

Oracle Fusion Middleware HA  
Transformations: 11g

*Oracle Maximum Availability Architecture White Paper  
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# Maximum Availability Architecture

Oracle Best Practices For High Availability

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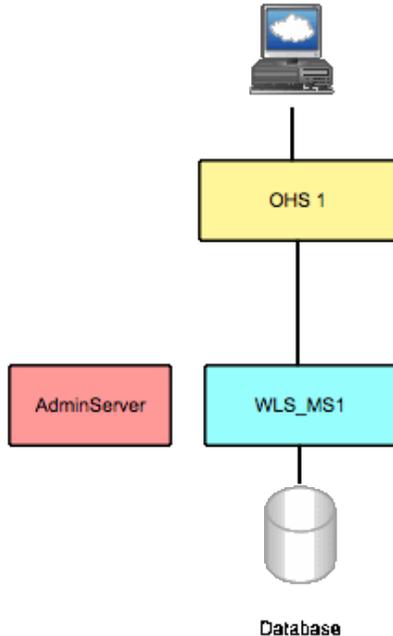
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## Oracle Fusion Middleware Transformation

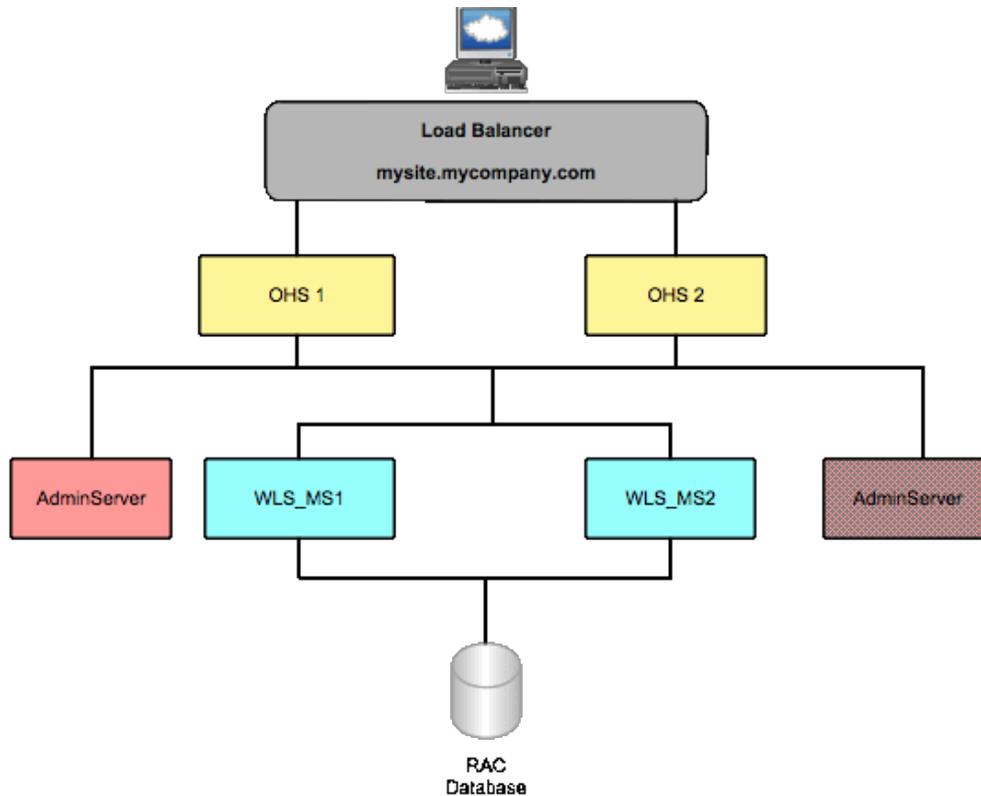
When Oracle Fusion Middleware is implemented initially, often the organizations needs are small. The initial implementation is often a one-host solution (everything is installed onto one server) using the simplest of installation types. As the business grows, the Oracle Fusion Middleware Installation becomes more vital to the day-to-day operation of the business. As such the implementation needs to be transformed from a single host installation into a multi-host highly available installation.

If a system is initially implemented in a highly available fashion then adding extra hosts is a simple matter of following the relevant High Availability/Enterprise Deployment documentation. However if the initial implementation has been installed in a single box (single instance) implementation the implementation needs to be transformed into one which will support the addition of additional nodes in the standard way. This document describes how to perform this transformation.

A typical single instance implementation looks like:



Once transformed into a highly available implementation it will look like:



There are two ways to transform a single instance architecture into a Highly Available one.

1. Out of place – An out of place transformation is where a completely new Highly Available environment is built. Once completed the configuration from the single instance implementation is migrated to the new highly available implementation and then business processes switched to the new topology. The advantage of this approach is that it is low risk, allowing the new topology to be built with no impact on the currently running system whilst the build is taking place. The downside to this approach is that completely separate hardware is required to build the new environment.
2. In place – An in place transformation is where the existing implementation is transformed to a highly available one in situ. The advantage of this approach is that it reuses current resources. The downside is that it is going to involve downtime and is an all or nothing approach.

This document is generic in nature, that is most of the sections below are applicable to all Fusion Middleware implementations regardless of type. There are a few product specific tasks, which need to be undertaken, and these are captured in a separate section.

The document is divided into a number of sections, these sections are:

- [Database transformation](#) – Change the Oracle WebLogic server implementation such that it accesses an Oracle Real Applications Cluster rather than a single instance database.
- [Storage transformation](#) – Moving from local storage to shared storage.
- [WebLogic Transformation](#) – Converting the Oracle WebLogic implementation from a single Managed Server to Managed Server cluster.
- [Web Tier Transformation](#) – Adding a highly available web tier.
- [Product Specific Transformation](#) – Steps applicable to specific products
- [Transformation Examples](#) – Example transformation plans.
- [Out of Place Transformation](#) – Details on how to perform an Out of Place Transformation.

The document should be used in conjunction with the [Oracle High Availability Guide](#) or the product specific Enterprise Deployment Guide, which will contain extra steps specific to individual products.

This document is concerned with converting single instance topologies to multi instance topologies it does not for example cover:

- Placing a Web Tier in front of your WebLogic Servers (See the HA/Enterprise Deployment Guides for details of how to do this).
- Load Balancer configuration.
- Changes to currently deployed applications, which may need amending to work in the Highly Available configuration, for example changing call back URL's to access the implementation via a load balancer.
- JMS in the database.
- AQ JMS.

This is covered in the [Oracle High Availability Guide](#).

The steps below are of a generic nature, and not all steps apply to all installation types. Oracle Portal, Forms, Reports, Discoverer, Business Intelligence and Oracle Directories are the prime exceptions.

It is important that prior to performing any of the steps below a suitable backup be taken in order to facilitate recovery if required.

## Database Transformation

This section describes how to upgrade your Fusion Middleware installation to access a RAC database rather than a single instance database. This section details the steps required to change WebLogic to access the new Oracle RAC database, it does not cover the actual steps required to migrate your single instance database to a Real Applications Cluster (RAC) database, instructions for doing this can be found in the [Oracle Real Application Clusters documentation](#).

An alternative method of converting a database to an Oracle Real Application Cluster database is to use Oracle Grid Control and Data Guard as described in the white paper: [Using Grid Control to implement of Extend High Availability with Oracle Database 11g and Oracle Data Guard](#).

### Data Sources

Generally when WebLogic is associated with a database a data source is created. In a single instance implementation there will be one data source created, when a RAC database is used there needs to be one data source per RAC instance. These data sources are then grouped together into a multi-data source, which the application will use to connect to the database.

When an application uses a data source it does so using a JNDI name. When converting from single instance to a RAC database, the JNDI name of the data source, which was created, is reassigned to a multi-data source.

This is achieved by performing the following:

Note: Prior to starting this process shutdown all managed servers except the admin server.

Login to the WebLogic console using a URL similar to  
<http://apphost1.mycompany.com:7001/console>

#### **Create one Data Source per RAC instance**

From the domain structure menu, select Services – JDBC – Data Sources.

Choose a data source and make note of its JNDI name.

Click on the data source e.g. myDS

Click on **Lock & Edit** from the change center.

Change the JNDI name from jdbc/myDS to jdbc/myDS1

Click **Save** to store the change.

Create new data sources for each of the RAC instances making sure that the JNDI name is unique, e.g. jdbc/myDS1, jdbc/myDS2 etc. Set the following Connection Pool information using the myDS entry as a template:

URL	Be sure to change the host name for each RAC node
Driver Class Name	Note: The Driver Class will indicate whether or not this is an XA data type.
Transactions supported	You can see this on the transactions tab of the data source.
Properties	
Passwords	
Initial Capacity	
Maximum Capacity	
Capacity Increment	
Statement Cache Type	
Test Connections On Reserve	
Test Table Name	
Connection Creation Retry Frequency	

Assign the Targets as per the Targets from myDS.

**Create a Multi Data Source**

Now that the data sources have been created for each data source an “umbrella” data source needs to be created which groups each of the individual data sources created above into a single multi-data source.

From the domain structure menu, select **Services – JDBC – Multi Data Sources**. (Services – JDBC – Data sources in 11.1.1.0.5)

Click on **New** to create a new Multi-data source.

