# Oracle® Fusion Middleware

Enterprise Deployment Guide for Oracle SOA Suite

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Oracle Fusion Middleware Enterprise Deployment Guide for Oracle SOA Suite, 11*g* Release 1 (11.1.1)

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Primary Author: Ron van de Crommert

Contributing Author: Fermin Castro Alonso, John Bassett, Lypp-Tek Khoo-Ellis

Contributor: Janga Aliminati, Pradeep Bhat, Kevin Cluggage, Richard Delval, Jordan Douglas, Eileen He, Rahul Menezes, Ranjit Mulye, Bharath Reddy, Michael Rhys, Praveen Sampath, Dhaval Shah, Sunita Sharma, Herb Stiel, Jianliang Yi, Zhiming Zhu

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# Preface

This preface describes the audience, contents and conventions used in the *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle SOA Suite*.

## Audience

This guide is intended for system administrators who are responsible for installing and configuring Oracle Fusion Middleware enterprise deployments.

## Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible to all users, including users that are disabled. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Accessibility standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For more information, visit the Oracle Accessibility Program Web site at `http://www.oracle.com/accessibility/`.

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## Related Documents

The following manuals in the Oracle Fusion Middleware documentation library provide additional information on the process of installing and configuring the Enterprise Deployment architectures:

- *Oracle Fusion Middleware Administrator's Guide*
- *Oracle Fusion Middleware Administrator's Guide for Oracle Virtual Directory*
- *Oracle Fusion Middleware Administrator's Guide for Oracle Internet Directory*

## Conventions

The following text conventions are used in this document:

| Convention | Meaning |
|---|---|
| **boldface** | Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary. |
| *italic* | Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values. |
| `monospace` | Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter. |

# 1

# 1Enterprise Deployment Overview

This chapter provides an overview of the enterprise topology for Oracle SOA Suite. It contains the following sections:

- Section 1.1, "What is an Enterprise Deployment?"
- Section 1.2, "Terminology"
- Section 1.3, "Benefits of Oracle Recommendations"
- Section 1.4, "Hardware Requirements"
- Section 1.5, "Enterprise Deployment Reference Topology"
- Section 1.6, "How to Use This Guide"

## 1.1 What is an Enterprise Deployment?

An enterprise deployment is an Oracle best practices blueprint based on proven Oracle high-availability and security technologies and recommendations for Oracle Fusion Middleware. The best practices described in these blueprints span all Oracle products across the entire technology stack: Oracle Database, Oracle Fusion Middleware, Oracle Applications, Oracle Collaboration Suite, and Fusion Middleware Control.

An Oracle Fusion Middleware enterprise deployment:

- considers various business service level agreements (SLA) to make high-availability best practices as widely applicable as possible
- leverages database grid servers and storage grid with low-cost storage to provide highly resilient, lower cost infrastructure
- uses results from extensive performance impact studies for different configurations to ensure that the high-availability architecture is optimally configured to perform and scale to business needs
- enables control over the length of time to recover from an outage and the amount of acceptable data loss from a natural disaster
- uses Oracle best practices and recommended architecture, which are independent of hardware and operating systems.

For more information on high availability practices, go to `http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm`.

**Note:** This document focuses on enterprise deployments in Linux environments, but enterprise deployments can also be implemented in UNIX and Windows environments.

## 1.2 Terminology

This section identifies terms used to describe components in prior releases, and the terms to which they correlate in 11*g* Release 1 (11.1.1).

- **Oracle home**: An Oracle home contains installed files necessary to host a specific product. For example, the SOA Oracle home contains a directory that contains binary and library files for Oracle SOA Suite. An Oracle home resides within the directory structure of the Middleware home. Each Oracle home can be associated with multiple Oracle instances or Oracle WebLogic Server domains.
- **WebLogic Server home**: A WebLogic Server home contains installed files necessary to host a WebLogic Server. The WebLogic Server home directory is a peer of Oracle home directories and resides within the directory structure of the Middleware home.
- **Middleware home:** A Middleware home consists of the Oracle WebLogic Server home, and, optionally, one or more Oracle homes. A Middleware home can reside on a local file system or on a remote shared disk that is accessible through NFS.
- **Oracle instance**: An Oracle instance contains one or more active middleware system components, for example Oracle Web Cache, Oracle HTTP Server, or Oracle Internet Directory. You determine which components are part of an instance, either at install time or by creating and configuring an instance at a later time. An Oracle instance contains files that can be updated, such as configuration files, log files, temporary files.
- **failover**: When a member of a high availability system fails unexpectedly (unplanned downtime), in order to continue offering services to its consumers, the system undergoes a failover operation. If the system is an active-passive system, the passive member is activated during the failover operation and consumers are directed to it instead of the failed member. The failover process can be performed manually, or it can be automated by setting up hardware cluster services to detect failures and move cluster resources from the failed node to the standby node. If the system is an active-active system, the failover is performed by the load balancer entity serving requests to the active members. If an active member fails, the load balancer detects the failure and automatically redirects requests for the failed member to the surviving active members. See *Oracle Fusion Middleware High Availability Guide* for information on active-active and active-passive systems.
- **failback**: After a system undergoes a successful failover operation, the original failed member can be repaired over time and be re-introduced into the system as a standby member. If desired, a failback process can be initiated to activate this member and deactivate the other. This process reverts the system back to its pre-failure configuration.
- **hardware cluster**: A hardware cluster is a collection of computers that provides a single view of network services (for example: an IP address) or application services (for example: databases, Web servers) to clients of these services. Each node in a hardware cluster is a standalone server that runs its own processes. These processes can communicate with one another to form what looks like a single system that cooperatively provides applications, system resources, and data to users.

A hardware cluster achieves high availability and scalability through the use of specialized hardware (cluster interconnect, shared storage) and software (health monitors, resource monitors). (The cluster interconnect is a private link used by the hardware cluster for heartbeat information to detect node death.) Due to the need for specialized hardware and software, hardware clusters are commonly provided by hardware vendors such as Sun, HP, IBM, and Dell. While the number of nodes that can be configured in a hardware cluster is vendor dependent, for the purpose of Oracle Fusion Middleware high availability, only two nodes are required. Hence, this document assumes a two-node hardware cluster for high availability solutions employing a hardware cluster.

- **cluster agent**: The software that runs on a node member of a hardware cluster that coordinates availability and performance operations with other nodes. Clusterware provides resource grouping, monitoring, and the ability to move services. A cluster agent can automate the service failover.
- **clusterware**: A software that manages the operations of the members of a cluster as a system. It allows one to define a set of resources and services to monitor via a heartbeat mechanism between cluster members and to move these resources and services to a different member in the cluster as efficiently and transparently as possible.
- **shared storage**: Shared storage is the storage subsystem that is accessible by all the machines in the EDG domain. Among other things, the following is located on the shared disk:
  - Middleware Home software
  - AdminServer Domain Home
  - JMS
  - Tlogs (where applicable)

  Managed Server homes can also be optionally located in the shared disk. The shared storage can be a Network Attached Storage (NAS), a Storage Area Network (SAN) or any other storage system that multiple nodes can access simultaneously and can read-write.
- **primary node**: The node that is actively running an Oracle Fusion Middleware instance at any given time and has been configured to have a backup/secondary node. If the primary node fails, Oracle Fusion Middleware instance is failed over to the secondary node. This failover can be manual or automated using the Clusterware for Administration Server. For a server migration based scenario, WebLogic Whole Server Migration is used for automated failover.
- **secondary node**: The node that is the backup node for an Oracle Fusion Middleware instance. This is where the active instance fails over when the primary node is no longer available. See the definition for primary node in this section.
- **network host name**: Network host name is a name assigned to an IP address either through the `/etc/hosts` file or through DNS resolution. This name is visible in the network that the machine to which it refers to is connected. Often, the network host name and physical host name are identical. However, each machine has only one physical host name but may have multiple network host names. Thus, a machine's network host name may not always be its physical host name.
- **physical host name**: This guide differentiates between the terms physical host name and network host name. This guide uses physical host name to refer to the

"internal name" of the current machine. On UNIX, this is the name returned by the `hostname` command.

Physical host name is used by Oracle Fusion Middleware to reference the local host. During installation, the installer automatically retrieves the physical host name from the current machine and stores it in the Oracle Fusion Middleware configuration metadata on disk.

- **physical IP**: Physical IP refers to the IP of a machine on the network. In almost all cases, it is normally associated with the physical host name of the machine (see the definition of the physical host name). In contrast to a virtual IP, it is always associated with the same machine when on a network.
- **switchover**: During normal operation, active members of a system may require maintenance or upgrading. A switchover process can be initiated to allow a substitute member to take over the workload performed by the member that requires maintenance or upgrading, which undergoes planned downtime. The switchover operation ensures continued service to consumers of the system.
- **switchback**: When a switchover operation is performed, a member of the system is deactivated for maintenance or upgrading. When the maintenance or upgrading is completed, the system can undergo a switchback operation to activate the upgraded member and bring the system back to the pre-switchover configuration.
- **virtual host name**: Virtual host name is a network addressable host name that maps to one or more physical machines via a load balancer or a hardware cluster. For load balancers, the name "virtual server name" is used interchangeably with virtual host name in this book. A load balancer can hold a virtual host name on behalf of a set of servers, and clients communicate indirectly with the machines using the virtual host name. A virtual host name in a hardware cluster is a network host name assigned to a cluster virtual IP. Because the cluster virtual IP is not permanently attached to any particular node of a cluster, the virtual host name is not permanently attached to any particular node either.

  **Note:** Whenever the term "virtual host name" is used in this document, it is assumed to be associated with a virtual IP address. In cases where just the IP address is needed or used, it will be explicitly stated.

- **virtual IP**: Also, cluster virtual IP and load balancer virtual IP. Generally, a virtual IP can be assigned to a hardware cluster or load balancer. To present a single system view of a cluster to network clients, a virtual IP serves as an entry point IP address to the group of servers which are members of the cluster. A virtual IP can be assigned to a server load balancer or a hardware cluster.

  A hardware cluster uses a cluster virtual IP to present to the outside world the entry point into the cluster (it can also be set up on a standalone machine). The hardware cluster's software manages the movement of this IP address between the two physical nodes of the cluster while clients connect to this IP address without the need to know which physical node this IP address is currently active on. In a typical two-node hardware cluster configuration, each machine has its own physical IP address and physical host name, while there could be several cluster IP addresses. These cluster IP addresses float or migrate between the two nodes. The node with current ownership of a cluster IP address is active for that address.

  A load balancer also uses a virtual IP as the entry point to a set of servers. These servers tend to be active at the same time. This virtual IP address is not assigned to

any individual server but to the load balancer which acts as a proxy between servers and their clients.

## 1.3 Benefits of Oracle Recommendations

The Oracle Fusion Middleware configurations discussed in this guide are designed to ensure security of all invocations, maximize hardware resources, and provide a reliable, standards-compliant system for enterprise computing with a variety of applications.

- Section 1.3.1, "Built-in Security"
- Section 1.3.2, "High Availability"

The security and high availability benefits of the Oracle Fusion Middleware configurations are realized through isolation in firewall zones and replication of software components.

### 1.3.1 Built-in Security

The Enterprise Deployment architectures are secure because every functional group of software components is isolated in its own DMZ, and all traffic is restricted by protocol and port. The following characteristics ensure security at all needed levels, as well as a high level of standards compliance:

- Configure external load balancers to redirect all external communication received on port 80 to port 443.

  **Note:** The Oracle Technology Network (`http://www.oracle.com/technology/index.html`) provides a list of validated load balancers and their configuration at `http://www.oracle.com/technology/products/ias/hi_av/Tested_LBR_FW_SSLAccel.html`.

- Communication from external clients does not go beyond the Load Balancing Router level.
- No direct communication from the Load Balancing Router to the data tier is allowed.
- Components are separated in different protection zones: the web tier, application tier, and the data tier.
- Direct communication between two firewalls at any one time is prohibited.
- If a communication begins in one firewall zone, it must end in the next firewall zone.
- Oracle Internet Directory is isolated in the data tier.
- Identity Management components are in a separate subnet.
- All communication between components across protection zones is restricted by port and protocol, according to firewall rules.

### 1.3.2 High Availability

The enterprise deployment architectures are highly available, because each component or functional group of software components is replicated on a different computer, and configured for component-level high availability.

## 1.4 Hardware Requirements

Typical hardware requirements for the Enterprise Deployment on Linux operating systems are listed in Table 1–1. The memory figures represent the memory required to install and run an Oracle Fusion Middleware server; however, for most production sites, you should configure at least 4 GB of physical memory.

For detailed requirements, or for requirements for other platforms, see the Oracle Fusion Middleware Installation Guide for that platform.

***Table 1–1 Typical Hardware Requirements***

| Server | Processor | Disk | Memory | TMP Directory | Swap |
|---|---|---|---|---|---|
| Database | 4 or more X Pentium, 1.5 GHz or greater | nXm<br>n = number of disks, at least 4 (striped as one disk)<br>m = size of the disk (minimum of 30 GB) | 6-8 GB | Default | Default |
| WEBHOST*n* | 2 or more X Pentium, 1.5 GHz or greater | 10 GB | 4 GB | Default | Default |
| SOAHOST*n* | 2 or more X Pentium, 1.5 GHz or greater | 10 GB[1] | 4 GB | Default | Default |
| BAMHOST*n* | 2 or more X Pentium, 1.5 GHz or greater | 10 GB[2] | 4 GB | Default | Default |

[1] For a shared storage MW_HOME configuration, two installations suffice by making a total of 20 GB independently of the number of slots.

[2] BAM can reuse MW_HOME binaries from the SOA installation in shared storage.

**Note:** You must perform the appropriate capacity planning to determine the number of nodes, CPU, and memory requirements for each node depending on the specific system's load as well as the throughput and response requirements. These will vary for each application or custom SOA system being used.

## 1.5 Enterprise Deployment Reference Topology

The instructions and diagrams in this guide describe a reference topology, to which variations may be applied.

This guide provides configuration instructions for a reference enterprise topology that uses service-oriented architecture (SOA) with Oracle Access Manager, as shown in Figure 1–1, or with Oracle Access Manager and Oracle Business Activity Monitoring (BAM), as shown in Figure 1–2.

***Figure 1–1 MySOACompany Topology with Oracle Access Manager***

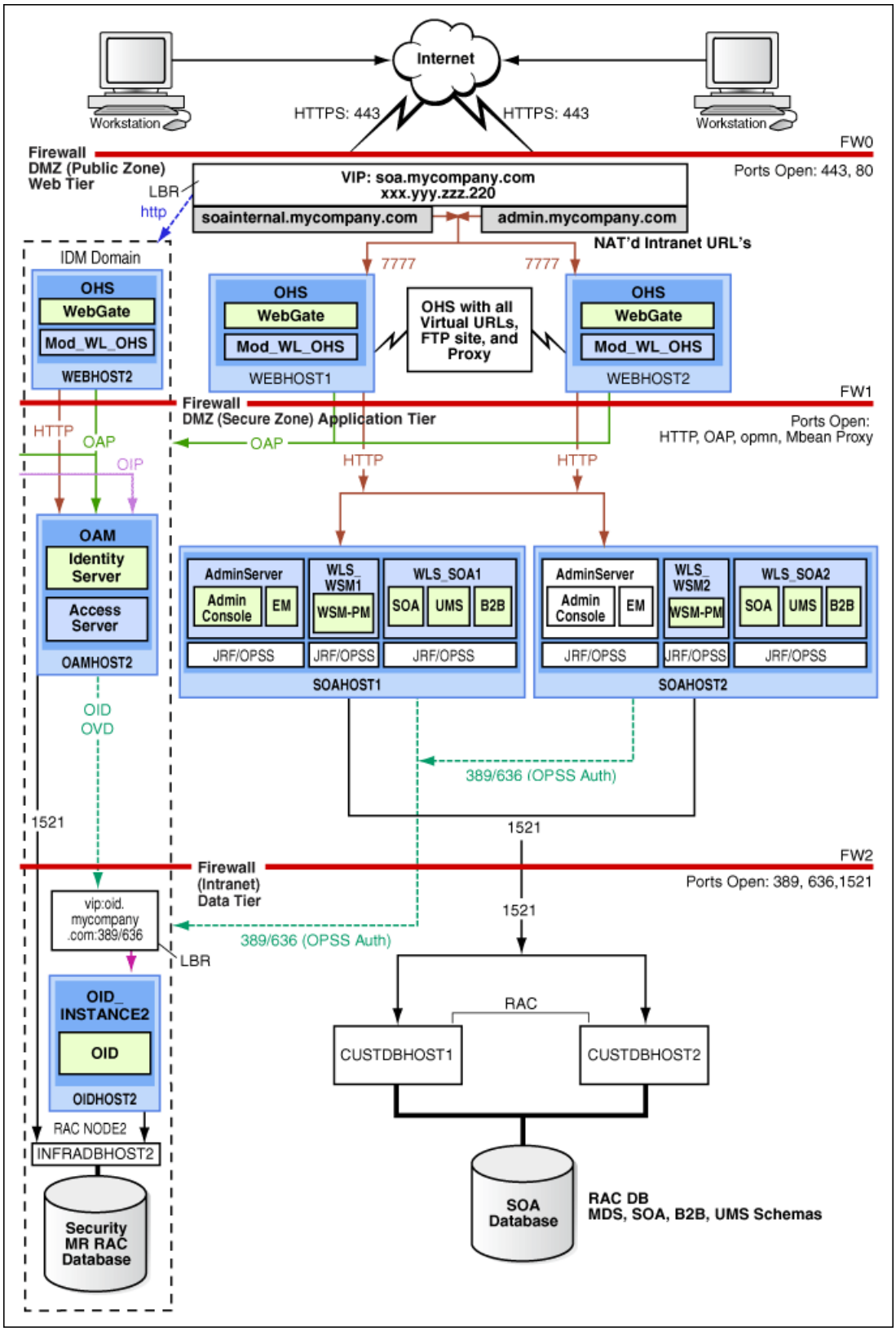
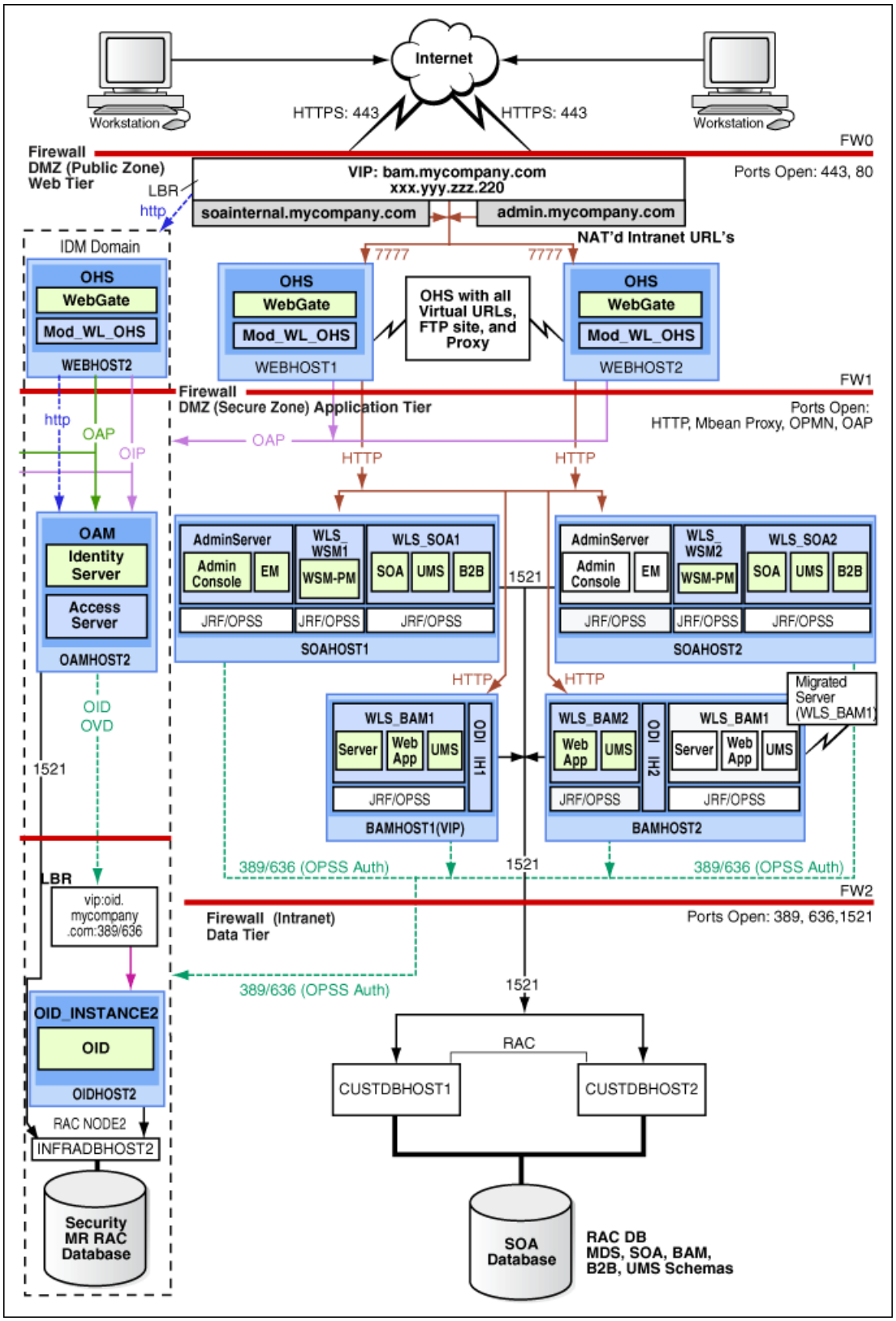


***Figure 1–2 MySOACompany Topology with Oracle Access Manager and Business Activity Monitoring***




This section covers these topics:

- Section 1.5.1, "Oracle Identity Management"
- Section 1.5.2, "Web Tier"
- Section 1.5.3, "Application Tier"
- Section 1.5.4, "Data Tier"
- Section 1.5.5, "What to Install"
- Section 1.5.6, "Unicast Requirement"

## 1.5.1 Oracle Identity Management

Integration with the Oracle Identity Management system is an important aspect of the enterprise deployment architecture. This integration provides features such as single sign-on, integration with OPSS, centralized identity and credential store, authentication for the WebLogic domain, and so on. The IDM EDG is separate from this EDG and exists in a separate domain by itself. For more information on identity management in an enterprise deployment context, see *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management*.

The primary interface to the IDM EDG is the LDAP traffic to the LDAP servers, the OAP (Oracle Access Protocol) to the OAM Access Servers, and the HTTP redirection of authentication requests.

## 1.5.2 Web Tier

Nodes in the web tier are located in the DMZ public zone.

In this tier, two nodes WEBHOST1 and WEBHOST2 run Oracle HTTP Server configured with WebGate and mod_wl_ohs.

Through mod_wl_ohs, which allows requests to be proxied from Oracle HTTP Server to WebLogic Server, Oracle HTTP Server forwards the requests to WebLogic Server running in the application tier.

WebGate (which is an Oracle Access Manager component) in Oracle HTTP Server uses Oracle Access Protocol (OAP) to communicate with Oracle Access Manager running on OAMHOST2, in the Identity Management DMZ. WebGate and Oracle Access Manager are used to perform operations such as user authentication.

The web tier also includes a load balancer router to handle external requests. External requests are sent to the virtual host names configured on the load balancer. The load balancer then forwards the requests to Oracle HTTP Server.

The WebGate module in Oracle HTTP Server uses Oracle Access Protocol (OAP) to communicate with Oracle Access Manager to perform operations such as querying user groups.

On the firewall protecting the web tier, only the HTTP ports are open: 443 for HTTPS and 80 for HTTP.

### 1.5.2.1 Load Balancer Requirements

This enterprise topology uses an external load balancer. This external load balancer should have the following features:

- Ability to load-balance traffic to a pool of real servers through a virtual host name: Clients access services using the virtual host name (instead of using actual host names). The load balancer can then load balance requests to the servers in the pool.

- Port translation configuration should be possible so that incoming requests on the virtual host name and port are directed to a different port on the backend servers.
- Monitoring of ports on the servers in the pool to determine availability of a service.
- Virtual servers and port configuration: Ability to configure virtual server names and ports on your external load balancer, and the virtual server names and ports must meet the following requirements:
  - The load balancer should allow configuration of multiple virtual servers. For each virtual server, the load balancer should allow configuration of traffic management on more than one port. For example, for Oracle HTTP Server in the web tier, the load balancer needs to be configured with a virtual server and ports for HTTP and HTTPS traffic.
  - The virtual server names must be associated with IP addresses and be part of your DNS. Clients must be able to access the external load balancer through the virtual server names.
- Ability to detect node failures and immediately stop routing traffic to the failed node.
- Fault-tolerant mode: It is highly recommended that you configure the load balancer to be in fault-tolerant mode.
- It is highly recommended that you configure the load balancer virtual server to return immediately to the calling client when the backend services to which it forwards traffic are unavailable. This is preferred over the client disconnecting on its own after a timeout based on the TCP/IP settings on the client machine.
- Sticky routing capability: Ability to maintain sticky connections to components. Examples of this include cookie-based persistence, IP-based persistence, and so on.
- The load balancer should be able to terminate SSL requests at the load balancer and forward traffic to the backend real servers using the equivalent non-SSL protocol (for example, HTTPS to HTTP). Typically, this feature is called SSL acceleration and it is required for this EDG.

### 1.5.3 Application Tier

Nodes in the application tier are located in the DMZ secure zone.

In this tier, two nodes SOAHOST1 and SOAHOST2 run Oracle WebLogic Server configured with managed servers for running SOA components such as BPEL Process Manager and B2B. The managed servers are configured in an active-active manner.

BAMHOST1 and BAMHOST2 run the BAM Server and BAM Web Applications.

SOAHOST1 and SOAHOST2 also run the Oracle WebLogic Server Administration Console and Oracle Enterprise Manager Fusion Middleware Control, but in an active-passive configuration. You can fail over the Administration Server manually (see Section 4.22, "Manually Failing Over the Administration Server to SOAHOST2"); alternatively you can configure the Oracle WebLogic Server Administration Console with CFC/CRS to fail over automatically on a separate hardware cluster (not shown in this architecture).

Oracle Web Services Manager (Oracle WSM) provides a policy framework to manage and secure Web services in the EDG topology. WSM Policy Manager also runs in active-active configuration in two additional WebLogic Servers.

On the firewall protecting the application tier, the HTTP ports, OAP port, and proxy port are open. The OAP port is for the WebGate module running in Oracle HTTP Server in the web tier to communicate with Oracle Access Manager. Applications requiring external HTTP access use Oracle HTTP Server as the proxy. (The proxy on the Oracle HTTP Server must be enabled to allow this access.)

### 1.5.4 Data Tier

Nodes in the data tier are located in the most secured network zone (the intranet).

In this tier, an RAC database runs on the nodes CUSTDBHOST1 and CUSTDBHOST2. The database contains the schemas needed by the SOA and BAM components. The BAM and SOA components running in the application tier access this database.

On the firewall protecting the data tier, the database listener port (typically, 1521) is required to be open. The LDAP ports (typically, 389 and 636) are also required to be open for the traffic accessing the LDAP storage in the IDM EDG.

### 1.5.5 What to Install

Table 1–2 identifies the source for installation of each software component. For more information, see *Oracle Fusion Middleware Installation Guide for Oracle SOA Suite* and *Oracle Fusion Middleware Installation Guide for Oracle WebCenter*.

***Table 1–2 Components and Installation Sources***

| Component | Distribution Medium |
|---|---|
| Oracle Database 10*g* or 11*g* | Oracle Database CD (in 10*g* series, 10.2.0.4 or higher; in 11*g* series, 11.1.0.7 or higher) |
| Repository Creation Utility (RCU) | Oracle Fusion Middleware Repository Creation Utility 11*g* (11.1.1.1.0) DVD |
| Oracle WebLogic Server (WLS) | Oracle Weblogic Server (10.3.1) DVD |
| Oracle HTTP Server | Oracle Fusion Middleware WebTier and Utilities 11*g* (11.1.1.1.0) DVD |
| Oracle SOA Suite | Oracle SOA Suite 11g (11.1.1.1.0) DVD |
| Oracle Business Activity Monitor (BAM) | Oracle Fusion Middleware 11*g* (11.1.1.1.0) DVD |
| Oracle Access Manager 10*g* Webgate | Oracle Access Manager 10*g* Webgates (10.1.4.3.0) DVD ; OAM OHS 11*g* webgates per platform |
| Oracle Virtual Directory (OVD) | Oracle Identity Management 11*g* (11.1.1.1.0) DVD |

### 1.5.6 Unicast Requirement

Oracle recommends that the nodes in the mySOACompany topology communicate using unicast. Unlike multicast communication, unicast does not require cross-network configuration and it reduces potential network errors that can occur from multicast address conflicts as well.

