

16

Configuring a Cluster

Objectives

After completing this lesson, you should be able to do the following:

- Prepare your environment for a cluster
- Create and configure a cluster
- Add servers to a cluster
- Start up and shut down clustered servers

Road Map

- Preparing for a cluster
 - Cluster architecture
 - Network and security topology
 - Machines
 - Names and addresses
- Configuring a cluster



Preparing Your Environment

Before you configure a cluster, you need to prepare your environment.

- Determine your cluster architecture.
- Understand your network and security topologies.
- Choose the machines for the cluster installation.
- Identify IP addresses or DNS names, and port numbers for the server instances in the cluster.
- For proxy architectures, you could have:
 - A single firewall between untrusted clients and the Web server layer
 - A firewall between the proxy layer and the cluster
- Configure the Node Manager

Hardware

- You can set up a cluster on a single computer for demonstration or development.
 - This is not practical for production environments.
- Each computer involved in a cluster should have a static IP address.
- There is no built-in limit for the number of server instances in a cluster.
 - Large multiprocessor servers can host clusters with numerous servers.
 - The recommendation is one server instance for every two CPUs.

IP Addresses and Host Names

- The IP address and host name information is needed for configuring and managing:
 - The administration server
 - Managed servers
 - Multicast communication
- For a production environment, use the host name resolved at DNS rather than IP addresses.
 - Firewalls can cause IP address translation errors.
- Each server should have a unique name.
- The multicast address should not be used for anything other than cluster communications.

Cluster Address

- The cluster address is used to communicate with entity and session beans by constructing the host name portion of the request URLs.
- You can explicitly define the address of a cluster.
 - The cluster address should be a DNS name that maps to the IP addresses or DNS names of each Oracle WebLogic Server instance in the cluster.
- You can also have Oracle WebLogic Server dynamically generate an address for each new request.
 - Minimizes configuration
 - Ensures an accurate cluster address
- The dynamic cluster address is created in the form of:
`listenaddress1:listenport1,listenaddress2:listenport2,listenaddress3:listenport3`

Road Map

- Preparing for a cluster
- Configuring a cluster
 - Administration Console
 - Configuration Wizard
 - WLST
 - Ant



Methods of Configuring Clusters

There are multiple ways to create and configure an Oracle WebLogic Server cluster:

- Configuration Wizard
- Administration Console
- WebLogic Scripting Tool (WLST)
- Java Management Extensions (JMX)
- WebLogic Server API

Creating a Cluster by Using the Administration Console

Domain Structure

- MedRecDomain
 - Environment
 - Servers
 - Clusters** (1)
 - Virtual Hosts
 - Migratable Targets
 - Machines
 - Work Managers
 - Startup & Shutdown Classes
 - Deployments

Clusters(Filtered - More Columns Exist)

New (2) Clone

Name	Cluster Address	Cluster Messaging Mode

New Clone Delete

Create a New Cluster

OK Cancel

Cluster Properties

The following properties will be used to create your new Cluster.
* Indicates required fields

What would you like to name your new Cluster?

* Name: MedRecCluster (3)

Clusters use messaging for sharing session, load balancing and failover, JMS, and other information between cluster members. Clusters can use either Unicast or Multicast messaging. Multicast is a simple broadcast technology that enables multiple applications to subscribe to a given IP address and port number and listen for messages, but requires hardware configuration and support. Unicast does not have these requirements. What messaging mode should this cluster use?

