockQuery_TC (Bronze_SP)
FinancialAdvice_WC	FinancialAdvice_TC (Gold_SP)

__ i. After you have mapped all of the work classes to transaction classes, click **OK**.

____ 28. So that the placement behavior can be observed more quickly than in the default case for the purpose of speeding this exercise, reduce the minimum time between placement changes.

__ a. In the Navigation panel, expand **Operational policies,** expand **Autonomic Managers,** and click **Application Placement Controller**.

__ b. Set “Minimum time between placement change” to **2 Minutes**.



__ c. Click **OK**.

____ 29. Save the changes.

__ a. Click **Review** in the messages area.

__ b. On the Save panel, make sure that the check box **Synchronize changes with Nodes** is selected.

__ c. Click **Save**.

Part 6: Start the servers

____ 30. Check the status of dynamic cluster instances on both the appserver nodes.

__ a. In the navigation panel, expand **Servers** and click **Application Servers**.

__ b. Note the status of the dynamic cluster instances StockTrade_DC_hostBNode01, StockTrade_DC_hostCNode01, AccountManagement_DC_hostBNode01, AccountManagement_DC_hostCNode01, FinancialAdvice_DC_hostBNode01 and FinancialAdvice_DC_hostCNode01. At this point they should all be **stopped**.

____ 31. Manually set the initial state of the servers, before you test the dynamic placement.

__ a. In the Navigation panel, expand **Servers** and click **Application Servers**.

__ b. Select the 1st, 3rd, and 6th Application Server and click **Start.**

__ c. Wait for confirmation that the servers are started. This could take several minutes. The stopped and started servers list should look like this:

Select	Name	Node	Version	Cluster Name	Status
☐	AccountManagementj_DC_hostBNode01	hostBNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	AccountManagementj_DC	▶
☐	AccountManagementj_DC_hostCNode01	hostCNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	AccountManagementj_DC	✖
☐	FinancialAdvice_DC_hostBNode01	hostBNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	FinancialAdvice_DC	▶
☐	FinancialAdvice_DC_hostCNode01	hostCNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	FinancialAdvice_DC	✖
☐	StockTrade_DC_hostBNode01	hostBNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	StockTrade_DC	✖
☐	StockTrade_DC_hostCNode01	hostCNode01	ND 6.1.0.7 WXDCG 6.1.0.0 WXDDG 6.1.0.0 WXDOP 6.1.0.0 XD 6.1.0.0	StockTrade_DC	▶
Total 6					

____ 32. Start the ODR server if it is not already started.

__ a. In the Navigation panel, expand **Servers** and click **on-demand routers**.

__ b. Select **ODR** if it is not started, select it and click **Start**.

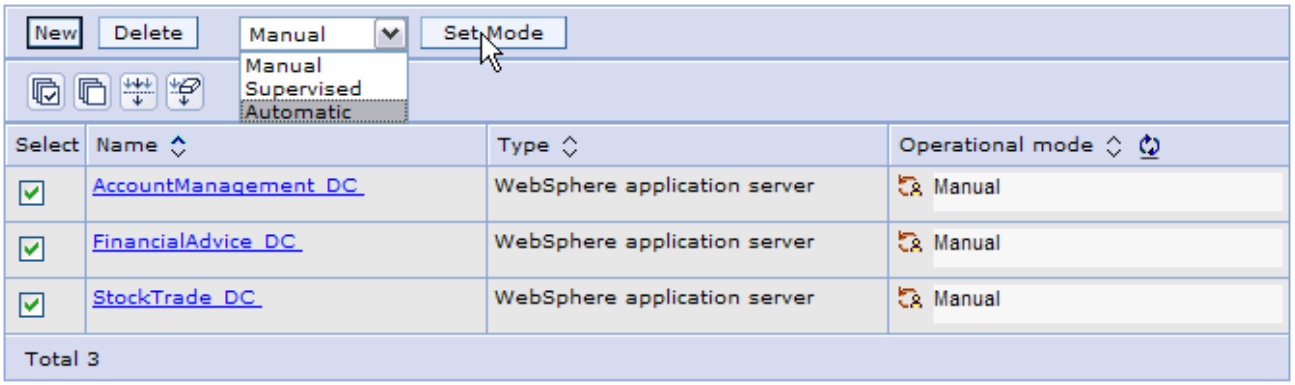
__ c. Wait for confirmation that the server has started.

____ 33. Set the dynamic clusters' operational mode to **Automatic**.

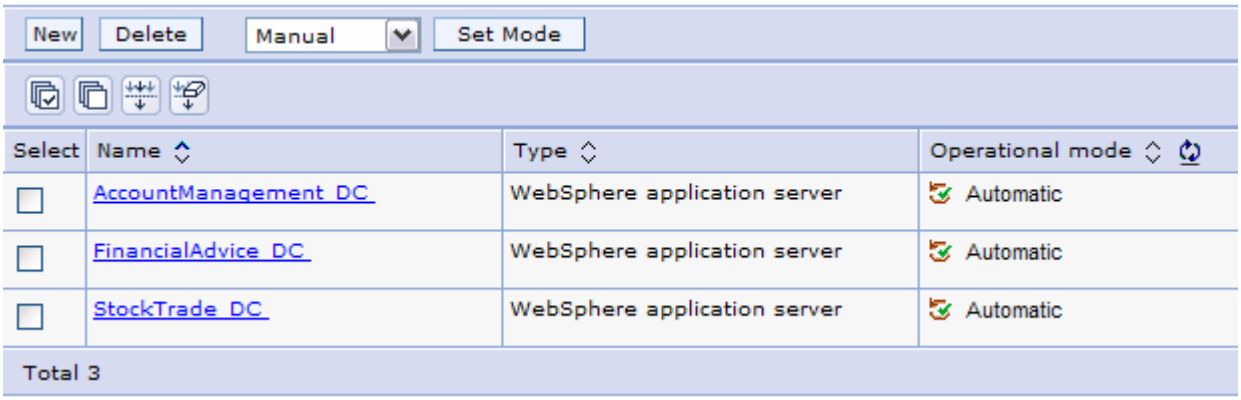
__ a. In the Navigation panel, expand **Servers** and click **Dynamic clusters**.

__ b. Select all of the dynamic clusters in the table.

__ c. Select **Automatic** in the drop-down list.



__ d. Click **Set Mode**.



Part 7: A quick tour of runtime operations

____ 34. In the navigation panel, expand **Runtime Operations**, then click on **Reports.** Accept the Adobe Software License agreement if it appears.

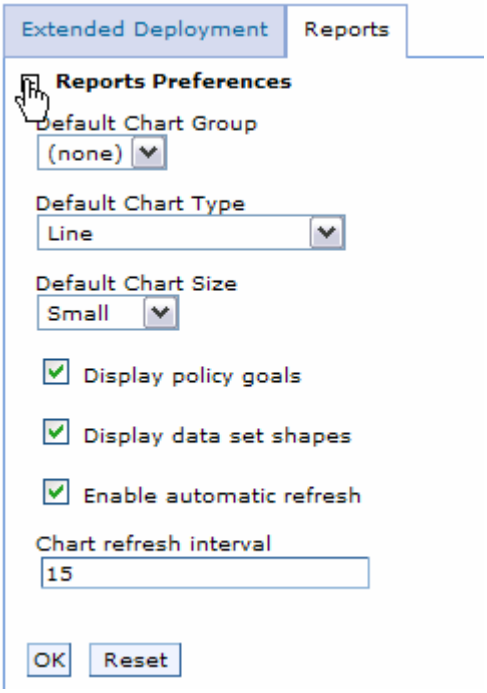
__ a. A chart group with the cell name will be automatically opened. The Reports pane will draw but no data will be graphed.