The following considerations apply when using unicast to handle cluster communications:

- All members of a WebLogic cluster must use the same message type. Mixing between multicast and unicast messaging is not allowed.
- Individual cluster members cannot override the cluster messaging type.
- The entire cluster must be shut down and restarted to change the message modes (from unicast to multicast or from multicast to unicast).
- JMS topics configured for multicasting can access WebLogic clusters configured for unicast because a JMS topic publishes messages on its own multicast address

that is independent of the cluster address. However, the following considerations apply:

- The router hardware configurations that allow unicast clusters may not allow JMS multicast subscribers to work.
- JMS multicast subscribers need to be in a network hardware configuration that allows multicast accessibility. (That is, JMS subscribers must be in a muticast-enabled network to access multicast topics.)

## 1.6 How to Use This Guide

This section covers the following topics:

- Section 1.6.1, "Installation and Configuration Procedure"
- Section 1.6.2, "Overview of Installation Strategies"

### 1.6.1 Installation and Configuration Procedure

Table 1–3 summarizes the process by which you install and configure SOA EDG. Follow the procedures indicated in the first column, in the order shown, for the chosen configuration.

**Note:** This document focuses on enterprise deployments in Linux environments, but enterprise deployments can also be implemented in UNIX and Windows environments.

***Table 1–3 SOA Installation Procedures***

| Perform the steps in... | To configure a domain with only Admin Server and WSM-PM | To configure a domain with Admin Server, WSM-PM, and to extend a domain with a SOA cluster | To configure a domain with Admin Server, WSM-PM, and BAM cluster | To configure a domain with Admin Server, WCM-PM, SOA cluster, and BAM cluster | To configure Admin Server and BAM without SOA |
|---|---|---|---|---|---|
| Chapter 2, "Database and Environment Preconfiguration" | Yes | Yes | Yes | Yes | Yes |
| Chapter 3, "Installing Oracle HTTP Server" | Yes | Yes | Yes | Yes | Yes |
| Chapter 4, "Creating a Domain" | Yes | Yes | Yes | Yes | Yes |

*Table 1–3 (Cont.) SOA Installation Procedures*

| Perform the steps in... | To configure a domain with only Admin Server and WSM-PM | To configure a domain with Admin Server, WSM-PM, and to extend a domain with a SOA cluster | To configure a domain with Admin Server, WSM-PM, and BAM cluster | To configure a domain with Admin Server, WCM-PM, SOA cluster, and BAM cluster | To configure Admin Server and BAM without SOA |
|---|---|---|---|---|---|
| Chapter 5, "Extending the Domain for SOA Components" | No | Yes | No | Yes | No |
| Chapter 6, "Extending the Domain to Include BAM" | No | No | Yes | Yes | Yes |
| Chapter 7, "Setting Up Node Manager" | Recommended (optional depending on the type of security required for the application tier) | Yes | Yes (for production environments) | Recommended (optional depending on the type of security required for the application tier) | Yes (for production environments) |

## 1.6.2 Overview of Installation Strategies

The Configuration Wizard enables you to extend the Oracle WebLogic domain by adding only the needed components; rather than using the Configuration Wizard to create SOA components and the Oracle Business Monitoring (BAM) components along with the domain that includes the Administration Server, Enterprise Manager, and WSM-PM in a single pass, you can instead create the domain and its Administration Server, Enterprise Manager, and WSM-PM in one pass of the Configuration Wizard and then extend the domain by adding only the SOA components (or if needed, only the BAM components) in a subsequent pass. Using this incremental approach, you can verify the installation of the servers and perform specific validations after each pass of the Configuration Wizard. In general, Oracle recommends the following approach:

1. Run a first pass of the Configuration Wizard to install the Administration Server, Enterprise Manager, and WSM-PM (described in Chapter 4, "Creating a Domain").
2. Run a second pass of the Configuration Wizard to install the SOA components (described in Chapter 5, "Extending the Domain for SOA Components").
3. Optionally, run a third pass to install the BAM components (described in Chapter 6, "Extending the Domain to Include BAM").

Oracle recommends this modular approach in order to facilitate the verification of individual components one by one. This building block approach simplifies the troubleshooting during the setup process and facilitates the configuration in smaller steps.

Some variation from the above topology is possible. For example, if a deployment chooses to install BAM alone, then only sections applicable extend with BAM need to be followed. Also, in this case, it is expected that the Adminserver will exist on BAMHOST1 instead and the instructions on creating the domain should be modified appropriately.

# 2

# 2Database and Environment Preconfiguration

This chapter describes database and network environment preconfiguration required by the SOA enterprise topology. This chapter contains the following sections:

- Section 2.1, "Database"
- Section 2.2, "Network"
- Section 2.3, "Shared Storage and Recommended Directory Structure"

## 2.1 Database

For the SOA enterprise topology, the database contains the Oracle Fusion Middleware Repository, which is a collection of schemas used by various Oracle Fusion Middleware components, such as the SOA components, BAM, and OWSM. This database is separate from the Identity Management database, which is used in Identity Management EDG by components such as Oracle Internet Directory, DIP, and so on.

You must install the Oracle Fusion Middleware Repository before you can configure the Oracle Fusion Middleware components. You install the Oracle Fusion Middleware metadata repository into an existing database using the Repository Creation Utility (RCU), which is available from the RCU DVD or from the location listed in Table 1–2. For the enterprise topology, a Real Application Clusters (RAC) database is highly recommended.

When you configure the SOA components, the configuration wizard will prompt you to enter the information for connecting to the database that contains the metadata repository.

This section covers the following topics:

- Section 2.1.1, "Setting Up the Database"
- Section 2.1.2, "Loading the Oracle Fusion Metadata Repository in the RAC Database"
- Section 2.1.4, "Backing Up the Database"

### 2.1.1 Setting Up the Database

Before loading the metadata repository into your database, check that the database meets the requirements described in these subsections:

- Section 2.1.1.1, "Database Host Requirements"
- Section 2.1.1.2, "Supported Database Versions"
- Section 2.1.1.3, "Initialization Parameters"

- Section 2.1.1.4, "Database Services"

#### 2.1.1.1 Database Host Requirements

On the hosts CUSTDBHOST1 and CUSTDBHOST2 in the data tier, note the following requirements:

- **Oracle Clusterware**

  For 11*g* Release 1 (11.1) for Linux, refer to the *Oracle Clusterware Installation Guide for Linux*.

- **Oracle Real Application Clusters**

  For 11*g* Release 1 (11.1) for Linux, refer to the *Oracle Real Application Clusters Installation Guide for Linux.* For 10*g* Release 2 (10.2) for Linux, refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide*.

- **Automatic Storage Management** (optional)

  ASM gets installed for the node as a whole. It is recommended that you install it in a separate Oracle Home from the Database Oracle Home. This option comes in at runInstaller. In the Select Configuration page, select the Configure Automatic Storage Management option to create a separate ASM home.

#### 2.1.1.2 Supported Database Versions

The following versions of the Oracle Database are supported:

- **Oracle Database 11g (11.1.0.7 or higher).** It is recommended to use the Enterprise Edition version, particularly if a Disaster Recovery site is planned or expected.
- **Oracle Database 10g (10.2.0.4 or higher).** Oracle Database 10*g* Express Edition (Oracle Database XE) is not supported in Oracle Fusion Middleware 11*g* release 1. It is recommended to use the Enterprise Edition version, particularly if a Disaster Recovery site is planned or expected.

To check the release of your database, you can query the `PRODUCT_COMPONENT_VERSION` view as follows:

```
SQL> SELECT VERSION FROM SYS.PRODUCT_COMPONENT_VERSION WHERE
PRODUCT LIKE 'Oracle%';
```

#### 2.1.1.3 Initialization Parameters

Ensure that the following initialization parameter is set to the required minimum value. It is checked by Repository Creation Assistant.

***Table 2–1 Required Initialization Parameters***

| Configuration | Parameter | Required Value | Parameter Class |
|---|---|---|---|
| SOA | `PROCESSES` | 300 or greater | Static |
| BAM | `PROCESSES` | 100 or greater | Static |
| SOA and BAM | `PROCESSES` | 400 or greater | Static |

To check the value of the initialization parameter using SQL*Plus, you can use the SHOW PARAMETER command.

As the SYS user, issue the SHOW PARAMETER command as follows:

```
SQL> SHOW PARAMETER processes
```

Set the initialization parameter using the following command:

```
SQL> ALTER SYSTEM SET processes=300 SCOPE=SPFILE;
```

Restart the database.

> **Note:** The method that you use to change a parameter's value depends on whether the parameter is static or dynamic, and on whether your database uses a parameter file or a server parameter file. See the *Oracle Database Administrator's Guide* for details on parameter files, server parameter files, and how to change parameter values.

#### 2.1.1.4 Database Services

Oracle recommends using the Oracle Enterprise Manager Cluster Managed Services Page to create database services that client applications will use to connect to the database. For complete instructions on creating database services, see the chapter on workload management in the *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Administration and Deployment Guide*.

You can also use SQL*Plus to configure this using the following instructions:

1. Use the `CREATE_SERVICE` subprogram to create the `soaedg.mycompany.com` database service. Log on to SQL*Plus as the sysdba user and run the following command:

   ```
   SQL> EXECUTE DBMS_SERVICE.CREATE_SERVICE
   (SERVICE_NAME => 'soaedg.mycompany.com',
   NETWORK_NAME => 'soaedg.mycompany.com',
   );
   ```

2. Add the service to the database and assign it to the instances using `srvctl`:

   ```
   prompt> srvctl add service -d soadb -s soaedg -r soadb1,soadb2
   ```

3. Start the service using `srvctl`:

   ```
   prompt> srvctl start service -d soadb -s soaedg
   ```

> **Note:** For more information about the SRVCTL command, see the *Oracle Real Application Clusters Administration and Deployment Guide*.

Oracle recommends that a specific database service be used for a product suite, even when they share the same database. It is also recommended that the database service used is different than the default database service. In this case, the database is *soadb.mycompany.com* and the default service is one with the same name. The SOA install is configured to use the service *soaedg.mycompany.com*. It is recommended that a service named *bamedg.mycompany.com* is used for BAM.

### 2.1.2 Loading the Oracle Fusion Metadata Repository in the RAC Database

To load the Oracle Fusion Middleware Repository into a database, complete these steps:

1. Start Repository Creation Utility (RCU), which is available from the RCU DVD or from the location listed in Table 1–2, by first inserting the RCU DVD.
2. Start RCU from the *bin* directory:

**./rcu**

3. In the Welcome screen, click **Next**.
4. In the Create Repository screen, select **Create** to load component schemas into a database. Click **Next**.
5. In the Database Connection Details screen, enter connect information for your database:
   - **Database Type**: select **Oracle Database**.
   - **Host Name**: Enter the name of the node that is running the database. For the RAC database, specify the VIP name or one of the node names as the host name: `CUSTDBHOST1-VIP`.
   - **Port**: Enter the port number for the database: 1521.
   - **Service Name**: Enter the service name of the database: soaedg.mycompany.com
   - **Username**: `SYS`
   - **Password**: Enter the password for the SYS user.
   - **Role**: `SYSDBA`

   Click **Next**.
6. If you get this warning message: The database you are connecting is with non-UTF8 charset, if you are going to use this database for multilingual support, you may have data loss. If you are not using for multilingual support you can continue, otherwise we strongly recommend using UTF-8 database.

   Click **Ignore** or **Stop**.
7. In the Select Components screen, do the following:
   - Select **Create a New Prefix**, and enter a prefix to use for the database schemas. Example: `DEV` or `PROD`. Prefixes are used to create logical groupings of multiple repositories in a database. For more information, see *Oracle Fusion Middleware Repository Creation Utility User's Guide*.

     **Tip:** Note the name of the schema because the upcoming steps require this information.

   - Select the following:
     – AS Common Schemas:

       - **Metadata Services**

     – SOA Infrastructure:

       - **SOA Infrastructure**

       - **User Messaging**

       - **Business and Activity Monitoring**

     **Note:** Business Activity Monitoring (BAM) is only required for BAM installations as described in Chapter 6, "Extending the Domain to Include BAM."

Click **Next**.

8. In the Schema Passwords screen, enter passwords for the main and additional (auxiliary) schema users, and click **Next**.
9. In the Map Tablespaces screen, choose the tablespaces for the selected components, and click **Next**.
10. In the Summary screen, click **Create**.
11. In the Completion Summary screen, click **Close**.

### 2.1.3 Configuring SOA Schemas for Transactional Recovery Privileges

You need the appropriate database privileges to allow the Oracle WebLogic Server transaction manager to query for transaction state information and issue the appropriate commands, such as commit and rollback, during recovery of in-flight transactions after a WebLogic Server container crash.

To configure the SOA schemas for transactional recovery privileges:

1. Log on to sqlplus as a user with sysdba privileges. For example:

```
sqlplus "/ as sysdba"
```

2. Grant select on sys.dba_pending_transactions to **soaedg_soainfra**.
3. Grant force any transaction to **soaedg_soainfra**.

> **Note:** These privileges should be granted to the owner of the soainfra schema, as determined by the RCU operations.

### 2.1.4 Backing Up the Database

After you have loaded the metadata repository in your database, you should make a backup.

Backing up the database is for the explicit purpose of quick recovery from any issue that may occur in the further steps. You can choose to use your backup strategy for the database for this purpose or simply take a backup using OS tools or RMAN for this purpose. It is recommended to use Oracle Recovery Manager for the database, particularly if the database was created using Oracle ASM. If possible, a cold backup using operating system tools such as tar can also be performed.

## 2.2 Network

This section covers the following topics:

- Section 2.2.1, "Virtual Server Names"
- Section 2.2.2, "Load Balancers"
- Section 2.2.3, "IPs and Virtual IPs"
- Section 2.2.4, "Firewalls and Ports"

### 2.2.1 Virtual Server Names

The SOA enterprise topology uses the following virtual server names:

- Section 2.2.1.1, "soa.mycompany.com"

- Section 2.2.1.2, "admin.mycompany.com"
- Section 2.2.1.3, "soainternal.mycompany.com"

Ensure that the virtual server names are associated with IP addresses and are part of your DNS. The nodes running Oracle Fusion Middleware must be able to resolve these virtual server names.

#### 2.2.1.1 soa.mycompany.com

`soa.mycompany.com` is a virtual server name that acts as the access point for all HTTP traffic to the runtime SOA components, such as soa-infra, workflow, and B2B. Traffic to SSL is configured. Clients access this service using the address `soa.mycompany.com:443`. This virtual server is defined on the load balancer.

#### 2.2.1.2 admin.mycompany.com

`admin.mycompany.com` is a virtual server name that acts as the access point for all internal HTTP traffic that is directed to administration services such as WebLogic Administration Server Console and Oracle Enterprise Manager.

The incoming traffic from clients is not SSL-enabled. Clients access this service using the address `admin.mycompany.com:80` and the requests are forwarded to port 7777 on WEBHOST1 and WEBHOST2.

This virtual server is defined on the load balancer.

#### 2.2.1.3 soainternal.mycompany.com

`soainternal.mycompany.com` is a virtual server name used for internal invocations of SOA services. This url is not exposed to the internet and is only accessible from the intranet. (For SOA systems, users can set this while modeling composites or at runtime with the appropriate EM/MBeans, as the url to be used for internal services invocations.)

The incoming traffic from clients is not SSL-enabled. Clients access this service using the address `soainternal.mycompany.com:80` and the requests are forwarded to port 7777 on WEBHOST1 and WEBHOST2.

This virtual server is defined on the load balancer.

### 2.2.2 Load Balancers

This enterprise topology uses an external load balancer. For more information on load balancers, see Section 1.5.2, "Web Tier."

> **Note:** The Oracle Technology Network (`http://www.oracle.com/technology/index.html`) provides a list of validated load balancers and their configuration at `http://www.oracle.com/technology/products/ias/hi_av/Tested_LBR_FW_SSLAccel.html`.

#### 2.2.2.1 Configuring the Load Balancer

To configure the load balancer, complete these steps:

1. Create a pool of servers. You will assign this pool to virtual servers.
2. Add the addresses of the Oracle HTTP Server hosts to the pool. For example:
   - WEBHOST1:7777

- WEBHOST2:7777

3. Configure a virtual server in the load balancer for `soa.mycompany.com:443`.
   - For this virtual server, use your system's frontend address as the virtual server address (for example, `soa.mycompany.com`). The frontend address is the externally facing host name used by your system and that will be exposed in the Internet.
   - Configure this virtual server with port 80 and port 443. Any request that goes to port 80 should be redirected to port 443.
   - Specify ANY as the protocol (non-HTTP protocols are required for B2B).
   - Enable address and port translation.
   - Enable reset of connections when services and/or nodes are down.
   - Assign the pool created in step 1 to the virtual server.
   - Create rules to filter out access to `/console` and `/em` on this virtual server.
4. Configure a virtual server in the load balancer for `admin.mycompany.com:80`.
   - For this virtual server, use your internal administration address as the virtual server address (for example, `admin.mycompany.com`). This address is typically not externalized.
   - Specify HTTP as the protocol.
   - Enable address and port translation.
   - Enable reset of connections when services and/or nodes are down.
   - Assign the pool created in step 1 to the virtual server.
5. Configure a virtual server in the load balancer for `soainternal.mycompany.com:80`.
   - For this virtual server, use your internal administration address as the virtual server address (for example, `soainternal.mycompany.com`). This address is typically not externalized.
   - Specify HTTP as the protocol.
   - Enable address and port translation.
   - Enable reset of connections when services and/or nodes are down.
   - Assign the pool created in step 1 to the virtual server.
   - Optionally, create rules to filter out access to `/console` and `/em` on this virtual server.
6. Configure monitors for the Oracle HTTP Server nodes to detect failures in these nodes.
   - Set up a monitor to regularly ping the "`/`" URL context.

     **Tip:** Use `GET /\n\n` instead if the Oracle HTTP Server's document root does not include `index.htm` and Oracle WebLogic Server returns a 404 error for "/".

   - For the ping interval, specify a value that does not overload your system. You can try 5 seconds as a starting point.

- For the timeout period, specify a value that can account for the longest time response that you can expect from your SOA system, that is, specify a value greater than the longest period of time any of your requests to HTTP servers can take.

### 2.2.3 IPs and Virtual IPs

Configure the Administration Server and the managed servers to listen on different virtual Ips and physical IPs as illustrated in Figure 2–1. As shown in this figure, each VIP and IP is attached to the WebLogic server that uses it. VIP1 is failed manually to restart the Administration Server in SOAHOST2. VIP2 and VIP3 fail over from SOAHOST1 to SOAHOST2 and from SOAHOST2 to SOAHOST1 respectively through Oracle WebLogic Server Migration feature. WLS_BAM1 also uses server migration to failover VIP4 from BAMHOST1 to BAMHOST2. See *Oracle Fusion Middleware High Availability Guide* for information on the WebLogic Server Migration feature. Physical IPs (non virtual) are fixed to each node. IP1 is the physical IP of SOAHOST1 and is used by the WLS_WSM1 WebServices Policy Manager server. IP2 is the physical IP of SOAHOST2 and is used by the WLS_WSM2 WebServices Policy Manager server. IP3 is the physical IP of BAMHOST2 and is used as the listen address by the WLS_BAM2 Server.

***Figure 2–1 IPs and VIPs Mapped to Administration Server and Managed Servers***

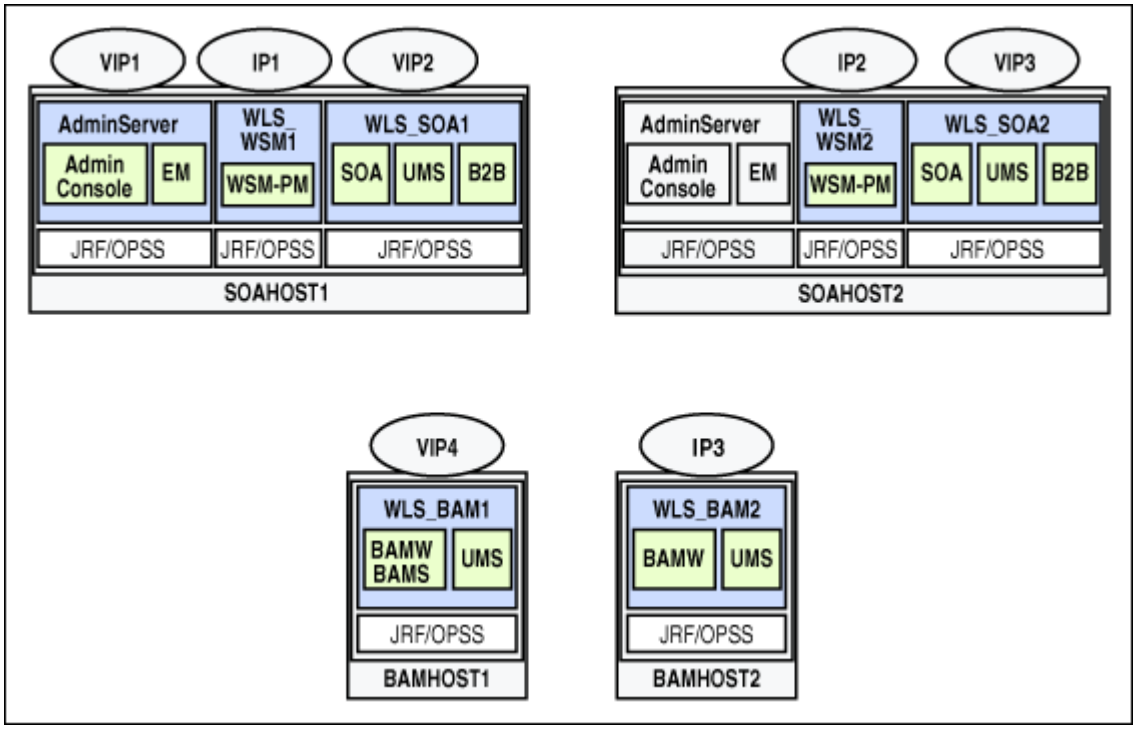



Table 2–2 provides descriptions of the various virtual hosts.

*Table 2–2 Virtual Hosts*

| Virtual IP | VIP Maps to... | Description |
|---|---|---|
| VIP1 | SOAHOST1VHN1 | SOAHOST1VHN1 is the virtual host name that is the listen address for the Administration Server and fails over with manual failover of the Administration Server. It is enabled on the node where the Administration Server process is running (SOAHOST1 by default). |
| VIP2 | SOAHOST1VHN2 | SOAHOST1VHN2 is the virtual host name that maps to the listen address for WLS_SOA1 and fails over with server migration of this managed server. It is enabled on the node where WLS_SOA1 process is running (SOAHOST1 by default). |
| VIP3 | SOAHOST2VHN1 | SOAHOST2VHN1 is the virtual host name that maps to the listen address for WLS_SOA2 and fails over with server migration of this managed server. It is enabled on the node where WLS_SOA2 process is running (SOAHOST2 by default). |
| VIP4 | BAMHOST1VHN1 | BAMHOST1VHN1 is the virtual host name that maps to the listen address for WLS_BAM1 and fails over with server migration of this managed server. It is enabled on the node where WLS_BAM1 process is running (BAMHOST1 by default). |

### 2.2.4 Firewalls and Ports

Many Oracle Fusion Middleware components and services use ports. As an administrator, you must know the port numbers used by these services, and to ensure that the same port number is not used by two services on a host.

Most port numbers are assigned during installation.

Table 2–3 lists the ports used in the SOA topology, including the ports that you must open on the firewalls in the topology.

Firewall notation:

- FW0 refers to the outermost firewall.
- FW1 refers to the firewall between the web tier and the application tier.
- FW2 refers to the firewall between the application tier and the data tier.

*Table 2–3 Ports Used*

| Type | Firewall | Port and Port Range | Protocol / Application | Inbound / Outbound | Other Considerations and Timeout Guidelines |
|---|---|---|---|---|---|
| Browser request | FW0 | 80 | HTTP / Load Balancer | Inbound | Timeout depends on all HTML content and the type of process model used for SOA. |
| Browser request | FW0 | 443 | HTTPS / Load Balancer | Inbound | Timeout depends on all HTML content and the type of process model used for SOA. |
| Load balancer to Oracle HTTP Server | n/a | 7777 | HTTP | n/a | See Section 2.2.2.1, "Configuring the Load Balancer." |

***Table 2–3 (Cont.) Ports Used***

| Type | Firewall | Port and Port Range | Protocol / Application | Inbound / Outbound | Other Considerations and Timeout Guidelines |
|---|---|---|---|---|---|
| OHS registration with Administration Server | FW1 | 7001 | HTTP/t3 | Inbound | Set the timeout to a short period (5-10 seconds). |
| OHS management by Administration Server | FW1 | OPMN port (6701) and OHS Admin Port (7779) | TCP and HTTP, respectively | Outbound | Set the timeout to a short period (5-10 seconds). |
| WSM-PM access | FW1 | 7010<br>Range: 7010 - 7999 | HTTP / WLS_ WSM-PM*n* | Inbound | Set the timeout to 60 seconds. |
| SOA Server access | FW1 | 8001<br>Range: 8000 - 8080 | HTTP / WLS_SOA*n* | Inbound | Timeout varies based on the type of process model used for SOA. |
| BAM access | FW1 | 9001<br>Range: 9000 - 9080 | HTTP / WLS_ BAM*n* | Inbound | Connections to BAM WebApps are kept open until the report/browser is closed, so set the timeout as high as the longest expected user session. |
| Communication between SOA Cluster members | n/a | 8001 | TCP/IP Unicast | n/a | By default, this communication uses the same port as the server's listen address. |
| Communication between WSM Cluster members | n/a | 7010 | TCP/IP Unicast | n/a | By default, this communication uses the same port as the server's listen address. |
| Session replication within a WebLogic Server cluster | n/a | n/a | n/a | n/a | By default, this communication uses the same port as the server's listen address. |
| Administration Console access | FW1 | 7001 | HTTP / Administration Server and Enterprise Manager<br>t3 | Both | You should tune this timeout based on the type of access to the admin console (whether it is planned to use the Oracle WebLogic Server Administration Console from application tier clients or clients external to the application tier). |
| Node Manager | n/a | 5556 | TCP/IP | n/a | n/a<br>For actual values, see "Firewalls and Ports" in *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management*. |

*Table 2–3 (Cont.) Ports Used*

| Type | Firewall | Port and Port Range | Protocol / Application | Inbound / Outbound | Other Considerations and Timeout Guidelines |
|---|---|---|---|---|---|
| Access Server access | FW1 | 6021 | OAP | Inbound | For actual values, see "Firewalls and Ports" in Oracle Fusion *Middleware Enterprise Deployment Guide for Oracle Identity Management*. |
| Identity Server access | FW1 | 6022 | OAP | Inbound | |
| Database access | FW2 | 1521 | SQL*Net | Both | Timeout depends on all database content and on the type of process model used for SOA. |
| Coherence for deployment | n/a | 8088<br>Range: 8080 - 8090 | | n/a | n/a |
| Oracle Internet Directory access | FW2 | 389 | LDAP | Inbound | You should tune the directory server's parameters based on load balancer, and not the other way around. |
| Oracle Internet Directory access | FW2 | 636 | LDAP SSL | Inbound | You should tune the directory server's parameters based on load balancer, and not the other way around. |
| JOC for OWSM | n/a | 9991 | TCP/IP | n/a | n/a |

**Note:** The TCP/IP port for B2B is a user-configured port and is not predefined. Similarly, the firewall ports depend on the definition of TCP/IP ports.

## 2.3 Shared Storage and Recommended Directory Structure

This following section details the directories and directory structure that Oracle recommends for an EDG topology. Other directory layouts are possible and supported, but the model adopted in this guide is chosen for maximum availability, providing both the best isolation of components and symmetry in the configuration and facilitating backup and disaster recovery. The rest of the document uses this directory structure and directory terminology.