Provide the following information:

Name	Give the Multi Data source a name e.g. MyMDS
JNDI Name	Use the same jndi name which was originally applied to the data source myDS e.g.

	jdbc/myDS
Algorithm Type	Select Load Balancing

Click **Next**

Select the targets that will use the multi data source. This will be the same list as the original myDS data source.

Click **Next**

Select whether or not the Driver is an XA or non-XA Data source type. This will depend on the value of Driver Class in the original myDS data source. i.e. If the Driver Class is mentions XA in its type then the Data Source type should XA otherwise it should be set to Non-XA.

Click **Next**

In the Add data sources page select all of the data sources for the original data source myDS e.g. myDS1 and myDS2.

Click **Finish**

Click **Activate Changes** in the change centre window.

Note: If you change or target a data source at the admin server you may see an error when activating the changes. If the activate changes button is no longer active then this error is because the admin server is running when the changes were activated. Restart the admin server and it will consume the changes. Any other errors will need to be fixed and activate changes issued again.

## Converting Data Sources using HA Power Tools

Converting Data Sources to Multi Data Sources can be simplified using the Oracle HA Power Tools. The power tools must first be enabled see [Enabling HA Power Tools](#) for details.

To convert existing data source(s) to multi data source(s):

Note: This is a post-installation step; make sure that all Managed Servers in the selected domain are down, with the exception of the Admin server.

1. Log in to Oracle WebLogic Server Administration Console, and click Domain in left navigation tree.
2. Click the **HA Power Tools** tab.
3. Click **HA Transformations**.

4. Click **Create Multi Data source**.
5. Click **Lock & Edit** to enable controls.
6. Select the **Select One or More Data source From The List** radio button
7. Choose the single instance data source(s), which needs to be converted to multi data source from the **Select Data source(s)** Available list.
8. Enter Multi Data source Name Suffix.
9. Select the Algorithm Type.
10. Enter Database Name.
11. Enter the list of comma separated Host Names.
12. Enter the RAC Database Port.
13. Select **Enable Server Side Load Balancing (Configure for RAC Data source)** check box.
14. Specify comma separated RAC Instance Names.
15. Click **Create Multi Data source**.
16. Verify whether new multi data source(s) and their corresponding data sources pointing to individual RAC instances are created.
17. Click **Activate Changes**.

### Other Data Sources

Sometimes applications access data by means other than data sources. Below is a list of other files, which may be used. If used these files will also need updating to reflect the fact that a RAC database is now being used.

#### **tnsnames.ora**

Some applications store database connection information in the tnsnames.ora file, which in Oracle Fusion Middleware Implementations is located in ORACLE\_INSTANCE/config.

This file can be updated either manually or using Oracle Net Manager (netmgr) or Oracle Net Config Assistant (netca). If using either of these tools ensure that the environment variable TNS\_ADMIN is defined before invoking.

A RAC 10g tnsnames entry will look something like:

```

MYDB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = mydbhost1-vip)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = mydbhost2-vip)(PORT = 1521))
    (LOAD_BALANCE = yes)
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = mydb.mycompany.com)
    )
  )
)

```

A RAC 11g tnsnames entry will look something like:

```

MYDB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = mydb-scan)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = mydb.mycompany.com)
    )
  )
)

```

## Business Intelligence

### BIEE

BIEE stores BI Agent information in a database. If this database is upgraded to a RAC database then the scheduler database connection information needs to be updated. This is achieved by:

1. Log in to Enterprise Manager Fusion Middleware Control.
2. Navigate to Business Intelligence – coreapplication
3. Click on the **Deployment** Tab.
4. Click on the **Scheduler** sub tab.
5. Update the Data Source to reflect the new RAC database. A sample RAC configuration is:

```

(DESCRIPTION = ( ADDRESS_LIST= (LOAD_BALANCE = yes)
  (ADDRESS = (PROTOCOL = TCP)(HOST = mydb-scan)(PORT = 1521))
)
(CONNECT_DATA =
  (SERVER = DEDICATED)
  (SERVICE_NAME = mydb.mycompany.com)
)
)

```

6. Click **Apply**.

### BI Publisher

BI Publisher stores database configuration information in the BIP console. To update the database information:

1. Log in to the BI Publisher console for Example  
[http://bi\\_server.mycompany.com:9704/xmlpserver](http://bi_server.mycompany.com:9704/xmlpserver).
2. Click on **Administration**.
3. Click on **Scheduler Configuration**.
4. Database configuration information is stored in the Database connection information. The connection information only needs changing if the connection type is jdbc.

### Oracle Virtual Directory

If you have configured database adapters in Oracle Virtual Directory and wish to change the adapter to access a RAC database then you must perform the following:

1. Log into Directory Services Manager.
2. Connect to virtual directory.
3. Click on the **Adapter** tab.
4. Select one of the database adapters from the displayed list by clicking on it.
5. Change the URL type to **Use Custom URL**.
6. In the Database URL field (if the database connection type is JDBC), enter the URL to connect to the RAC database, such as:
 

```
jdbc:oracle:oci:@(DESCRIPTION=(ADDRESS_LIST=(LOAD_
BALANCE=ON)(ADDRESS=(PROTOCOL=TCP)(HOST=host-name-
1)(PORT=1521))(ADDRESS=
(PROTOCOL=TCP)(HOST=host-name-2)(PORT=1521)))(CONNECT_
DATA=(SERVER=DEDICATED)(SERVICE_NAME=database-service-name)))
```
7. Click **Apply**.

### Restart Managed Servers

In order for the changes to take effect each Managed Server included in the targets list needs to be restarted. This is achieved by selecting **Environment – Servers** from the domain structure menu.

Click on the **Control** tab.

Check the box next to the server(s) to be restarted. Select **Shutdown** and choose whether to perform a Forced Shutdown Now or a shutdown after current requests have been processed (When work completes), from the shutdown menu.

Click **Yes** to confirm the shutdown.

Check the box next to the server(s) to be restarted. Click **Start**, and then click **Yes** to restart the servers.

Retest the application.

## Storage Transformation

### Migration of Oracle Binaries to Shared Disk

Oracle Fusion Middleware products (with the exception of Portal, Forms, Reports and Discoverer) advocate the use of shared file systems for the Oracle binaries. The easiest way to do this is to shutdown the WebLogic domain, backup the Oracle binaries. Create a shared disk area on SAN or NAS. Mount the shared volume in the same location and then restore the backup made earlier.

When mounting the Oracle binaries on subsequent machines copy the oraInst.loc file (usually located in /etc) to the new nodes.

In high availability configurations it is recommended that more than one set of shared binaries be used to facilitate rolling upgrades. Please refer to the appropriate Enterprise Deployment/High Availability guide on how to achieve this.

### Microsoft Windows

In a Microsoft windows environment windows registry elements pertaining to the binary installation need to be transferred to all servers which access the shared binaries the same is true of any Oracle entries in the Path Environment variable.

1. Check the contents of the environment variable 'Path' on the initial machine. Update any entries, which refer to Oracle binary file locations on the local disk to the equivalent location on the shared disk.
2. Export the registry key HKEY\_LOCAL\_MACHINE/oracle from machine 1 to machine 2.

Copy the Start Menu from machine 1 to machine 2 by copying the files under C:\Document and Settings\All Users\Start Menu\Programs\<Menu> from Machine 1 to Machine 2. You can do this with any Windows Backup tool, or Zip utility. For example, using the Windows Backup Utility:

- a. Invoke the Windows Backup Utility by selecting **Accessories, System Tools,** and then **Backup.**
- b. Select **C:\Document and Settings\All Users\Start Menu\Programs\<Menu>**
- c. Copy the backup file to the second node.
- d. Restore the backup to the same location: **C:\Document and Settings\All Users\Start Menu\Programs\**

## Move Admin and Managed Servers to Shared Disk

In Highly Available Fusion Middleware deployments the Administration server and Managed Server components need to be moved to shared disk, this is to facilitate failover and server migration in the event of the primary server becoming unavailable.

Moving the Administration server to shared disk involves backing up the server domain from its current location mounting that location as a shared location and restoring the backup. In the event of failure the disk can be mounted on another host and the servers started from there.

This will work for all deployments, note with Oracle Portal, Forms, Reports, Discoverer and Business intelligence, the originally created managed server (along with the administration server), will remain in the same location. In all other products the managed servers (except the Admin Server) can be moved to a different location if desired, for more information on this see the product specific Enterprise Deployment Guide.

## WebLogic Transformation

When Oracle Fusion Middleware is installed in a non-HA environment, a number of WebLogic Managed Servers will be created. Into these Managed Servers will be deployed applications, these applications may access a number of resources such as data sources, JMS ,modules and persistent stores all of which will be mapped to the Managed Server. In HA environments these managed servers and resources will need to be moved into a cluster, persistent stores moved to shared storage and JMS modules configured to be Uniform Distributed Destinations. Once this has been done new managed servers can be created on supplementary hosts, to provide high availability.

As part of a WebLogic transformation the following need to be performed all of which are described below:

- Configure Admin server for HA
- Configure persistence stores to use shared storage rather than local storage.
- Update JMS Modules to use Uniform Distributed Destinations (UDD)
- Create Cluster(s)
- Create Machines for new hosts
- Create Managed Servers for Supplementary Hosts.
- Propagating changes to supplementary hosts

Note: Oracle Portal, Forms, Reports, Discoverer and Business intelligence scale out differently to the other products. Once the initial installation is clustered then the standard processes can be used to scale out these products to supplementary hosts.