At the top of the pane, if any operation alerts messages are available, they are displayed here. Here is an example of two messages you might see in Operation Alerts.

Operation alerts will notify you of various operational status conditions or error conditions, including servers or node agents that are stopped or that have failed, the absence of http traffic, or the “unknown” status of a system component. “Unknown” conditions are often harmless situations. In this case shown, no http traffic is flowing and so ARFM is not reporting its state to administrative processes, resulting in the “Unknown” operation alert. The lack of http traffic is also why you see the operation alert that indicates that the on-demand router is not posting any statistics.

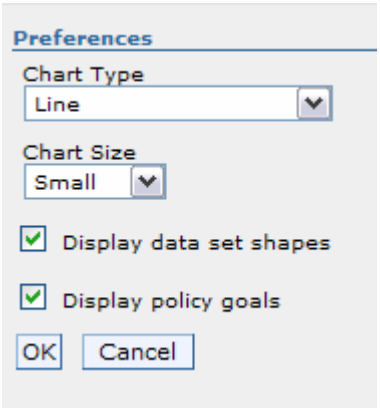
Note: Loading operation alerts requires communications to various distributed components, which can result in a delay – sometimes as long as 15 to 25 seconds - in the posting of the operation alerts when navigating to the Reports or Extended Deployment panes. Once the messages are loaded, the delay will not be seen again as long as you continue your work within the pane, unless you click the “Refresh”

__ b. Expand **Reports Preferences** at the top left of the Reports panel. Using these settings, you can change the default charting characteristics of new reports. After reviewing these settings, collapse the **Reports Preferences** section.

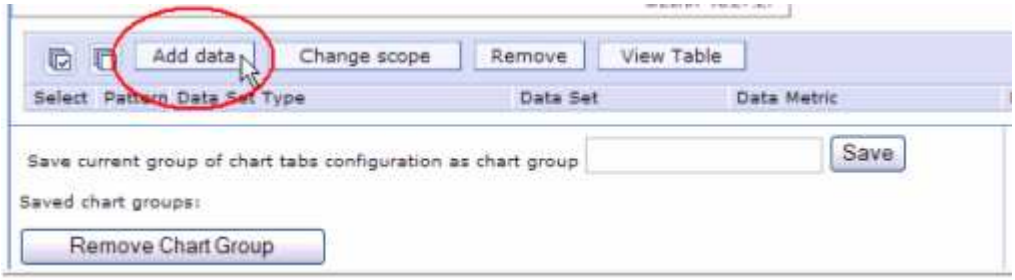


__ c. Just above and to the right of the charting area, note the **Preferences** clickable control, which allows you to make immediate changes to a chart is actively being charted.

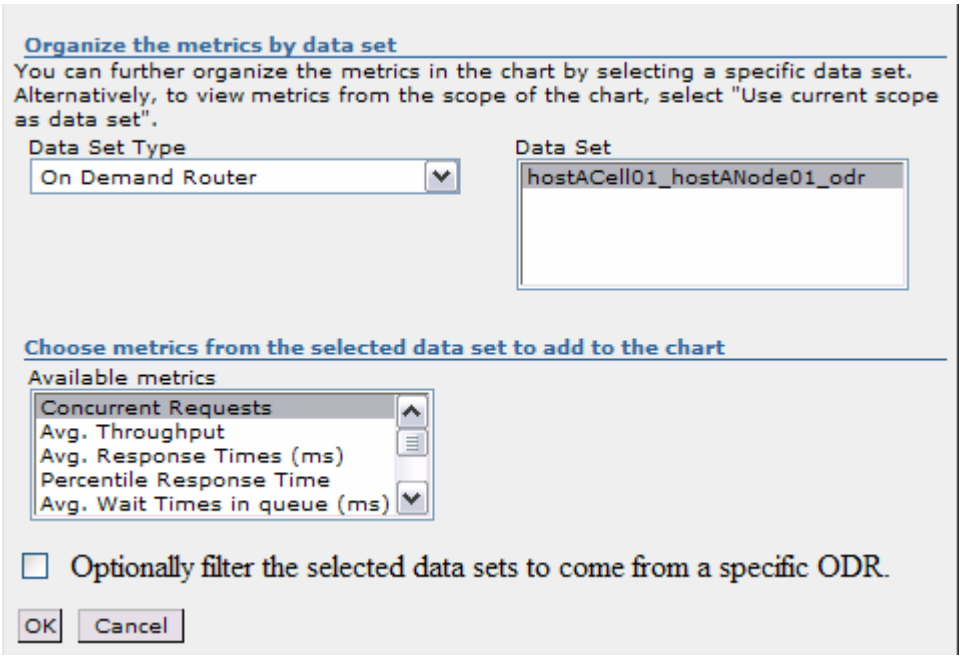
Click on **Preferences** to see the settings that can be applied to active charts. Click **OK** or **Cancel** after you have reviewed the settings.



__ d. At the bottom portion of the pane, you manage the data which you want to chart. Typically, you start by clicking “Add data” and selecting the data metrics. After the selection is made, charting automatically begins a few seconds later.

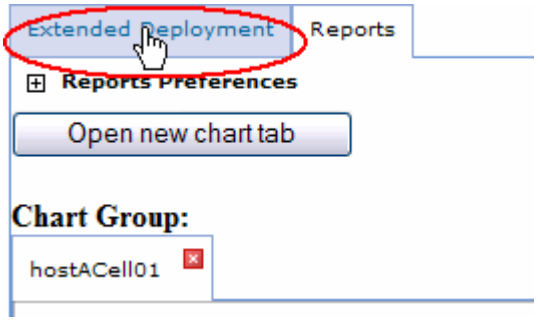


Click on **Add data** just below the chart for the cell name. A gray pop-up should appear with pulldown and selection capabilities for **Data Set Type**, **Data Set** and **Available metrics.**

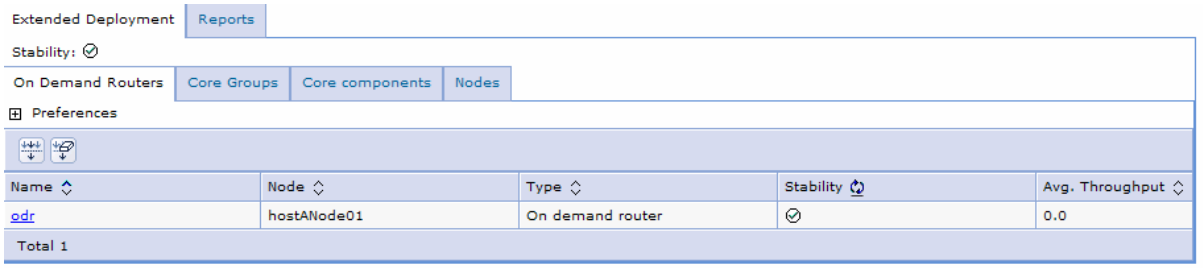


__ e. Click **Cancel**. You will return to this function later to set up charting for the service policies related to the XDStock application.