This section covers these topics:

- Section 2.3.1, "Terminology for Directories and Directory Environment Variables"
- Section 2.3.2, "Recommended Locations for the Different Directories"
- Section 2.3.3, "Shared Storage Configuration"

### 2.3.1 Terminology for Directories and Directory Environment Variables

- **ORACLE_BASE:** This environment variable and related directory path refers to the base directory under which Oracle products are installed.
- **MW_HOME:** This environment variable and related directory path refers to the location where Fusion Middleware (FMW) resides.
- **WL_HOME:** This environment variable and related directory path contains installed files necessary to host a WebLogic Server.
- **ORACLE_HOME:** This environment variable and related directory path refers to the location where Oracle FMW SOA Suite is installed.
- **ORACLE_COMMON_HOME**: This environment variable and related directory path refers to the Oracle home that contains the binary and library files required for the Oracle Enterprise Manager Fusion Middleware Control and Java Required Files (JRF).
- **DOMAIN Directory:** This directory path refers to the location where the Oracle WebLogic Domain information (configuration artifacts) is stored. Different WLS Servers can use different domain directories even when in the same node as described below.
- **ORACLE_INSTANCE:** An Oracle instance contains one or more system components, such as Oracle Web Cache, Oracle HTTP Server, or Oracle Internet Directory. An Oracle instance directory contains updateable files, such as configuration files, log files, and temporary files.

### 2.3.2 Recommended Locations for the Different Directories

Oracle Fusion Middleware 11*g* allows creating multiple SOA servers from one single binary installation. This allows the installation of binaries in a single location on a shared storage and the reuse of this installation by the servers in different nodes. However, for maximum availability, Oracle recommends using redundant binary installations. In the EDG model, two MW HOMEs (each of which has a WL_HOME and an ORACLE_HOME for each product suite) are installed in a shared storage. Additional servers (when scaling out or up) of the same type can use either one of these two locations without requiring more installations. Ideally, users should use two different volumes (referred to as VOL1 and VOL2 below) for redundant binary location, thus isolating as much as possible the failures in each volume. For additional protection, Oracle recommends that these volumes are disk mirrored. If multiple volumes are not available, Oracle recommends using mount points to simulate the same mount location in a different directory in the shared storage. Although this does not guarantee the protection that multiple volumes provide, it does allow protection from user deletions and individual file corruption.

When an ORACLE_HOME or a WL_HOME is shared by multiple servers in different nodes, it is recommended to maintain the Oracle Inventory and Middleware home list in those nodes updated for consistency in the installations and application of patches. To update the oraInventory in a node and "attach" an installation in a shared storage to it, use `ORACLE_HOME/oui/bin/attachHome.sh`. To update the Middleware home list to add or remove a WL_HOME, edit the `<user_home>/bea/ beahomelist` file. This would be required for any nodes installed additionally to the two ones used in this EDG. An example of the oraInventory and beahomelist updates is provided in the scale-out steps included in this guide.

Oracle recommends also separating the domain directory used by the Administration Server from the domain directory used by managed servers. This allows a symmetric configuration for the domain directories used by managed server, and isolates the

failover of the Administration Server. The domain directory for the Administration Server must reside in a shared storage to allow failover to another node with the same configuration. The managed servers' domain directories can reside in a local or shared storage.

It is possible to use a shared domain directory for all managed servers in different nodes or use one domain directory per node. Sharing domain directories for managed servers facilitates the scale-out procedures. In this case, the deployment should conform to the requirements (if any) of the storage system to facilitate multiple machines mounting the same shared volume.

All procedures that apply to multiple local domains apply to a single shared domain. Hence, this enterprise deployment guide uses a model where one domain directory is used per node. The directory can be local or reside in shared storage.

JMS file stores and JTA transaction logs need to be placed on a shared storage in order to ensure that they are available from multiple boxes for recovery in the case of a server failure or migration.

Based on the above assumptions, the following paragraphs describe the directories recommended. Wherever a shared storage location is directly specified, it is implied that shared storage is required for that directory. When using local disk or shared storage is optional the mount specification is qualified with "if using a shared disk." The shared storage locations are examples and can be changed as long as the provided mount points are used. However, Oracle recommends this structure in the shared storage device for consistency and simplicity.

**ORACLE_BASE:**

/u01/app/oracle

**MW_HOME (application tier):**

ORACLE_BASE/product/fmw

- Mount point: ORACLE_BASE/product/fmw
- Shared storage location: ORACLE_BASE/product/fmw (VOL1 and VOL2)

**MW_HOME (web tier):**

ORACLE_BASE/product/fmw/web

- Mount point: ORACLE_BASE/product/fmw
- Shared storage location: ORACLE_BASE/product/fmw (VOL1 and VOL2)

**WL_HOME:**

MW_HOME/wlserver_10.3

**ORACLE_HOME:**

MW_HOME/soa

**ORACLE_COMMON_HOME:**

MW_HOME/oracle_common

**ORACLE_INSTANCE:**

ORACLE_BASE/admin/<instance_name>

- If you are using a shared disk, the mount point on the machine is `ORACLE_BASE/admin/<instance_name>` mounted to `ORACLE_BASE/admin/<instance_name>` (VOL1).

> **Note:** `(VOL1)` is optional; you could also use `(VOL2)`.

**Domain Directory for Administration Server Domain Directory:**

ORACLE_BASE/admin/<domain_name>/aserver/<domain_name> (The last "domain_name" is added by config wizard)

- Mount point on machine: ORACLE_BASE/admin/<domain_name>/aserver
- Shared storage location: ORACLE_BASE/admin/<domain_name>/aserver

**Domain Directory for Managed Server Domain Directory:**

ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>

- If you are using a shared disk, the mount point on the machine is `ORACLE_BASE/admin/<domain_name>/mserver` mounted to `/ORACLE_BASE/admin/<domain_name>/Noden/mserver/` (each node uses a different domain directory for managed servers).

> **Note:** This procedure is really shared storage dependent. The above example is specific to NAS, but other storage types may provide this redundancy with different types of mappings.

**Location for JMS file-based stores and Tlogs (SOA only):**

ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/jms

ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/tlogs

- Mount point: ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/
- Shared storage location: ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/

**Location for Application Directory:**

ORACLE_BASE/admin/<domain_name>/apps

- Mount point: ORACLE_BASE/admin/<domain_name>/apps
- Shared storage location: ORACLE_BASE/admin/<domain_name>/aserver

Figure 2–2 shows this directory structure in a diagram.

***Figure 2–2 Directory Structure***

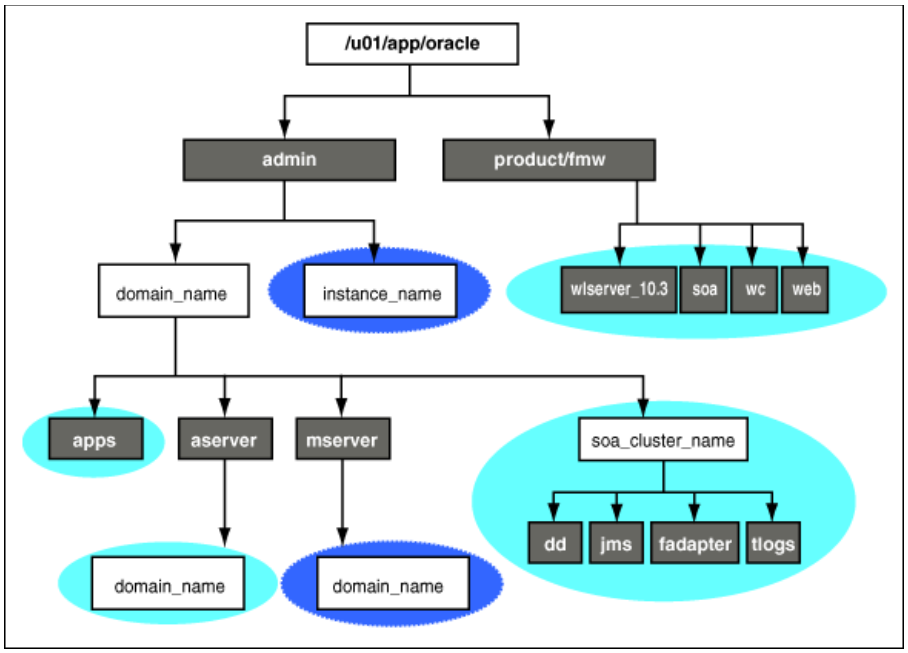



Diagram representation of the directory structure that is described in the text preceding this image.

**********

The directory structure in Figure 2–2 does not show other required internal directories, such as `oracle_common` and `jrockit`.

Table 2–4 explains what the various color-coded elements in the diagram mean.

***Table 2–4 Directory Structure Elements***

| Element | Explanation |
|---|---|
| | The Administration Server domain directories, applications, deployment plans, file adapter control directory, JMS and TX logs, and the entire MW_HOME are on a shared disk. |
| | The managed server domain directories can be on a local disk or a shared disk. Further, if you want to share the managed server domain directories on multiple nodes, then you must mount the same shared disk location across the nodes. The `instance_name` directory for the web tier can be on a local disk or a shared disk. |
| | Fixed name. |
| | Installation-dependent name. |

Figure 2–3 shows an example configuration for shared storage with multiple volumes for SOA. This can be extrapolated with the same structure for BAM deployments.

***Figure 2–3 Example Configuration for Shared Storage***

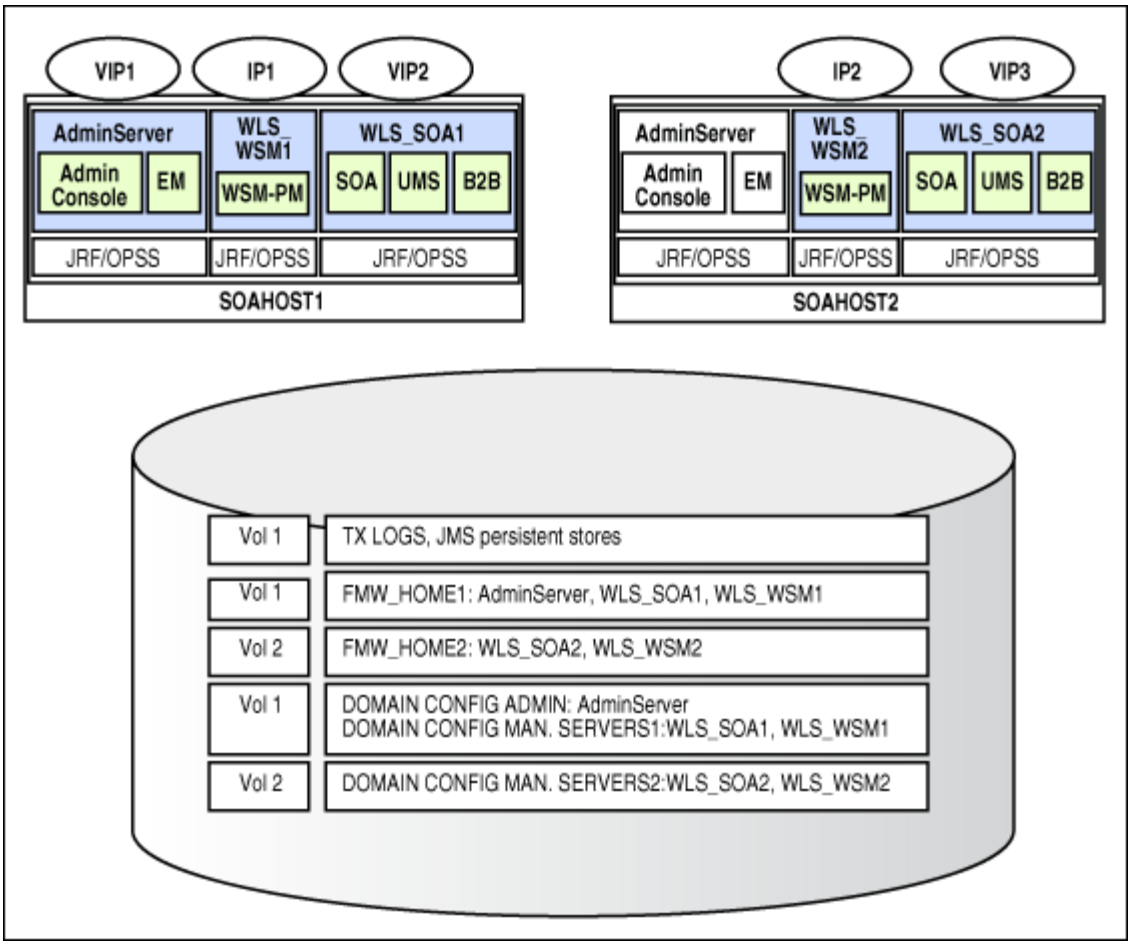



Table 2–5 summarizes the directory structure for the domain.

***Table 2–5 Contents of Shared Storage***

| Server | Type of Data | Volume in Shared Storage | Directory | Files |
|---|---|---|---|---|
| WLS_SOA1 | Tx Logs | VOL1 | ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/tlogs | The transaction directory is common (decided by WebLogic Server), but the files are separate. |
| WLS_SOA2 | Tx Logs | VOL1 | ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/tlogs | The transaction directory is common (decided by WebLogic Server), but the files are separate. |
| WLS_SOA1 | JMS Stores | VOL1 | ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/jms | The transaction directory is common (decided by WebLogic Server), but the files are separate; for example: SOAJMSStore1, UMSJMSStore1, and so on. |

*Table 2–5 (Cont.) Contents of Shared Storage*

| Server | Type of Data | Volume in Shared Storage | Directory | Files |
|---|---|---|---|---|
| WLS_SOA2 | JMS Stores | VOL1 | ORACLE_BASE/admin/<domain_name>/<soa_cluster_name>/jms | The transaction directory is common (decided by WebLogic Server), but the files are separate; for example: SOAJMSStore2, UMSJMSStore2, etc. |
| WLS_SOA1 | WLS Install | VOL1 | MW_HOME | Individual in each volume, but both servers see same directory structure. |
| WLS_SOA2 | WLS Install | VOL2 | MW_HOME | Individual in each volume, but both servers see same directory structure. |
| WLS_SOA1 | SOA Install | VOL1 | MW_HOME/ soa | Individual in each volume, but both servers see same directory structure. |
| WLS_SOA2 | SOA Install | VOL2 | MW_HOME/ soa | Individual in each volume, but both servers see same directory structure. |
| WLS_SOA1 | Domain Config | VOL1 | ORACLE_BASE/admin/<domain_name>/mserver/<domain_name> | Individual in each volume, but both servers see same directory structure. |
| WLS_SOA2 | Domain Config | VOL2 | ORACLE_BASE/admin/<domain_name>/mserver/<domain_name> | Individual in each volume, but both servers see same directory structure. |

### 2.3.3 Shared Storage Configuration

The following steps show to create and mount shared storage locations so that SOAHOST1 and SOAHOST2 can see the same location for binary installation in two separate volumes.

"nasfiler" is the shared storage filer.

**From SOAHOST1:**

```
SOAHOST1> mount nasfiler:/vol/vol1/u01/app/oracle/product/fmw
/u01/app/oracle/product/fmw -t nfs
```

**From SOAHOST2:**

```
SOAHOST2> mount nasfiler:/vol/vol2/u01/app/oracle/product/fmw
/u01/app/oracle/product/fmw -t nfs
```

If only one volume is available, users can provide redundancy for the binaries by using two different directories in the shared storage and mounting them to the same dir in the SOA Servers:

**From SOAHOST1:**

```
SOAHOST1> mount nasfiler:/vol/vol1/u01/app/oracle/product/fmw1
/u01/app/oracle/product/fmw -t nfs
```

**From SOAHOST2:**

```
SOAHOST2> mount nasfiler:/vol/vol2/u01/app/oracle/product/fmw2
```

```
/u01/app/oracle/product/fmw -t nfs
```

The following commands show how to share the SOA TX logs location across different nodes:

```
SOAHOST1> mount nasfiler:/vol/vol1/u01/app/oracle/stores/soadomain/soa_
cluster/tlogs
/u01/app/oracle/stores/soadomain/soa_cluster/tlogs -t nfs

SOAHOST2> nasfiler:/vol/vol1/u01/app/oracle/stores/soadomain/soa_cluster/tlogs
/u01/app/oracle/stores/soadomain/soa_cluster/tlogs -t nfs
```

**Note:** The shared storage can be a NAS or SAN device. The following illustrates an example of creating storage for a NAS device from SOAHOST1. The options may differ.

```
SOAHOST1> mount nasfiler:/vol/vol1/fmw11shared ORACLE_BASE/wls -t
nfs -o rw,bg,hard,nointr,tcp,vers=3,timeo=300,rsize=32768,
wsize=32768
```

Contact your storage vendor and machine administrator for the correct options for your environment.

## 2.4 LDAP as Credential and Policy Store

With Oracle Fusion Middleware, you can use different types of credential and policy stores in a WebLogic domain. Domains can use stores based on XML files or on different types of LDAP providers. When a domain uses an LDAP store, all policy and credential data is kept and maintained in a centralized store. However, when using XML policy stores, the changes made on managed servers are not propagated to the Administration Server unless they use the same domain home.

An Oracle Fusion Middleware SOA Suite Enterprise Deployment Topology uses different domain homes for the Administration Server and the managed server as described in the Section 2.3, "Shared Storage and Recommended Directory Structure." Derived from this, and for integrity and consistency purposes, Oracle requires the use of an LDAP as policy and credential store in context of Oracle Fusion Middleware SOA Suite Enterprise Deployment Topology. To configure the Oracle Fusion Middleware SOA Suite Enterprise Deployment Topology with an LDAP as Credential and Policy store, follow the steps in Section 9.1, "Credential and Policy Store Configuration."

# 3 Installing Oracle HTTP Server

You install and configure Oracle HTTP Server on nodes in the web tier.

This chapter contains the following sections:

- Section 3.1, "Installing Oracle HTTP Server on WEBHOST1 and WEBHOST2"
- Section 3.2, "Validating Oracle HTTP Server Through the Load Balancer"
- Section 3.3, "Backing Up Oracle HTTP Server"

## 3.1 Installing Oracle HTTP Server on WEBHOST1 and WEBHOST2

Follow these steps to install Oracle HTTP Server on WEBHOST1 and WEBHOST2:

1. Check that your machines meet the following requirements:
   - Ensure that the system, patch, kernel, and other requirements are met as specified in the installation guide.
   - Because Oracle HTTP Server is installed by default on port 7777, you must ensure that port 7777 is not used by any service on the nodes. To check if this port is in use, run the following command before installing Oracle HTTP Server. You must free the ports if they are in use.

     ```
     netstat -an | grep 7777
     ```
2. On Linux platforms, if the `/etc/oraInst.loc` file exists, check that its contents are correct. Specifically, check that the inventory directory is correct and that you have write permissions for that directory.

   If the `/etc/oraInst.loc` file does not exist, you can skip this step.
3. Start the Oracle Universal Installer from the Oracle Fusion Middleware 11*g* WebTier and Utilities DVD by issuing this command:

   ```
   runInstaller
   ```
4. If the Specify Inventory Directory screen appears, enter the location for the inventory and the user group and then click **OK**; otherwise, ignore steps 4 and 5 and continue with step 6.
5. Execute the root privileged actions as indicated in the dialog and then click **OK**.
6. In the **Welcome** screen, click **Next**.
7. In the **Select Installation Type** screen, select **Install and Configure**, and click **Next**.
8. In the **Prerequisite Checks** screen, ensure that all the prerequisites are met, then click **Next**.

9. In the **Specify Installation Location** screen, do the following:
   - On WEBHOST1, set the **Location** to:

     `MW_HOME/web`

   - On WEBHOST2, set the **Location** to:

     `MW_HOME/web`

   Click **Next**.
10. In the **Configure Components** screen, do the following:
    - Select **Oracle Http Server**.
    - Do *not* select **Oracle Web Cache**.
    - Do *not* select **Associate Selected Components with WebLogic Domain** because you have not yet installed WebLogic Server.

    Click **Next**.
11. In the **Specify Component Details** screen, do the following:
    - Enter the following values for WEBHOST1:
      - **Instance Home Location**: `ORACLE_BASE/admin/<instance_name>`
      - **Instance Name**: `ohs_instance1`
      - **OHS Component Name**: `ohs1`
    - Enter the following values for WEBHOST2:
      - **Instance Home Location**: `ORACLE_BASE/admin/<instance_name>`
      - **Instance Name**: `ohs_instance2`
      - **OHS Component Name**: `ohs2`

    Click **Next**.
12. In the **Configure Ports** screen, do the following:
    - Select **Specify Ports using Configuration File** and copy the *staticports.ini* template file from your installation disk (the file is located in the */Disk1/stage/Response* directory) to you user's home. Then use the **Browse** button to select this file.
    - Click **View/Edit File** to open the *staticports.ini* file in an editor.
    - Change the Oracle HTTP Server port in that file to 7777.
    - Save the file.

    Click **Next**.

    **Note:** For more information on setting ports, refer to *Oracle Fusion Middleware Installation Guide for Oracle SOA Suite*.
13. In the **Specify Security Updates** screen, enter your e-mail address to receive e-mail notifications of security issues (if required). Enter your Oracle Support Password to receive security updates through My Oracle Support.
14. In the **Installation Summary** screen, ensure that the selections are correct, and click **Install**.

15. In the **Configuration** screen, multiple configuration assistants are launched in succession, which can be a lengthy process. When it completes, the **Configuration Completed** screen appears.
16. In the **Installation Completed** screen, click **Finish** to exit.

## 3.2 Validating Oracle HTTP Server Through the Load Balancer

Define the directives of the `<VirtualHost>` section of the httpd.conf file on both OHS servers. This file is located in the `ORACLE_BASE/admin/<instance_name>/config/OHS/ohs1` (or `ohs2`) directory. Add the following entries to the file:

```
NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName https://soa.mycompany.com:443
    ServerAdmin you@your.address
    RewriteEngine On
    RewriteOptions inherit
</VirtualHost>

NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName admin.mycompany.com:80
    ServerAdmin you@your.address
    RewriteEngine On
    RewriteOptions inherit
</VirtualHost>

NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName soainternal.mycompany.com:80
    ServerAdmin you@your.address
    RewriteEngine On
    RewriteOptions inherit
</VirtualHost>
```

Make sure that you restart both OHS servers after modifying the `httpd.conf` files:

```
WEBHOST> cd ORACLE_BASE/admin/<instance_name>/bin
WEBHOST> opmnctl start
WEBHOST> opmnctl restartproc process-type=OHS
```

Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.

Access the following URLs to ensure that your load balancer and Oracle HTTP Server are configured properly:

- `http://soa.mycompany.com/index.html`
- `http://admin.mycompany.com/index.html`
- `http://soainternal.mycompany.com/index.html`

## 3.3 Backing Up Oracle HTTP Server

After you have verified that the Oracle HTTP Server installation is working, back up the installation. This is a quick backup for the express purpose of immediate restore in case of problems in the further steps. The backup destination is the local disk. This backup can be discarded once the enterprise deployment setup is complete. At this point, the regular deployment-specific backup and recovery process can be initiated. The *Oracle Fusion Middleware Administrator's Guide* provides further details. For information on describing the Oracle HTTP Server data that must be backed up and restored, refer to the "Backup and Recovery Recommendations for Oracle HTTP Server" section in this guide. For information on how to recover components, see "Recovery of Components" and "Recovery After Loss of Component" sections in the guide. For recommendations specific to recovering from the loss of a host, see the "Recovering Oracle HTTP Server to a Different Host" in the guide.

To back up the installation a this point, complete these steps:

1. Shut down the instance using `opmnctl`.

   ```
   ORACLE_BASE/admin/<instance_name>/bin/opmnctl stopall
   ```

2. Back up the Middleware Home on the web tier using the following command:

   ```
   tar -cvpf BACKUP_LOCATION/web.tar $MW_HOME
   ```

3. Back up the Instance Home on the web tier using the following command:

   ```
   tar -cvpf BACKUP_LOCATION/web_<instance_name>.tar $ORACLE_INSTANCE
   ```

4. Start the instance using `opmnctl`:

   ```
   ORACLE_BASE/admin/<instance_name>/bin/opmnctl startall
   ```

# 4

# 4Creating a Domain

This chapter describes how to create a domain using the Configuration Wizard, Oracle WebLogic Server Administration Console, Oracle Enterprise Manager, and Oracle WSM Policy Manager. You can extend the domain to add SOA components and, optionally, Oracle Business Activity Monitoring.

**Important: Oracle strongly recommends that you read the release notes for any additional installation and deployment considerations prior to starting the setup process.**

This chapter contains the following sections:


- Section 4.1, "Installing Oracle Fusion Middleware Home"
- Section 4.2, "Backing Up the Installation"
- Section 4.3, "Enabling VIP1 in SOAHOST1"
- Section 4.4, "Running the Configuration Wizard on SOAHOST1 to Create a Domain"
- Section 4.5, "Creating a Separate Domain Directory for Managed Servers in the Same Node as the Administration Server"
- Section 4.6, "Creating boot.properties for the Administration Server on SOAHOST1"
- Section 4.7, "Starting the Administration Server on SOAHOST1"
- Section 4.8, "Validating the Administration Server"
- Section 4.9, "Applying the Java Required Files (JRF) Template to the WSM-PM_Cluster"
- Section 4.10, "Disabling Host Name Verification for the Oracle WebLogic Administration Server and the WLS_WSM1 Managed Server"
- Section 4.11, "Starting Node Manager on SOAHOST1"
- Section 4.12, "Starting and Validating the WLS_WSM1 Managed Server"
- Section 4.13, "Propagating the Domain Configuration to SOAHOST2 Using the unpack Utility"
- Section 4.14, "Disabling Host Name Verification for the WLS_WSM2 Managed Server"
- Section 4.15, "Starting Node Manager on SOAHOST2"

- Section 4.16, "Starting and Validating the WLS_WSM2 Managed Server"
- Section 4.17, "Configuring the Java Object Cache for Oracle WSM"
- Section 4.18, "Configuring Oracle HTTP Server for the Administration Server and the WLS_WSM-PMn Managed Servers"
- Section 4.19, "Registering Oracle HTTP Server With WebLogic Server"
- Section 4.20, "Setting the Frontend URL for the Administration Console and Setting Redirection Preferences"
- Section 4.21, "Validating Access Through Oracle HTTP Server"
- Section 4.22, "Manually Failing Over the Administration Server to SOAHOST2"
- Section 4.23, "Validating Access to SOAHOST2 Through Oracle HTTP Server"
- Section 4.24, "Failing the Administration Server Back to SOAHOST1"
- Section 4.25, "Backing Up the Installation"

# 4.1 Installing Oracle Fusion Middleware Home

As described in Section 2.3, "Shared Storage and Recommended Directory Structure," you install Oracle Fusion Middleware in at least two storage locations for redundancy.

You must install the following components of Oracle Fusion Middleware:

- Oracle WebLogic Server (see Section 4.1.1, "Installing Oracle WebLogic Server")
- Oracle SOA Suite (see Section 4.1.2, "Installing Oracle Fusion Middleware for SOA")

## 4.1.1 Installing Oracle WebLogic Server

Perform these steps to install Oracle WebLogic Server on SOAHOST1 and SOAHOST2.

1. Start the Oracle WebLogic Server installer.
2. In the Welcome screen, click **Next**.
3. In the Choose Middleware Home Directory screen, do the following:
   - Select **Create a New Middleware Home**.
   - For Middleware Home Directory, enter **MW_HOME**.

     **Note:** ORACLE_BASE is the base directory under which Oracle products are installed. The recommended value is `/u01/app/oracle`. See Section 2.3, "Shared Storage and Recommended Directory Structure" for more information.

   Click **Next**.
4. In the Register for Security Updates screen, enter your contact information so that you can be notified of security updates, and click **Next**.
5. In the Choose Install Type screen, select **Custom**, and click **Next**.
6. In the Choose Products and Components screen, click **Next**.
7. In the JDK Selection screen, select *only* **Oracle JRockit 1.6.0_14 SDK**, and click **Next**.

8. In the Choose Product Installation Directories screen, accept the directory **WL_HOME**, and click **Next**.
9. In the Installation Summary screen, click **Next**.
10. In the Installation Complete screen, unselect **Run QuickStart**, and click **Done**.

### 4.1.2 Installing Oracle Fusion Middleware for SOA

Perform these steps to install Oracle Fusion Middleware for SOA on SOAHOST1 and SOAHOST2.

1. On Linux platforms, if the `/etc/oraInst.loc` file exists, check that its contents are correct. Specifically, check that the inventory directory is correct and that you have write permissions for that directory.

   If the `/etc/oraInst.loc` file does not exist, you can skip this step.

2. Start the installer for Oracle Fusion Middleware for SOA.

   ```
   SOAHOST1> runInstaller
   ```

   When the installer prompts you for a JRE/JDK location, enter the Oracle SDK location created in the Oracle WebLogic Server installation, for example, **MW_HOME/jrockit_160_14_R27.6.4-18**.