Messaging Mode: Unicast (4)


Unicast Broadcast Channel:

Multicast Address: 239.192.0.0 (6)

Multicast Port: 7001

OK Cancel

Setting Cluster Attributes

Clusters(Filterd - More Columns Exist)								
<input type="button" value="New"/> <input type="button" value="Clone"/> <input type="button" value="Delete"/>			Showing 1 to 1 of 1 Previous Next					
<input type="checkbox"/>	Name 	Cluster Address	Cluster Messaging Mode	Migration Basis	Default Load Algorithm	Replication Type	Cluster Broadcast Channel	Servers
<input type="checkbox"/>	MedRecCluster		Unicast	Database	Round Robin	(None)		

Settings for MedRecCluster

Configuration

Monitoring

Control

Deployments

Services

Notes

General

Messaging

Servers

Replication

Migration

Singleton Services

Scheduling

Overload

Health Monitoring

HTTP

Name: MedRecCluster

 **Default Load Algorithm:**

 **Cluster Address:**

 **Number Of Servers In Cluster Address:**

Configuring Cluster Communication

The screenshot shows the 'Configuring Cluster Communication' window. The 'Messaging Mode' is set to 'Unicast'. Under the 'Advanced' section, the following settings are visible:

Setting	Value
Unicast Broadcast Channel	
Multicast Address	239.192.0.0
Multicast Port	7001
Multicast Send Delay	3
Multicast TTL	1
Multicast Buffer Size	64
Idle Periods Until Timeout	3

At the bottom, there is a checkbox for 'Enable Data Encryption' which is currently unchecked.

For Multicast: Number of network hops (subnets) that a message is allowed to travel

Number of missed heartbeats before failure is assumed

Adding Cluster Members: Option 1

Settings for MedRecCluster

Configuration | Monitoring | Control

General | Messaging | **Servers** | Replication

This page lists the servers that are assigned to this cluster.

[Customize this table](#)

Servers

Add **Remove**

☐ **Name**

Add **Remove**

Add a Server to Cluster

Back **Next** **Finish** **Cancel**

Identify Server

Identify the server to be added

How would you like to proceed?

☒ **Select an existing server, and add it as a member of this cluster**

Select a server:

☐ **Create a new server and add it to this cluster**

MedRecSvr1

MedRecSvr1

MedRecSvr2

MedRecSvr3

Adding Cluster Members: Option 2

The screenshot shows the Oracle Enterprise Manager console. On the left, the 'Domain Structure' tree is expanded to 'MedRecDomain' > 'Environment' > 'Servers', which is highlighted with a red box and a green circle with the number 1. On the right, the 'Servers (Filtered - More Columns Exist)' table is displayed. It contains a list of servers: MedRecAdmSvr(admin), MedRecSvr1, MedRecSvr2, and MedRecSvr3. The 'MedRecSvr3' row is highlighted with a green circle with the number 2. Above the table are buttons for 'New', 'Clone', and 'Delete'. Below the table are also buttons for 'New', 'Clone', and 'Delete'.

<input type="checkbox"/>	Name ^
<input type="checkbox"/>	MedRecAdmSvr(admin)
<input type="checkbox"/>	MedRecSvr1
<input type="checkbox"/>	MedRecSvr2
<input type="checkbox"/>	MedRecSvr3

The screenshot shows the 'Add Cluster Member' dialog box. The 'Name' field is set to 'MedRecSvr3'. The 'Machine' dropdown is set to 'MedRecMch2'. The 'Cluster' dropdown is set to '(Stand-Alone)'. The 'Listen Address' field is set to 'MedRecCluster'. A green circle with the number 3 is placed over the 'Cluster' dropdown menu.

Name: MedRecSvr3

Machine: MedRecMch2

Cluster: (Stand-Alone)

Listen Address: MedRecCluster

Creating a Cluster with the Configuration Wizard

Configure Managed Servers

Add or delete configuration information for Managed Servers. A typical production environment has one or more Managed Servers. Each Managed Server is an instance of WebLogic Server used to host enterprise applications.

Add Delete Discard Changes Switch Display

	Name*	Listen address*	Listen port	SSL listen port	SSL enabled
1	MS_1	All Local Addresses	8003	N/A	<input type="checkbox"/>
2	MS_2	All Local Addresses	8005	N/A	<input type="checkbox"/>
→ 3	MS_3	All Local Addresses	8007	N/A	<input type="checkbox"/>

Configure Clusters

Add or delete configuration information for clusters. A cluster consists of multiple server instances working together to provide increased scalability and reliability.