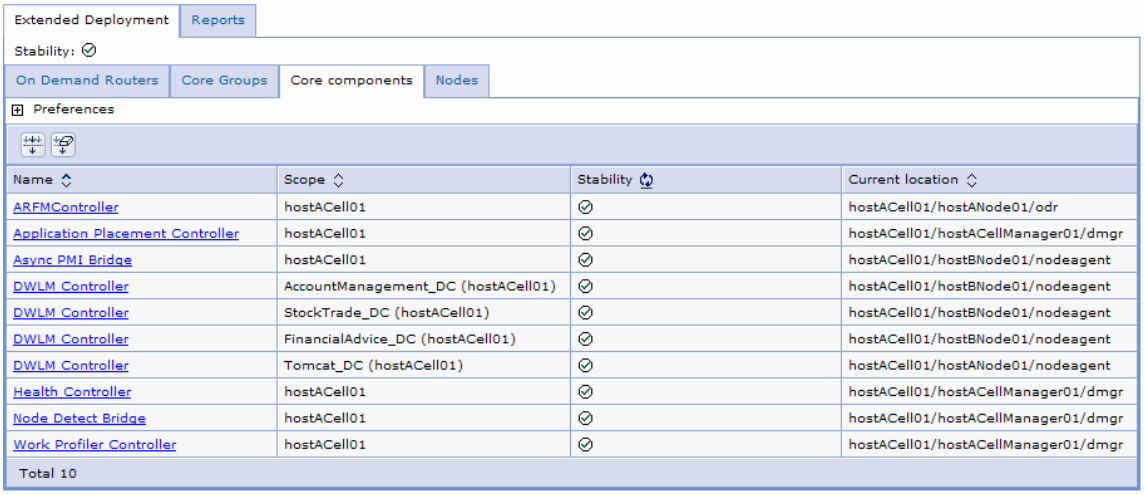
__ f. At the top left corner of the pane, click on the **Extended Deployment** tab.



__ g. The **Extended Deployment** tab (the equivalent of navigating to Runtime Operations / Extended Deployment, except that operation alerts are not reloaded) shows you the stability and location of on-demand routers, core groups, core components, and nodes.

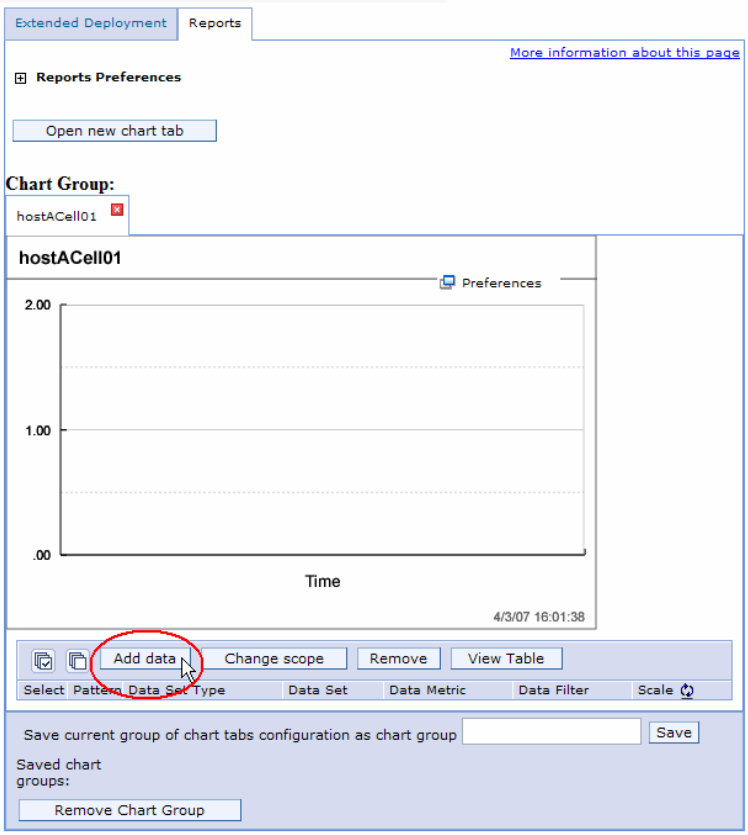


__ h. Click on the various tabs to review the status of the core groups, components, and nodes. Below is a snapshot of all core components displaying as “Stable”. If any one of the resources in any of the 4 tabs display as unstable, click on the specific resource to get more information about the issue.



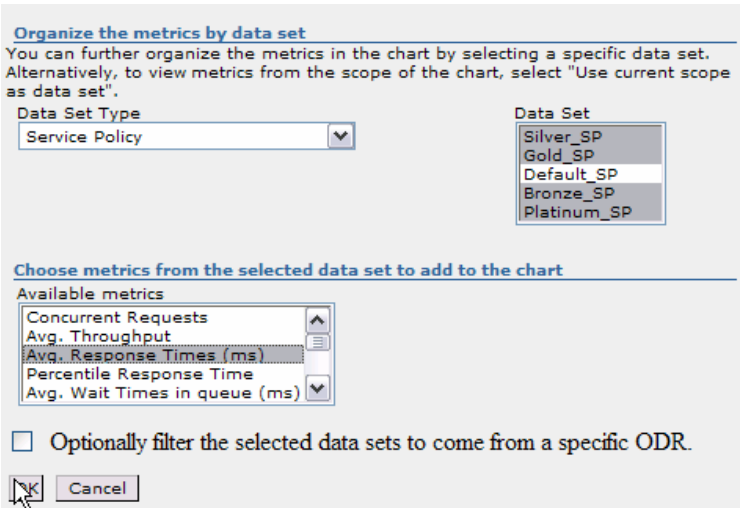
Part 8: Charting and verifying application server placement

____ 35. In the Navigation panel, expand **Runtime operations**, and then click on **Reports.**

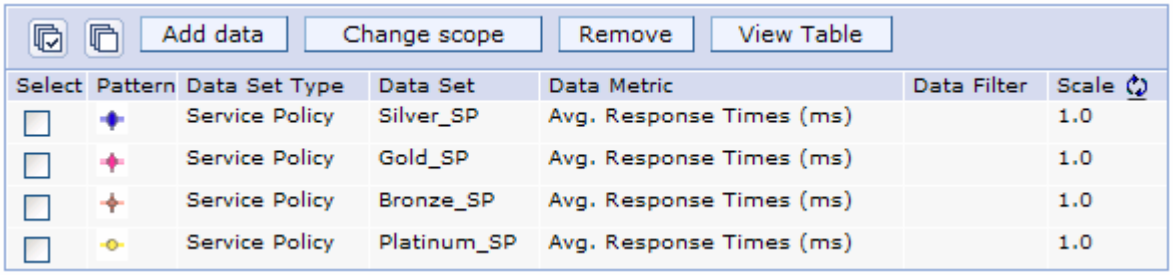


____ 36. Click on **Add data.**

____ 37. In the Data Set Type pulldown, select **Service Policy.** In the **Data Set** area, select the four Service Policies you previously defined (in other words, do NOT select Default_SP). You can press and hold the Ctrl key and left click to make individual selections. In the **Available metrics** area, select **Avg. Response Times (ms).** Then click **OK**.



____ 38. The specific service policies you chose will appear within the list below the charting area. Since there is no HTTP traffic yet, no data will be charted and the goal lines do not appear within the chart.



Note: Do not close the administrative console. You will come back to it after starting the load generator.