3. In the Specify Inventory Directory screen, do the following:

   a. Enter `HOME/oraInventory`, where `HOME` is the home directory of the user performing the installation (this is the recommended location).

   b. Enter the OS group for the user performing the installation.

   c. Click **Next**.

   Follow the instructions on screen to execute `/createCentralInventory.sh` as root. Click **OK**.

4. In the Welcome screen, click **Next**.
5. In the Prerequisite Check screen, verify that the checks complete successfully, and click **Next**.
6. Specify the installation location. Select the previously installed Middleware Home from the drop-down list. For the Oracle Home directory, enter the directory name (**soa**).

   Click **Next**.

7. In the Installation Summary screen, click **Install**.
8. In the Installation Complete screen, click **Finish**.

## 4.2 Backing Up the Installation

The Fusion Middleware Home should be backed up now (make sure that you stop the server first):

```
SOAHOST1> tar -cvpf fmwhomeback.tar MW_HOME
```

This creates a backup of the installation files for both Oracle WebLogic Server and Oracle Fusion Middleware for SOA.

## 4.3 Enabling VIP1 in SOAHOST1

Please note that this step is required for failover of the Administration Server, regardless of whether or not SOA is installed.

You are associating the Administration Server with a virtual hostname (SOAHOST1VHN1). This Virtual Host Name must be mapped to the appropriate VIP (VIP1) either by a DNS Server or by a custom `/etc/host` entry. Check that SOAHOST1VHN1 is available per your name resolution system, (DNS server, /etc/hosts), in the required nodes in your SOA topology. The VIP (VIP1) that is associated to this Virtual Host Name (SOAHOST1VHN11) must be enabled in SOAHOST1.

To enable the virtual IP on 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.).

## 4.4 Running the Configuration Wizard on SOAHOST1 to Create a Domain

Run the Configuration Wizard from the SOAhome directory to create a domain containing the Administration Server and Oracle Web Services Manager. Later, you will extend the domain to contain SOA components.

1. Ensure that the database where you installed the repository is running. For RAC databases, it is recommended that all instances are running, so that the validation check later on becomes more reliable.
2. Change directory to the location of the Configuration Wizard. This is within the SOA home directory.

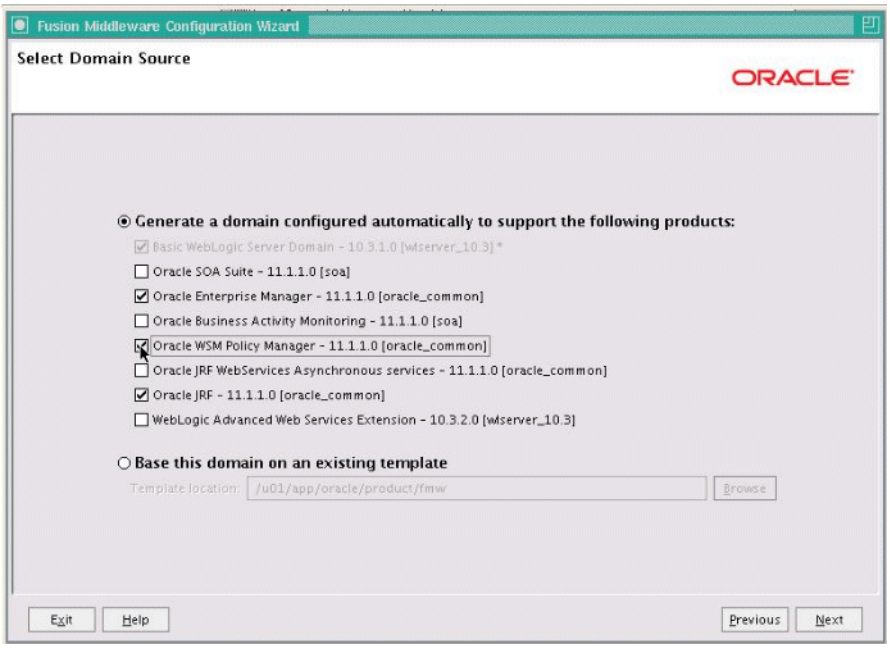
   ```
   SOAHOST1> cd ORACLE_HOME/common/bin
   ```

3. Start the Oracle Fusion Middleware Configuration Wizard:

   ```
   SOAHOST1> ./config.sh
   ```

4. In the Welcome screen, select **Create a New WebLogic Domain**, and click **Next**.
5. The Select Domain Source screen is displayed (Figure 4–1).

***Figure 4–1 Select Domain Source Screen***




Screenshot of the Select Domain Source screen, where you select the products that the newly created WebLogic domain will support automatically. It is described in further detail in the text following this image.

**********

In the Select Domain Source screen, do the following:

- Select **Generate a domain configured automatically to support the following products**.
- Select the following products:
  - **Basic WebLogic Server Domain - 10.3.1.0 [wlserver_10.3]** (this should be selected automatically)
  - **Oracle Enterprise Manager - 11.1.1.0 [oracle_common]**
  - **Oracle WSM Policy Manager 11.1.1.0 [oracle_common]**
  - **Oracle JRF - 11.1.1.0 [oracle_common]** (this should be selected automatically)

If you accidentally deselect some of the targets, make sure that the following selections are made in this screen:

- Oracle Enterprise Manager
- Oracle WSM Policy Manager
- Oracle JRF

Click **Next**.

6. In the Specify Domain Name and Location screen, enter the domain name (soaedg_domain).

   Make sure that the domain directory matches the directory and shared storage mount point recommended in Chapter 2, "Database and Environment Preconfiguration": enter `ORACLE_BASE/admin/<domain_name>/aserver/`

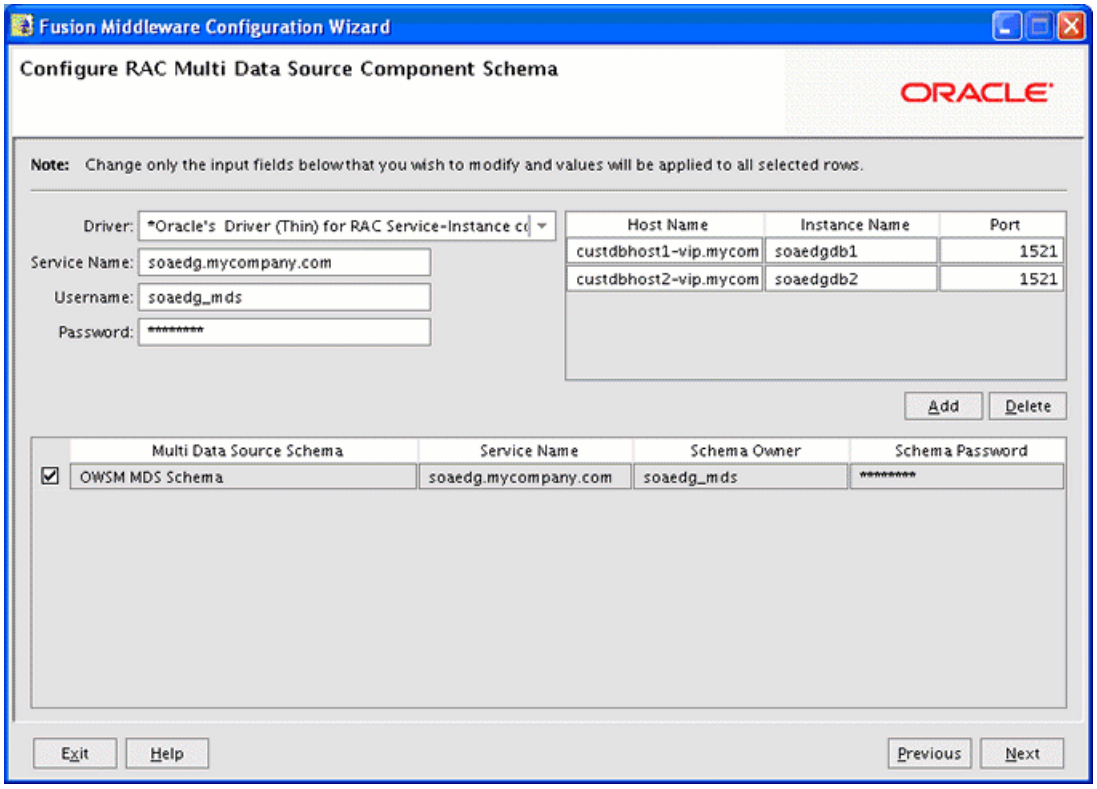
for the domain directory and `ORACLE_BASE/admin/<domain_name>/apps` for the application directory. This directory should be in shared storage.

7. Click **Next**.
8. In the Configure Administrator Username and Password screen, enter the username and password to be used for the domain's administrator.

   Click **Next**.
9. In the Configure Server Start Mode and JDK screen, do the following:
   - For WebLogic Domain Startup Mode, select **Production Mode**.
   - For JDK Selection, select **Oracle JRockit 1.6.0_14 SDK**.

   Click **Next**.
10. In the Configure JDBC Components Schema screen, do the following:
    a. Select the OWSM MDS schema.
    b. Select **Configure selected component schemas as RAC multi data source schemas in the next panel**.
    c. Click **Next**.
11. The Configure RAC Multi Data Sources Component Schema screen is displayed (Figure 4–2).

***Figure 4–2 Configure RAC Multi Data Source Component Schema Screen***




In this screen, do the following:

a. Enter values for the following fields, specifying the connect information for the RAC database that was seeded with RCU.

- **Driver:** Select **Oracle driver (Thin) for RAC Service-Instance connections, Versions:10, 11**.
- **Service Name:** Enter the service name of the database, for example, `soaedg.mycompany.com`.
- **Username:** Enter the complete user name (including the prefix) for the schemas.
- **Password:** Enter the password to use to access the schemas.

**b.** Enter the host name, instance name, and port.

**c.** Click **Add**.

**d.** Repeat this for each RAC instance.

**e.** Click **Next**.

**12.** In the Test JDBC Data Sources screen, the connections should be tested automatically. The **Status** column displays the results. Ensure that all connections were successful. If not, click **Previous** to return to the previous screen and correct your entries.

Click **Next** when all the connections are successful.

**13.** In the Select Advanced Configuration screen, select the following:

- **Administration Server**
- **Managed Servers, Clusters and Machines**
- **Deployment and Services**

Click **Next**.

**14.** In the Configure the Administration Server screen, enter the following values:

- Name: **AdminServer**
- Listen Address: enter SOAHOST1VHN1.
- Listen Port: **7001**
- SSL listen port: **N/A**
- SSL enabled: **unchecked**

Click **Next**.

**15.** In the Configure Managed Servers screen, click **Add** to add the following managed servers:

***Table 4–1 Managed Servers***

| Name | Listen Address | Listen Port | SSL Listen Port | SSL Enabled |
|---|---|---|---|---|
| WLS_WSM1 | SOAHOST1 | 7010 | n/a | No |
| WLS_WSM2 | SOAHOST2 | 7010 | n/a | No |

Click **Next**.

**16.** In the Configure Clusters screen, Click **Add** to add the following clusters:

*Table 4–2 Clusters*

| Name | Cluster Messaging Mode | Multicast Address | Multicast Port | Cluster Address |
|---|---|---|---|---|
| WSM-PM_Cluster | unicast | n/a | n/a | Leave it empty. |

Click **Next**.

17. In the Assign Servers to Clusters screen, assign servers to clusters as follows:
    - **WSM-PM_Cluster:**
      - WLS_WSM1
      - WLS_WSM2

    Click **Next**.
18. In the Configure Machines screen, do the following:
    - Click the **Unix Machine** tab and then click **Add** to add the following machines:

*Table 4–3 Machines*

| Name | Node Manager Listen Address |
|---|---|
| SOAHOST1 | SOAHOST1 |
| SOAHOST2 | SOAHOST2 |

    Leave all other fields to their default values.

    Click **Next**.
19. In the Assign Servers to Machines screen, assign servers to machines as follows:
    - **SOAHOST1:**
      - AdminServer
      - WLS_WSM1
    - **SOAHOST2:**
      - WLS_WSM2

    Click **Next**.
20. In the **Target Deployments to Clusters or Servers** screen, make sure that the **wsm-pm** application and the **oracle.wsm.seedpolicies** library is targeted to the **WSM-PM_Cluster** only. Make sure that all other deployments are targeted to the **AdminServer**. Click **Next**.
21. In the **Target Services to Clusters or Servers** screen, select the following:
    - On the left, select **WSM-PM_Cluster**. On the right, select **JDBC System Resource** (this automatically selects all the wsm datasources (mds-owsm)).
    - On the left, select **Admin Server**. On the right, select **JDBC System Resource** (this automatically selects all the wsm datasources (mds-owsm)).

    All JDBC system resources should be targeted to both the Admin Server and WSM-PM_Cluster.

- On the left, select **WSM-PM_Cluster**. On the right, select **JOC-Shutdown**, **JOC-Startup**, and **OWSM Startup Class**.
- On the left, select **Admin Server**. On the right, deselect **JOC-Shutdown** and **JOC-Startup**. Make sure these services are not targeted to the Admin Server.

**JOC-Shutdown**, **JOC-Startup**, and **OWSM Startup Class** should be targeted only to the **WSM-PM_Cluster**.

- Make sure that all the remaining services are targeted to the **Admin Server**.

22. In the Configuration Summary screen, click **Create**.
23. In the Create Domain screen, click **Done**.

## 4.5 Creating a Separate Domain Directory for Managed Servers in the Same Node as the Administration Server

Use the `pack` and `unpack` commands to separate the domain directory used by the Administration Server from the domain directory used by the managed server in SOAHOST1as recommended in Chapter 2, "Database and Environment Preconfiguration."

1. Run the pack command on SOAHOST1 to create a template pack as follows:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin

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

2. Run the unpack command on SOAHOST1 to unpack the template in the managed server domain directory as follows:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin

SOAHOST1> ./unpack.sh -domain=ORACLE_BASE/admin/<domain_name>/mserver/<domain_
name> -template=soadomaintemplate.jar
```

## 4.6 Creating boot.properties for the Administration Server on SOAHOST1

Create a `boot.properties` file for the Administration Server on SOAHOST1. The `boot.properties` file enables the Administration Server to start without prompting you for the administrator username and password.

**For the Administration Server:**

1. Create the following directory structure:

```
mkdir ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/servers

mkdir ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/servers/
AdminServer

mkdir ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/servers/
AdminServer/security
```

2. In a text editor, create a file called `boot.properties` in the last directory created in the previous step, and enter the following lines in the file:

```
username=<adminuser>
```

```
password=<password>
```

**Note:** When you start the Administration Server, the username and password entries in the file get encrypted. You start the Administration Server in Section 4.7, "Starting the Administration Server on SOAHOST1."

For security reasons, you want to minimize the time the entries in the file are left unencrypted: after you edit the file, you should start the server as soon as possible so that the entries get encrypted.

## 4.7 Starting the Administration Server on SOAHOST1

Start the Administration Server:

```
SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin
SOAHOST1> ./startWebLogic.sh
```

## 4.8 Validating the Administration Server

Perform these steps to ensure that the Administration Server is properly configured:

1. In a browser, go to `http://SOAHOST1VHN1:7001/console`.
2. Log in as the administrator.
3. Verify that the WLS_WSM1 and WLS_WSM2 managed servers are listed.
4. Verify that the WSM-PM_Cluster cluster is listed.
5. Check that you can access Oracle Enterprise Manager at `http://SOAHOST1VHN1:7001/em`.
6. Log in to EM Console with the username and password you specified in Section 4.6, "Creating boot.properties for the Administration Server on SOAHOST1."

## 4.9 Applying the Java Required Files (JRF) Template to the WSM-PM_ Cluster

After the domain is created with the Configuration Wizard, you must target a number of resources not included in the WebLogic server installation to the WSM-PM Cluster.

To target these resources:

1. Log in to Oracle Enterprise Manager Fusion Middleware Control with the username and password you specified in Section 4.6, "Creating boot.properties for the Administration Server on SOAHOST1."
2. On the navigation tree on the left, expand **Farm_<domain_name>**, **WebLogic Domain**, and then **<domain_name>**, and select **WSM_PM_Cluster**.
3. Click **Apply JRF Template** on the right.
4. Wait for the confirmation message to appear on the screen.

   This message should confirm that the JRF Template has been successfully applied to the WSM-PM_Cluster cluster.

## 4.10 Disabling Host Name Verification for the Oracle WebLogic Administration Server and the WLS_WSM1 Managed Server

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"). 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 EDG topology configuration is complete as described in Chapter 7, "Setting Up Node Manager."

Perform these steps to disable host name verification:

1. Log in to Oracle WebLogic Server Administration Console.
2. Click **Lock and Edit**.
3. Expand the **Environment** node in the Domain Structure window.
4. Click **Servers**. The Summary of Servers page appears.
5. Select **AdminServer(admin)** in the Names column of the table. The Settings page for AdminServer(admin) appear.
6. Click the **SSL** tab.
7. Click **Advanced**.
8. Set Hostname Verification to **None**.
9. Click **Save**.
10. Repeat steps 4 to 8 for the WLS_WSM1 server.
11. Save and activate the changes.
12. The change requires restart of the Administration Server to be effective. To do this, complete these steps:
    a. In the Summary of Servers screen, select the **Control** tab.
    b. Select **AdminServer(admin)** in the table and then click **Shutdown**.
    c. Start the Administration Server again from the command line as follows:

```
SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin
SOAHOST1> ./startWebLogic.sh
```

## 4.11 Starting Node Manager on SOAHOST1

Perform these steps to start Node Manager on SOAHOST1:

1. Run the *setNMProps.sh* script, which is located in the *ORACLE_COMMON_HOME/common/bin* directory, to set the `StartScriptEnabled` property to 'true' before starting Node Manager:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin
SOAHOST1> ./setNMProps.sh
```

> **Note:** You must use the `StartScriptEnabled` property to avoid class loading failures and other problems. See also Section 10.6.5, "Incomplete Policy Migration After Failed Restart of SOA Server."

2. Start Node Manager:

```
SOAHOST1> cd WL_HOME/server/bin
SOAHOST1> ./startNodeManager.sh
```

## 4.12 Starting and Validating the WLS_WSM1 Managed Server

Perform these steps to start the WLS_WSM1 managed server and check that it is configured correctly:

1. Start the WLS_WSM1 managed server using the Oracle WebLogic Server Administration Console as follows:
   a. Expand the **Environment** node in the Domain Structure window.
   b. Choose **Servers**. The Summary of Servers page appears.
   c. Click the **Control** tab.
   d. Select **WLS_WSM1** and then click **Start**.
2. Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.
3. Access `http://SOAHOST1:7010/wsm-pm`.
4. Click **Validate Policy Manager**. A list of policies and assertion templates available in the data store appear.

> **Note:** The configuration is incorrect if no policies or assertion templates appear.

## 4.13 Propagating the Domain Configuration to SOAHOST2 Using the unpack Utility

Perform these steps to propagate the domain configuration:

1. Run the following command on SOAHOST1 to copy the template file created previously.

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin
SOAHOST1> scp soadomaintemplate.jar oracle@SOAHOST2:/ORACLE_HOME/common/bin
```

2. Run the `unpack` command on SOAHOST2 to unpack the propagated template.

> **Note:** Run `unpack` from the `ORACLE_COMMON_HOME/common/bin` directory, not from the `WL_HOME/common/bin` directory.

```
SOAHOST2> cd ORACLE_COMMON_HOME/common/bin
SOAHOST2> ./unpack.sh -domain=ORACLE_BASE/admin/<domain_name>/mserver/<domain_
name> -template=soadomaintemplate.jar
```

> **Note:** The `ORACLE_BASE/admin/<domain_name>/mserver` directory must exist before running `unpack`.

## 4.14 Disabling Host Name Verification for the WLS_WSM2 Managed Server

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"). 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 EDG topology configuration is complete as described in Chapter 7, "Setting Up Node Manager."

Perform these steps to disable host name verification:

1. Log in to Oracle WebLogic Server Administration Console.
2. Click **Lock and Edit**.
3. Expand the **Environment** node in the Domain Structure window.
4. Click **Servers**. The Summary of Servers page appears.
5. Select **WLS_WSM2** in the Names column of the table. The Settings page for AdminServer(admin) appear.
6. Click the **SSL** tab.
7. Click **Advanced**.
8. Set Hostname Verification to **None**.
9. Save and activate the changes.

## 4.15 Starting Node Manager on SOAHOST2

Perform these steps to start Node Manager on SOAHOST2:

1. Run the *setNMProps.sh* script, which is located in the *ORACLE_COMMON_HOME/common/bin* directory, to set the `StartScriptEnabled` property to 'true' before starting Node Manager:

```
SOAHOST2> cd ORACLE_COMMON_HOME/common/bin
SOAHOST2> ./setNMProps.sh
```

> **Note:** You must use the `StartScriptEnabled` property to avoid class loading failures and other problems. See also Section 10.6.5, "Incomplete Policy Migration After Failed Restart of SOA Server."

2. Start Node Manager:

```
SOAHOST2> cd WL_HOME/server/bin
SOAHOST2> ./startNodeManager.sh
```

## 4.16 Starting and Validating the WLS_WSM2 Managed Server

Perform these steps to start the WLS_WSM2 managed server and check that it is configured correctly:

1. Start the WLS_WSM2 managed server using the Administration Console.
2. Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to

"Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.

3. Access `http://SOAHOST2:7010/wsm-pm`.
4. Click validate policy manager.

## 4.17 Configuring the Java Object Cache for Oracle WSM

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

The Java Object Cache can be configured using the `MW_HOME/oracle_common/bin/configure-joc.py` script. This is a Python script which can be used to configure JOC in the managed servers. The script runs in WLST online mode and expects the Administration Server to be up and running.

When configuring JOC ports for Oracle products, Oracle recommends using ports in the 9988 to 9998 range.

**Note:** After configuring the Java Object Cache using the wlst commands or *configure-joc.py* script, all affected managed servers should be restarted for the configurations to take effect.

### Usage

1. Connect to the Administration Server using the command-line Oracle WebLogic Scripting Tool (WLST), for example:

```
MW_HOME/soa/common/bin/wlst.sh
$ connect()
```

Enter the Oracle WebLogic Administration user name and password when prompted.

2. After connecting to the Administration Server using `wlst`, start the script using the `execfile` command, for example:

```
wls:/mydomain/serverConfig>execfile('MW_HOME/oracle_
common/bin/configure-joc.py')
```

3. Configure JOC for all the managed servers for a given cluster.

Enter 'y' when the script prompts whether you want to specify a cluster name, and also specify the cluster name and discover port, when prompted. This discovers all the managed servers for the given cluster and configure the JOC. The discover port is common for the entire JOC configuration across the cluster. For example:

```
Do you want to specify a cluster name (y/n) <y>
Enter Cluster Name : WSM_Cluster
Enter Discover Port : 9991
```

Here is a walkthrough for using `configure-joc.py` for HA environments:

```
execfile('MW_HOME/oracle_common/bin/configure-joc.py')
.
Enter Hostnames (eg host1,host2) : SOAHOST1, SOAHOST2
.
Do you want to specify a cluster name (y/n) <y>y
.
```

```
Enter Cluster Name : WSM_Cluster
.
Enter Discover Port : 9991
.
Enter Distribute Mode (true|false) <true> : true
.
Do you want to exclude any server(s) from JOC configuration (y/n) <n> n
```

The script can also be used to perform the following JOC configurations:

- Configure JOC for all specified managed servers.

  Enter 'n' when the script prompts whether you want to specify a cluster name, and also specify the managed server and discover port, when prompted. For example:

  ```
  Do you want to specify a cluster name (y/n) <y>n
  Enter Managed Server and Discover Port (eg WLS_WSM1:9998, WLS_WSM1:9998) : WLS_
  WSMM1:9991,WLS_WSM2:9991
  ```

- Exclude JOC configuration for some managed servers.

  The script allows you to specify the list of managed servers for which the JOC configuration "DistributeMode" will be set to 'false'. Enter 'y' when the script prompts whether you want to exclude any servers from JOC configuration, and enter the managed server names to be excluded, when prompted. For example:

  ```
  Do you want to exclude any server(s) from JOC configuration (y/n) <n>y
  Exclude Managed Server List (eg Server1,Server2) : WLS_WSM1,WLS_WSM3
  ```

- Disable the distribution mode for all managed servers.

  The script allows you to disable the distribution to all the managed servers for a specified cluster. Specify 'false' when the script prompts for the distribution mode. By default, the distribution mode is set to 'true'.

Verify JOC configuration using the CacheWatcher utility. See *Oracle Fusion Middleware High Availability Guide*.

You can configure the Java Object Cache (JOC) using the **HA Power Tools** tab in the Oracle WebLogic Administration Console as described in the *Oracle Fusion Middleware High Availability Guide*.

## 4.18 Configuring Oracle HTTP Server for the Administration Server and the WLS_WSM-PM*n* Managed Servers

To enable Oracle HTTP Server to route to the Administration Server and the WSM-PM_Cluster, which contain the WLS_WSM-PM*n* managed servers, you must set the `WebLogicCluster` parameter to the list of nodes in the cluster:

1. On WEBHOST1 and WEBHOST2, add the following lines to the *ORACLE_BASE/admin/<instance_name>/config/OHS/<component_name>/mod_wl_ohs.conf* file:

   ```
   # WSM-PM
   <Location /wsm-pm>
       SetHandler weblogic-handler
       WebLogicCluster SOAHOST1:7010,SOAHOST2:7010
   </Location>

   # Admin Server and EM
   <Location /console>
       SetHandler weblogic-handler
       WebLogicHost SOAHOST1VHN1
   ```

```
    WeblogicPort 7001
</Location>
<Location /consolehelp>
    SetHandler weblogic-handler
     WebLogicHost SOAHOST1VHN1
    WeblogicPort 7001
 </Location>
<Location /em>
    SetHandler weblogic-handler
    WebLogicHost SOAHOST1VHN1
    WeblogicPort 7001
</Location>
```

2. Make sure the *httpd.conf* file located in the same directory as the *mod_wl_ohs* file contains the following lines:

```
NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName https://soa.mycompany.com:443
    ServerAdmin you@your.address
    RewriteEngine On
    RewriteOptions inherit
</VirtualHost>

NameVirtualHost *:7777
<VirtualHost *:7777>
    ServerName admin.mycompany.com:80
    ServerAdmin you@your.address
    RewriteEngine On
    RewriteOptions inherit
</VirtualHost>
```

> **Note:** Values such as `soa.mycompany.com:443,7777`, `admin.mycompany:80`, and `you@youraddress` that are noted in this document serve as examples only. Enter values based on the actual environment.

3. Restart Oracle HTTP Server on both WEBHOST1 and WEBHOST2.