## Configure the Administration Server for HA

The WebLogic administration server is a singleton service. That means that it can only ever run on one node at a time. In order to make the Administration server highly available, it must be bound to a virtual IP address. This virtual IP address is bound to the host running the administration server. In the event of the failure of the node the virtual IP address can be bound to a surviving host and the administration server started on that node assuming that the node has access to the shared storage created above.

### Enabling ADMINVHN on ADMINHOST1

In order to assign a virtual IP address you need an unused IP Address, which is in the same public subnet as the hosts on which you want to assign it. The IP Address should be assigned to a host name (ADMINVHN) in DNS.

Assigning a virtual IP Address to a machine is different depending on the operating system in use. There follows the instructions on how this is done in Linux.

Run the `ifconfig` command as root:

```
/sbin/ifconfig <interface:index> <IPAddress> netmask <netmask>  
/sbin/arping -q -U -c 3 -I <interface> <IPAddress>
```

For example:

```
/sbin/ifconfig ethX:Y 100.200.140.206 netmask 255.255.255.0
```

Enable your network to register the new location of the virtual IP, for example:

```
/sbin/arping -q -U -c 3 -I ethX 100.200.140.206
```

Validate that the address is available by pinging it from another node, for example:

```
/bin/ping 100.200.140.206
```

In this example 'ethX' is the ethernet interface (eth0 or eth1) and Y is the index (0, 1, 2, etc.).

### Create a Machine for the Virtual Host Name

1. From the WebLogic Console select **Environment – Machines** from the Domain Structure menu.
2. Select **Lock & Edit** to allow changes to be made.
3. Select **New** to add a new machine.

4. Give the machine a name it is suggested that this is the name of the virtual name if using virtual hosts e.g. ADMINVHN
5. Select the Machine OS either Unix or Other. Use Unix for all varieties of Unix be it Solaris or Linux etc.
6. Click **OK**
7. When the list of machines is displayed, click on the newly created machine.
8. Select Node Manager tab.
9. Enter a Listen Address; This should be localhost
10. Click **Save**.
11. Click on the **Servers** tab.
12. Click **Add**
13. Select the option **Select and existing server** and then choose **AdminServer** from the drop down list.
14. Click **Finish**.
15. Select **Activate Changes** to store the configuration.
16. Restart the administration server.

The administration server can now be started from the bound host, assuming that the shared server directory created above is mounted on that host.

Note: If you are not fronting your Administration Server with an Oracle HTTP server, then you should do so. For information on how to do this follow the instructions in the Enterprise Deployment guide relevant to the product you are using.

### Configure Persistent Stores to Use Shared Directory

In a highly available environment where persistence is stored in a directory on the files system, this directory needs to be accessed by all of the nodes in the deployment. Persistent stores used by the application need to be updated to point to a shared directory, which is visible to all nodes.

Note: If persistence is stored in a database then no specific action is required, as the database is available to all nodes by default.

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Services** node and then click the **Persistent Stores** node. The Summary of Persistent Stores page appears.

3. Select the persistent store (represented as a hyperlink) from the Name column of the table. The Settings page for the persistent store appear.
4. In the Configuration tab, enter the location on a persistent storage solution (such as NAS or SAN) that is available to other servers in the cluster in the Directory field. Specifying this location enables pending JMS messages to be sent. The location should follow the following directory structure:

```
ORACLE_BASE/admin/<domain_name>/<cluster_name>/jms
```

**Note:** This directory must also exist before you restart the server.

5. Click **Save** and **Activate Changes**.
6. Repeat these steps for each persistent store in the configuration.
7. Restart the servers to make the change in the persistent stores effective.

### Configuring Default Persistence Store for Transaction Recovery

Each server has a transaction log that stores information about committed transactions that are coordinated by the server that may not have been completed. The WebLogic Server uses this transaction log for recovery from system crashes or network failures. To leverage the migration capability of the Transaction Recovery Service for the servers within a cluster, store the transaction log in a location accessible to a server and its backup servers.

#### Notes:

- This location should ideally be a dual-ported SCSI disk or on a Storage Area Network (SAN).
- Before performing this operation ensure that the managed server has been shutdown gracefully.

To set the location for the default persistence store, complete these steps:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Environment** node and then click the **Servers** node. The Summary of Servers page appears.
3. Click the name of the server (represented as a hyperlink) in Name column of the table. The Settings page for the selected server appears and defaults to the Configuration tab.

4. Click the **Services** sub-tab.
5. In the Default Store section of the page, enter the path to the folder where the default persistent stores will store its data files. The location should follow the following directory structure:  

```
ORACLE_BASE/admin/<domain_name>/<cluster_name>/tlogs
```
6. Click **Save**.

Note:

To enable migration of the Transaction Recovery Service, specify a location on a persistent storage solution that is available to other servers in the cluster. Managed Servers from each cluster node must be able to access this directory. This directory must exist before you restart the server.

### Convert JMS Destinations to Uniform Distributed Destinations

Note: When a JMS destination is converted to a Uniform Distributed Destination, all messages currently in the queue will be lost. It is recommended therefore that the queue be paused (for inserts) and existing messages flushed through before converting the queue.

#### Pausing JMS Server

To pause the queue:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Environment - Messaging - JMS Servers (Environment – Services – Messaging – JMS Servers 11.1.1.5)**. The Summary of JMS Servers page appears.
3. Select a server.
4. Click on the **Control Tab**
5. Select **Insertion – Pause**
6. Click on **Yes**.

Restarting the queue is the same procedure just set step 5 to Resume.

#### Identify the JMS Modules, which need updating

Note: The administration server must be started to perform these steps.

Identify the JMS Modules which need updating:

1. Log into the Oracle WebLogic Server Administration Console.

2. In the Domain Structure window, expand the **Environment - Messaging -JMS Modules (Environment – Services – Messaging – JMS Servers 11.1.1.5)**. The Summary of JMS Modules page appears.
3. Click on each JMS Module in turn and make a note of the JMS module name and the managed server it is targeted to. You will need them when you move the managed servers to a cluster.

Note: Actual conversion will take place as part of the clustering process below.

### Clustering WebLogic Managed Servers

In a Highly available configuration, applications and resources are not mapped to individual managed servers but to clusters of managed servers. In order to transform a non-HA implementation to a HA implementation, Clusters must be created for the managed servers, the resources previously assigned to the individual managed servers reassigned to the cluster. The process to achieve this is described below.

Note: Oracle Portal, Forms, Reports and Discoverer and Oracle Business Intelligence only require this step to be performed if during the installation the clustered box was deselected. To determine if this is the case, log in to the WebLogic administration console, and select Environment – Clusters. If you see any clusters listed then the product was installed clustered. It may however still be necessary assign a listen address for the original managed server(s) that were created. See below for instructions on how to do this.

Note: The admin server must be shutdown to perform these steps.

1. Start the Oracle WebLogic Scripting Tool using the command `wlst.sh` (`wlst.bat` on Windows), which is located in the directory  
`MW_HOME/oracle_common/common/bin`
2. Connect to the domain using the `readDomain` command. For example:  

```
wls:/offline>readDomain('/u01/app/oracle/admin/<domain_name>/aserver/<domain_name>')
```
3. If you have any JMS modules in your implementation which are targeted to a managed server you are going to add to a cluster. You must update them to be a UDD JMS destination at the same time. You convert a JMS Destination to a UDD using the `setDistDestType` command. For example:  

```
wls:/offline/SOA_Domain> setDistDestType('SOAJMSModule', 'UDD')
```

Repeat the above commands for each of the JMS Module Names Identified above

4. Create a cluster using the command `create`. For example:  

```
wls:/offline/SOA_Domain>create('cluster_soa','Cluster')
```

5. Move the existing Managed Server and re-target its resources to the newly created cluster using the assign command for example:

```
wls:/offline/SOA_Domain>assign('Server','soa_server1','Cluster','soa_cluster')
```

6. Save the changes using the command updateDomain. For Example:

```
wls:/offline/SOA_Domain>updateDomain()
wls:/offline/SOA_Domain>closeDomain()
wls:/offline/SOA_Domain>exit()
```

For example if you were converting SOA to a cluster you would issue the following commands on wlst:

```
wls:/offline>readDomain('/u01/app/oracle/admin/<domain_name>/aserver/<domain_name>')
wls:/offline>setDistDestType('BPMJMSModule','UDD')
wls:/offline>setDistDestType('SOAJMSModule','UDD')
wls:/offline>setDistDestType('UMSJMSSystemResource','UDD')
wls:/offline>create('cluster_soa','Cluster')
wls:/offline>assign('Server','soa_server1','Cluster','cluster_soa')
wls:/offline>updateDomain()
wls:/offline>exit()
```

#### NOTES:

- JMS Modules must be converted to UDD Destinations at the same time as assigning the managed server to a cluster.
- All JMS Modules associated with a managed server must be converted at the same time.
- All managed servers which use a JMS module being converted to a UDD must be converted at the same time. For example, if you have an implementation with SOA and BAM then the UMSJMSSystemResource will be used by both the managed servers soa\_server1 and bam\_server1. In this instance either convert the managed servers to a cluster using a single WLS session or ensure that the UMSJMSSystemResource appears in both conversion scripts.
- JMS Modules cannot be converted to UDD's once the cluster has been created.