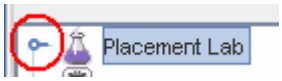
Note: In this lab you will use Apache JMeter to generate a simulated load on the XDStock application. This tool is freely available from http://jakarta.apache.org/JMeter/

____ 39. Start JMeter on hostA, the machine running the deployment manager and the ODR.

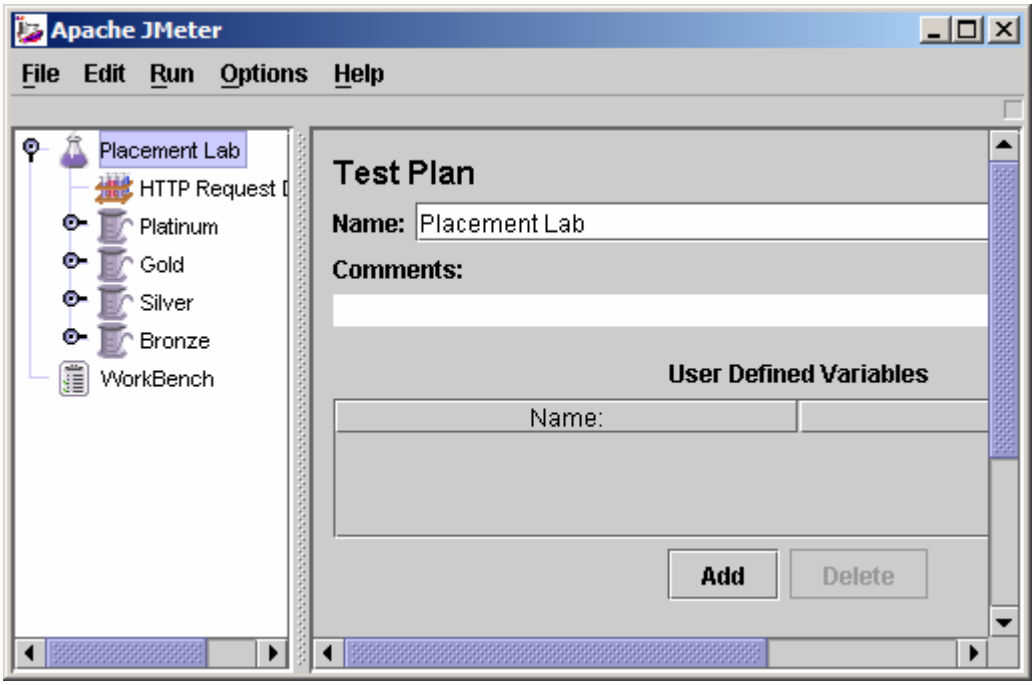
__ a. Open a Command Prompt and navigate to C:\LabFilesXD\PlacementLab.

__ b. Type **jmeter MicroWebApp\ PlacementLab.jmx** and press **enter.** The necessary jars will be loaded to run the test tool. Once that is complete, a GUI will appear that allows you to run the test tool.

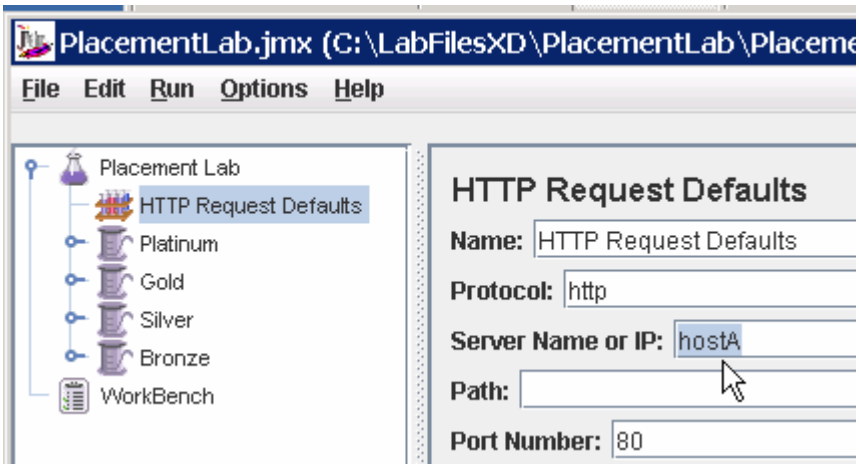
__ c. Click this graphical symbol in the left pane to expand the plan:



This plan will drive a moderate amount of load against each of your Web modules.

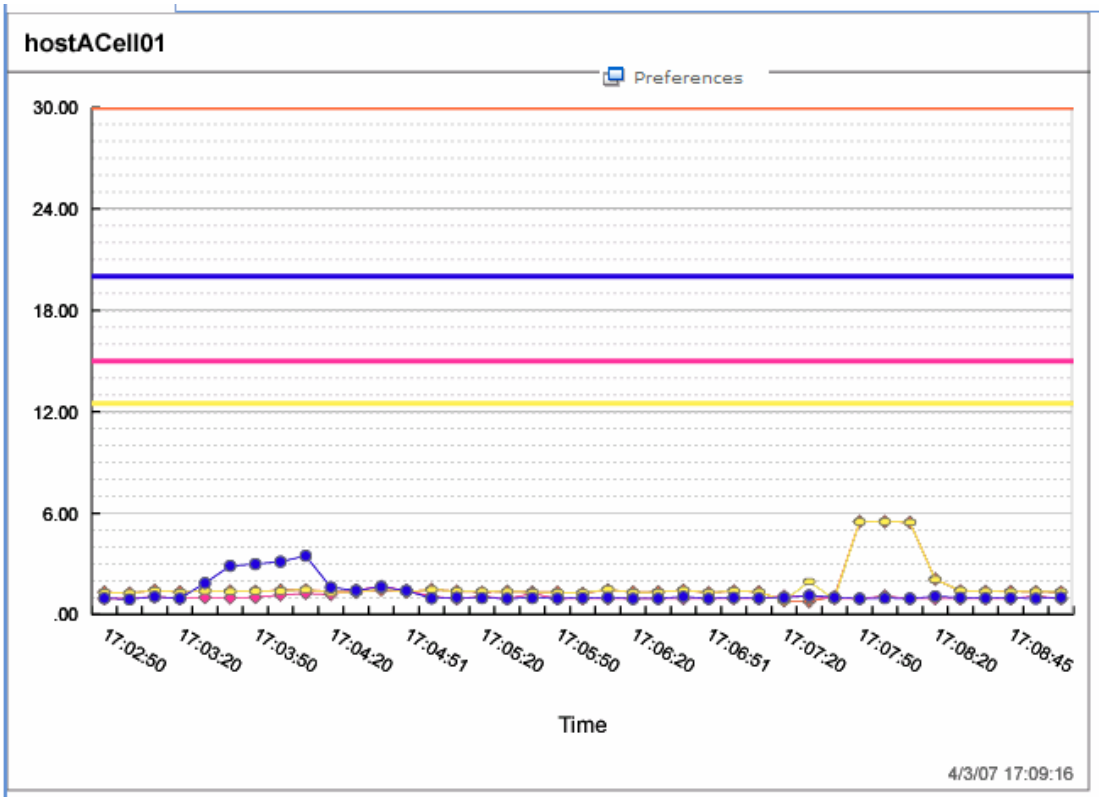


__ d. Click **HTTP Request Defaults.** If **hostA** is not the server node name where the odr is running, overtype this field with your odr server node name.