```
WEBHOST1> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs1

WEBHOST2> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs2
```

The servers specified in the `WebLogicCluster` parameter are only important at startup time for the plug-in. The list needs to provide at least one running cluster member for the plug-in to discover other members of the cluster. Note that the listed cluster member must be running when Oracle HTTP Server is started. Oracle WebLogic Server and the plug-in work together to update the server list automatically with new, failed, and recovered cluster members.

Some example scenarios:

- Example 1: If you have a two-node cluster and then add a third member, you do not need to update the configuration to add the third member. The third member will be discovered on the fly at runtime.

- Example 2: You have a three-node cluster but only two nodes are listed in the configuration. However, if both listed nodes are down when you start Oracle HTTP Server, then the plug-in would fail to route to the cluster. You must ensure that at least one of the listed nodes is running when you start Oracle HTTP Server.

  If you list all members of the cluster, then you guarantee you can route to the cluster, assuming at least one member is running when Oracle HTTP Server is started.

For more information on configuring the WebLogic Server plug-in, see the Oracle Fusion Middleware Using Web Server Plug-Ins With Oracle WebLogic Server guide.

## 4.19 Registering Oracle HTTP Server With WebLogic Server

Oracle HTTP Server must forward requests to WebLogic Server. To do this, you must register Oracle HTTP Server with WebLogic Server using the following command:

```
WEBHOST1> cd ORACLE_BASE/admin/<instance_name>/bin

WEBHOST1> ./opmnctl registerinstance -adminHost SOAHOST1VHN1 -adminPort 7001
-adminUsername weblogic
```

You must also run this command from WEBHOST2 for OHS2.

## 4.20 Setting the Frontend URL for the Administration Console and Setting Redirection Preferences

When you access the Oracle WebLogic Server Administration Console using an LRB, changing the Administration Server's frontend URL is required so that the user's browser is redirected to the appropriate LRB address. To change the Administration Server's frontend URL, complete these steps:

1. Log in to Oracle WebLogic Server Administration Console.
2. Click **Lock and Edit**.
3. Expand the Environment node in the Domain Structure window.
4. Click **Servers** to open the Summary of Servers page.
5. Select **Admin Server** in the Names column of the table. The Settings page for AdminServer(admin) appear.
6. Click the Protocols tab.
7. Click the HTTP tab.
8. Set the **Front End Hist** field to `soa.mycompany.com` (your LBR address).
9. Save and activate the changes.

Oracle also recommends disabling tracking on configuration changes in the Oracle WebLogic Server Administration Console so that the console does not trigger the reload of configuration pages when activation of changes occurs. To disable the reload, log in to the Oracle WebLogic Server Administration Console, click the **preferences** link in the banner, and then the **shared preferences** tab. Deselect the **follow configuration changes** checkbox.

## 4.21 Validating Access Through Oracle HTTP Server

Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.

Validate WSM_Cluster through both Oracle HTTP Server using the following URLs:

- `http://Webtier_node1:7777/wsm-pm`
- `http://Webtier_node2:7777/wsm-pm`
- `http://Webtier_node1:7777/console`
- `http://Webtier_node2:7777/console`
- `http://Webtier_node1:7777/em`
- `http://Webtier_node2:7777/em`
- `https://soa.mycompany.com/wsm-pm`
- `http://admin.mycompany.com/console`
- `http://admin.mycompany.com/em`

For information on configuring system access through the load balancer, see Section 2.2.2, "Load Balancers."

---

**Note:** After the registering Oracle HTTP Server as described in Section 4.19, "Registering Oracle HTTP Server With WebLogic Server," the Oracle HTTP Server should appear as a manageable target in the Oracle Enterprise Manager Console. To verify this, log into the Enterprise Manager Console. The WebTier item in the navigation tree should show that Oracle HTTP Server has been registered.

---

## 4.22 Manually Failing Over the Administration Server to SOAHOST2

In case a node fails, you can fail over the Administration Server to another node. This section describes how to fail over the Administration Server from SOAHOST1 to SOAHOST2.

Assumptions:

- The Administration Server is configured to listen on SOAHOST1VHN1, and not on ANY address. See step 14 in Section 4.4, "Running the Configuration Wizard on SOAHOST1 to Create a Domain".
- These procedures assume that the two nodes use two individual domain directories, and that the directories reside in local storage or in shared storage in different volumes.
- The Administration Server is failed over from SOAHOST1 to SOAHOST2, and the two nodes have these IPs:
  - SOAHOST1: 100.200.140.165
  - SOAHOST2: 100.200.140.205
  - VIPHOST1: 100.200.140.206. This is the VIP where the Administration Server is running, assigned to ethX:Y, available in SOAHOST1 and SOAHOST2.

- The domain directory where the Administration Server is running in SOAHOST1 is on a shared storage and is mounted also from SOAHOST2.

The following procedure shows how to fail over the Administration Server to a different node (SOAHOST2), but the Administration Server will still use the same WebLogic Server machine (which is a logical machine, not a physical machine).

1. Stop the Administration Server.
2. Migrate IP to the second node.
   a. Run the following command as root on SOAHOST1 (where X:Y is the current interface used by SOAHOST1VHN1):

      ```
      SOAHOST1> /sbin/ifconfig ethX:Y down
      ```

   b. Run the following command on SOAHOST2:

      ```
      SOAHOST2> /sbin/ifconfig <interface:index> <IP_Address> netmask <netmask>
      ```

      For example:

      ```
      /sbin/ifconfig eth0:1 10.0.0.1 netmask 255.255.255.0
      ```

      **Note:** Ensure that the netmask and interface to be used to match the available network configuration in SOAHOST2.

3. Update routing tables through `arping`, for example:

   ```
   SOAHOST2> /sbin/arping -b -A -c 3 -I eth0 10.0.0.1
   ```

4. Start the Administration Server on SOAHOST2.

   ```
   SOAHOST2> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin

   SOAHOST2> ./startWebLogic.sh
   ```

5. Test that you can access the Administration Server on SOAHOST2 as follows:
   a. Ensure that you can access the Oracle WebLogic Server Administration Console at `http://SOAHOST1VHN1:7001/console`.
   b. Check that you can access and verify the status of components in the Oracle Enterprise Manager at `http://SOAHOST1VHN1:7001/em`.

      **Note:** The Administration Server does not use Node Manager for failing over. After a manual failover, the machine name that appears in the **Current Machine** field in the Administration Console for the server is SOAHOST1, and not the failover machine, SOAHOST2. Since Node Manager does not monitor the Administration Server, the machine name that appears in the **Current Machine** field, is not relevant and you can ignored it.

## 4.23 Validating Access to SOAHOST2 Through Oracle HTTP Server

Perform the same steps as in Section 4.21, "Validating Access Through Oracle HTTP Server". This is to check that you can access the Administration Server when it is running on SOAHOST2.

## 4.24 Failing the Administration Server Back to SOAHOST1

This step checks that you can fail back the Administration Server, that is, stop it on SOAHOST2 and run it on SOAHOST1. To do this, migrate SOAHOST1VHN1 back to SOAHOST1 node as follows:

1. Run the following command on SOAHOST2.

   ```
   SOAHOST2> /sbin/ifconfig ethZ:N down
   ```

2. Run the following command on SOAHOST1:

   ```
   SOAHOST1> /sbin/ifconfig ethX:Y 100.200.140.206 netmask 255.255.255.0
   ```

   **Note:** Ensure that the netmask and interface to be used match the available network configuration in SOAHOST1

3. Update routing tables through arping. Run the following command from SOAHOST1.

   ```
   SOAHOST1> /sbin/arping -b -A -c 3 -I ethZ 100.200.140.206
   ```

4. Start the Administration Server again on SOAHOST1.

   ```
   SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin
   SOAHOST1> ./startWebLogic.sh
   ```

5. Test that you can access the Oracle WebLogic Server Administration Console at `http://SOAHOST1VHN1:7001/console`.
6. Check that you can access and verify the status of components in the Oracle Enterprise Manager at `http://SOAHOST1VHN1:7001/em`.

## 4.25 Backing Up the Installation

Perform a backup to save your domain configuration (make sure that you stop the server first). The configuration files all exist under the `ORACLE_BASE/admin/<domain_name>` directory.

```
SOAHOST1> tar -cvpf edgdomainback.tar ORACLE_BASE/admin/<domain_name>
```

# 5

# 5Extending the Domain for SOA Components

This chapter describes how to use the Configuration Wizard to extend the domain to include SOA components. You created in the domain in Chapter 4, "Creating a Domain."

**Important: Oracle strongly recommends that you read the release notes for any additional installation and deployment considerations prior to starting the setup process.**

This chapter contains the following sections:


- Section 5.1, "Enabling VIP2 in SOAHOST1 and VIP3 SOAHOSt2"
- Section 5.2, "Extending the Domain for SOA Components"
- Section 5.3, "Restarting the Administration Server"
- Section 5.4, "Configuring Oracle Coherence for Deploying Composites"
- Section 5.5, "Running the soa-createUDD.py Script"
- Section 5.6, "Disabling Host Name Verification for the WLS_SOAn Managed Server"
- Section 5.7, "Restarting the Node Manager on SOAHOST1"
- Section 5.8, "Propagating the Domain Changes to the Managed Server Domain Directory"
- Section 5.9, "Starting the WLS_SOA1 Managed Server on SOAHOST1"
- Section 5.10, "Validating the WLS_SOA1 and WLS_WSM1 Managed Servers"
- Section 5.11, "Propagating the Domain Configuration to SOAHOST2 Using the unpack Utility"
- Section 5.12, "Extracting the XEngine Files in SOAHOST2"
- Section 5.13, "Restarting Node Manager on SOAHOST2"
- Section 5.14, "Starting and Validating the WLS_SOA2 Managed Server"
- Section 5.15, "Configuring Oracle HTTP Server for the WLS_SOAn Managed Servers"
- Section 5.16, "Validating Access Through Oracle HTTP Server"
- Section 5.17, "Setting the Frontend HTTP Host and Port"
- Section 5.18, "Configuring a Shared JMS Persistence Store"

- Section 5.19, "Configuring a Default Persistence Store for Transaction Recovery"
- Section 5.20, "Enabling High Availability for Oracle File and FTP Adapters"
- Section 5.21, "Scaling the Oracle Database Adapter"
- Section 5.22, "Backing Up the Installation"

## 5.1 Enabling VIP2 in SOAHOST1 and VIP3 SOAHOST2

The SOA domain uses virtual hostnames as the listen addresses for the SOA managed servers. You must enable A VIP mapping each of these hostnames on the two SOA Machines, (VIP2 on SOAHOST1 and VIP3 on SOAHOST2), and must be correctly resolve the virtual hostnames in the network system used by the topology (either by DNS Server, hosts resolution).

To enable the VIP, follow the steps described in Section 4.3, "Enabling VIP1 in SOAHOST1." These VIPs and VHNs are required to enable server migration for the SOA Servers. Server migration must be configured for the SOA System for high availability purposes. Refer to Chapter 8, "Server Migration" for more details on configuring server migration for the SOA servers.

## 5.2 Extending the Domain for SOA Components

In this step, you extend the domain created in Chapter 4, "Creating a Domain" to contain SOA components.

---

**Note:** You must back up the current domain before extending the domain. You may use the backup to recover in case any errors were made in the domain extension. See *Oracle Fusion Middleware Administrator's Guide*.

---

---

**Note:** Oracle SOA uses Quartz to maintain its jobs and schedules in the database. The system clocks for the SOA WebLogic cluster must be synchronized to enable Quartz jobs to run correctly across the cluster.

---

1. Change directory to the location of the Configuration Wizard. This is within the SOA home directory. (It is recommended that all database instances should be up.)

   ```
   SOAHOS1> cd ORACLE_HOME/common/bin
   ```

2. Start the Configuration Wizard.

   ```
   SOAHOST1> ./config.sh
   ```

3. In the Welcome screen, select **Extend an existing WebLogic domain**, and click **Next**.
4. In the WebLogic Domain Directory screen, select the WebLogic domain directory (`ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>`), and click **Next**.
5. In the Select Extension Source screen, do the following:
   - Select **Extend my domain automatically to support the following added products**.

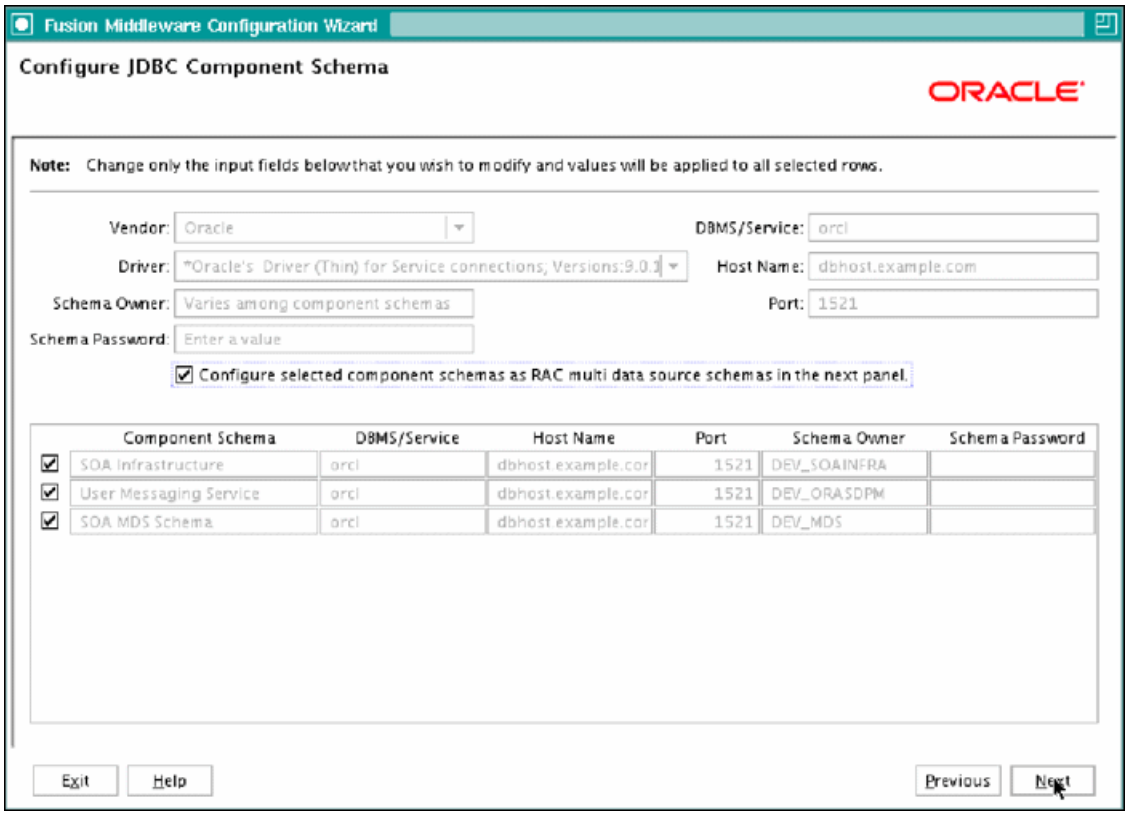
- Select the following products:
  - **Oracle SOA Suite 11.1.1.0**

    The following products should already be selected, and grayed out. They were selected when you created in domain in Section 4.4, "Running the Configuration Wizard on SOAHOST1 to Create a Domain."
  - Basic WebLogic Server Domain
  - JRF

Click **Next**.

6. If you get a "Conflict Detected" message that Oracle JRF is already defined in the domain, select the **Keep Existing Component** option and click **OK**.
7. In the Configure JDBC Component Schema screen (Figure 5–1), do the following:
   a. Select the **SOA Infrastructure**, **User Messaging Service**, and **SOA MDS Schema** rows in the table.
   b. Select **Configure selected component schemas as RAC multi data source schemas in the next panel.**
   c. Click **Next**.

***Figure 5–1 Configure JDBC Component Schema Screen***




Screenshot of the Configure JDBC Component Schema screen for SOA.

**********

8. In the Configure RAC Multi Data Source Component Schema screen (Figure 5–2), do the following:

a. Select **SOA Infrastructure**.

b. Enter values for the following fields, specifying the connect information for the RAC database that was seeded with RCU.

   – **Driver:** Select **Oracle driver (Thin) for RAC Service-Instance connections, Versions:10, 11**.

   – **Service Name:** Enter the service name of the database; for example, `soaedg.mycompany.com`.

   – **Username:** Enter the complete user name (including prefix) for the schemas. The user names shown in Figure 5–2 assume that `soedg` was used as prefix for schema creation from RCU.

   – **Password:** Enter the password to use to access the schemas.

c. Click **Add** and enter the details for the first RAC instance.

d. Repeat for each RAC instance.

e. Deselect **SOA Infrastructure**.

f. Select **User Messaging Service**.

g. Repeat steps b, c, and d for the User Messaging Schema.

h. Deselect **User Messaging Service**.

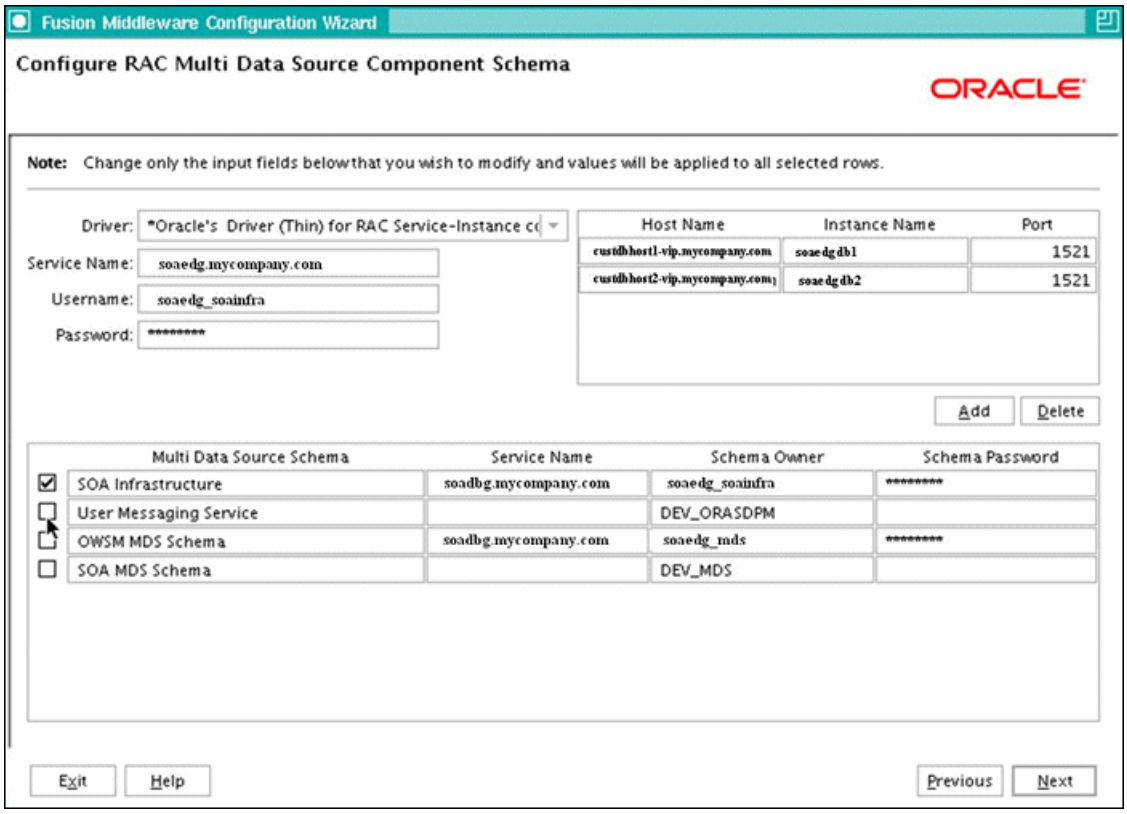
i. Select **SOA MDS Schema**.

j. Repeat steps b, c, and d for the SOA MDS Schema.

k. Leave the OWSM MDS Schema information as it is.

l. Click **Next**

*Figure 5–2 Configure RAC Multi Data Source Component Schema Screen*




Screenshot of the Configure RAC Multi Data Source Component Schema screen for SOA.

**********

9. In the Test JDBC Data Sources screen, the connections should be tested automatically. The Status column displays the results. Ensure that all connections were successful. If not, click **Previous** to return to the previous screen and correct your entries.

   Click **Next** when all the connections are successful.

10. In the Select Optional Configuration screen, select **Managed Servers**, **Cluster and Machines**, and then **Deployment and services**. Click **Next**.

11. In the Configure Managed Servers screen, add the required managed servers.

    A server called `soa_server1` is created automatically. Rename this to WLS_SOA1 and give it the attributes listed in Table 5–1. Then, add a new server called WLS_SOA2. The WLS_WSM1 and WLS_WSM2 managed servers should already be present because they are part of the domain that you are extending. In the end, the list of managed servers should match that in Table 5–1.

*Table 5–1 Managed Servers*

| Name | Listen Address | Listen Port | SSL Listen Port | SSL Enabled |
|---|---|---|---|---|
| WLS_SOA1 | SOAHOST1VHN2 | 8001 | n/a | No |
| WLS_SOA2 | SOAHOST2VHN1 | 8001 | n/a | No |
| WLS_WSM1 | SOAHOST1 | 7010 | n/a | No |

*Table 5–1 (Cont.) Managed Servers*

| Name | Listen Address | Listen Port | SSL Listen Port | SSL Enabled |
|---|---|---|---|---|
| WLS_WSM2 | SOAHOST2 | 7010 | n/a | No |

Click **Next**.

12. In the Configure Clusters screen, add the following clusters:

*Table 5–2 Clusters*

| Name | Cluster Messaging Mode | Multicast Address | Multicast Port | Cluster Address |
|---|---|---|---|---|
| SOA_Cluster | unicast | n/a | n/a | Leave it empty. |
| WSM-PM_Cluster | unicast | n/a | n/a | Leave it empty. |

Click **Next**.

13. In the Assign Servers to Clusters screen, assign servers to clusters as follows:
    - **SOA_Cluster:**
      - WLS_SOA1
      - WLS_SOA2
    - **WSM-PM_Cluster:**
      - WLS_WSM1
      - WLS_WSM2

    Click **Next**.

14. In the Configure Machines screen, do the following:
    - Delete the **LocalMachine** that appears by default.
    - Click the **Unix Machine** tab. The following entries appear (listed in Table 5–3):

*Table 5–3 Machines*

| Name | Node Manager Listen Address |
|---|---|
| SOAHOST1 | SOAHOST1 |
| SOAHOST2 | SOAHOST2 |

Leave all other fields to their default values.

Click **Next**.

15. In the Assign Servers to Machines screen, assign servers to machines as follows:
    - **SOAHOST1:**
      - AdminServer
      - WLS_SOA1
      - WLS_WSM1
    - **SOAHOST2:**
      - WLS_SOA2

– WLS_WSM2

Click **Next**.

16. In the Target Deployments to Clusters or Servers screen, ensure the following targets:
    - **usermessagingserver** and **usermessagingdriver-email** should be targeted only to **SOA_Cluster**. (The usermessaging-xmpp, usermessaging-smpp, and usermessaging-voicexml applications are optional.)
    - The **oracle.rules.***, **oracle.sdp.***, and **oracle.soa.*** deployments should be targeted only to **SOA_Cluster**.
    - The **wsm-smp** application should be targeted only to **WSM-PM_Cluster**.
    - The **oracle.rules.***, **oracle.sdp.***, and **oracle.soa.*** libraries should be targeted only to **SOA_Cluster**.
    - The **oracle.wsm.seedpolicies** library should be targeted only to **WSM-PM_Cluster**.

    Click **Next**.
17. In the Target Services to Clusters or Servers screen, ensure the following targets:
    - Target **JOC Startup Class** and **JOC Shutdown Class** only to **WSM-PM_Cluster**.
    - Target **OWSM Startup Class** only to **WSM-PM_Cluster**.
    - Target **mds-owsm**, **mds-owsm-rac0**, and **mds-owsm-rac1** to both **WSM-PM_Cluster** and **AdminServer**.

    Click **Next**.
18. In the Configuration Summary screen click **Extend**.

    **Note:** Click **OK** to dismiss the warning dialog about the domain configuration ports conflicting with the host ports. This warning appears because of the existing WSM-PM installation.

19. In the Extending Domain screen, click **Done**.

    You must restart the Administration Server for this configuration to take effect.

## 5.3 Restarting the Administration Server

Restart the Administration Server so that the changes to the domain are picked up.

1. Stop the Administration Server.

```
SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin
SOAHOST1> ./stopWebLogic.sh
```

2. Start the Administration Server:

```
SOAHOST1> ./startWebLogic.sh
```

## 5.4 Configuring Oracle Coherence for Deploying Composites

Although deploying composites uses multicast communication by default, Oracle recommends using unicast communication instead in SOA enterprise deployments. Use unicast if you disable multicast communication for security reasons.

> **Note:** An incorrect configuration of the Oracle Coherence framework that is used for deployment may prevent the SOA system from starting. The deployment framework must be properly customized for the network environment on which the SOA system runs. Oracle recommends the following configuration described in this section.

### Enabling Communication for Deployment Using Unicast Communication

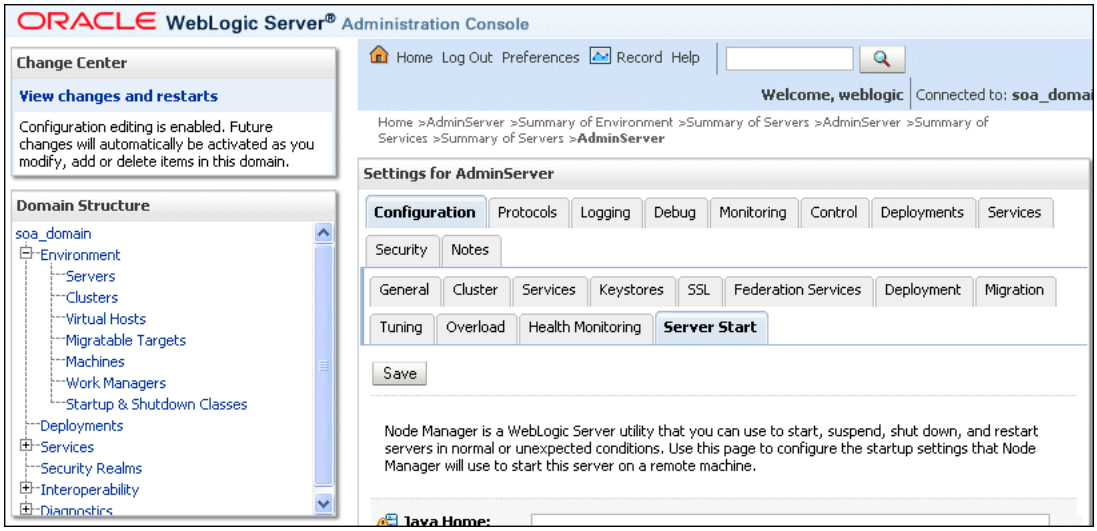
Multicast communication enables Oracle Fusion Middleware SOA to discover all of the members of a cluster to which to it deploys composites dynamically. However, unicast communication does not enable nodes to discover other cluster members in this way. Consequently, you must specify the nodes that belong to the cluster. You do not need to specify all of the nodes of a cluster, however. You need only specify enough nodes so that a new node added to the cluster can discover one of the existing nodes. As a result, when a new node has joined the cluster, it is able to discover all of the other nodes in the cluster. Additionally, in configurations such as SOA enterprise deployments where multiple IPs are available in the same box, you must configure Oracle Coherence to use a specific host name to create the Oracle Coherence cluster.

> **Tip:** To guarantee high availability during deployments of SOA composites, specify enough nodes so that at least one of them is running at any given time.

Specify the nodes using the `tangosol.coherence.wka<n>` system property, where *<n>* is a number between 1 and 9. You can specify up to 9 nodes. Start the numbering at 1. This numbering must be sequential and must not contain gaps. In addition, specify the host name used by Oracle Coherence to create a cluster through the `tangosol.coherence.localhost` system property. This local host name should be the virtual host name used by the SOA server as the listener addresses (SOAHOST1VHN2 and SOAHOST2VHN1). Set this property by adding the `-Dtangosol.coherence.localhost` parameters to the Arguments field of the Oracle WebLogic Server Administration Console's Server Start tab (Figure 5–3).

> **Note:** SOAHOST1VHN2 is the virtual host name that maps to the virtual IP where WLS_SOA1 listening (in SOAHOST1). SOAHOST2VHN1 is the virtual host name that maps to the virtual IP where WLS_SOA2 is listening (in SOAHOST2).

***Figure 5–3 Setting the Host Name Using the Start Server Tab of Oracle WebLogic Server Administration Console***




This image shows the Server Start tab of the Oracle WebLogic Server Administration Console. The surrounding text describes how to access this tab and how to use it.

**********

### Specifying the host name

To add the host name used by Oracle Coherence, complete these steps:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Environment** node.
3. Click **Servers**. The Summary of Servers page appears.
4. Click the name of the server (**WLS_SOA1** or **WLS_SOA2**, which are represented as hyperlinks) in Name column of the table. The settings page for the selected server appears.
5. Click **Lock and Edit**.
6. Click the Configuration tab, and then the Server Start tab.
7. Enter the following for WLS_SOA1 and WLS_SOA2 into the Arguments field.

   For WLS_SOA1, enter the following:

   ```
   -Dtangosol.coherence.wka1=SOAHOST1VHN2 -Dtangosol.coherence.wka2=SOAHOST2VHN1
   -Dtangosol.coherence.localhost=SOAHOST1VHN2
   ```

   For WLS_SOA2, enter the following:

   ```
   -Dtangosol.coherence.wka1=SOAHOST2VHN1 -Dtangosol.coherence.wka2=SOAHOST1VHN2
   -Dtangosol.coherence.localhost=SOAHOST2VHN1
   ```

8. Click **Save** and **Activate Changes**.

---

**Note:** You must ensure that these variables are passed to the managed server correctly. (They should be reflected in the server's output log.) Failure of the Oracle Coherence framework can prevent the soa-infra application from starting.

---

**Note:** The multicast and unicast addresses are different from the ones used by the WebLogic Server cluster for cluster communication. SOA guarantees that composites are deployed to members of a single WebLogic Server cluster even though the communication protocol for the two entities (the WebLogic Server cluster and the groups to which composites are deployed) are different.

**Note:** The coherence cluster used for deployment uses port 8088 by default. This port can be changed by specifying the `-Dtangosol.coherence.wkaX.port` startup parameter.

## 5.5 Running the soa-createUDD.py Script

Before you can start the WLS_SOA1 managed server on SOAHOST1, you must run the `soa-createUDD.py` script. You run the script using WLST offline:

1. Run the `setDomainEnv.sh` script to set up the environment:

   ```
   SOAHOST1>. ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin/
   setDomainEnv.sh
   ```

2. Run the `soa-createUDD.py` script, which is located in the `ORACLE_HOME/bin` directory:

   ```
   SOAHOST1> MW_HOME/jrockit_160_14_R27.6.4-18/bin/java weblogic.WLST ORACLE_
   HOME/bin/soa-createUDD.py --domain_home ORACLE_BASE/admin/<domain_
   name>/aserver/<domain_name> --soacluster SOA_Cluster
   ```

3. Restart the Administration Server. See the steps in Section 5.3, "Restarting the Administration Server."

4. Verify that the following modules are listed in the Oracle WebLogic Server Administration Console:

   - **SOAJMSModuleUDDs**

     Verify this module by first expanding the **Services** node in the Domain Structure window and then expanding the **Messaging** node in the Oracle WebLogic Server Administration Console. Select **JMS Modules**. Select **SOAJMSMOduleUDDS** (represented as a hyperlink) in the Names column of the table. Open the **Subdeployment** tab, and then click **SOAJMSSubDM**.

     Verify that the module is targeted to SOAJMSServer_auto_1 and SOAJMSServer_auto_2.

   - **UMSJMSSystemResource**

     Verify this module by first expanding the **Services** node in the Domain Structure window and then expanding the **Messaging** node in the Oracle WebLogic Server Administration Console. Select **JMS Modules**. Select **UMSJMSSystemResource** (represented as a hyperlink) in the Names column of the table. Open the **Subdeployment** tab, and then click **UMSJMSSubDMSOA**.

     Verify that the module is targeted to UMSJMSServer_auto_1 and UMSJMSServer_auto_2.

You also create UDDs using the **HA Power Tools** tab in the Oracle WebLogic Administration Console as described in the *Oracle Fusion Middleware High Availability Guide*

## 5.6 Disabling Host Name Verification for the WLS_SOA*n* Managed Server

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"). 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 EDG topology configuration is complete as described in Chapter 7, "Setting Up Node Manager."

To disable host name verification, complete these steps:

1. Log in to Oracle WebLogic Server Administration Console.
2. Click **Lock and Edit**.
3. Expand the **Environment** node in the Domain Structure window.
4. Click **Servers**. The Summary of Servers page appears.
5. Select **WLS_SOA1** (represented as a hyperlink) from the Names column of the table. The Settings page appears.
6. Select the **SSL** tab.
7. Expand the **Advanced** section of the page.
8. Set Hostname Verification to **None**.
9. Click **Save**.
10. Repeat these steps for the WLS_SOA2 managed server.
11. Save and activate the changes.

## 5.7 Restarting the Node Manager on SOAHOST1

To restart the Node Manager on SOAHOST1, complete these steps:

1. Stop Node Manager.