Repeat the above commands for each cluster, which needs to be created.

Restart the administration server to view the changes.

## Create Machines

In a Highly Available environment, Managed Servers need to be assigned to specific machines/hosts. Default installs do not always create specific WebLogic machines for each of the hosts, but may create a generic machine called local host. When transforming a single

instance implementation to a highly available one then machines need to be created for each of the target hosts in the infrastructure. These machines need to be assigned to hosts and Managed Servers. This process will not be necessary for Oracle Portal, Forms, Reports. During the Enterprise Deployment of SOA and Web Center WebLogic Machines are created for all hosts participating in the cluster. When transforming a Identity and Access Management, SOA or Webcenter implementation these machines need to be created manually. This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

To create Machines and assign them to hosts follow the following steps.

1. From the WebLogic Console select **Environment – Machines** from the Domain structure menu.
2. Select **Lock & Edit** to allow changes to be made.
3. Select **New** to create a new machine.
4. Give the machine a Name. It is suggested that this is the name of the host, or a virtual name if using virtual hosts.
5. Select the Machine OS. Either Unix or Other. Use Unix for all varieties of Unix be it Solaris or Linux etc.
6. Click **OK**.
7. When the list of machines is displayed, click on the newly created machine.
8. Select **Node Manager** tab.
9. Enter a Listen Address; this should be the Name/IP Address of the host, which this machine refers to. If this is a virtual host then enter the virtual hostname/IP address instead.

Note: If you are creating a machine for the admin server host which is utilizing a virtual IP address the node manager listen address should be set to localhost.

10. Click **Save**.
11. Click on the **Servers** tab.
12. Click **Add**.
13. Select the option **Select and existing server** and then choose a Managed Server, which will run on this host from the drop down list.
14. Click **Finish**.
15. Repeat steps 12-14 for each Managed Server, which will run on this host.

16. Repeat steps 1-15 for each host being defined.
17. When finished remove the local machine entry by ticking the box next to its name and pressing **Delete**.
18. Select **Activate Changes** to store the configuration.

### Create Servers for Supplementary Hosts

Oracle Portal, Forms, Reports, Discoverer and Identity management (release 1) creates new WebLogic Managed servers as part of the expand domain scenario. Other products such as SOA and Web Center and Oracle Identity and Access Management however require that Supplementary WebLogic Managed Servers be created manually. In a single instance installation one WebLogic Managed Server will have been created for each application for the installed host. In a highly available configuration we require one Managed Server per application per host.

For example Weblogic Managed Server `soa_server1` will have been created for the SOA application and it will have been setup to run on the initial host. In order to make the installation suitable for HA you need to create a second Weblogic Managed Server `soa_server2`, which will run on `host2`. We will do this by cloning the existing `soa_server1` Managed Server, assigning it to the cluster and machine that was created above. This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

Repeat the following for each existing Managed Server.

1. Login to the Weblogic Console.
2. Select **Environment – Servers** from the Domain Structure menu.
3. Click **Lock & Edit** to allow editing.
4. Click on the check box next to the server to be cloned. For example `soa_server1`
5. Click **Clone**.
6. Supply a Server Name for the server.
7. Set the **Server Listen Address** to the DNS name of the host on which the server will run.
8. Click **OK**.
9. Once the server is cloned the WebLogic console will revert to the list of servers.
10. Click on the new server.
11. In the **Machine** field select the name of the machine on which the Managed Server will run on.

12. Click on **Save** to store the change.
13. Click on **Activate changes** to apply the change.

### Assign Listen Address to Original Servers

When the original installation was performed it was assumed that the managed servers would all be located on a single host, when moving to a Highly Available environment each of the original managed servers needs to have a listen address assigned to it. To do this, perform the following steps:

1. Log into the WebLogic console.
2. Select **Environment – Servers** from the Domain Structure menu.
3. Click **Lock & Edit** to allow editing.
4. Click on the original managed server which was created for example soa\_server1
5. Enter a Listen Address. This will be the DNS Name of the server hosting the managed server.
6. Click **Save**.
7. Repeat for each of the managed servers, which was created originally.

### Create Persistent Stores for the newly created Managed Servers

When the original installation completed it may have created a number of persistent stores, which were targeted to the original Managed Servers. In the steps above, these filestores will have been changed to use a shared directory.

Now that we have created some new Managed Servers, new persistent stores need to be created for these Managed Servers. This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

1. Log into the WebLogic console,
2. In the Domain Structure window, expand the **Services - Persistent Stores** entry. The Summary of Persistent Stores page appears.

If you see a list of predefined persistent stores targeted at the original servers. Each of these entries needs to have a corresponding entry for the newly created Managed Servers. For example SOAJMSFilestore currently targeted to soa\_server1. A new filestore SOAJMSFilestore2 needs to be created and targeted to soa\_server2.

Note: If you see similarly named persistent stores targeted to two different managed servers then you need to create two new ones for the two new managed servers.

The following steps need to be repeated for each Filestore. They need to be repeated for each Managed Server created (for example, one for soa\_server2 and one for soa\_server3 – if created).

3. Select **Lock & Edit** to allow editing.
4. Click **New** then select **Create FileStore** or **Create JDBCStore**. This will be the same value as the original.
5. Give the persistent store a Name. We suggest using the original name with the Managed Server number as a suffix, for example SOAJMSFileStore2
6. Set the **Target** to the newly created Managed Server.
7. Set the Directory to the same-shared directory as the original.
8. Click on **OK**.

Once all persistent stores have been created click **Activate Changes**.

### Create JMS Servers for Newly Created Managed Servers

When the initial installation completed it may have created a number of JMS servers, which were targeted at the original Managed Servers.

Now that we have created some new Managed Servers and persistence stores, new JMS Servers need to be created for these Managed Servers. This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

1. Log in to the Weblogic console,
2. In the Domain Structure window, expand **Services - Messaging – JMS Servers** entry. The Summary of JMS Servers page appears.

If you see a list of predefined JMS Servers targeted at the original servers. Each entry needs to have a corresponding entry for the newly created Managed Servers. e.g. BAMJMSServer currently targeted to bam\_server1. A new JMS Server BAMJMSServer2 needs to be created and targeted to bam\_server2.

The following steps need to be repeated for each JMS Server. They need to be repeated for each Managed Server created (for example one for bam\_server2 and one for bam\_server3 – if created).

1. Select **Lock & Edit** to allow editing.
2. Click **New**

3. Give the JMS Server a Name. We suggest using the original name with the Managed Server number as a suffix, for example BAMJMSServer2
4. If the original has a persistent store associated with it, then select the corresponding persistent store created for the new Managed Server above.
5. Click **Next**.
6. Set the target to the newly created Managed Server above (For SOA use the migratable name).
7. Click **Finish**.
8. Once all Persistence stores have been created click on **Activate Changes**.

### Target JMS Servers to JMS Modules

If you have created JMS Servers above then you will need to add them as targets to the existing JMS Modules. To do this.

Note: This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

1. Select **Lock & Edit** to allow editing.
2. Click **New**
3. Click on **Services – Messaging – JMS Modules**. The list of JMS modules will be displayed.
4. Click on each JMS module in turn, a list of resources will be displayed.
5. Click on the **Sub Deployments** Tab
6. Click on each Subdeployment
7. Add one of the newly created JMS servers to the deployment. For example:  
JMS Module BPMJMSModule has one sub-deployment BPMJMSServerxxxxxx which is initially targeted to the JMS Server BPMJMSServer\_auto1. For this sub deployment the JMS Server BPMJMSServer\_auto2 needs to be added to the target list.
8. Click **Save**
9. When finished click on **Activate Changes**.

## Disabling Host Name Verification for the Managed Servers

This step is required if you have not set up the appropriate certificates to authenticate the different nodes with the administration server (see [Chapter 7, "Setting Up Node Manager"](#) of the SOA Enterprise Deployment Guide for details). If you have not configured the server certificates, you will receive errors when managing the different WebLogic Servers. To avoid these errors, disable host name verification while setting up and validating the topology, and enable it again once the configuration is complete.

Perform these steps to disable host name verification:

1. Log in to Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Environment - Servers** entry. The Summary of Servers page appears.
3. Click on the name of a server name. For example **soa\_server1**
4. Select the **General - SSL** sub-tab.
5. Click **Lock & Edit** to allow editing.
6. Expand the **Advanced** properties
7. Set Hostname Verification to **None**.
8. Repeat for each Managed Server
9. Save and **Activate changes**.

## Propagating the Domain Configuration to Successive Hosts Using the pack/unpack Utility

Having setup the configuration for the successive nodes in the High Availability architecture, this configuration needs to be copied from the initial host to each successive host in turn. The steps below describe how to do this. This assumes that the Managed Servers are going to be running on shared storage as described above.

Note: This is not necessary for Oracle Portal, Forms, Reports, Discoverer and Business Intelligence, for these products follow the instructions in the High Availability Guide or Enterprise Deployment Guide for Scaling Out the configuration.