__ e. Click **Run** then click **Start** to start the stress tool using these plan settings.

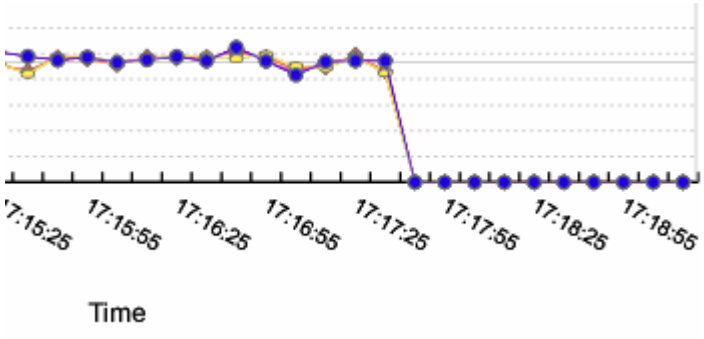
__ f. Observe the application average response times in the administrative console. The data is plotted with policy goals shown and might be hard to view. Click on **Preferences**, set the Chart Size to Medium, and click **OK**. The data will then look similar to the snapshot below. If you still have problems seeing the data, experiment with temporarily unchecking “Display policy goals” in **Preferences**, although you will probably want to set “Display policy goals” on later.



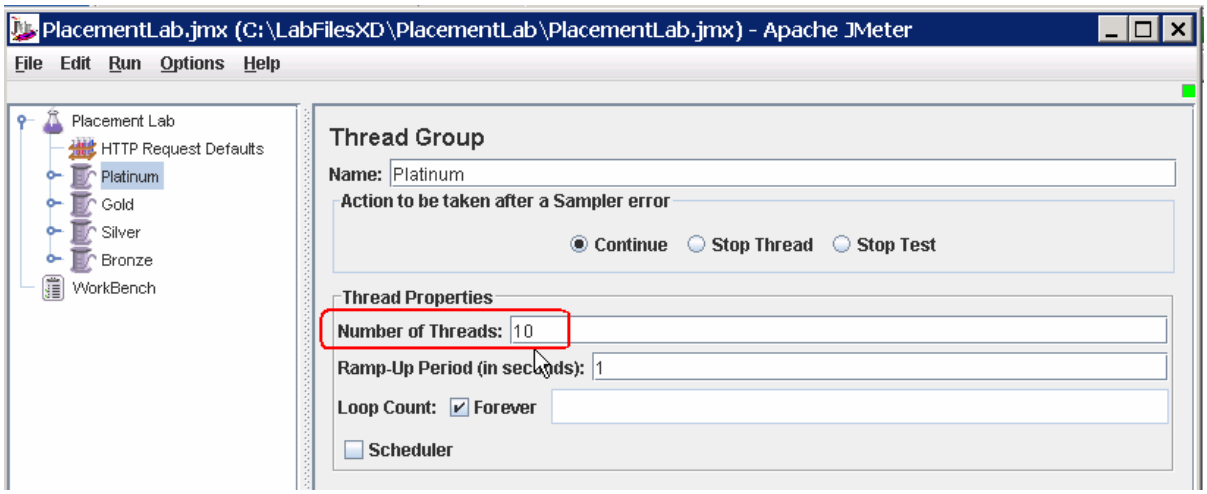
____ 40. Stop the stress tool and add additional sessions for Platinum within JMeter.

__ a. Click **Run** and then **Stop** menu in the stress tool.

__ b. Check back in Reports in the administrative console. Note that machine utilizations have gone down.

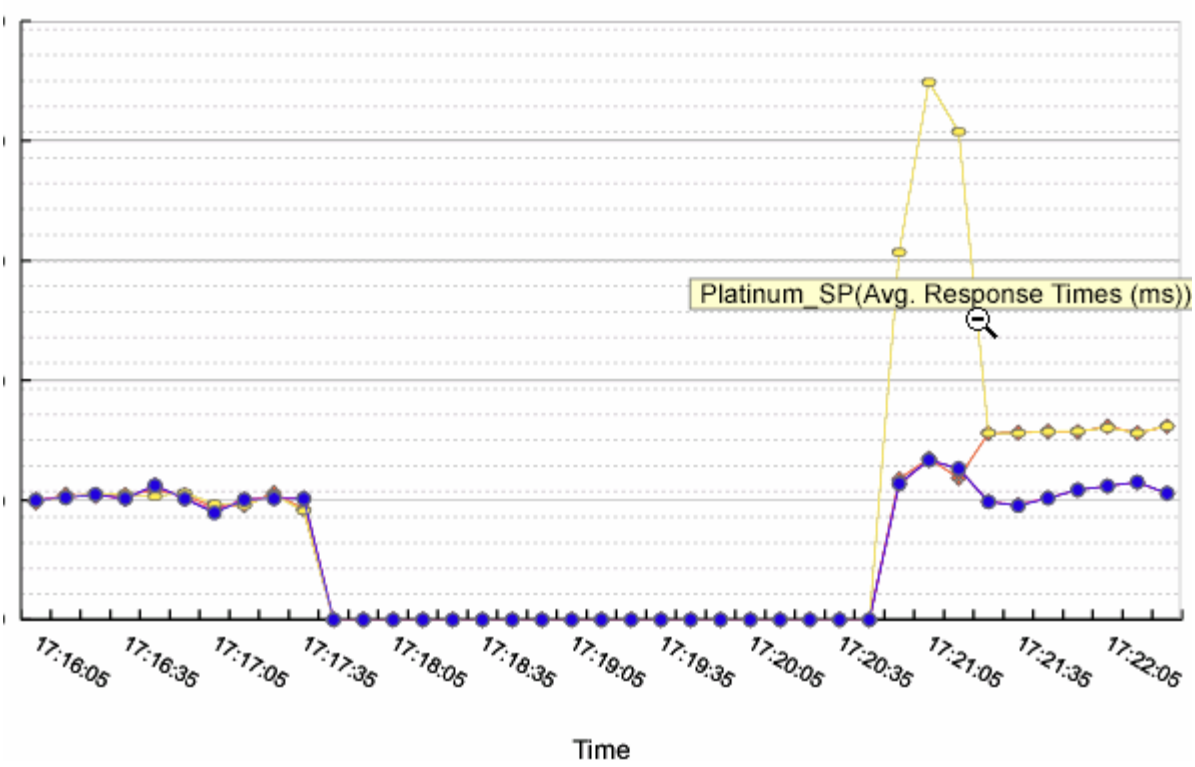


__ c. In the JMeter interface, change the number of threads for the Platinum group to **10**.



__ d. Restart the load by selecting **Start** from the **Run** menu.

____ 41. Observe the Reports chart in the administrative console. Note that the average response time for Platinum_SP (associated with StockTrade running on hostCNode01) will increase. This is because you have increased the number of requests for the StockTrade Web application (because StockTrade's service policy is **Platinum**).



____ 42. Within JMeter, change the sessions to produce more stress on Platinum service policy.

__ a. Stop the current test plan by selecting **Run > Stop**.

__ b. Increase the number of threads for Platinum – start at 20, for example.

____ 43. Click **Run >Start** to restart the stress tool with the new settings.

____ 44. Observe the Reports chart in the administrative console. The utilization for the node running the StockTrade dynamic cluster will increase because that dynamic cluster instance is running both the StockTrade and StockQuery applications, and StockTrade is more heavily loaded (StockTrade gets the Platinum requests while StockQuery gets the Bronze requests.) Under lighter loads, the response time for both Platinum and Bronze requests will be nearly the same but as the load increases, preference will be given to the Platinum http requests.