```
SOAHOST1> cd WL_HOME/server/bin
SOAHOST1> ./stopNodeManager.sh
```

2. Start Node Manager:

```
SOAHOST1> ./startNodeManager.sh
```

## 5.8 Propagating the Domain Changes to the Managed Server Domain Directory

To propagate the start scripts and classpath configuration from the Administration Server's domain directory to the managed server domain directory:

1. Create a copy of the managed server domain directory and the managed server applications directory.
2. Run the `pack` command on SOAHOST1 to create a template pack using the following commands:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin

SOAHOST1> ./pack.sh -managed=true -domain=ORACLE_BASE/admin/<domain_
name>/aserver/<domain_name> -template=soadomaintemplateExtSOA.jar -template_
name=soa_domain_templateExtSOA
```

3. Run the `unpack` command on SOAHOST1 to `unpack` the propagated template to the domain directory of the managed server using the following command:

```
SOAHOST1> ./unpack.sh -domain=ORACLE_BASE/admin/<domain_name>/mserver/<domain_
name>/ -overwrite_domain=true -template=soadomaintemplateExtSOA.jar -app_
dir=ORACLE_BASE/admin/<domain_name>/mserver/apps
```

## 5.9 Starting the WLS_SOA1 Managed Server on SOAHOST1

To start the WLS_SOA1 managed server on SOAHOST1, complete these steps:

1. Access the Administration Console at `http://SOAHOST1VHN1:7001/console`.
2. Click **Servers**.
3. Open the **Control** tab.
4. Select **WLS_SOA1**.
5. Click **Start**.

> **Note:** SOAHOST1VHN1 is the virtual host name that maps to the virtual IP where the Administration Server is listening (in SOAHOST1).

## 5.10 Validating the WLS_SOA1 and WLS_WSM1 Managed Servers

To validate the WLS_SOA1 and WLS_WSM1 managed servers, complete these steps:

1. Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.
2. Access `http://SOAHOST1VHN2:8001/soa-infra` to verify status of WLS_SOA1.
3. Access `http://SOAHOST1:7010/wsm-pm` to verify status of WLS_WSM1.
4. Access `http://SOAHOST1VHN2:8001/b2bconsole` to verify status of B2B.
5. Access `http://SOAHOST1VHN2:8001/integration/worklistapp` to verify status of the worklist application.

> **Note:** These URLs vary if you use VIPs for WLS_SOA*n*.

## 5.11 Propagating the Domain Configuration to SOAHOST2 Using the unpack Utility

To propagate the domain configuration, complete these steps:

1. Run the following command on SOAHOST1 to copy the template file created in the previous step to SOAHOST2.

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin

SOAHOST1> scp soadomaintemplateExtSOA.jar oracle@node2:ORACLE_COMMON_
HOME/common/bin
```

2. Run the `unpack` command on SOAHOST2 to unpack the propagated template.

```
SOAHOST2> cd ORACLE_COMMON_HOME/common/bin

SOAHOST2> ./unpack.sh -domain=ORACLE_BASE/admin/<domain_name>/mserver/<domain_
name>/ -template=soadomaintemplateExtSOA.jar -overwrite_domain=true -app_
dir=ORACLE_BASE/admin/<domain_dir>/mserver/apps
```

## 5.12 Extracting the XEngine Files in SOAHOST2

To enable B2B's XEngine in SOAHOST2, you need to extract the content of the XEngine tar manually:

```
SOAHOST2>cd ORACLE_HOME/soa/thirdparty/edifecs
SOAHOST2>tar -xzvf XEngine.tar.gz
```

## 5.13 Restarting Node Manager on SOAHOST2

Perform the steps in Section 5.7, "Restarting the Node Manager on SOAHOST1" on SOAHOST2.

## 5.14 Starting and Validating the WLS_SOA2 Managed Server

Perform these steps to start the WLS_SOA2 managed server and check that it is configured correctly:

1. Start the WLS_SOA2 managed server using the Administration Console.
2. Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.
3. Access `http://SOAHOST2VHN1:8001/soa-infra`.
4. Access `http://SOAHOST2VHN1:8001/b2bconsole` to verify status of B2B.
5. Access `http://SOAHOST2VHN1:8001/integration/worklistapp` to verify status of the worklist application.

## 5.15 Configuring Oracle HTTP Server for the WLS_SOA*n* Managed Servers

To enable Oracle HTTP Server to route to the SOA_Cluster, which contains the WLS_SOA*n* managed servers, you must set the `WebLogicCluster` parameter to the list of nodes in the cluster.

1. On WEBHOST1 and WEBHOST2, add the following lines to the *ORACLE_BASE/admin/<instance_name>/config/OHS/<component_name>/mod_wl_ohs.conf* file:

```
# SOA soa-infra app
<Location /soa-infra>
```

```
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

# Worklist
<Location /integration/>
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

# B2B
<Location /b2bconsole>
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

# UMS prefs
<Location /sdpmessaging/userprefs-ui >
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

# Default to-do taskflow
<Location /DefaultToDoTaskFlow/>
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

# Workflow
<Location /workflow>
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
</Location>

#Required if attachments are added for workflow tasks
 <Location /ADFAttachmentHelper>
    SetHandler weblogic-handler
    WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
 </Location>

# SOA composer application
 <Location /soa/composer>
     SetHandler weblogic-handler
     WebLogicCluster SOAHOST1VHN2:8001,SOAHOST2VHN1:8001
 </Location>
```

> **Note:** The entry for `/workflow` is optional. It is for workflow tasks associated with ADF task forms. The `/workflow` URL itself can be a different value, depending on the form.

2. Restart Oracle HTTP Server on WEBHOST1 and WEBHOST2:

```
WEBHOST1> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs1
WEBHOST2> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs2
```

The servers specified in the `WebLogicCluster` parameter are only important at startup time for the plug-in. The list needs to provide at least one running cluster member for the plug-in to discover other members of the cluster. Note that the listed cluster member must be running when Oracle HTTP Server is started. Oracle WebLogic Server and the plug-in work together to update the server list automatically with new, failed, and recovered cluster members.

Sample scenarios:

- Example 1: If you have a two-node cluster and then add a third member, you do not need to update the configuration to add the third member. The third member will be discovered on the fly at runtime.
- Example 2: You have a three-node cluster but only two nodes are listed in the configuration. However, if both listed nodes are down when you start Oracle HTTP Server, then the plug-in would fail to route to the cluster. You must ensure that at least one of the listed nodes is running when you start Oracle HTTP Server.

  If you list all members of the cluster, then you guarantee you can route to the cluster, assuming at least one member is running when Oracle HTTP Server is started.

For more information on configuring the WebLogic Server plug-in, see the Oracle Fusion Middleware Using Web Server Plug-Ins With Oracle WebLogic Server guide.

## 5.16 Validating Access Through Oracle HTTP Server

Verify that the server status is reported as "Running" in the Admin Console. If the server is shown as "Starting" or "Resuming," wait for the server status to change to "Started." If another status is reported (such as "Admin" or "Failed"), check the server output log files for errors. See Section 10.6, "Troubleshooting" for possible causes.

Verify that you can access these URLs, where `'webhostN'` specifies the name of each Oracle HTTP Server host (for example, `WEBHOST1`, `WEBHOST2`):

- `http://webhostN:7777/soa-infra`
- `http://webhostN:7777/integration/worklistapp`
- `http://webhostN:7777/b2bconsole`
- `http://webhostN:7777/sdpmessaging/userprefs-ui`

Validate SOA_Cluster through both Oracle HTTP Server instances.

Refer to load balancer configuration to access the system through the load balancer.

## 5.17 Setting the Frontend HTTP Host and Port

You must set the frontend HTTP host and port for the Oracle WebLogic Server cluster:

1. In the WebLogic Server Administration Console, in the Change Center section, click **Lock & Edit**.
2. In the left pane, choose **Environment** in the Domain Structure window and then choose **Clusters**. The Summary of Clusters page appears.
3. Select the WLS_SOA cluster.
4. Select **HTTP**.
5. Set the values for the following:
   - **Frontend Host**: soa.mycompany.com

- **Frontend HTTPS Port**: 443

6. Click **Save**.
7. To activate the changes, click **Activate Changes** in the Change Center section of the Administration Console.
8. Restart the servers to make the Frontend Host directive in the cluster effective.

---

**Note:** If you do not set the frontend HTTP host and port, you get the following message when trying to retrieve a document definition XSD from Oracle B2B:

```
An error occured while loading the document definitions.
java.lang.IllegalArgumentException: Cluster address must be set
when clustering is enabled.
```

---

#### Callback URL

The SOA system calculates the callback URL as follows:

- If a request to SOA originates from an external or internal service, then SOA uses the callback URL specified by the client.
- If a request to an external or internal asynchronous service originates from SOA, the callback URL is determined using the following method, in decreasing order of preference:
  1. Use `callbackServerURL` specified as a binding property for the specific reference. (You can set this when modeling the composite or at runtime using the MBeans). This allows different service calls to have different callback URLs. That is, a callback URL from an external service can be set to be different than one to an internal service In the context of the EDG architecture, typically this will be `soa.mycompany.com` (443/https) for external services and `soainternal.mycompany.com` (7777/http) for internal services. At runtime, this property is set using the System MBean Browser, through the corresponding binding mbean. To add a specific URL, add a `callbackServerURL` property to its Properties attribute, then invoke the save operation.
  2. Use the callback URL as specified in *soa-infra-config.xml*. In this case, only one address can be specified. When a mix of both external and internal services can be invoked, this should be set to `soa.mycompany.com` (443/https) in the EDG architecture. When only internal services are to be invoked, this can be set to `soainternal.mycompany.com` (7777/http).
  3. Use the callback URL as the frontend host specified in WLS for the SOA_ Cluster. In this case, too, only one address can be specified and the recommendation is same as the one for *soa-infra-config.xml*.
  4. Use the local host name as provided by WLS MBean APIs. This is not recommended in HA environments such as EDG.

## 5.18 Configuring a Shared JMS Persistence Store

Configure the location for all of the persistence stores as a directory that is visible from both nodes. For more information see Section 4.1, "Installing Oracle Fusion Middleware Home." You must then change all of the persistent stores to use this shared base directory as follows:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Services** node and then click the **Persistence Stores** node. The Summary of Persistence Stores page appears.
3. Select the persistence store (represented as a hyperlink) from the Name column of the table. The Settings page for the persistence 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>/<soa_cluster_name>/jms
   ```

   **Note:** Both WLS_SOA1 and WLS_SOA2 must be able to access this directory. This directory must also exist before you restart the server.

5. Click **Save** and activate changes.
6. Restart the servers to make the change in the persistent stores effective.

## 5.19 Configuring a 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.

**Note:** Preferably, this location should be a dual-ported SCSI disk or on a Storage Area Network (SAN).

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** 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 directory structure of the path is as follows:

   ```
   ORACLE_BASE/admin/<domain_name>/<soa_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. Both WLS_SOA1 and WLS_SOA2 must be able to access this directory. This directory must also exist before you restart the server.

## 5.20 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. To make Oracle File and FTP Adapters highly available for outbound operations, use the database mutex locking operation as described in "High Availability in Outbound Operations" in *Oracle Fusion Middleware User's Guide for Technology Adapters*. The database mutex locking operation enables these adapters to ensure that multiple references do not overwrite one another if they write to the same directory.

**Note:** The File Adapter picks up a file from the inbound directory, processes it, and then outputs a file to the output directory. Because the File Adapter is non-transactional, files can be processed twice. As a result, it is possible to get duplicate files when there is failover in the RAC backend or in the SOA managed servers.

### 5.20.1 Using the Database Mutex Locking Operation

Use the following procedure to make an outbound Oracle File or FTP Adapter service highly available using database table as a coordinator:

**Note:** You must increase global transaction timeouts if you use database as a coordinator.

1. **Create Database Tables**

   You are not required to perform this step since the database schemas are pre-created as a part of soainfra.

2. **Modify Deployment Descriptor for Oracle File Adapter**

   Modify Oracle File Adapter deployment descriptor for the connection-instance corresponding to `eis/HAFileAdapter` from the Oracle WebLogic Server console:

   a. Log into your Oracle WebLogic Server console. To access the console navigate to `http://`*`servername`*`:`*`portnumber`*`/console`.

   b. Click **Deployments** in the left pane for Domain Structure.

   c. Click **FileAdapter** under Summary of Deployments on the right pane.

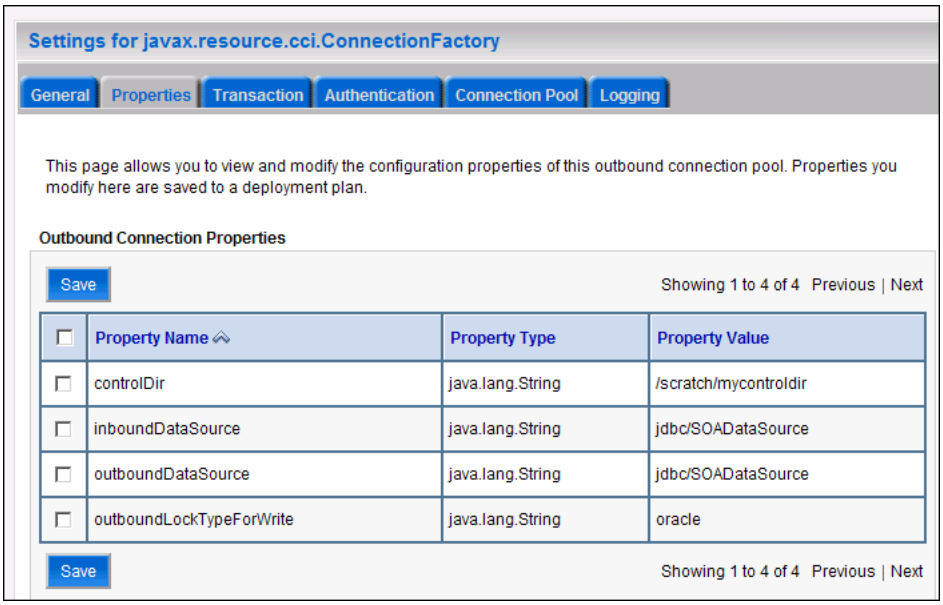
   d. Click the **Configuration** tab.

   e. Click the **Outbound Connection Pools** tab, and expand **javax.resource.cci.ConnectionFactory** to see the configured connection factories.

f. Click **eis/HAFileAdapter**. The Outbound Connection Properties for the connection factory corresponding to high availability is displayed.

g. The connection factory properties appear as shown in Figure 5–4.

***Figure 5–4 Oracle WebLogic Server Console - Settings for javax.resource.cci.Connectionfactory Page***




This figure shows the Oracle WebLogic Server Console - Settings for javax.resource.cci.ConnectionFactory page with the **Properties** tab selected. The connection property name, type, and value columns provide the relevant connection property information.

**********

Click on **Lock and Edit**. After this, the property value column becomes editable (you can click on any of the rows under "Property Value" and modify its value).

The new parameters in connection factory for Oracle File and FTP Adapters are as follows:

`controlDir`: Set it to the directory structure where you want the control files to be stored. You must set it to a shared location if multiple WebLogic Server instances run in a cluster. Structure the directory for shared storage as follows:

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

`inboundDataSource`: Set the value to `jdbc/SOADataSource`. This is the data source, where the schemas corresponding to high availability are pre-created. The pre-created schemas can be found under `ORACLE_HOME/rcu/integration/soainfra/sql/adapter/createschema_adapter_oracle.sql`. If you want to create the schemas elsewhere, use this script. You must set the inboundDataSource property accordingly if you choose a different schema.

`outboundDataSource`: Set the value to `jdbc/SOADataSource`. This is the data source where the schemas corresponding to high availability are pre-created. The pre-created schemas can be found under `ORACLE_HOME/`

rcu/integration/soainfra/sql/adapter/createschema_adapter_oracle.sql. If you want to create the schemas elsewhere, use this script. You must set the outboundDataSource property if you choose to do so.

outboundDataSourceLocal: Set the value to jdbc/SOADataSource. This is the datasource where the schemas corresponding to high availability are pre-created.

outboundLockTypeForWrite: Set the value to oracle if you are using Oracle Database. By default the Oracle File and FTP Adapters use an in-memory mutex to lock outbound write operations. You must choose from the following values for synchronizing write operations:

memory: The Oracle File and FTP Adapters use an in-memory mutex to synchronize access to the file system.

oracle: The adapter uses Oracle Database sequence.

db: The adapter uses a pre-created database table (FILEADAPTER_MUTEX) as the locking mechanism. You must use this option only if you are using a schema other than the Oracle Database schema.

user-defined: The adapter uses a user-defined mutex. To configure the user-defined mutex, you must implement the mutex interface: "oracle.tip.adapter.file.Mutex" and then configure a new binding-property with the name "oracle.tip.adapter.file.mutex" and value as the fully qualified class name for the mutex for the outbound reference.

**h.** Click **Save** after you update the properties. The Save Deployment Plan page appears.

**i.** Enter a shared storage location for the deployment plan. The directory structure is as follows:

```
ORACLE_BASE/admin/<domain_name>/<cluster_name>/dp/Plan.xml
```

**j.** Click **Save and Activate**.

**k.** Configure BPEL Process or Mediator Scenario to use the connection factory as shown in the following example:

```
<adapter-config name="FlatStructureOut" adapter="File Adapter"
xmlns="http://platform.integration.oracle/blocks/adapter/fw/metadata">
  <connection-factory location="eis/HAFileAdapter" adapterRef=""/>
  <endpoint-interaction portType="Write_ptt" operation="Write">
<interaction-spec
className="oracle.tip.adapter.file.outbound.FileInteractionSpec">
      <property../>
      <property../>
    </interaction-spec>
  </endpoint-interaction>
</adapter-config>
```

**Note:** The location attribute is set to eis/HAFileAdapter for the connection factory.

## 5.21 Scaling the Oracle Database Adapter

If you are using Logical Delete polling, and you set MarkReservedValue, skip locking is not used.

Formerly, the best practice for multiple Oracle Database Adapter process instances deployed to multiple Oracle BPEL Process Manager, or Oracle Mediator nodes was essentially using `LogicalDeletePollingStrategy` or `DeletePollingStrategy` with a unique `MarkReservedValue` on each polling node, and setting `MaxTransactionSize`.

However, with the introduction of skip locking in this release that approach has now been superseded. If you were using this approach previously, you can simply remove (in db.jca) or clear (Logical Delete Page of wizard) the MarkReservedValue, and you automatically get skip locking.

The benefits of using skip locking over a reserved value include:

- Skip locking scales better in a cluster and under load.
- All work is in one transaction (as opposed to update/reserve, then commit, then select in a new transaction), so the risk of facing a non-recoverable situation in a high availability environment is minimized.
- No unique `MarkReservedValue` must be specified. Previously, for this to work you would have to configure a complex variable, such as `R${weblogic.Name-2}-${IP-2}-${instance}`.

For more information, see "Scalability" and "Polling Strategies" in *Oracle Fusion Middleware User's Guide for Technology Adapters*.

## 5.22 Backing Up the Installation

After you have verified that the extended domain is working, back up the installation. This is a quick backup for the express purpose of immediate restore in case of problems in the further steps. The backup destination is the local disk. This backup can be discarded once the enterprise deployment setup is complete. At this point, the regular deployment-specific backup and recovery process can be initiated. The *Oracle Fusion Middleware Administrator's Guide* provides further details. For information on describing the Oracle HTTP Server data that must be backed up and restored, refer to the "Backup and Recovery Recommendations for Oracle HTTP Server" section in this guide. For information on how to recover components, see "Recovery of Components" and "Recovery After Loss of Component" sections in the guide. For recommendations specific to recovering from the loss of a host, see the "Recovering Oracle HTTP Server to a Different Host" in the guide. Also refer to the *Oracle Database Backup and Recovery Guide* for information on database backup.

To back up the installation a this point, complete these steps:

1. Back up the web tier:
   a. Shut down the instance using `opmnctl`.

      ```
      ORACLE_BASE/admin/<instance_name>/bin/opmnctl stopall
      ```

   b. Back up the Middleware Home on the web tier using the following command (as root):

      ```
      tar -cvpf BACKUP_LOCATION/web.tar $MW_HOME
      ```

   c. Back up the Instance Home on the web tier using the following command (as root):

      ```
      tar -cvpf BACKUP_LOCATION/web_instance.tar $ORACLE_INSTANCE
      ```

   d. Start the instance using `opmnctl`:

```
ORACLE_BASE/admin/<instance_name>/bin/opmnctl startall
```

2. Back up the database. This is a full database backup (either hot or cold) using Oracle Recovery Manager (recommended) or OS tools such as `tar` for cold backups if possible.
3. Back up the Administration Server domain directory to save your domain configuration. The configuration files all exist under the `ORACLE_BASE/admin/<domain_name>` directory.

```
SOAHOST1> tar -cvpf edgdomainback.tar ORACLE_BASE/admin/<domain_name>
```

---

**Note:** ORACLE_HOME should be backed up if any changes are made to the XEngine configuration that are part of your B2B setup. These files are located under `ORACLE_HOME/soa/thirdparty/edifecs/XEngine`. To back up ORACLE_HOME, execute the following command:

```
SOAHOST1> tar -cvpf fmwhomeback.tar MW_HOME
```

---

# 6 Extending the Domain to Include BAM

This chapter is for users who want to use Oracle Business Activity Monitoring (BAM) in their enterprise. It covers the following topics:

- Section 6.1, "Overview of Adding BAM to a Domain"
- Section 6.3, "Extending the Domain to Include BAM"
- Section 6.4, "Running the soa-createUDD.py Script"
- Section 6.5, "Configuring a JMS Persistence Store for BAM UMS"
- Section 6.7, "Untargeting the BAM Server System from WLS_BAM2"
- Section 6.6, "Configuring a Default Persistence Store for Transaction Recovery"
- Section 6.8, "Propagating the Domain Configuration to BAMHOST1 and BAMHOST2 Using the pack/unpack Utility"
- Section 6.9, "Disabling Host Name Verification for the WLS_BAMn Managed Servers"
- Section 6.10, "Starting Node Manager on BAMHOST1 and BAMHOST2"
- Section 6.11, "Starting the BAM System"
- Section 6.12, "Configuring the BAM Web Applications to Use the BAM Server in BAMHOST1"
- Section 6.13, "Configuring the ADCServer to Use the Appropriate BAMServer Address"
- Section 6.14, "Configuring Oracle HTTP Server for the WLS_BAMn Managed Servers"
- Section 6.15, "Validating Access Through Oracle HTTP Server"
- Section 6.16, "Configuring Server Migration for the WLS_BAM Servers"
- Section 6.17, "Configuration Changes Applied to BAM components in an EDG Topology"
- Section 6.18, "Backing Up the Installation"

## 6.1 Overview of Adding BAM to a Domain

The BAM system is installed using the WL_HOME and ORACLE_HOME created in Chapter 4, "Creating a Domain" on a shared storage. BAMHOST1 and BAMHOST2 mount `MW_HOME` and reuse the existing WLS and SOA installations. The `pack` and `unpack` utilities are used to bootstrap the domain configuration for the WLS_BAM1 and WLS_BAM2 servers in these two new nodes. As a result, you do not need to

install any software in these two nodes. For the BAM system to work properly, BAMHOST1 and BAMHOST2 must maintain the same system configuration that was required for installing Oracle FMW in SOAHOST1 and SOAHOST2. Otherwise, unpredictable behavior in the execution of binaries may occur.

#### Performing Backups

Before using the Configuration Wizard, you must back up the domain as described in in *Oracle Fusion Middleware Administrator's Guide*.

This section describes how to add BAM to the domain that you created in Chapter 4, "Creating a Domain" through the following steps.

> **Note:** You might have already added SOA components to the domain as described in Chapter 5, "Extending the Domain for SOA Components."

- Step 1: Enabling VIP4 in BAHHOST1
- Step 2: Extending the Domain to Include BAM
- Step 3: Running the soa-createUDD.py Script
- Step 4: Configuring a JMS Persistence Store for BAM UMS
- Step 5: Configuring a Default Persistence Store for Transaction Recovery
- Step 6: Untargeting the BAM Server System from WLS_BAM2
- Step 7: Propagating the Domain Configuration to BAMHOST1 and BAMHOST2 Using the pack/unpack Utility
- Step 8: Starting Node Manager on BAMHOST1 and BAMHOST2
- Step 9: Starting the BAM System
- Step 10: Configuring the BAM Web Applications to Use the BAM Server in BAMHOST1
- Step 11: Configuring the ADCServer to Use the Appropriate BAMServer Address
- Step 12: Configuring Oracle HTTP Server for the WLS_BAMn Managed Servers
- Step 13: Configuring Server Migration for the WLS_BAM Servers

## 6.2 Enabling VIP4 in BAHHOST1

The BAM System uses a virtual hostname as the listen addresses for the managed server hosting the BAM Server component. This virtual host name and corresponding virtual IP is required to enable server migration for the BAM Server component. You must enable a VIP (VIP4) mapping BAMHOST1VHN1 on BAMHOST1 and must correctly resolve the BAMHOST1VHN1 hostname in the network system used by the topology (either by DNS Server, hosts resolution).

To enable VIP4, follow the steps described in Section 4.3, "Enabling VIP1 in SOAHOST1."

## 6.3 Extending the Domain to Include BAM

In this step, you extend the domain created in Chapter 4, "Creating a Domain" to contain BAM. The instructions in this section assume that the BAM deployment uses

the same database service (`soaedg.mycompany.com`) as the SOA deployment. However, a deployment may choose to use a different database service specifically for BAM.

> **Note:** Before performing these steps, back up the domain as described in *Oracle Fusion Middleware Administrator's Guide*.

1. Change directory to the location of the Configuration Wizard. This is within the SOA home directory.

   ```
   SOAHOST1> cd ORACLE_HOME/common/bin
   ```

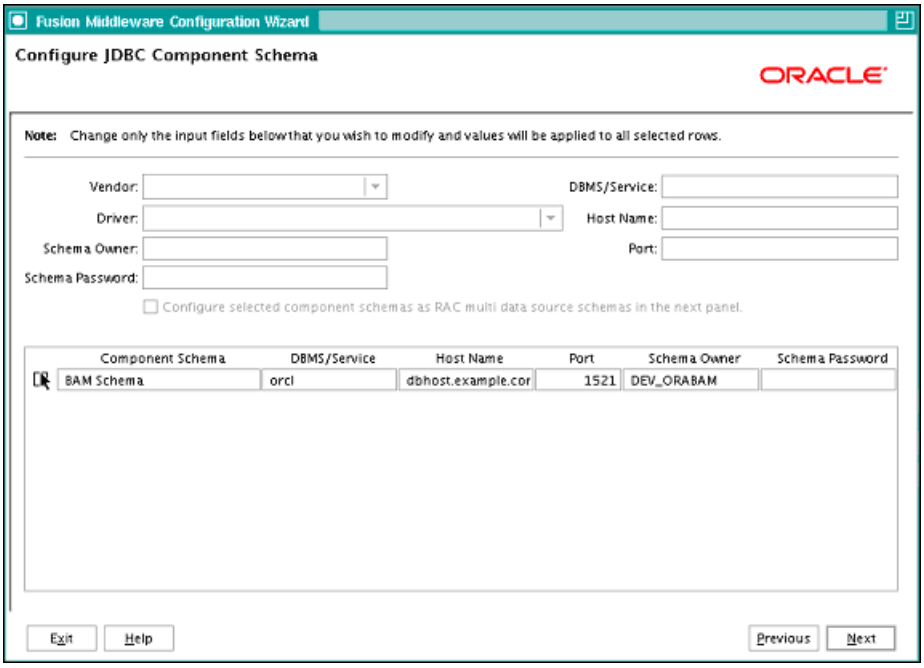
2. Start the Configuration Wizard:

   ```
   SOAHOST1> ./config.sh
   ```

3. In the Welcome screen, select **Extend an existing WebLogic domain**, and click **Next**.
4. In the WebLogic Domain Directory screen, select the WebLogic domain directory (`ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>`), and click **Next**.
5. In the Select Extension Source screen, do the following:
   - Select **Extend my domain automatically to support the following added products**.
   - Select the following products:
     - **Oracle Business Activity Monitoring 11.1.1.1**

   Click **Next**.
6. In the Configure JDBC Component Schema screen (Figure 6–1), do the following:
   a. Select **BAM Schema**.
   b. Select **Configure selected component schemas as RAC multi data source schemas in the next panel**.
   c. Click **Next**.

***Figure 6–1 Configure JDBC Component Schema Screen***




Screenshot of the Configure JDBC Component Schema screen for Oracle Business Activity Monitoring (BAM).

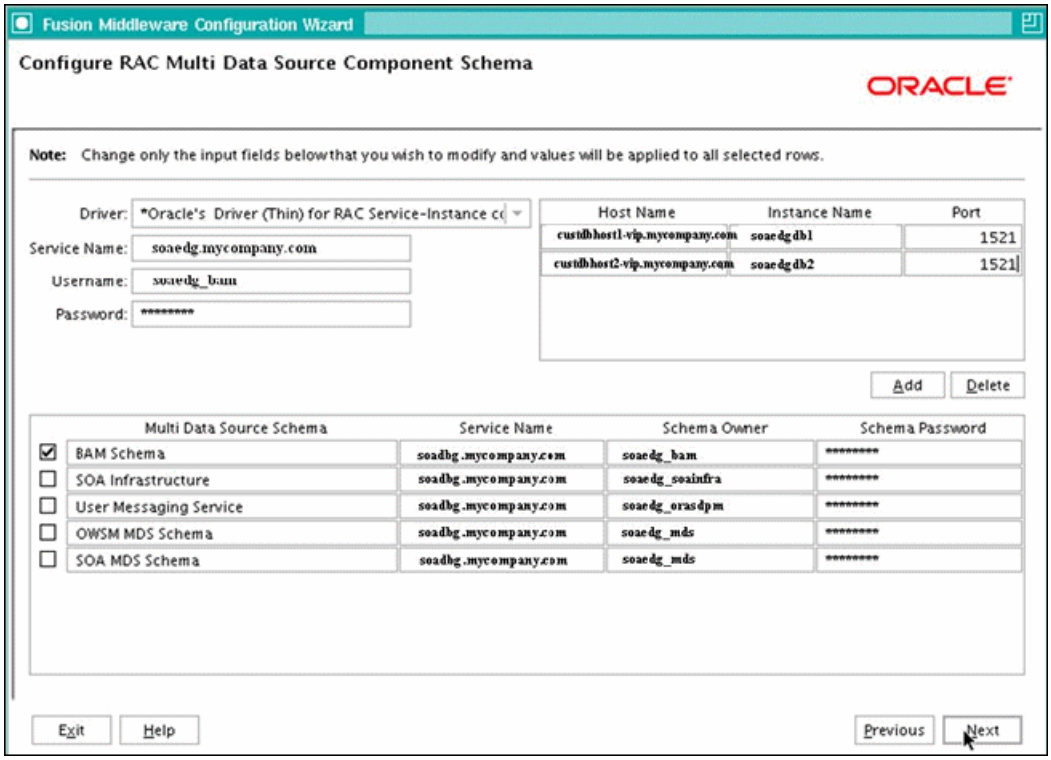
**********

7. In the Configure RAC Multi Data Sources Component Schema screen (Figure 6–2), do the following:
   a. Select **BAM Schema**. Leave the other data sources as they are.
   b. Enter values for the following fields, specifying the connect information for the RAC database that was seeded with RCU.
      - **Driver:** Select **Oracle driver (Thin) for RAC Service-Instance connections, Versions:10, 11**.
      - **Service Name:** Enter the service name of the database; for example, `soaedg.mycompany.com`.
      - **Username**: Enter the complete user name (including prefix) for the schemas. The user names shown in Figure 6–2 assume that `soedg` was used as prefix for schema creation from RCU.
      - **Password:** Enter the password to use to access the schemas.
   c. Click **Add** and enter the details for the first RAC instance.
   d. Repeat for each RAC instance.

      **Note:** Leave the SOA Infrastructure, User Messaging Service, OWSM MDS, and SOA MDS Schema information as it is.

   e. Click **Next**.

*Figure 6–2 Configure Multi Data Source Component Schema Screen*




Screenshot of the Configure Multi Data Source Component Schema screen for Oracle Business Activity Monitoring (BAM).

**********

8. In the Test JDBC Data Sources screen, the connections should be tested automatically. The Status column displays the results. Ensure that all connections were successful. If not, click **Previous** to return to the previous screen and correct your entries.

   Click **Next** when all the connections are successful.

9. In the Optional Configuration screen, select the following:

   - **Managed Servers, Clusters, and Machines**
   - **Deployments and Services**

10. In the Configure Managed Servers screen, add the required managed servers.

    A server called bam_server1 is created automatically. Rename this to WLS_BAM1 and add a new server called WLS_BAM2. Give these servers the attributes listed in Table 6–1. Do not modify the other servers that appear in this screen; leave them as they are.

*Table 6–1 Managed Servers*

| Name | Listen Address | Listen Port | SSL Listen Port | SSL Enabled |
|---|---|---|---|---|
| WLS_BAM1 | BAMHOST1VHN1 | 9001 | n/a | No |
| WLS_BAM2 | BAMHOST2 | 9001 | n/a | No |

Click **Next**.

11. In the Configure Clusters screen, add the following clusters listed in Table 6–2. Do not modify the other clusters that display in this screen; leave them as they are.

*Table 6–2 Clusters*

| Name | Cluster Messaging Mode | Multicast Address | Multicast Port | Cluster Address |
|---|---|---|---|---|
| BAM_Cluster | unicast | n/a | n/a | Leave it empty. |

Click **Next**.

12. In the Assign Servers to Clusters screen, add the following. Do not modify the other assignments that display in this screen; leave them as they are.
    - BAM_Cluster
      - WLS_BAM1
      - WLS_BAM2

    Click **Next**.

13. In the Configure Machines screen, do the following:
    - Delete the **LocalMachine** that appears by default.
    - Click the **Unix Machine** tab. You should add the BAMHOST1 and BAMHOST2 machines and have the following entries:

*Table 6–3 Machines*

| Name | Node Manager Listen Address |
|---|---|
| SOAHOST1 | SOAHOST1 |
| SOAHOST2 | SOAHOST2 |
| BAMHOST1 | BAMHOST1 |
| BAMHOST2 | BAMHOST2 |

    Leave all other fields to their default values.

    Click **Next**.

14. In the Assign Servers to Machines screen, do the following:
    - Assign WLS_BAM1 to BAMHOST1
    - Assign WLS_BAM2 to BAMHOST2.

    Click **Next**.

15. In the Target Deployments to Clusters or Servers screen, ensure the following targets:
    - **usermessagingserver** and **usermessagingdriver-email** should be targeted only to **SOA_Cluster** and **BAM_Cluster**. (The usermessaging-xmpp, usermessaging-smpp, and usermessaging-voicexml applications are optional.)
    - **WSM-PM** should be targeted only to **WSM-PM_Cluster**.
    - The **DMS Application** should be targeted to **BAM_Cluster**, **SOA_Cluster**, **WSM-PM_Cluster** and **Admin Server**.

- The **oracle.rules.***, **oracle.sdp.*** deployments should be targeted to **SOA_Cluster** and **BAM_Cluster**. The **oracle.soa.*** deployments should be targeted only to **SOA_Cluster**.
- The **oracle.wsm.seedpolicies** library should be targeted only to the **WSM-PM_Cluster**.
- **oracle.bam** is targeted only to **BAM_Cluster**.

Click **Next**.

16. In the Target Services to Clusters or Servers screen, ensure the following targets:
    - **OWSM Startup Class** should be targeted only to **WSM_Cluster**.
    - **mds-owsm**, **mds-owsm-rac0**, and **mds-owsm-rac1** should be targeted to both **WSM-PM_Cluster** and **AdminServer**.
    - **mds-soa**, **mds-soa-rac0**, and **mds-soa-rac1** should be targeted to both **SOA_Cluster** and **AdminServer**.
    - **OraSDPMDatasource**, **OraSDPMDatasource-rac0**, and **OraSDPMDatasource-rac1** should be targeted to both **SOA_Cluster** and **BAM_Cluster**.
17. Click **Next**.
18. In the Configuration Summary screen, click **Extend**.

    **Note:** Because you are extending a domain, do not change the values that appear in the Configuration Summary screen.

19. Click **OK** in the warning dialog about conflicts in ports for the domain.
20. In the Creating Domain screen, click **Done**.
21. Restart the Administration Server to enable these changes to take effect.

### 6.3.1 Restarting the Administration Server

Restart the Administration Server to commit the changes to the domain.

1. Stop the Administration Server:

```
SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin
SOAHOST1> ./stopWebLogic.sh
```

2. Start the Administration Server:

```
SOAHOST1> ./startWebLogic.sh
```

## 6.4 Running the soa-createUDD.py Script

You must run the `soa-createUDD.py` script using WLST offline before you can start the WLS_BAM1 managed server on SOAHOST1. This script is located at `<ORACLE_HOME>/bin/soa-createUDD.py`.

1. Run the `setDomainEnv.sh` script to set up the environment:

```
SOAHOST1> ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/bin/
setDomainEnv.sh
```

2. Run the `soa-createUDD.py` script, which is located in the `ORACLE_HOME/bin` directory:

```
SOAHOST1> MW_HOME/jrockit_160_14_R27.6.4-18/bin/java weblogic.WLST ORACLE_
HOME/bin/soa-createUDD.py
--domain_home ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>
--bamcluster BAM_Cluster
--extend=true
```

> **Note:** In this case, it is assumed that the soa-CreateUDD.py script has been run previously for the SOA components (described in Chapter 5, "Extending the Domain for SOA Components") and is now being used for extending the domain to BAM. This script allows other models, such as configuring the JMS system in one single pass for both SOA and BAM together, or for configuring the JMS system for BAM only. See the soa-createUDD.py script file for additional information about the different options of the script.

3. Restart the Administration Server. See the steps in Section 6.3.1, "Restarting the Administration Server."
4. Log into the Oracle WebLogic Server Administration Console.
5. Expand **Services** and then **Messaging** in the Domain Structure window.
6. Click **JMS Modules**. The JMS Modules page appears.
7. Click **UMSJMSSystemResource** (represented as a hyperlink) in the Names column of the table.
8. Click the **Subdeployments** tab.
9. Delete all of the subdeployments except for **UMSJMSSubDMSOA**.
10. Access the Oracle WebLogic Server Administration Console.
11. Expand **Services** and then **Messaging** in the Domain Structure window.
12. Click **JMS Modules**. The JMS Modules page appears.
13. Click **UMSJMSSystemResource** (represented as a hyperlink) in the Names column of the table.
14. Click **Targets**.
15. Deselect the **BAM Cluster** as target.
16. Click **Save and Activate**.
17. Verify that the following modules are listed in the Oracle WebLogic Server Administration Console:
    - **SOAJMSModuleUDDs**

      In the Domain Structure window of the Oracle WebLogic Server Administration Console, expand the **Services** node, then the Messaging node. Choose **JMS Modules**. The JMS Modules page appears. Click **SOAJMSMOduleUDDS** (represented as a hyperlink) in the Names column of the table. Click the **Subdeployment** tab. Click **SOAJMSSubDM**.

      Verify that the module is targeted to **SOAJMSServer_auto_1** and **SOAJMSServer_auto_2**.

- **UMSJMSSystemResource**

  In the Domain Structure window of the Oracle WebLogic Server Administration Console, expand the **Services** node, then the **Messaging** node. Choose **JMS Modules**. The JMS Modules page appears. Click **UMSJMSSystemResource** (represented as a hyperlink) in the Names column of the table. Click the **Subdeployment** tab. Click **UMSJMSSubDMSOA**.

  Verify that the module is targeted to **UMSJMSServer_auto_1** and **UMSJMSServer_auto_2**.

- **BAMJMSModuleUDDs**

  In the Domain Structure window of the Oracle WebLogic Server Administration Console, expand the **Services** node, then the **Messaging** node. Choose **JMS Modules**. The JMS Modules page appears. Click **BAMJMSModuleUDDs** (represented as a hyperlink) in the Names column of the table. Click the **Subdeployment** tab. Click **BAMJMSSubDM**.

  Verify that the module is targeted to **BAMJMSServer_auto_1** and **BAMJMSServer_auto_2**.

- **UMSJMSModuleUDDsBAM**

  In the Domain Structure window of the Oracle WebLogic Server Administration Console, expand the **Services** node, then the **Messaging** node. Choose **JMS Modules**. The JMS Modules page appears. Click **UMSJMSModuleUDDsBAM** (represented as a hyperlink) in the Names column of the table. Click the **Subdeployment** tab. Click **UMSJMSSubDMBAM**.

  Verify that the module is targeted to **UMSJMSServer_auto_3** and **UMSJMSServer_auto_4**.

## 6.5 Configuring a JMS Persistence Store for BAM UMS

Configure the location for all of the persistence stores as a directory that is visible from both nodes. For more information, see Section 4.1, "Installing Oracle Fusion Middleware Home." You must then change all of the persistent stores to use this shared base directory as follows:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand the **Services node** and then click the **Persistence Stores** node. The Summary of Persistence Stores page appears.
3. Select the **UMSJMSFileStore_auto_3** persistence store (represented as a hyperlink) from the Name column of the table. The Settings page for the persistence 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>/<soa_cluster_name>/jms
   ```

5. Click **Save and Activate**.
6. Repeat the steps for **UMSJMSFileStore_auto_4**

## 6.6 Configuring a 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 the server.

> **Note:** Preferably, this location should be a dual-ported SCSI disk or on a Storage Area Network (SAN).

To set the location for the default persistence store, complete these steps for WLS_BAM1:

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 **WLS_BAM1** (represented as a hyperlink) in the Name column of the table. The settings page for the WLS_BAM1 server appears and defaults to the **Configuration** tab.
4. Click the **Services** 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 directory structure of the path is as follows:

   ```
   ORACLE_BASE/admin/<domain_name>/<soa_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. Both BAMHOST1 and BAMHOST2 must be able to access this directory. This directory must also exist before you restart the server.

## 6.7 Untargeting the BAM Server System from WLS_BAM2

Because the BAM server component in BAM is a singleton, you must untarget it from one of the WLS_BAM servers before you configure it for server migration.

In this step, you remove the BAM server runtime from WLS_BAM2. Perform these steps to untarget the BAM server artifacts from WLS_BAM2:

1. Log into the Oracle WebLogic Administration Console at `http://SOAHOST1VHN1:7001/console`.
2. In the Domain Structure window, choose **Environment** and then **Servers**. The Summary of Servers page appears.
3. Select **WLS_BAM2** in Name column of the table. The Settings page for WLS_BAM2 appears.
4. Click the **Deployments** tab.

5. Select the **oracle-bam** application from the Name column of the table. The Settings page for the oracle-bam application appears.
6. Click the **Targets** tab.
7. Click **Lock and Edit**.
8. Change the targets for the modules as described in Table 6–4.

> **Note:** You must target all of these components as described in Table 6–4, as incorrect targeting can prevent the BAM system from starting.

***Table 6–4 oracle-bam Component Target Types***

| Component | Type | Target |
|---|---|---|
| oracle-bam(11.1.1) | Enterprise Application | BAM_Cluster |
| /oracle/bam | WEBAPP | WLS_BAM1 |
| oracle-bam-adc-ejb.jar | EJB | WLS_BAM1 |
| oracle-bam-ems-ejb.jar | EJB | WLS_BAM1 |
| oracle-bam-eventengine-ejb.jar | EJB | WLS_BAM1 |
| oracle-bam-reportcache-ejb.jar | EJB | WLS_BAM1 |
| oracle-bam-statuslistener-ejb.jar | EJB | WLS_BAM1 |
| OracleBAM | WEBAPP | BAM_Cluster |
| OracleBAMWS | WEBAPP | BAM_Cluster |
| sdpmessagingclient-ejb.jar | EJB | WLS_BAM1 |

## 6.8 Propagating the Domain Configuration to BAMHOST1 and BAMHOST2 Using the pack/unpack Utility

An EDG topology with WLS_BAM1 and WLS_BAM2 can run in the same nodes as WLS_SOA1 and WLS_SOA2, provided that the nodes have the appropriate capacity. In that case Oracle also recommends that you run the `pack/unpack` to a new and isolated domain directory for the WLS_BAM servers to preserve the SOA configuration existing in `ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>`. A suggested approach is to have a separate domain directory for BAM in SOAHOST1 at `ORACLE_BASE/admin/<domain_name>/mserverbam/<domain_name>`.

1. Make sure that a similar directory and shared storage configuration as SOAHOST2 is present in BAMHOST1 (described in Chapter 2, "Database and Environment Preconfiguration"). BAMHOST1 and BAMHOST2 should have mounted the `MW_HOME` directory as created in Chapter 4, "Creating a Domain."
2. Run the `pack` command on SOAHOST1 to create a template pack as follows:
   a. Run the following command:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin
```

> **Note:** Notice that this directory is available as mount point to the MW_HOME created in Chapter 4, "Creating a Domain."

b. Run the pack command:

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

3. Run the following command on SOAHOST1 to copy the template file created in the previous step to BAMHOST1.

```
SOAHOST1> scp soadomaintemplateBAM.jar
   oracle@BAMHOST1:/ORACLE_COMMON_HOME/common/bin
```

4. Run the `unpack` command on BAMHOST1 to unpack the template in the managed server domain directory as follows:

```
BAMHOST1> cd ORACLE_BASE/fmw/soa/common/bin
BAMHOST1> ./unpack.sh -domain= ORACLE_BASE/admin/<domain_name>/mserver/<domain_
name> -template=soadomaintemplateBAM.jar "-app_dir=ORACLE_BASE/admin/<domain_
name>/mserver/apps
```

5. Run the copy and unpack commands for BAMHOST2.

## 6.9 Disabling Host Name Verification for the WLS_BAM*n* 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"). 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 EDG topology configuration is complete as described in Chapter 7, "Setting Up Node Manager."

Perform these steps to disable host name verification:

1. Log in to Oracle WebLogic Server Administration Console.
2. In the Administration Console, select **WLS_BAM1**, then **SSL**, and then **Advanced**.
3. Set Hostname Verification to **None**.
4. In the Administration Console, select **WLS_BAM2**, then **SSL**, and then **Advanced**.
5. Save and activate the changes.

## 6.10 Starting Node Manager on BAMHOST1 and BAMHOST2

Perform these steps to start Node Manager on BAMHOST1 and BAMHOST2:

1. On each server, run the *setNMProps.sh* script, which is located in the *ORACLE_COMMON_HOME/common/bin* directory, to set the `StartScriptEnabled` property to 'true' before starting Node Manager:

```
BAMHOSTn> cd ORACLE_COMMON_HOME/common/bin
BAMHOSTn> ./setNMProps.sh
```

> **Note:** You must use the `StartScriptEnabled` property to avoid class loading failures and other problems. See also Section 10.6.5, "Incomplete Policy Migration After Failed Restart of SOA Server."

> **Note:** If the BAM server is sharing the MW_HOME in a local or shared storage with SOA, as suggested in the shared storage configuration described in Chapter 2, "Database and Environment Preconfiguration," it is not required to run `setNMProps.sh` again. In this case, Node Manager has already been configured to use a startscript.

2. Run the following commands to start Node Manager on BAMHOST1:

```
BAMHOST1> cd WL_HOME/server/bin
BAMHOST1> ./startNodeManager.sh BAMHOST1
```

Run the following commands to start Node Manager on BAMHOST2:

```
BAMHOST2> cd WL_HOME/server/bin
BAMHOST2> ./startNodeManager.sh BAMHOST2
```

## 6.11 Starting the BAM System

Perform these steps to start the WLS_BAM1 managed server on BAMHOST1:

1. Start the WLS_BAM1 managed servers:
   a. Log into the Oracle WebLogic Server Administration Console at `http://soahost1vhn1:7001/console`.
   b. In the Domain Structure window, expand the **Environment** node and then select **Servers**. The Summary of Servers page appears.
   c. Click the **Control** tab.
   d. Select **WLS_BAM1** from the Servers column of the table.
   e. Click **Start**.
2. Access `http://BAMHOST1VHN1:9001/OracleBAM` to verify status of WLS_BAM1.

If the managed server fails to start with the following message:

```
Listener refused the connection with the following error:
ORA-12519, TNS:no appropriate service handler found
The Connection descriptor used by the client was <db_connect_string>
```

Verify that the `PROCESSES` initialization parameter for the database is set to a high enough value. See Section 2.1.1.3, "Initialization Parameters" for details. This error often occurs when you start servers that are subsequent the first server.

1. Start the WLS_BAM2 managed servers:
   a. Log into the Oracle WebLogic Administration Console at `http://soahost1vhn1:7001/console`.
   b. In the Domain Structure window, expand the **Environment** node and then select **Servers**. The Summary of Servers page appears.
   c. Click the **Control** tab.
   d. Select **WLS_BAM2** from the Servers column of the table.
   e. Click **Start**.
2. Access `http://BAMHOST2:9001/OracleBAM` to verify status of WLS_BAM2.

**Note:** These instructions assume that the host name verification displayed previously for the WS-M or SOA managed servers in SOAHOST2 and that the Node Manager is already running on SOAHOST2.

## 6.12 Configuring the BAM Web Applications to Use the BAM Server in BAMHOST1

Perform these steps to configure the OracleBamWeb(WLS_BAM1) and OracleBamWeb(WLS_BAM2) applications to use the BAM server in BAMHOST1:

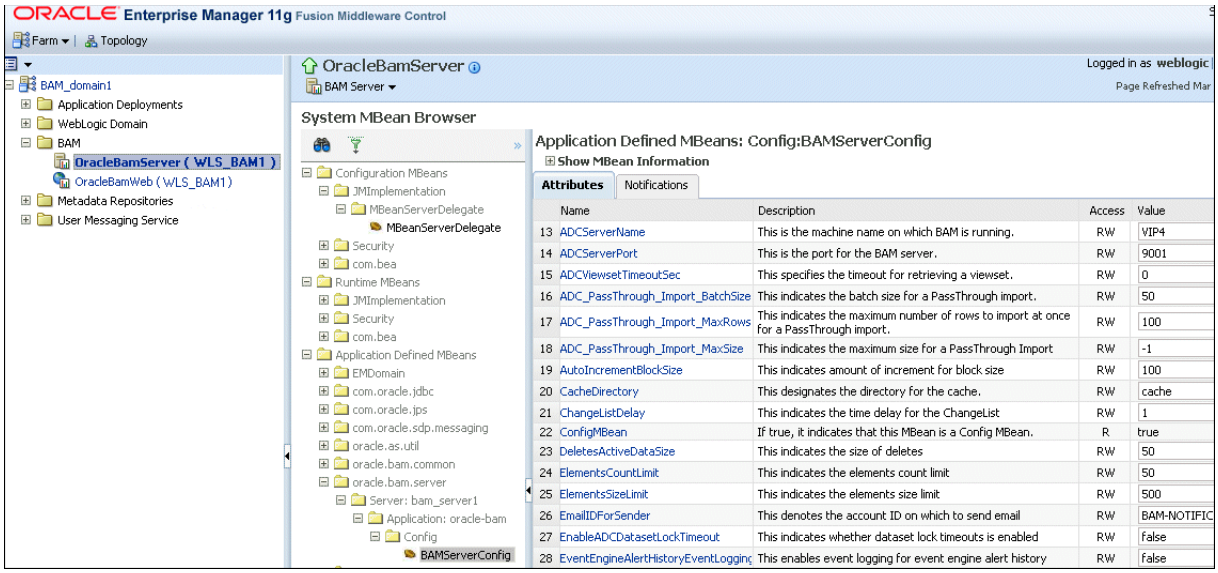
1. Access Oracle Enterprise Manager Fusion Middleware Control through `http://soahost1vhn1:7001/em`.
2. Expand **BAM** in the navigation tree.
3. Right-click **OracleBamWeb(WLS_BAM1)**.
4. Choose **BAM Web Properties** from the context menu. The BAM Web Properties page appears.
5. Define the following properties:
   - Enter *http:s//soa.mycompany.com* for the application URL.
   - Enter *BAMHOST1VHN1* for the server name. See also Table 2–2 in Section 2.2.3, "IPs and Virtual IPs."
6. Select **OracleBamWeb(WLS_BAM2)** from the navigation tree and then repeat these steps.

## 6.13 Configuring the ADCServer to Use the Appropriate BAMServer Address

Perform these steps to configure the ADCServer to use the correct BAMServer address:

1. Access Oracle Enterprise Manager Fusion Middleware Control through `http://soahost1vhn1:7001/em`.
2. Expand **BAM** in the navigation tree.
3. Right-click **OracleBamServer(WLS_BAM1)**.
4. Choose **System MBean Browser** from the context menu.
5. In the System MBean Browser, expand oracle.bam.server (located within Application Defined MBeans).
6. Click the **BamServerConfig** MBean (as illustrated in Figure 6–3).
7. Update the ADCServerName attribute by entering `BAMHOST1VHN1` as the value.
8. Update the ADCServerPort attribute to the listening port of the BAM server.
9. Click **Apply**.

***Figure 6–3 The System MBean Browser***




A screen shot of the System MBean Browser accessed through the Oracle Enterprise Manager FMW Console. This graphic shows the BAM Web application, OracleBamServer(WLS_BAM1) selected in the navigation tree. BamServerConfig is selected in the System MBean Browser. The MBean's attributes, including ADCServerName is exposed. The text further describes this image.