1. Make sure that a similar directory and shared storage configuration, as the initial host is present on the host being configured. The ORACLE\_HOME directory should already be mounted as well as the shared area for the Administration and Managed Servers.
2. Run the `pack` command on HOST1 to create a template. Pack as follows:

Run the following command:

```
HOST1> cd ORACLE_BASE/product/fmw/soa/common/bin
```

Run the pack command:

```
SOAHOST1> ./pack.sh -managed=true
           -domain=ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>
           -template=soadomaintemplate.jar
           -template_name=soa_domain_templateBAM
```

3. Copy the generated file soadomaintemplate.jar to HOST2.
4. Run the `unpack` command on HOST2 to unpack the template in the Managed Server domain directory as follows:

```
HOST2> cd ORACLE_BASE/fmw/soa/common/bin
HOST2> ./unpack.sh -domain=
ORACLE_BASE/admin/<domain_name>/mserver/<domain_name> -
template=soadomaintemplateBAM.jar "-
app_dir=ORACLE_BASE/admin/<domain_name>/mserver/apps
```

Repeat for each successive host.

### Set Host Name Assertion

In a highly available configuration, there will be two or more WebLogic Managed Servers supporting each application. In order for the implementation to be highly available, these Managed Servers need to work together. Typically this is done by adding two or more web servers in front of the cluster of WebLogic Managed Servers. These web servers will then be fronted by a load balancer, which will distribute requests to the web servers, which will then distribute the requests amongst the WebLogic cluster members.

In some installations a web server may not be implemented, in such a case a load balancer is used to distribute requests amongst WebLogic cluster members directly.

When a load balancer is used the URL's will be of the form  
<http://loadbalancer.mycompany.com:port/...>

Note: Load balancers may implement port redirection that is requests received by the load balancer on port 80 may be routed to hosts using a different port.

In general operation applications will generate internal application calls using http. It is important that these internal application calls are directed to the load balancer using the load balancers listen port. This is done by setting host name assertion in the WebLogic cluster.

Repeat the following for each cluster in your implementation.

1. Log in to the WebLogic Console
2. Navigate to **Environment – Clusters** from the Domain Structure menu.
3. Click on **Lock & Edit** from the change center.

4. Click on the name of a cluster.
5. Select the **HTTP** Tab.
6. Set the **Frontend Host** to be the DNS Name of the Load balancer.
7. Set the **Frontend HTTP** port to the load balancers listening port. e.g. 80.
8. Click **Save**
9. Once all clusters have been updated click **Activate Changes** from the Change Center

## Start the New Managed Servers

Having propagated the Managed Servers to the new node, the Managed Servers need to be started. Before starting the Managed Server ensure that node manager is running on the node:

## Start the Node Manager

Perform these steps to start Node Manager:

- a. Run the following commands to start Node Manager:

```
HOST> cd ORACLE_BASE/product/fmw/wlserver_10.3/server/bin
HOST> ./startNodeManager.sh
```

This will have created a node manager properties file. Now stop node manager by killing the process.

- b. On each server, run the `setNMProps.sh` script, which is located in the `ORACLE_HOME/common/bin` directory, to set the `StartScriptEnabled` property to 'true' in the node manager property file created above.

```
HOST> cd ORACLE_HOME/common/bin
HOST> ./setNMProps.sh
```

- c. Run the following commands to start Node Manager:

```
HOST> cd ORACLE_BASE/product/fmw/wlserver_10.3/server/bin
HOST> ./startNodeManager.sh
```

## Validate the Application

Check that the application is working by using the standard test URL's for your application.

## Troubleshooting

If the Managed Servers do not start after starting them on successive nodes, or the application URL's do not work then the following should be checked:

1. Log files.

Log files are located in `DOM_HOME/servers/serverName/logs`, pay particular attention to the files ending in `.log` and `.out`

2. Check to see that the applications are deployed successfully:

- a. From the WebLogic console select **Environment – Servers** from the Domain Structure menu.
- b. Click on the server name.
- c. Click on the **Deployments** tab.
- d. Ensure that the State is Active for all applications. If not try restarting the application by clicking on the application name, then the **Control** tab.
- e. Check the box next to the application and select shutdown from the drop down list.
- f. Select **OK** to confirm the shutdown.
- g. Once completed, select the check box next to the application and select startup.
- h. Click **OK** to confirm.

3. Retest the application.

## Web Tier Transformation

The Oracle Web Tier, in some products is installed by default; in others it is a separate installation.

When the Oracle Web Tier is installed against a single instance implementation, it will be configured to route traffic to the individual WebLogic Managed Servers. Transforming the Web Tier, involves changing these routes away from the original Managed Servers to the Managed Server clusters instead, it also involves changing the web tier to be accessible via a load balancer address.

When installed in a single instance environment the Oracle Web Tier is usually configured to be accessed via the local host name. In a highly available implementation access to the site is usually via a site name attached to a load balancer instead. This site name resides in DNS, the load

balancer then routes requests to the Web Tiers. This is normally a straightforward process however; in some of the Oracle products such as Oracle Portal this is more complex.

### Configure OHS to Use a Site Name

By default the Oracle HTTP server listens for requests on the local host, when constructing loopback requests it does so using the local hostname. When implemented in a highly available configuration the Oracle HTTP server needs to generate loopback requests using the site (load balancer) name. In order to do this create a file called `virtual_hosts.conf` in the directory

```
ORACLE_INSTANCE/config/OHS/<component>/moduleconf
```

This file will contain the following lines:

```
NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName http://mysite.mycompany1.com:7777
    RewriteEngine On
    RewriteOptions inherit
    UseCanonicalName On
</VirtualHost>
```

The Oracle HTTP server needs to be restarted for the change to take effect.

Note: If using Oracle Portal, Web Cache and the portal application needs to be rewired to use the site name, see the [High Availability Guide](#) for details. This also applies to Oracle Reports, Forms and Discoverer, which may be using Oracle Web Cache.

### Routing WebLogic Requests to a WebLogic Cluster

#### Update Oracle HTTP Server configuration to be cluster aware.

Now that a WebLogic cluster has been created, these requests need to be directed to the cluster.

There are a number of files where this routing information can appear for Oracle products they will be located in the directory `ORACLE_INSTANCE/config/OHS/ohs1/moduleconf/`

Typical files are:

- `mod_ohs_wl.conf`
- `portal.conf`
- `reports_ohs.conf`
- `module_disco.conf`
- `forms.conf`
- `admin.conf`
- `oif.conf`
- `soa.conf`

Etc.

Locate the files, which have entries, which look similar to:

```
<Location /portal>
  SetHandler weblogic-handler
  WebLogicHost apphost1.mycompany.com
  WebLogicPort 9001
</Location>
```

Remove the lines beginning WebLogicHost and WebLogic Port and add in a line, which looks like:

```
WebLogicCluster apphost1:9001,apphost2:9001
```

For example in the above example the edited entry will look like:

```
<Location /portal>
  SetHandler weblogic-handler
  WebLogicCluster apphost1.mycompany.com:9001,apphost2.mycompany.com
</Location>
```

As more cluster nodes are added this routing directive will be extended.

Restart the Oracle HTTP Server using the command:

```
opmnctl restartproc process-type=OHS
```

## Product Specific Transformation Steps

### Oracle Identity Management

#### Transformation of the Oracle Directory Tier

The Oracle Directory tier consists of Oracle Internet Directory (OID) and Oracle Virtual Directory (OVD).

There are no specific steps required to transform these products into a highly available deployment.

Follow the instructions located in the Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management 11g Release 1 (11.1.1.3)

Notes:

- If OVD is in use and a new OID instance is added the OVD adapter will require modifying to point to the new OID instance. The LDAP Adapter enables Oracle Virtual Directory to present data as a sub tree of the virtual directory by providing real-time

directory structure and schema translations. One LDAP Adapter is required for each distinct LDAP source you want to connect to. For example, if you have two LDAP repositories that are replicas of each other, you would deploy one LDAP Adapter and configure it to list the hostnames and ports of the replicas. See the [Oracle Fusion Middleware Administrators Guide for Oracle Virtual Directory](#) for details.

- If a single instance of OID (with no OVD) or a single instance of OVD is transformed into a highly available OID/OVD by adding subsequent instances these instances need to be fronted by a load balancer. In order to keep things simple it is recommended that the virtual name of the OID/OVD cluster assigned at the load balancer is the same as the original host name for example host1.mycompany.com which did equate to the host running the single instance, would be changed to point to the load balancer following transformation.

In Oracle Access Manager 11g it is possible to change the OID/OVD name to a virtual name. To do this:

1. Log into OAM 11g console.
2. Click on **System Configuration** Tab.
3. From the navigator select **Data Sources – User Identity Stores**.
4. Double click on the Identity Store to be changed.
5. Update the Ldap URL to reflect the virtual host name
6. Click **Apply**

### Transforming DIP and ODSM

If when you created your ODSM environment you selected the clustered option then there are no special requirements to transform a singleton DIP and ODSM instance to be highly available.

If however when you created your ODSM environment you did not select the clustered option you must convert your ODSM instance into a clustered one. To do this follow the steps in [Clustering WebLogic Managed Servers using WLST](#).