The utilization of the node running StockTrade will approach 100% and eventually the StockTrade or StockQuery transaction Class will fail to meet their response-time goals. After several minutes of this high processor activity, you should see that a new StockTrade server instance has been started on the nodeB to handle some of the requests to the StockTrade dynamic cluster.

NOTE: The amount of stress that is required to fully utilize your node is dependent upon your environment (for example, RAM and processor speed). So, if the StockTrade server instance on hostBNode01 is not started, then increase the stress for Platinum by 10 and try again. If both machines become overloaded, try reducing the number of threads for http requests using the nodeB machine (FinancialAdvice and AccountManagement).

____ 45. Stop the Stress tool

__ a. Select **Stop** from the **Run** menu.

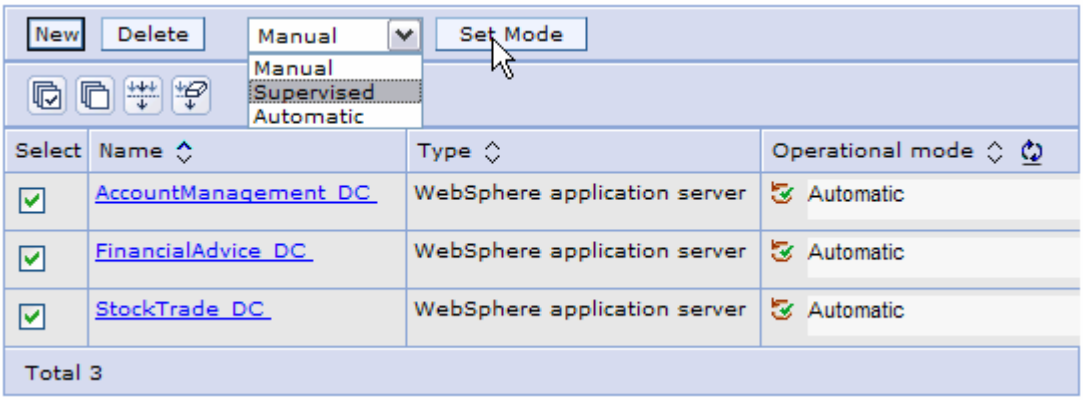
____ 46. Set the dynamic clusters' Operational Mode to Supervised in the administrative console

__ a. Expand **Servers**.

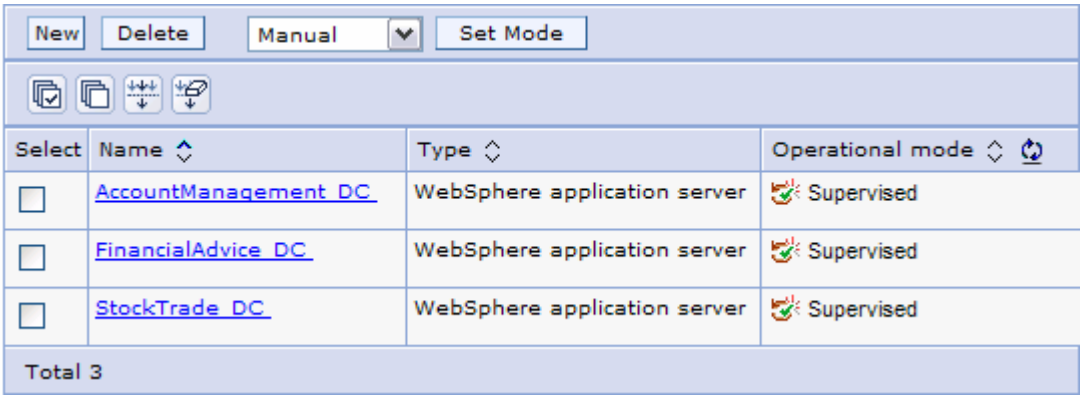
__ b. Click **Dynamic Clusters**.

__ c. Select all of the dynamic clusters

__ d. Select **Supervised** in the drop-down list.



__ e. Click **Set mode**.



____ 47. Manually set initial conditions again.

__ a. Expand **Servers.**

__ b. Select **Application Servers.**

__ c. Select all dynamic cluster instances that are started.

__ d. Press the **Stop** button.

__ e. Wait for confirmation that all servers are stopped.

__ f. Select the dynamic cluster instances **AccountManagement_DC_hostBNode01**, **FinancialAdvice_DC_hostBNode01** and **StockTrade_DC_hostCNode01**.

__ g. Press the **Start** button.

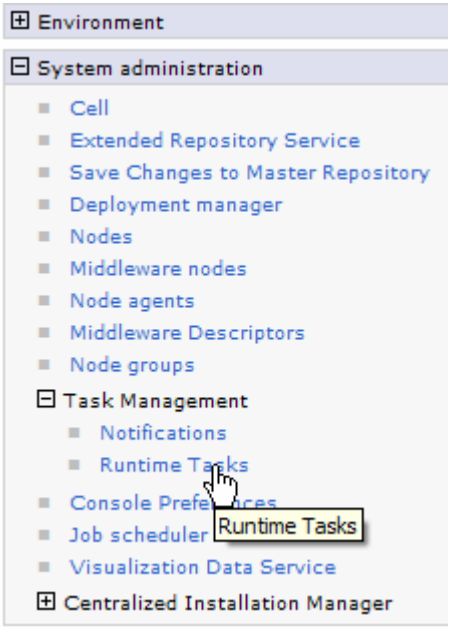
__ h. Wait for confirmation that the servers are started.

____ 48. Start the stress again.

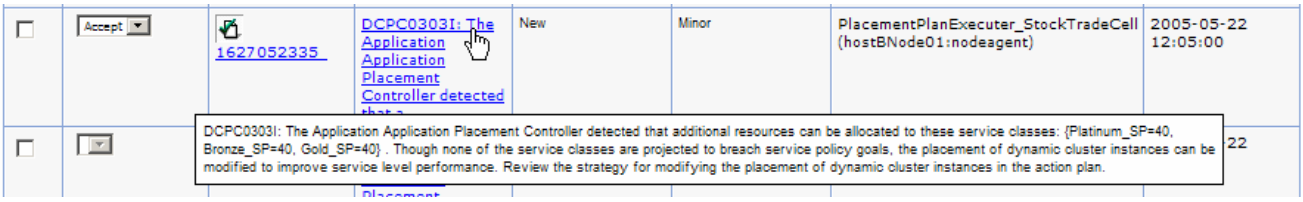
__ a. Select **Start** from the **Run** menu to start the stress.

____ 49. Review the Runtime Tasks to see what tasks are suggested by Extended Deployment.

__ a. Expand **System administration** and then expand **Task Management.** Click **Runtime Tasks**.

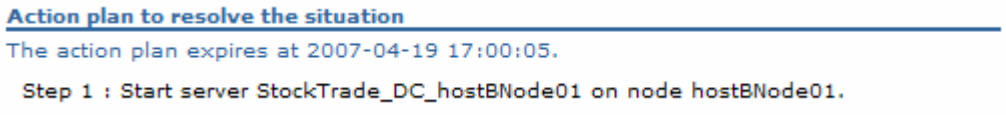


After the stress has run for a while, a task will appear (depending on the processor load and hardware and RAM available, the particular task may vary).