Add Delete Discard Changes Switch Display

	Name*	Cluster messaging mode	Multicast address	Multicast port	Cluster address
→ 1	new_Cluster_1	unicast	N/A	N/A	

Assign Servers to Clusters

Assign Managed Servers to a cluster in the domain.

Select a cluster in the right pane. Then select the managed server(s) in the left pane and assign them to the cluster by clicking the right arrow button.

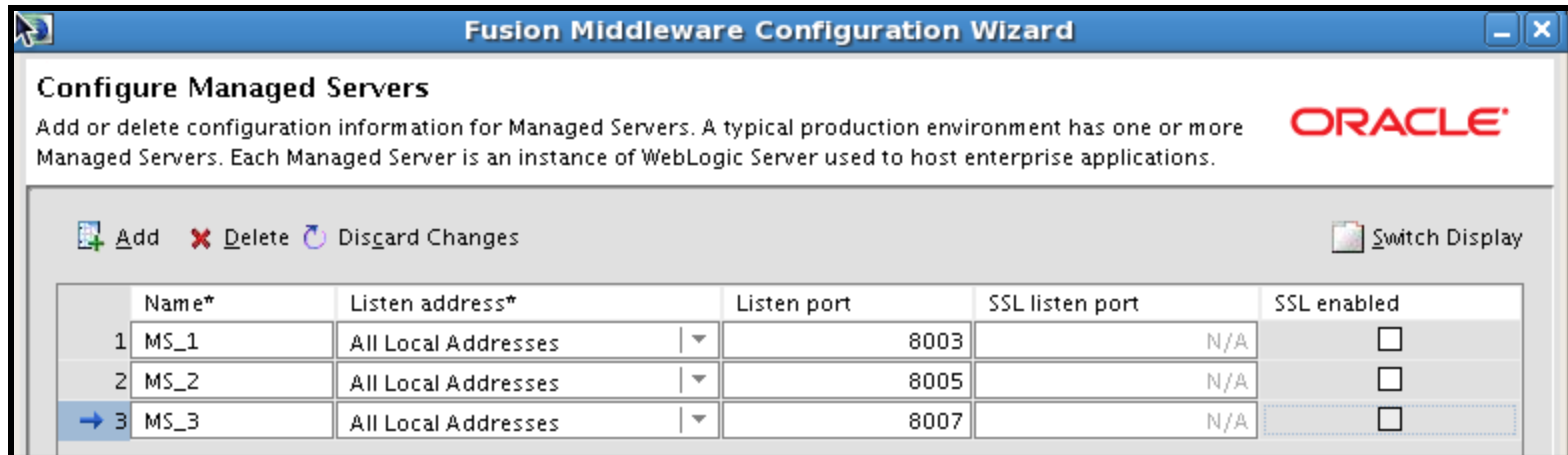
Server

- MS_3

Cluster





- new_Cluster_1
 - MS_1
 - MS_2

Clusters and the Configuration Wizard

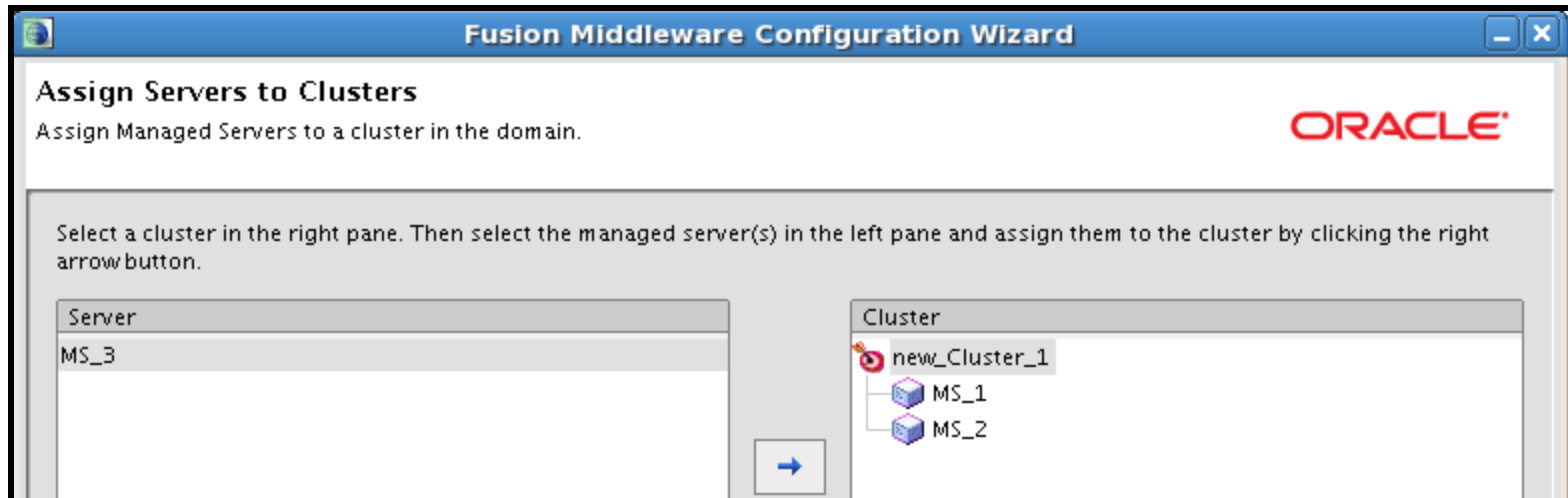


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Assign Servers to Clusters

Assign Managed Servers to a cluster in the domain.

Select a cluster in the right pane. Then select the managed server(s) in the left pane and assign them to the cluster by clicking the right arrow button.

Server

- MS_3



Cluster

- new_Cluster_1
 - MS_1
 - MS_2

Clusters and WLST

```
connect('myuser','mypass','myhost:7001')
edit()
startEdit()
cd('/')
cmo.createCluster('HRWebCluster')
cd('/Clusters/HRWebCluster')
cluster = getMBean('/Clusters/HRWebCluster')
cd('/Servers/serverA')
cmo.setCluster(cluster)
cd('/Servers/serverB')
cmo.setCluster(cluster)
cd('/Servers/serverC')
cmo.setCluster(cluster)
activate()
disconnect()
exit()
```