Once clustered follow the instructions for Scaling out Oracle Directory Integration Platform and Oracle Directory Services Manager in the [Oracle Identity Management Enterprise Deployment Guide \(11.1.1.3.0\)](#)

### Oracle Single Sign-On 10g

Whilst there are no specific steps required to make the Oracle Directory tier, highly available, once multiple directories exist as described above, Oracle Single Sign-On 10g needs to be updated such that it uses the virtual directory name associated with the load balancer. This is achieved by following the steps in the [Oracle Application Server High Availability Guide 10g](#).

### Register Oracle Access Manager 11g Instance

After the OAM Managed Server has been cloned, a new Oracle Access Manager server needs to be registered:

1. Log in to the Oracle Access Manager console
2. Click the **System Configuration** tab.
3. Click **Server Instances**.
4. Select **Create** from the Actions menu.
5. Enter the following information:

**Server Name:** New server name e.g. oam\_server2

**Host:** Host that the server will run on

**Port:** Listen port that was assigned when the Managed Server was created

**OAM Proxy Port:** Port you want the OAM proxy to run on. This is unique for the host. The default for the existing host is 5575, if this server is to run on a new host then it is recommended to keep this the same as the original server.

**Proxy Server ID:** AccessServerConfigProxy

**Mode:** This should be the same mode as the original server is running.

6. Click **Coherence** tab.
7. Set **Local Port** to a unique value on the host.
8. Click **Apply**.
9. Expand **Agents – OAM Agents – 10g WebGates** (11.1.1.4)
  - a. Click on each agent in turn
  - b. Click **Open** from the Actions Menu
  - c. Repeat for any agents under **11g WebGates**
10. Expand **Access Server Manager Settings** in the navigator (11.1.1.5)
  - a. Expand **SSO Agents**
  - b. Click **OAM Agents**
  - c. Click **Open** from the Actions Men
  - d. Click **Search**. A list of defined OAM Agents will be displayed.
  - e. Click on each in turn
11. In the Primary Servers box click **+**

12. Select the newly created access server from the drop down list.
13. Set the Maximum Number of connections
14. Click **Apply**
15. Repeat for each agent.
16. Restart any OHS servers which have a WebGate associated with the OAM11g instance.

### Make OAM11g Aware of Load Balancer

By default, Oracle Access Manager sends requests to the login page located on the local server. In an Enterprise deployment this needs to be changed so that login page requests are sent to the load balancer. Proceed as follows:

1. Log in to the OAM Console
2. Click the **System Configuration** tab.
3. For 11.1.1.3 Double click **Server Instances**.
  - a. Click **SSO Engine** tab.
4. For 11.1.1.5 Expand **Access Manager Settings**
  - a. Click on **Access Manager Settings**
  - b. Select **Open** from the actions menu.
5. Enter the following information
  - **OAM Server Host:** load balancer name e.g. loadbalancer.mycompany.com
  - **OAM Server Host:** Load Balancer Listen Port
  - **OAM Server Protocol:** HTTP if the load balancer is listening on a http port otherwise select https.
6. Click **Apply**.

### Change OAM11g Request Cache Type (Not required in 11.1.1.5)

In High Availability configurations, you must change the Request Cache type from BASIC to COOKIE. You change it by using `wlst`, as follows.

1. Set up the environment for `wlst` by running the command

```
. DOMAIN_HOME/bin/setDomainEnv.sh
```
2. Start `wlst` by issuing the command: `IAM_ORACLE_HOME/common/bin/wlst.sh`
3. Connect to your domain:

```
wls:/offline> connect()
```

4. Enter WebLogic Administration username and password. Enter the URL for the WebLogic Administration Server in the format:

```
t3://IDMHOST1.mycompany.com:7001
```

5. Issue the command:

```
wls:/IDMDomain/serverConfig> configRequestCacheType(type="COOKIE")
```

6. Verify that the command has worked by issuing the command:

```
wls:/IDMDomain/serverConfig> displayRequestCacheType()
```

7. Exit WLS tool by issuing the command:

```
wls:/IDMDomain/serverConfig> exit()
```

### Update SOA Host and Port for OIM

Update the SOA host and port using Oracle Enterprise Manager Fusion Middleware Control. Follow the steps below:

Note: The OIM Managed Server must be started before this step can be performed.

1. Log in to Oracle Enterprise Manager Fusion Middleware Control
2. Navigate to **Identity and Access**, and then **oim**.
3. Right-click **oim** and navigate to **System MBean Browser**.
4. Under **Application Defined MBeans**, navigate to **oracle.iam, Application:oim, XMLConfig, Config, XMLConfig.SOAConfig**, and then **SOAConfig**.
5. Update the value for the **Rmiurl** attribute with the host and port of the new SOA server. eg. t3://host1.mycompany.com:8001,host2.mycompany.com:8001
6. Update the value of SOA Config SOAP URL with the load balancer host and port.
7. Click **Apply** to save the changes.

The **Rmiurl** attribute is used for accessing SOA EJBs deployed on SOA Managed Servers. This is the application server URL. For a clustered deployment of Oracle Identity Manager, it is a comma-separated list of all the SOA Managed Server URLs. The following are example values for this

```
attribute: t3://oimhost1.mycompany.com:8001 oim host2.m ycom pany.com 8001 oim host3.m
ycompany.com:8001
```

### Update Oracle SOA for Oracle Identity Manager

Oracle Identity Manager installations also include Oracle SOA Suite. If you are making an Oracle Identity Manager Highly Available then you must also perform the steps for Oracle SOA described below.

## Oracle SOA Suite

### Configuring SOA cluster for Coherence

Oracle recommends using unicast communication for clusters in enterprise deployments. The following needs to be performed for each Managed Server in a cluster:

Note: This step is not required for Oracle Portal, Forms, Reports, Discoverer, Oracle Directory Tier and Provisioning and Oracle Access Manager.

1. From the Weblogic console,
2. In the Domain Structure window, expand the **Environment** node and then click the **Servers** entry. The Summary of Servers page appears.
3. Click on the server name e.g. **soa\_server1**
4. Select the **Configuration** tab and the **Server Start** sub tab.
5. Select **Lock & Edit** to allow editing.
6. Add the following to the **arguments** box

```
-Dtangosol.coherence.wka1=soahost1
-Dtangosol.coherence.wka2=soahost2
-Dtangosol.coherence.localhost=soalocalhostname
```

There should be a `Dtangosol.coherence.wka<n>` entry for each host in the cluster where `n` is a sequential number.  
  
The `-Dtangosol.coherence.localhost` entry will have the name/virtual name of the host on which the Managed Server runs.
7. Click on **save**.
8. Click on the next Managed Server in the cluster for example `soa_server2` and repeat steps 4 and 5. Repeat for all Managed Servers in the cluster.
9. Once all coherence configurations have been applied click **Activate Changes**.

### Configuring Oracle Coherence for SOA Using Oracle HA Power Tools

Oracle recommends using unicast communication in SOA enterprise deployments. Oracle HA Power Tool to configure coherence for deploying composite creates the `Dtangosol.coherence.wka<n>` and `Dtangosol.coherence.localhost` system properties as server start parameters for all the Managed Server(s) in the specified cluster.

To configure Oracle Coherence for deploying composites for all the Managed Servers in the cluster:

1. Log in to Oracle WebLogic Server Administration Console, and click Domain in left navigation tree.
2. Click **HA Power Tools** tab.
3. Click **Configure Unicast**.
4. Click **Lock & Edit** to enable controls.
5. Select the **Cluster Name** from the drop down list.
6. Click **Configure Unicast**.
7. Verify whether the Server Start Arguments for all the Managed Servers in the cluster is set properly.
8. Click **Activate Changes**.

#### Move WSM to its own Managed Servers

In a single instance deployment WSM is deployed into the SOA managed servers, in high availability deployments it is recommended that WSM is deployed into its own managed servers. To do this perform the following steps:

1. From the Weblogic console.
2. Shutdown all running managed servers except the Admin Server.
3. In the Domain Structure window, expand the **Environment** node and then click the **Clusters** entry. The Summary of Clusters page appears.
4. Click **Lock & Edit** to enable editing.
5. Click on **New**
6. Enter a name of WSM-PM\_cluster
7. Click **OK**.
8. In the Domain Structure window, expand the **Environment** node and then click the **Servers** entry. The Summary of Servers page appears.
9. Click **New**
10. Enter :

Server name: WLS\_WSM1

Listen Address: DNS name of the server on which the managed server will run e.g. SOAHOST1

Server Listen Port: 7010

Assign to Cluster: WSM-PM\_Cluster

11. Click **Finish**
12. Click on the newly created managed server **WLS\_WSM1**
13. Set the machine to the Host on which the server will run and ensure it is assigned to the cluster WSM-PM\_cluster
14. Click **Save**
15. Repeat steps 8-13 creating a second managed server WLS\_WSM2.
16. In the Domain Structure window, click on **Deployments**.
17. Click on the deployment **wsm-pm**.
18. Click on the **Targets** tab.
19. Select wsm-pm and click on **Change Targets**
20. Change the targets to WSM-PM\_cluster (all servers in the cluster), removing any existing targeting.
21. Click **Yes**.
22. Repeat steps 15-20 for the deployment oracle.wsm.seedpolicies.  
  