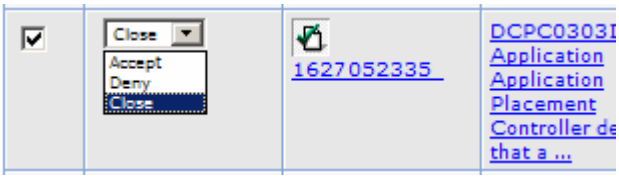


Note: In Supervised mode you must manually determine whether to accept or deny these tasks. This is different from the Automatic operational mode, which allows Extended Deployment to run the tasks on its own. If you do not take action for some time the task will expire, not allowing the runtime task to run.

__ b. Select the **Task ID** to better understand the suggested action. This will open a new window with the task information and, depending on the Task, optionally an action plan.



__ c. Disable the runtime task. Select **Close** in the drop-down list. Select the check box beside the Runtime Task. Click **Execute**. Selecting **Close** tells the system that you will manually take the recommended action. Had you selected **Accept** the system would have taken the action on your behalf. Selecting **Deny** tells the system you do not want the task to occur.



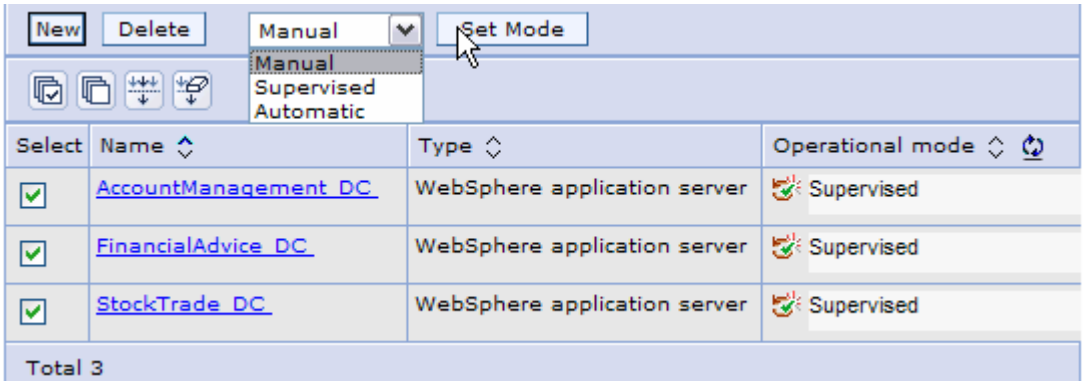
____ 50. Stop the stress by selecting **Stop** from the **Run** menu in JMeter.

____ 51. Set the dynamic clusters' Operational Mode to Manual.

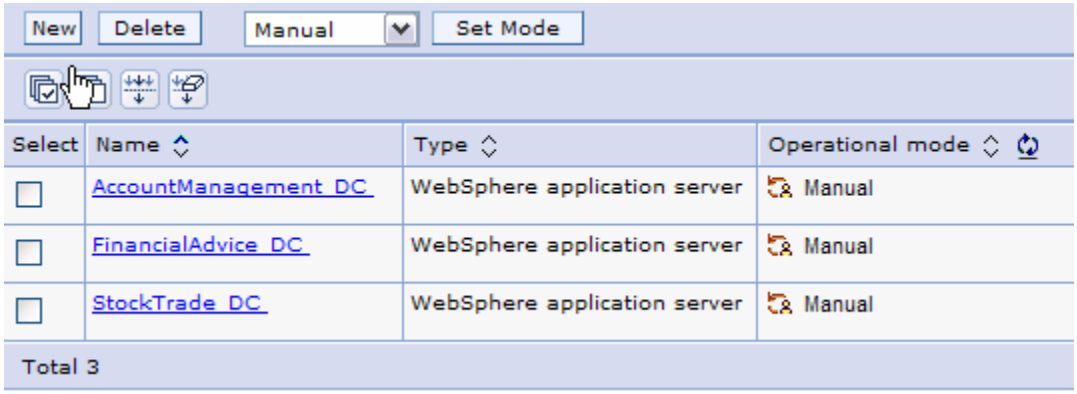
__ a. In the Navigation panel, expand **Servers** and click **Dynamic Clusters**.

__ b. Select all of the dynamic clusters in the table.

__ c. Select **Manual** in the drop-down list.



__ d. Click **Set mode**.



____ 52. Stop the servers.

__ a. In the Navigation panel, expand **Servers** and select **Application Servers**.

__ b. Select all of the running dynamic cluster instances.

__ c. Click **Stop**.

__ d. Wait for confirmation that the servers have been stopped.

What you did in this exercise

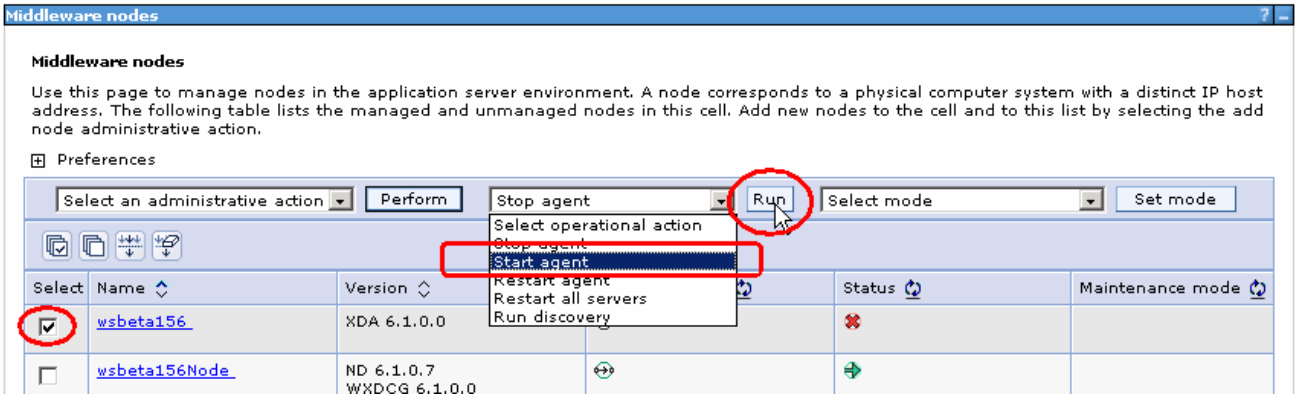
In this exercise, you configured WebSphere Extended Deployment for Application Server Placement. You learned how to create the on-demand router, dynamic clusters, Service Policies and transaction classes for your business goals. The visualization features added to the product provides an easy and quick method to review the individual services and the overall WebSphere cell. With a stress tool you were able to observe how Extended Deployment reacts to the different loads to meet the service goals that you defined.

Appendix A – Starting a middleware node from the administrative console

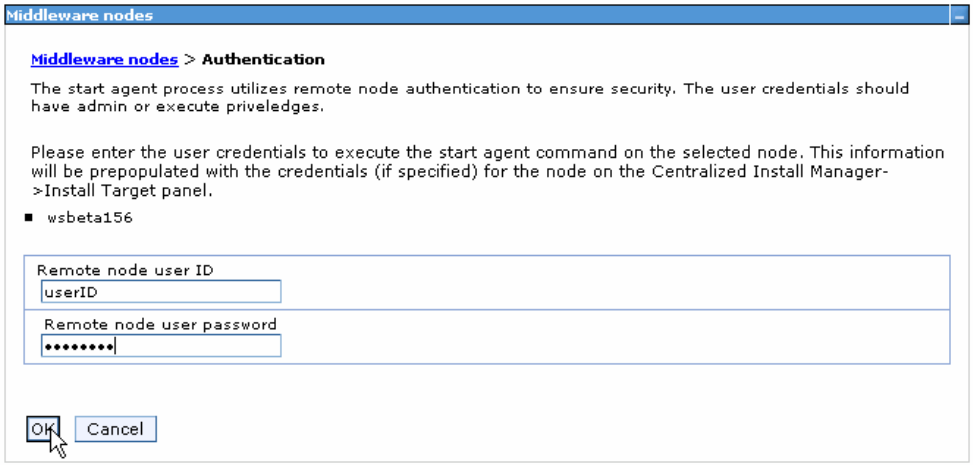
The “Lab Requirements” section of this lab shows a multi-machine environment that is required to complete the exercise. This section will walk you through creating such an environment, provided that you have already completed the installation lab exercise.