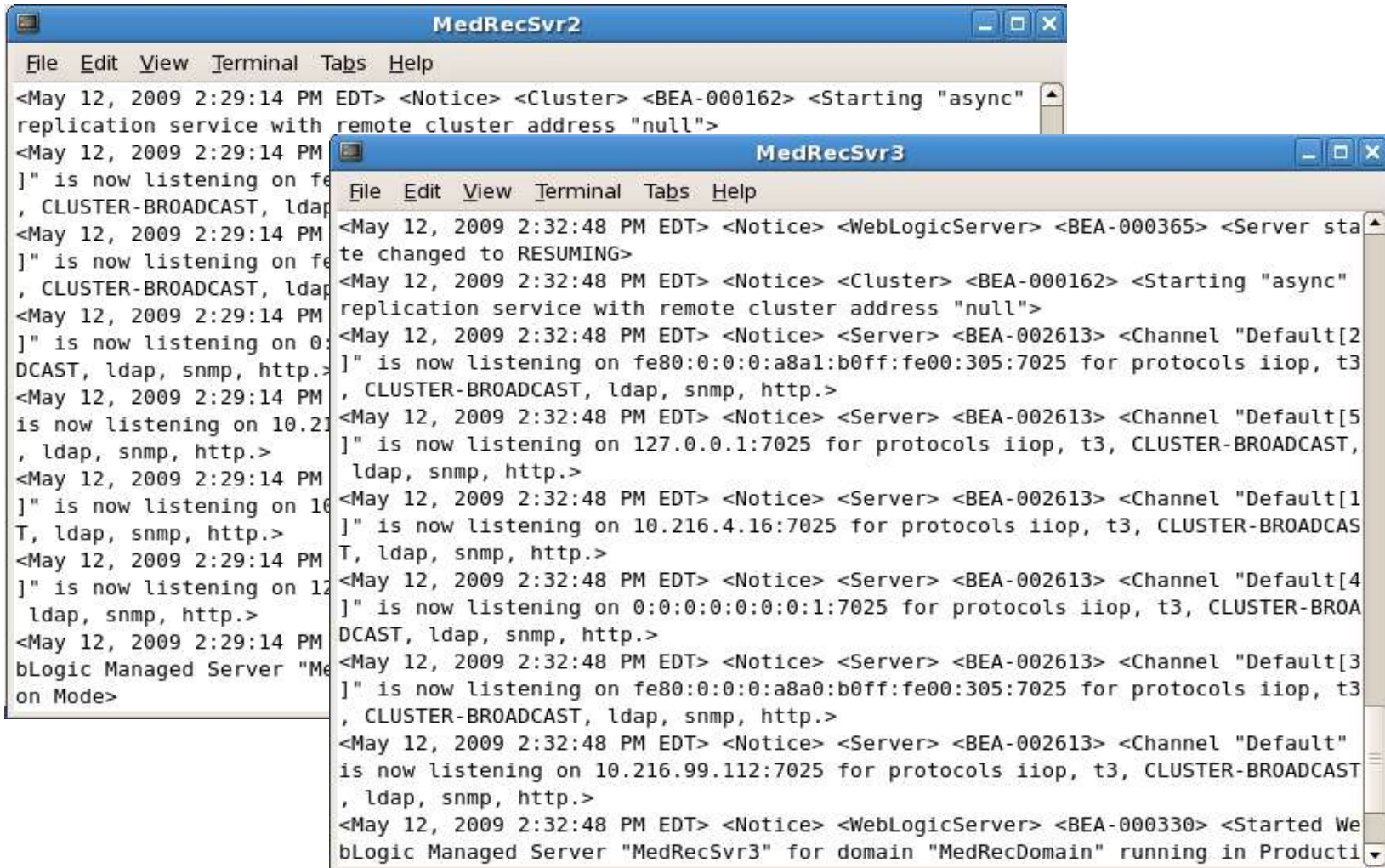
Create a new cluster.

Assign cluster members.

Creating a Cluster Using the Cluster MBean

- The Cluster MBean is used to create a cluster by using Ant or command-line tools.
- Configuring the cluster from the command line requires the combined use of Cluster and Server MBeans.
- To create new clusters within a domain, use:
 - `weblogic.management.configuration.ClusterMBean`