Note: If you plan to deploy WebLogic WebServices then oracle.wsm.seedpolicies also needs to be targeted to the soa\_cluster.
23. In the Domain Structure window, expand **Environment** and click on **Startup and Shutdown Classes**.
24. Click on **JOC Startup Class**.
25. Click on the **Targets** tab
26. Change the target to WSM-PM\_cluster removing any existing targeting.
27. Repeat steps 23-26 for the startup class JOC Shutdown Class.
28. In the Domain Structure window, expand **Services** and click on **Data Sources**.
29. Click on the Data Sources mds-owsm, mds-owsm-rac0 and mds-owsm-rac1 in turn.
30. Click on the **Targets** tab
31. Change the targeting to include WSM-PM\_cluster.

32. Log in to Oracle Enterprise Manager Fusion Middleware Control
33. In the navigation tree, navigate to Farm\_<domain\_name> - WebLogic Domain - <domain\_name>. Click on WSM\_PM\_Cluster
34. Click Apply JRF Template on the right
35. Wait for confirmation message to appear on the screen.
36. Restart the admin server and managed servers.

### **Setting Connection Destination Identifiers for B2B Queues**

Oracle B2B uses specific JMS Destination Member calls, and requires setting the Create Destination Identifier (CDI) for these calls to succeed. To set up the Create Destination Identifier see the [Oracle High Availability Guide](#)

### **Setting the WLS Cluster address for Direct Binding/RMI invocations to composites**

When using direct binding composites, you must set the WLS Cluster address for the SOA\_Cluster. To set the WLS Cluster address see the [High Availability Guide](#)

### **Extracting the XEngine Files in SOAHOST2**

To enable B2B's XEngine in SOAHOST2, you need to extract the content of the XEngine tar manually, see the [High Availability Guide for Details](#)

## **Oracle BAM**

### **Un-target BAM Server from Supplementary Hosts**

Because the BAM server component in BAM is a singleton, you must untarget it from all but one of the WLS\_BAM servers before you configure it for server migration. Otherwise the system would use two active BAM Servers, which could cause different data inconsistencies. This way, BAM Web applications run in both BAMHOST1 and BAMHOST2, but BAM Server is initially active only in BAMHOST1

For details on how to do this see the [High Availability Guide](#).

### **Configure BAM Web Applications to Use the BAM Server in BAMHOST1**

Configure the web applications to use the BAM server on BAMHOST1 by following the instructions in the [High Availability Guide](#)

### **Configure ADCServer to Use the Appropriate BAMServer Address**

Configure the ADC server to use the appropriate BAM Server address by following the instructions in the [High Availability Guide](#)

Note this is not required in 11.1.1.4.0

#### Configure BAM Server to use a virtual Host Name

In order to configure the BAM server for server migration it has to be configured to use a virtual IP address. Firstly enable a virtual IP address following the instructions in the [High Availability Guide](#) then assign this listen address to the BAM server using the following:

1. Login to the WebLogic Administration Console
2. Select **Environment – Servers** from the Domain Structure menu
3. Click on the BAM server
4. Click on **Lock & Edit** from the change center
5. Change the Listen Address to the BAM Virtual Host Name created above.
6. Click **Activate changes** from the change center.

Restart the Managed Server.

#### Configuring the Cache Size for BAM JDBC Data Sources

The statement cache size parameter must be set to 0 for a BAM JDBC data source. While this is the default setting when the Configuration Wizard is run against a single instance of a database, the statement cache size is not set for the BAM JDBC data sources when the Configuration Wizard is run against a RAC database. In this case, you must configure the statement cache size using the Oracle WebLogic Server Administration Console.

Note:

To make BAM data sources available in the Oracle WebLogic Server Administration Consoles, you must restart the Administration Server to commit changes made using the Configuration Wizard.

To configure the statement cache size, complete these steps:

1. Click **Lock & Edit**.
2. Expand the **Services** node in the Domain Structure window.
3. Expand the JDBC node and then select Data Sources. The Summary of JDBC Data Sources page appears.

4. Click BAMDataSource-rac0 in the Names column of the table. The Settings page appears.
5. Click the **Connection Pool** tab.
6. Enter 0 in the Statement Cache Size field.
7. Click **Save and Activate**.
8. Repeat these steps for BAMDataSource-rac1.

## Oracle BPM

### Enabling High Availability for Oracle File and FTP Adapters

The Oracle File and FTP Adapters enable a BPEL process or an Oracle Mediator to read and write files on local file systems and on remote file systems through FTP (File Transfer Protocol). These adapters support high availability for an active-active topology with Oracle BPEL Process Manager and Oracle Mediator service engines for both inbound and outbound operations. See the [High Availability Guide for Details](#)

## Oracle Portal

### Update Database Connection Information

Oracle Portal stores its database configuration in its own file `portal_dads.conf`, which is located inside WebLogic. The best way to update this file is via Oracle Fusion Middleware Control.

1. Login in FMW control using a URL similar to:
  - a. `http://apphost1.mycompany.com:7001/em`
2. Select **Portal – Portal** from the navigation menu on the left.
3. Either left click the on the Portal Entry or from the drop down menu on the portal page select **Settings – Database** Access Descriptor.
4. Click on the entry `/pls/portal` and click **edit**
5. Change the database connect string to a RAC value which will look something like:

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=mydbhost1-vip)(PORT=1521))(ADDRESS=(PROTOCOL=TCP)(HOST=mydbhost2-vip)(PORT=1521))(LOAD_BALANCE=yes)(CONNECT_DATA=(SERVICE_NAME=mydb.mycompany.com)))
```

6. Ensure that the Database Connect String Format is set to **NetServiceNameFormat**.

7. Click **OK**.

## Oracle Reports

### Update Database Connection Information

If Oracle Reports is installed with Oracle Portal, then the reports server will have the Portal database connection information embedded in its configuration file. If the Oracle Portal database is RAC enabled then this database information needs to be updated.

Edit the file `rwserver.conf` which is located in

```
DOM_HOME/config/fmwconfig/servers/WLS_REPORTS/applications/reports_<version>/configuration/
```

Find the entry `<property name="portalConnection"`

Change the value to a value which looks something like:

```
value="mydbhost1-vip:1521^mydbhost2-vip:1521@mydb.mycompany.com"
```

Save the file.

Note: Oracle Reports has two types of report server, the standalone reports server and the in-line reports server. In Highly Available Oracle Reports configurations only the in-line reports server is supported. The configuration file mentioned above is for the in-line reports server. If this is just a transformation of the database rather than the entire FMW stack then the `rwserver.conf` file located at:

```
ORACLE_INSTANCE/  
config/ReportsServerComponent/ReportsServer_stamx12_calssic1/rwserver.conf
```

also needs to be modified in the same manner.

## Web Center Transformation

### Set Up Java Object Cache

The Java Object Cache (JOC) should be configured among all the servers running Web Center Spaces. This local cache is provided to increase the performance of Oracle Web Center Spaces.

To configure the Java Object Cache see the [Enterprise Deployment Guide](#).

### Convert Discussions Forum from Multicast to Unicast

To convert Discussions Forum from multicast to unicast see the [Enterprise Deployment Guide](#).

### Cluster Discussions Server

Cluster the Discussion Server as described in the [Enterprise Deployment Guide](#).

### Configure Wiki Server

To set the Wiki Server to be clustered see the [Enterprise Deployment Guide](#).

Note this only applies to (11.1.1.2.0)

### Configure Activity Graph for Clustering

To configure Activity Graph for clustering see the [Enterprise Deployment Guide](#).

### Configure Web Center Analytics for Clusters

To configure Activity Graph for clustering see the [Enterprise Deployment Guide](#).

### Configure WebCenter REST API's

To configure WebCenter REST API's see the [Enterprise Deployment Guide](#).

## UCM Transformation

### Make UCM Managed Server Cluster Aware

When installed initially UCM needs to be updated to show the fact that it is now part of a cluster.

This is done in two parts:

- Configure UCM to use shared storage.
- Configure UCM to use a load balancer.

Perform these steps to configure the initial UCM Managed Server (WLS\_UCM1) Managed Server:

1. Log in to WLS\_UCM1 at <http://ECMHOST1:16200/cs> to display a configuration page. **Note:** The UCM configuration files are on a shared disk so that all members of the cluster can access them. The shared disk location for the Oracle ECM enterprise deployment is at `ORACLE_BASE/admin/ecm_domain/aserver/ucm_cluster`.
2. Change the following values on the server configuration page (make sure to select the "Is New Content Server Instance" check box to see all options):
  - **Content Server Instance Folder:** Set this to `ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs` (Shared Filesystem)
  - **Native File Repository Location:** Set this to `ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs/vault` (Shared Filesystem)
  - **WebLayout Folder:** Set this to `ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs/weblayout` (Shared File system)
  - **Server Socket Port:** Set this to 4444.

- **Socket Connection Address Security Filter:** Set this to a pipe-delimited list of localhost and the server IPs:  
127.0.0.1|ECMHOST1|ECMHOST2|HTTPHOST1|HTTPHOST2
  - **WebServer HTTP/HTTPS Address:** Set this to your ECM site name for example ecm.mycompany.com:80
  - **Server Instance Label:** Set this to 'UCM\_Cluster1'.
  - **Server Instance Description:** Set this to 'Cluster ucm\_cluster1'.
  - **Auto\_Number Prefix:** Set this to 'ucm\_cluster1-'.
3. Click **Submit** when finished and restart the Managed Server using the Oracle WebLogic Server Administration Console.

### Configuring the successive UCM Managed Servers

Once a new Managed Server is created the configuration of the new Managed Server needs to be updated to use shared storage.

Perform these steps to configure the WLS\_UCM2 Managed Server:

1. Log in to WLS\_UCM2 at `http://ECMHOST2:16200/cs` to display a configuration page. **Note:** The UCM configuration files are on a shared disk so that all members of the cluster can access them. The shared disk location for the Oracle ECM enterprise deployment is at `ORACLE_BASE/admin/ecm_domain/aserver/ucm_cluster`.
2. Change the following values on the server configuration page:
  - **Content Server Instance Folder:** Set this to  
`ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs`
  - **Native File Repository Location:** Set this to  
`ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs/vault`
  - **WebLayout Folder:** Set this to  
`ORACLE_BASE/admin/ecm_domain/ucm_cluster/cs/weblayout`
  - Make sure that the 'Is new Content Server Instance?' check box is not selected.
3. Click **Submit** when finished and restart the Managed Server using the Oracle WebLogic Server Administration Console.

### Configure Service Retries

Set server retries to ensure connections are reestablished during an Oracle RAC failover. This is achieved by following the [Enterprise Deployment Guide](#)

## I/PM Transformation

### Upgrade the Default File Store

To upgrade the Default File Store follow the steps in the [Enterprise Deployment Guide](#)

#### **Add the Oracle I/PM Server Listen Addresses to the List of Allowed Hosts in Oracle UCM**

To add the Oracle I/PM server Listen addresses follow the steps in the [Enterprise Deployment Guide](#)

## Transformation Examples

### SOA Transformation

This section of the Document describes how to transform a SOA implementation from single instance to a highly available one.

1. [Transform database from single instance to a RAC database](#)
2. [Transform Storage to Shared Disk](#)
3. [Configure persistence store to use shared directory.](#)
4. [Configure Administration Server for HA](#)
5. [Configure Default Persistence Store for Transaction Recovery](#)
6. [Convert JMS destinations to Uniform distributed Destinations.](#)
7. [Create WebLogic cluster for SOA](#)
8. [Set Connection Identifiers for B2B Queues](#)
9. [Enable HA for Oracle File and FTP Adapters](#)
10. [Create Machines](#)
11. [Create Managed Servers for supplementary hosts](#)
12. [Create Persistence Stores for newly created Managed Servers](#)
13. [Create JMS Servers for Newly created Managed Servers](#)
14. [Disable Hostname verification](#)
15. [Configure Cluster for Coherence](#)
16. [Propagating the Domain Configuration to successive hosts using the pack/unpack Utility](#)
17. [Perform SOA specific steps.](#)

## Identity Management 11g Transformation

This section of the Document describes how to transform an Identity Management implementation from single instance to a highly available one.

When moving to a Highly Available Identity management solution it is recommended that an external directory store be used. Instructions on how to do this can be found in the Oracle Identity Management [High Availability Guide](#).

Note: This procedure is applicable for all products other than Oracle Identity Federation. For Oracle Identity Federation follow the steps to configure OIMHOST2 in the Oracle Identity Management [High Availability Guide](#).

1. [Transform database from single instance to a RAC database](#)
2. [Transform Storage to Shared Disk](#)
3. [Transform Directory tier.](#)
4. [Transform Directory Integration Platform and Directory Services Manager](#)
5. [Configure Administration Server for HA](#)
6. [Configure persistence store to use shared directory.](#)
7. [Configure Default Persistence Store for Transaction Recovery](#)
8. [Convert JMS destinations to Uniform distributed Destinations.](#)
9. [Create WebLogic clusters for Identity Management Components \(OIM, OAM, SOA, OAAM\)](#)
10. [Create Machines](#)
11. [Create Managed Servers for supplementary hosts](#)
12. [Create Persistence Stores for newly created Managed Servers](#)
13. [Create JMS Servers for Newly created Managed Servers](#)
14. [Disable Hostname verification](#)
15. [Configure SOA Cluster for Coherence](#)
16. [Register OAM instance](#) (OAM only)
17. [Propagating the Domain Configuration to successive hosts using the pack/unpack Utility](#)
18. [Setting the WLS Cluster address for Direct Binding/RMI invocations to composites](#) (OIM/SOA only)

19. [Extracting the XEngine Files in SOAHOST2](#) (OIM/SOA only)
20. [Configure Oracle Web Tier to access Oracle IDM Managed Servers.](#)
21. [Set Host Name Assertion](#)
22. [Make OAM aware of the load balancer](#) (OAM only)
23. [Change OAM Request Type](#) (OAM only)
24. [Update SOA Host and Port for OIM](#) (OIM Only)

### Oracle Access Manager 10g Transformation

There are no special requirements for transforming Oracle Access Manager 10g, simply follow the instructions in the [Enterprise Deployment Guide](#).

### Web Center Transformation

This section of the Document describes how to transform a Web Center implementation from single instance to a highly available one.

1. [Transform database from single instance to a RAC database](#)
2. [Transform Storage to Shared Disk](#)
3. [Configure Administration Server for HA](#)
4. [Create WebLogic clusters](#)
5. [Create Machines](#)
6. [Create Managed Servers for supplementary hosts](#)
7. [Disable Hostname verification](#)
8. [WebCenter Specific transformation steps.](#)
9. [Configure Oracle Web Tier to access Oracle WebCenter Managed Servers.](#)
10. [Set Host Name Assertion](#)

### Business Intelligence Transformation

This section of the document describes how to transform a Business Intelligence implementation from single instance to a highly available one.

1. [Transform database from single instance to a RAC database](#)
2. [Transform Storage to Shared Disk](#)
3. [Configure Administration Server for HA](#)
4. [Create WebLogic clusters](#)

Note: If the clustered check box was ticked at install time then it will not be necessary to create the clusters. Check the WebLogic console to see if clusters have already been created.

5. Follow the steps in the [Oracle High Availability Guide](#)

## Out of Place Transformation

An out of place transformation is where a completely new environment is built to facilitate high availability. Once built and tested data can be migrated from the existing implementation to the new implementation.

The advantages of an out of place transformation are:

- New environment can be fully tested prior to switchover.
- Data migration can be tested several times to ensure that the procedure works.
- Downtime is limited to the time it takes to migrate data and update DNS settings.

### Procedure

The procedure to perform an out of place migration is as follows:

1. Build a new highly available environment as per the Oracle High Availability Guide or the relevant Oracle Enterprise Deployment Guide.
2. Ensure that the Oracle Home has the same patches applied to it as the existing environment. Grid Control can assist with this, either by comparing the new Oracle Home to the existing Oracle Home or cloning the existing Oracle Home to the new Oracle Home.
3. Migrate the data from the existing implementation to the new implementation using the procedures defined below:
  - [Moving Identity Management Components to an existing production environment.](#)
  - [Moving Oracle SOA Suite to an Existing Production Environment](#)
  - [Moving Oracle Business Activity Monitoring to an Existing Production Environment](#)

- [Moving User Messaging Service to an Existing Production Environment](#)
  - [Moving Oracle WebCenter to an Existing Production Environment](#)
  - [Moving Oracle Web Tier to an Existing Production Environment](#)
  - [Moving Oracle Portal, Forms, Reports and Discoverer to an Existing Production Environment](#)
  - [Moving Oracle Business Intelligence to an Existing Production Environment](#)
  - [Moving Oracle Enterprise Content Management to an Existing Production Environment](#)
4. Update DNS to point to the new environment.

## Identity Management

If an out of place migration is performed for Oracle Access Manager, applications which previously had been associated with the single instance OAM will require registering with the new Oracle Access Managers.

### Oracle Access Manager 10g

After moving Oracle Access Manager 10g a WebGate profile will require creating for any existing products or applications, which have been registered with it. Instructions on how to do this can be found with the relevant product installation instructions.

### Oracle Access Manager 11g

After moving Oracle Access Manager 11g a WebGate Agent will require creating for any existing products or applications, which have been registered with it. Instructions on how to do this can be found with the relevant product installation instructions. Once the new agent has been created a file called ObAccessClient.xml will have been generated. This file needs copying to the directory WEBGATE\_HOME/access/oblix/lib/ on the Web Tiers and the Oracle HTTP Servers restarted.

## Appendix A - Enabling HA Power Tools

The HA Power Tools are not installed by default. In order to use the power tools they must be installed into the Oracle WebLogic console. This is done using the following procedure:

1. Copy the following .war files located in the MW\_HOME/oracle\_common/hapowertools directory to the DOMAIN\_HOME/console-ext directory.
  - powertools-core.war
  - powertools-createudd.war

- powertools-configurejoc.war

In addition you will need to place the following files into the same location. These files can be downloaded from <http://www.oracle.com/technetwork/database/focus-areas/availability/powertools-487411.zip> :

- powertools-createudd.war
- powertools-hatransformations.war
- powertools-scaletopology.war

2. Restart the Administration Server.
3. After restarting the Administration Server, the HA Power Tools tab appears when you click Domain in the left navigation tree.



FMW Transformation  
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