____ 1. In the administrative console, expand **System administration,** and then click on **Middleware nodes.**

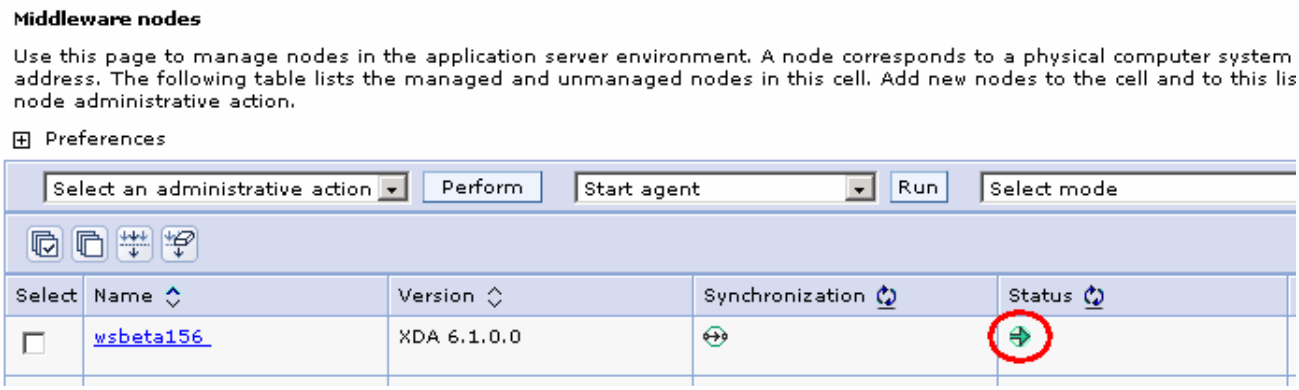
____ 2. Select the middleware node you want to start. Then in the “Select operational action” pulldown, select **Start agent**, then click **Run.**



____ 3. Type in the values for **Remote node user ID** and **Remote node user password.** Then click **OK.**



____ 4. The list will display and the Status field should indicate “Started” . If it displays as still “Stopped”, click the Refresh icon .



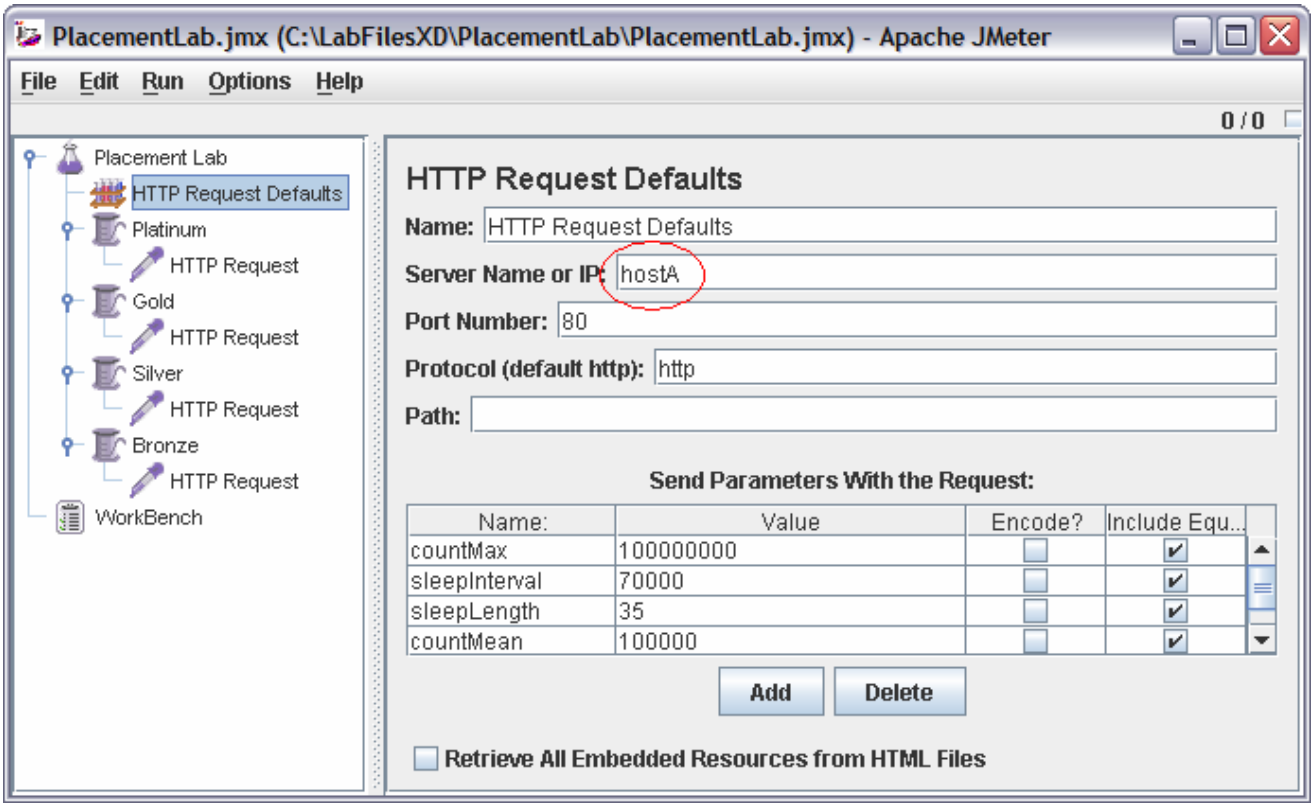
Appendix B – Customizing load generator

The lab instructions use Apache JMeter to generate a simulated load on the XDStock application. This tool is freely available from http://jakarta.apache.org/JMeter/

However, you are free to use your favorite load generator. These are the URLs used in the classroom:

- http://hostA/FinancialAdvice/CpuAndSleepBound?countMax=100000000&
  sleepInterval=70000&sleepLength=35&countMean=100000&deterministic=true
- http://hostA/StockQuery/CpuAndSleepBound?countMax=100000000&
  sleepInterval=70000&sleepLength=35&countMean=100000&deterministic=true
- http://hostA/AccountManagement/CpuAndSleepBound?countMax=100000000&
  sleepInterval=70000&sleepLength=35&countMean=100000&deterministic=true
- http://hostA/StockTrade/CpuAndSleepBound?countMax=100000000&
  sleepInterval=70000&sleepLength=35&countMean=100000&deterministic=true

If you use the included JMeter test plan, you may need to change the host name to match your configuration, first select “HTTP Request Defaults” in the test plan and change “Server Name or IP” to the host name for the server hosting the on-demand router.



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