Synchronization When Starting Servers in a Cluster



The image shows two overlapping terminal windows. The top window, titled 'MedRecSvr2', displays logs for a WebLogic Managed Server starting an async replication service. The bottom window, titled 'MedRecSvr3', displays logs for a WebLogic Server starting multiple channels (Default[1] through Default[5]) and then starting the WebLogic Managed Server 'MedRecSvr3'.

```
MedRecSvr2
File Edit View Terminal Tabs Help
<May 12, 2009 2:29:14 PM EDT> <Notice> <Cluster> <BEA-000162> <Starting "async"
replication service with remote cluster address "null">
<May 12, 2009 2:29:14 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[1]"
is now listening on fe80:0:0:0:a8a1:b0ff:fe00:305:7025 for protocols iiop, t3,
, CLUSTER-BROADCAST, ldap, snmp, http.>
<May 12, 2009 2:29:14 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[2]"
is now listening on fe80:0:0:0:a8a1:b0ff:fe00:305:7025 for protocols iiop, t3,
, CLUSTER-BROADCAST, ldap, snmp, http.>
<May 12, 2009 2:29:14 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[3]"
is now listening on 10.216.4.16:7025 for protocols iiop, t3, CLUSTER-BROADCAST,
, ldap, snmp, http.>
<May 12, 2009 2:29:14 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[4]"
is now listening on 10.216.99.112:7025 for protocols iiop, t3, CLUSTER-BROADCAST,
, ldap, snmp, http.>
<May 12, 2009 2:29:14 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[5]"
is now listening on 0:0:0:0:0:0:0:1:7025 for protocols iiop, t3, CLUSTER-BROA
DCAST, ldap, snmp, http.>
<May 12, 2009 2:29:14 PM EDT> <Notice> <WebLogicServer> <BEA-000330> <Started We
bLogic Managed Server "MedRecSvr2" for domain "MedRecDomain" running in Producti
on Mode>

MedRecSvr3
File Edit View Terminal Tabs Help
<May 12, 2009 2:32:48 PM EDT> <Notice> <WebLogicServer> <BEA-000365> <Server sta
te changed to RESUMING>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Cluster> <BEA-000162> <Starting "async"
replication service with remote cluster address "null">
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[2]"
is now listening on fe80:0:0:0:a8a1:b0ff:fe00:305:7025 for protocols iiop, t3,
, CLUSTER-BROADCAST, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[5]"
is now listening on 127.0.0.1:7025 for protocols iiop, t3, CLUSTER-BROADCAST,
, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[1]"
is now listening on 10.216.4.16:7025 for protocols iiop, t3, CLUSTER-BROADCAS
T, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[4]"
is now listening on 0:0:0:0:0:0:0:1:7025 for protocols iiop, t3, CLUSTER-BROA
DCAST, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default[3]"
is now listening on fe80:0:0:0:a8a0:b0ff:fe00:305:7025 for protocols iiop, t3,
, CLUSTER-BROADCAST, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <Server> <BEA-002613> <Channel "Default"
is now listening on 10.216.99.112:7025 for protocols iiop, t3, CLUSTER-BROADCAST
, ldap, snmp, http.>
<May 12, 2009 2:32:48 PM EDT> <Notice> <WebLogicServer> <BEA-000330> <Started We
bLogic Managed Server "MedRecSvr3" for domain "MedRecDomain" running in Producti
```

Configuring OHS as Proxy Server

- To effectively use the load balancing and failover features, you should configure a proxy.
- You can configure OHS as the proxy by:
 - Including configuration directives in `httpd.conf`
 - Creating another file with directives and setting an include directive in `httpd.conf`
- The `WebLogicCluster` directive is the most important `mod_wl_ohs` for a cluster.
- You specify the list of host names of the managed servers with their ports in the `WebLogicCluster` directive.
- If you add or remove members to or from this list, you may have to restart OHS.

Starting and Stopping OHS Manually

- To give effect to configuration changes to `httpd.conf`, you should restart OHS.
- The processing life cycle for OHS is managed by Oracle Process Manager and Notification Server (OPMN).
- The command-line interface to OPMN is `opmnctl`.
- To restart OHS, use the following command:

```
$> ./opmnctl restartproc process-type=OHS
```

- You can also stop, and then start OHS.

```
$> ./opmnctl stopproc process-type=OHS  
$> ./opmnctl startproc process-type=OHS
```

Verifying Access Through OHS

Get the port on which OHS is running by using:

```
$> ./opmnctl status -l
```

```
Processes in Instance: wtinst
```

```
-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+
ias-component | process-type | pid | status |      uid |
memused |    uptime | ports
-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+
ohsa          | OHS          | 8614 | Alive | 1775979054 |
348736 |    0:00:29 | https:8889,https:4443,http:8888
```

Quiz

Which of the following is NOT an available configuration attribute associated with Oracle WebLogic Cluster?

1. Messaging mode
2. Multicast TTL
3. Multicast port
4. Broadcast server

Summary

In this lesson, you should have learned how to:

- Prepare your environment for a cluster
- Create and configure a cluster
- Add servers to a cluster
- Start up and shut down clustered servers

Practice 16 Overview: Configuring Clusters

This practice covers the following topics:

- Creating a cluster
- Assigning two servers to the cluster
- Verifying the port and status of Oracle HTTP Server