**********

## 6.14 Configuring Oracle HTTP Server for the WLS_BAM*n* Managed Servers

To enable Oracle HTTP Server to route to BAM_Cluster, which contains the WLS_BAM*n* managed servers, you must set the `WebLogicCluster` parameter to the list of nodes in the cluster as follows:

1. Add the following lines to the `OHS_HOME/instances/ohs_instance1/config/OHS/ohs1/mod_wl_ohs.conf` file:

```
# BAM Web Application
<Location /OracleBAM >
    SetHandler weblogic-handler
    WebLogicCluster BAMHOST1VHN1:9001,BAMHOST2:9001
</Location>
```

2. Restart Oracle HTTP Server on both WEBHOST1 and WEBHOST2 as follows:

```
WEBHOST1> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs1
WEBHOST2> ORACLE_BASE/admin/<instance_name>/bin/opmnctl restartproc
ias-component=ohs2
```

## 6.15 Validating Access Through Oracle HTTP Server

Verify URLS to ensure that appropriate routing and failover is working from the HTTP Server to the BAM_Cluster. Perform these steps to verify URLs:

1. While WLS_BAM2 is running, stop WLS_BAM1 using the Oracle WebLogic Server Administration Console.
2. Access `WebHost1:7777/OracleBAM` to verify the appropriate functionality. (Please note that you will not be able to retrieve reports or data since the BAM server is down.)
3. Start WLS_BAM1 from the Oracle WebLogic Server Administration Console.
4. Stop WLS_BAM2 from the Oracle WebLogic Server Administration Console.
5. Access `WebHost1:7777/OracleBAM` to verify the appropriate functionality.

## 6.16 Configuring Server Migration for the WLS_BAM Servers

The high-availability architecture for BAM uses server migration to protect the BAM server singleton service against failures. The WLS_BAM1 managed server is configured so that it can be restarted on BAMHOST2 if it fails. For this configuration, WLS_BAM1 listens on a specific, floating IP address that is failed over by WebLogic Server migration. To configure server migration for the WLS_BAM1 managed servers, complete the following tasks:

- Step 1: Setting Up the User and Tablespace for the Server Migration Leasing Table
- Step 2: Creating a Multi-Data Source from the WebLogic Server Administration Console
- Step 3: Editing the Node Manager's Properties File
- Step 4: Set Environment and Superuser Privileges for the wlsifconfig.sh Script
- Step 5: Enabling Host Name Verification Certificates Between Node Manager in the BAMHOSTn Nodes and the Administration Server
- Step 6: Configure Server Migration Targets
- Step 7: Test Server Migration

> **Note:** If server migration was configured previously for SOA, the BAM stem can use the same data sources and database schemas. In that case, steps 1 through 4 may not be required, but you must also target the corresponding server-migration/leasing datasources to the BAM Cluster.

### 6.16.1 Setting Up the User and Tablespace for the Server Migration Leasing Table

Perform these steps to create the user and tablespace:

1. Create a tablespace called *leasing*. For example, log on to SQL*Plus as the sysdba user and run the following command:

```
SQL> create tablespace leasing
        logging datafile 'DB_HOME/oradata/orcl/leasing.dbf'
        size 32m autoextend on next 32m maxsize 2048m extent management local;
```

2. Create a user named *leasing* and assign it to the leasing tablespace as follows:

```
SQL> create user leasing identified by welcome1;
SQL> grant create table to leasing;
SQL> grant create session to leasing;
SQL> alter user leasing default tablespace leasing;
SQL> alter user leasing quota unlimited on LEASING;
```

3. Create the leasing table using the `leasing.dll` script as follows:
   a. Copy the *leasing.ddl* file located in the `WL_HOME/server/db/oracle/920` directory to your database node.
   b. Connect to the database as the leasing user.
   c. Run the `leasing.ddl` script in SQL*Plus as follows:

```
SQL> @copy_location/leasing.ddl;
```

## 6.16.2 Creating a Multi-Data Source from the WebLogic Server Administration Console

Use the Oracle WebLogic Server Administration Console to create a multi-data source for the leasing table. You create a data source to each of the RAC database instances during the process of setting up the multi-data source, both for these data sources and for the global leasing multi-data source. When you create this data source:

- Ensure that it is a non-xa data source
- The names of the multi-data sources are in the format of *<MultiDS>-rac0*, *<MultiDS>-rac1*, and so on.
- Use Oracle's Driver (Thin) Version 9.0.1, 9.2.0, 10, 11
- Use Supports Global Transactions, One-Phase Commit, and specify a service name for your database
- Target these data sources to the BAM Cluster.
- Make sure the datasources' connection pool initial capacity is set to **0**. To do this, select **Services**, **JDBC**, and then **Datasources**. In the Datasources screen, click the **Datasource Name**, then click the **Connection Pool** tab, and enter **0** in the **Initial capacity** field.

For information on using Oracle WebLogic Server Administration to create a multi-data source, see Section 8.2, "Creating a Multi-Data Source Using the Oracle WebLogic Server Administration Console."

## 6.16.3 Editing the Node Manager's Properties File

The `nodemanager.properties` file is located in the *WL_HOME*/common/nodemanager directory.

Add the following properties to enable server migration to work properly:

```
Interface=eth0
NetMask=255.255.255.0
UseMACBroadcast=true
```

- `Interface`

  This property specifies the interface name for the floating IP (`eth0`, for example).

> **Note:** Do not specify the sub interface, such as `eth0:1` or `eth0:2`. This interface is to be used without the `:0`, or `:1`. The Node Manager's scripts traverse the different `:X` enabled IPs to determine which to add or remove. For example, the valid values in Linux environments are `eth0`, `eth1`, or, `eth2`, `eth3`, `ethn`, depending on the number of interfaces configured.

- `NetMask`

  This property specifies the net mask for the interface for the floating IP.

- `UseMACBroadcast`

  This property specifies whether or not to use a node's MAC address when sending ARP packets, that is, whether or not to use the `-b` flag in the arping command.

Perform this configuration in the two nodes where the servers are running. Verify in the output of Node Manager (the shell where the Node Manager is started) that these properties are in use. Otherwise, problems may occur during migration. The output should be similar to the following:

```
...
StateCheckInterval=500
Interface=eth0
NetMask=255.255.255.0
...
```

> **Note:** The following steps are not required if the server properties (start properties) have been properly set and Node Manager can start the servers remotely.

1. If not done already, set the `StartScriptEnabled` property in the `nodemanager.properties` file to true. This is required for the shiphome to enable Node Manager to start the managed servers.
2. Start Node Manager on Node 1 and Node 2 by running the `startNodeManager.sh` script, which is located in the `WL_HOME/server/bin/` directory.

> **Note:** When running Node Manager from a shared storage installation, multiple nodes are started using the same `nodemanager.properties` file. However, each node may require different `NetMask` or `Interface` properties. In this case, specify individual parameters on a per-node basis using environment variables. For example, to use a different interface (eth3) in SOAHOSTn, use the `Interface` environment variable as follows: `SOAHOSTn> export JAVA_OPTIONS=-DInterface=eth3` and start Node Manager after the variable has been set in the shell.

### 6.16.4 Set Environment and Superuser Privileges for the wlsifconfig.sh Script

Perform these steps to set the environment and superuser privileges for the `wlsifconfig.sh` script:

1. Ensure that the PATH environment variable includes the files listed in Table 6–5.

***Table 6–5 Required Files for the PATH Environment***

| File | Directory Location |
|---|---|
| `wlsifconfig.sh` | `ORACLE_BASE/admin/<domain_name>/mserver/ <domain_name>/bin/server_migration` |
| `wlscontrol.sh` | `WL_HOME/common/ bin` |

*Table 6–5 (Cont.) Required Files for the PATH Environment*

| File | Directory Location |
|---|---|
| `nodemanager.domains` | `WL_HOME/common` |

2. Grant sudo configuration for the `wlsifconfig.sh script`.
   - Configure sudo to work without a password prompt.
   - For security reasons, sudo should be restricted to the subset of commands required to run the `wlsifconfig.sh` script. For example, to set the environment and superuser privileges for the `wlsifconfig.sh` script, complete these steps:
     a. Grant sudo privilege to the WebLogic user ('oracle') with no password restriction, and grant execute privilege on the */sbin/ifconfig* and */sbin/arping* binaries.
     b. Make sure the script is executable by the WebLogic user ('oracle'). The following is an example of an entry inside */etc/sudoers* granting sudo execution privilege for `oracle` and also over `ifconfig` and `arping`:

     ```
     oracle ALL=NOPASSWD: /sbin/ifconfig,/sbin/arping
     ```

     **Note:** Ask the system administrator for the sudo and system rights as appropriate to this step.

### 6.16.5 Enabling Host Name Verification Certificates Between Node Manager in the BAMHOST*n* Nodes and the Administration Server

See Section 7.2, "Enabling Host Name Verification Certificates for Node Manager in SOAHOST1."

### 6.16.6 Configure Server Migration Targets

Configuring Cluster Migration sets the `DataSourceForAutomaticMigration` property to true. Perform these steps to configure cluster migration in a cluster:

1. Log into the Oracle WebLogic Server Administration Console.
2. In the Domain Structure window, expand **Environment** and select **Clusters**. The Summary of Clusters page appears.
3. Click the cluster for which you want to configure migration (**BAM_Cluster**) in the Name column of the table.
4. Click the **Migration** tab.
5. In the **Available** field, select the machine to which to allow migration and click the right arrow. In this case, select **BAMHOST1** and **BAMHOST2**.
6. Select the data source to be used for automatic migration. In this case select the leasing data source.
7. Click **Save**.
8. Set the candidate machines for server migration:

**Note:** You must perform this task for WLS_BAM1 only, as WLS_BAM2 does not use server migration.

a. In Domain Structure window of the Oracle WebLogic Server Administration Console, expand **Environment** and select **Servers**.

b. Select the server for which you want to configure migration.

c. Click the **Migration** tab.

d. In the **Available** field, located in the Migration Configuration section, select the machines to which to allow migration and click the right arrow. Select **BAMHOST2** for **WLS_BAM1**.

e. Select **Automatic Server Migration Enabled**. This enables the Node Manager to start a failed server on the target node automatically.

f. Click **Save**.

g. Restart the Administration Server and the WLS_BAM1 server.

## 6.16.7 Test Server Migration

Perform these steps to verify that Server Migration is working properly:

**From Node 1:**

1. Kill the WLS_BAM1 managed server.

   To do this, run this command:

   ```
   BAMHOST1> kill -9 <pid>
   ```

   where <*pid*> specifies the process ID of the managed server. You can identify the pid in the node by running this command:

   ```
   BAMHOST1> ps -ef | grep WLS_BAM1
   ```

2. Watch the Node Manager console: you should see a message indicating that WLS_BAM1's floating IP has been disabled.

3. Wait for the Node Manager to try a second restart of WLS_BAM1. Node Manager waits for a fence period of 30 seconds before trying this restart.

4. Once Node Manager restarts the server, stop it again. Now Node Manager should log a message indicating that the server will not be restarted again locally.

**From Node 2:**

1. Watch the local Node Manager console. After 30 seconds since the last try to restart WLS_BAM1on Node 1, Node Manager on Node 2 should prompt that the floating IP for WLS_BAM1 is being brought up and that the server is being restarted in this node.

2. Access the Oracle BAM console using BAMHOST1VHN1 and soa.mycompany.com/OracleBAM.

#### Verification From the Administration Console

Migration can also be verified in the Administration Console:

1. Log into the Administration Console.

2. Click on **Domain** on the left console.

3. Click the **Monitoring** tab and then on the **Migration** tab.

   The Migration Status table provides information on the status of the migration.

## 6.17 Configuration Changes Applied to BAM components in an EDG Topology

If you are using Oracle BAM in a clustered environment, any configuration property changes you make in Oracle Enterprise Manager on one node must be made on all nodes (i.e. configuration changes applied to one server are no applied automatically to all servers in the BAM cluster. In addition, consider the following when making configuration changes to BAM Server in a BAM EDG Topology:

Since server migration is used, the BAM Server is moved to a different node's domain directory. It is necessary to pre-create the BAM Server configuration in the failover node. The BAM Server configuration files are located in the following directory:

*ORACLE_BASE*/admin/<domain_name>/mserver/<domain_name>
/servers/<servername>/tmp/_WL_user/oracle-bam_11.1.1

/*/APP-INF/classes/config/

Where '*' represents a directory name randomly generated by Oracle WebLogic Server during deployment, for example, `3682yq`.

In order to create the files in preparation for possible failovers, you can force a server migration and copy the files from the source node. For example, for BAM:

1. Configure the driver for WLS_BAM1 in BAMHOST1.
2. Force a failover of WLS_BAM1 to BAMHOST2. Verify the directory structure for the BAM Server in the failover node:

   ```
   cd ORACLE_BASE/admin/<domain_name>/mserver/
   <domain_name>/servers/<servername>/tmp/_WL_user/oracle-bam_11.1.1
   /*/APP-INF/classes/config/
   ```

   Where '*' represents a directory name randomly generated by Oracle WebLogic Server during deployment, for example, `3682yq`.

## 6.18 Backing Up the Installation

After you have verified that the extended domain is working, back up the installation. This is a quick backup for the express purpose of immediate restore in case of problems in the further steps. The backup destination is the local disk. This backup can be discarded once the enterprise deployment setup is complete. At this point, the regular deployment-specific backup and recovery process can be initiated. The *Oracle Fusion Middleware Administrator's Guide* provides further details. For information on describing the Oracle HTTP Server data that must be backed up and restored, refer to the "Backup and Recovery Recommendations for Oracle HTTP Server" section in this guide. For information on how to recover components, see "Recovery of Components" and "Recovery After Loss of Component" sections in the guide. For recommendations specific to recovering from the loss of a host, see the "Recovering Oracle HTTP Server to a Different Host" in the guide. Also refer to the *Oracle Database Backup and Recovery Guide* for information on database backup.

Perform these steps to back up the installation a this point:

1. Back up the web tier:

**a.** Shut down the instance using `opmnctl`.

```
ORACLE_BASE/admin/<instance_name>/bin/opmnctl stopall
```

**b.** Back up the Middleware Home on the web tier using the following command (as root):

```
tar -cvpf BACKUP_LOCATION/web.tar $MW_HOME
```

**c.** Back up the Instance Home on the web tier using the following command (as root):

```
tar -cvpf BACKUP_LOCATION/web_instance.tar $ORACLE_INSTANCE
```

**d.** Start the instance using `opmnctl`:

```
ORACLE_BASE/admin/<instance_name>/bin/opmnctl startall
```

2. Back up the database. This is a full database backup (either hot or cold) using Oracle Recovery Manager (recommended) or OS tools such as `tar` for cold backups if possible.
3. Back up the AdminServer domain directory. Perform a backup to save your domain configuration. The configuration files all exist under the `ORACLE_BASE/admin/<domain_name>` directory.

```
SOAHOST1> tar -cvpf edgdomainback.tar ORACLE_BASE/admin/<domain_name>
```

# 7 Setting Up Node Manager

This chapter describes how to configure Node Manager per the EDG recommendations. Oracle Fusion Middleware EDG recommends using host name verification for the communications between Node Manager and the Administration Server. This requires the use of certificates for the different addresses communicating with the Administration Server. In this chapter, the steps for configuring SOAHOST1 and SOAHOST2 certificates for host name verification are provided. Similar steps would be required for BAMHOST1 and BAMHOST2 in a BAM EDG topology. Although the appropriate hos tname changes in the steps are required for BAM, the procedure and syntax are exactly the same.

This chapter includes the following sections:


- Section 7.1, "About the Node Manager"
- Section 7.2, "Enabling Host Name Verification Certificates for Node Manager in SOAHOST1"
- Section 7.3, "Starting the Node Manager on SOAHOST1"
- Section 7.4, "Enabling Host Name Verification Certificates for the Node Manager in SOAHOST2"
- Section 7.5, "Starting the Node Manager on SOAHOST2"


## 7.1 About the Node Manager

The Node Manager enables you to start and stop the Administration Server and the managed servers.

#### About Passwords

The passwords used in this guide are used only as examples. Use secure passwords in a production environment. For example, use passwords that include both uppercase and lowercase characters as well as numbers.

## 7.2 Enabling Host Name Verification Certificates for Node Manager in SOAHOST1

Perform these steps to set up host name verification certificates for communication between the Node Manager and the Administration Server.

- Step 1: Generating Self-Signed Certificates Using the utils.CertGen Utility
- Step 2: Creating an Identity Keystore Using the utils.ImportPrivateKey Utility
- Step 3: Creating a Trust Keystore Using the Keytool Utility

- Step 4: Configuring Node Manager to Use the Custom Keystores

## 7.2.1 Generating Self-Signed Certificates Using the utils.CertGen Utility

Follow these steps to create self-signed certificates on SOAHOST1.mycompany.com. These certificates should be created using the network name/alias. For information on on using trust CA certificates instead, see "Configuring Identity and Trust" in *Oracle Fusion Middleware Securing Oracle WebLogic Server*.

1. Set up your environment by running the `WL_HOME/server/bin/setWLSEnv.sh` script:

   In the Bourne shell, run the following command:

   ```
   SOAHOST1> . setWLSEnv.sh
   ```

   Verify that the CLASSPATH environment variable is set:

   ```
   SOAHOST1> echo $CLASSPATH
   ```

2. Create a user-defined directory for the certificates. For example, create a directory called *certs* under the `ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>` directory. Note that certificates can be shared across WLS domains.

   ```
   SOAHOST1> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/
   SOAHOST1> mkdir certs
   ```

3. Change directory to the user-defined directory.

   ```
   SOAHOST1> cd certs
   ```

4. Run the `utils.CertGen` tool from the user-defined directory to create the certificates for both SOAHOST1 and SOAHOST1VHN1.

   Syntax:

   ```
   java utils.CertGen <key_passphrase> <cert_file_name> <key_file_name> [export | domestic] [hostname]
   ```

   Examples:

   ```
   SOAHOST1> java utils.CertGen welcome1 SOAHOST1_cert SOAHOST1_key
               domestic SOAHOST1.mycompany.com

   SOAHOST1> java utils.CertGen welcome1 VIPHOST1_cert VIPHOST1_key
               domestic SOAHOST1VHN1.mycompany.com
   ```

## 7.2.2 Creating an Identity Keystore Using the utils.ImportPrivateKey Utility

Follow these steps to create an Identity Keystore on SOAHOST1.mycompany.com.

1. Create a new identity keystore called *appIdentityKeyStore* using the utils.ImportPrivateKey utility.

   Create this keystore under the same directory as the certificates (that is, `ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/certs`.

   **Note:** The Identity Store is created (if none exists) when you import a certificate and the corresponding key into the Identity Store using the `utils.ImportPrivateKey` utility.

Import the certificate and private key for both SOAHOST1 and VIPHOST1 into the Identity Store. Make sure that you use a different alias for each of the certificate/key pair imported.

Syntax:

```
java utils.ImportPrivateKey <keystore_file> <keystore_
password> <certificate_alias_to_use> <private_key_passphrase>
<certificate_file> <private_key_file> [<keystore_type>]
```

Examples:

```
SOAHOST1> java utils.ImportPrivateKey appIdentityKeyStore.jks welcome1
           appIdentity1 welcome1
           ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/SOAHOST1_cert.pem
           ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/SOAHOST1_key.pem

SOAHOST1> java utils.ImportPrivateKey appIdentityKeyStore.jks welcome1
           appIdentity2 welcome1
           ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/VIPHOST1_cert.pem
           ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/VIPHOST1_key.pem
```

### 7.2.3 Creating a Trust Keystore Using the Keytool Utility

Follow these steps to create the Trust Keystore on SOAHOST1.mycompany.com.

1. Copy the standard java keystore to create the new trust keystore since it already contains most of the root CA certificates needed. Oracle does not recommend modifying the standard Java trust key store directly. Copy the standard Java keystore CA certificates located under the *WL_HOME*/server/lib directory to the same directory as the certificates. For example:

   ```
   cp WL_HOME/server/lib/cacerts
   ORACLE_BASE/admin/<domain_name>/aserver/<domain_
   name>/certs/appTrustKeyStore.jks
   ```

2. The default password for the standard Java keystore is `changeit`. Oracle recommends always changing the default password. Use the keytool utility to do this. The syntax is:

   ```
   keytool -storepasswd -new <NewPassword> -keystore <TrustKeyStore> -storepass
   <Original Password>
   ```

   For example:

   ```
   keytool -storepasswd -new welcome1 -keystore appTrustKeyStore.jks -storepass
   changeit
   ```

3. The CA certificate `CertGenCA.der` is used to sign all certificates generated by the utils.CertGen tool and is located at *WL_HOME*/server/lib directory. This CA certificate must be imported into the `appTrustKeyStore` using the keytool utility. The syntax is:

   ```
   keytool -import -v -noprompt -trustcacerts -alias <AliasName>
    -file <CAFileLocation> -keystore <KeyStoreLocation> -storepass <KeyStore
   Password>
   ```

   For example:

```
keytool -import -v -noprompt -trustcacerts -alias clientCACert -file
 $WL_HOME/server/lib/CertGenCA.der -keystore appTrustKeyStore.jks -storepass
welcome1
```

### 7.2.4 Configuring Node Manager to Use the Custom Keystores

To configure the Node Manager to use the custom keystores, add the following lines to the end of the `nodemanager.properties` file located in the `WL_HOME/common/nodemanager` directory:

```
KeyStores=CustomIdentityAndCustomTrust
CustomIdentityKeyStoreFileName=<Identity KeyStore>
CustomIdentityKeyStorePassPhrase=<Identity KeyStore Passwd>
CustomIdentityAlias=<Identity Key Store Alias>
CustomIdentityPrivateKeyPassPhrase=<Private Key used when creating Certificate>
Make sure to use the correct value for CustomIdentityAlias on each node. For
example on SOAHOST1, use appIdentity1, and on VIPHOST1, use appIdentity2.
Example for Node 1:
KeyStores=CustomIdentityAndCustomTrust
CustomIdentityKeyStoreFileName=ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/appIdentityKeyStore.jks
CustomIdentityKeyStorePassPhrase=welcome1
CustomIdentityAlias=appIdentity1
CustomIdentityPrivateKeyPassPhrase=welcome1
```

The passphrase entries in the `nodemanager.properties` file get encrypted when you start Node Manager as described in Section 7.3, "Starting the Node Manager on SOAHOST1." For security reasons, you want to minimize the time the entries in the `nodemanager.properties` file are left unencrypted. After you edit the file, you should start Node Manager as soon as possible so that the entries get encrypted.

When using a common/shared storage installation for MW_HOME, Node Manager is started from different nodes using the same base configuration (nodemanager.properties). In that case, it is required to add the certificate for all the nodes that share the binaries to the appIdentityKeyStore.jks identity store. To do this, create the certificate for the new node and import it to appIdentityKeyStore.jks as described above. Once the certificates are available in the store, each node manager needs to point to a different identity alias to send the correct certificate to the Administration Server. To do this, set different environment variables before starting Node Manager in the different nodes:

```
SOAHOST1>cd WL_HOME/server/bin
SOAHOST1>export JAVA_OPTIONS=-DCustomIdentityAlias=appIdentitySOAHOST1

SOAHOSTn>cd WL_HOME/server/bin
SOAHOSTn>export JAVA_OPTIONS=-DCustomIdentityAlias=appIdentitySOAHOSTn
```

## 7.3 Starting the Node Manager on SOAHOST1

Run these commands to start Node Manager on SOAHOST1:

> **Note:** If you have not configured and started Node Manager for the first time yet, run the *setNMProps.sh* script as specified in section Section 4.11, "Starting Node Manager on SOAHOST1." This will enable the use of the start script which is required for SOA and/or BAM.

```
SOAHOST1> cd WL_HOME/server/bin
SOAHOST1> ./startNodeManager.sh
```

## 7.4 Enabling Host Name Verification Certificates for the Node Manager in SOAHOST2

Perform these steps to set up SSL for communication between the Node Manager and the Administration Server:

- Step 1: Generating Self-Signed Certificates Using the utils.CertGen Utility
- Step 2: Creating an Identity Keystore Using the "utils.ImportPrivateKey" Utility
- Step 3: Creating a Trust Keystore Using the Keytool Utility
- Step 4: Configuring Node Manager to Use the Custom Keystores

### 7.4.1 Generating Self-Signed Certificates Using the utils.CertGen Utility

Follow these steps to create self-signed certificates on SOAHOST2.mycompany.com. These certificates should be created using the network name/alias.

1. Set up your environment by running the `WL_HOME/server/bin/setWLSEnv.sh` script:

   In the Bourne shell, run the following command:

   ```
   SOAHOST2> . setWLSEnv.sh
   ```

   Verify that the CLASSPATH environment variable is set:

   ```
   SOAHOST2> echo $CLASSPATH
   ```

2. Create a user-defined directory for the certificates. For example, create a directory called *certs* under the `ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>` directory. Note that certificates can be shared across WLS domains.

   ```
   SOAHOST2> cd ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>
   SOAHOST2> mkdir certs
   ```

   **Note:** The directory where keystores and trust keystores are maintained must be on shared storage that is accessible from all nodes so that when the Administration Server or SOA servers fail over, (manually or with server migration), the appropriate certificates can be accessed.

3. Change directory to the user-defined directory.

   ```
   SOAHOST2> cd certs
   ```

4. Run the utils.CertGen tool from the user-defined directory to create the certificates for both SOAHOST2 and VIPHOST1.

   Syntax:

   ```
   java utils.CertGen <key_passphrase> <cert_file_name> <key_file_name> [export | domestic] [hostname]
   ```

   Examples:

```
SOAHOST2> java utils.CertGen welcome1 SOAHOST2_cert SOAHOST2_key
            domestic SOAHOST2.mycompany.com

SOAHOST2> java utils.CertGen welcome1 VIPHOST1_cert VIPHOST1_key
            domestic SOAHOST1VHN1.mycompany.com
```

### 7.4.2 Creating an Identity Keystore Using the "utils.ImportPrivateKey" Utility

Follow these steps to create an Identity Keystore on SOAHOST2.mycompany.com.

1. Create a new identity keystore called "appIdentityKeyStore" using the "utils.ImportPrivateKey" utility.

   Create this keystore under the same directory as the certificates (that is, `ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/certs`).

   Note that the Identity Store is created (if none exists) when you import a certificate and the corresponding key into the Identity Store using the "utils.ImportPrivateKey" utility.

   Import the certificate and private key for both SOAHOST2 and VIPHOST1 into the Identity Store. Make sure that you use a different alias for each of the certificate/key pair imported.

   Syntax:

   `java utils.ImportPrivateKey` *`<keystore_file> <keystore_password> <certificate_alias_to_use> <private_key_passphrase> <certificate_file> <private_key_file>`* `[`*`<keystore_type>`*`]`

   Examples:

```
SOAHOST2> java utils.ImportPrivateKey appIdentityKeyStore.jks welcome1
            appIdentity1 welcome1
            ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/SOAHOST1_cert.pem
            ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/SOAHOST1_key.pem

SOAHOST2> java utils.ImportPrivateKey appIdentityKeyStore.jks welcome1
            appIdentity2 welcome1
            ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/VIPHOST1_cert.pem
            ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/certs/VIPHOST1_key.pem
```

### 7.4.3 Creating a Trust Keystore Using the keytool Utility

Follow these steps to create the Trust Keystore on SOAHOST2.mycompany.com.

1. Create a new trust keystore called *appTrustKeyStore* using the `keytool` utility:

```
bash-3.00$ keytool -keystore appTrustKeyStore.jks -genkey -keyalg RSA
-alias app TrustKey -dname "cn=appTrustKey,ou=FOR TESTING ONLY,
o=MyOrganization,L=MyTown,ST=MyState,C=US"
Enter keystore password:
Re-enter new password:
Enter key password for <appTrustKey>
       (RETURN if same as keystore password):
bash-3.00$ _
```

**Note:** Use the standard Java keystore to create the new trust keystore because it already contains most of the needed root CA certificates. Do not to modify the standard Java trust key store directly.

2. You will be asked a series of questions. The keystore is created after you respond to these questions.

   **Tip:** Make a note of the information that you provide on the command line and in the subsequent dialog box, because you will need this information to define gateway policy steps.

3. Change the default password for the standard Java keystore utility using the `keytool` utility. Use the following syntax to change the default password:

   ```
   keytool -storepasswd -keystore <TrustKeyStore>
   ```

4. Import the CA certificate called *CertGenCA.der* into the appTrustKeyStore using the `keytool` utility. This certificate, which is located in the `WL_HOME/server/lib` directory, is used to sign all certificates generated by utils.CertGen tool. Import *CertGenCA.der* using the following syntax:

   ```
   keytool -import -v -noprompt -trustcacerts -alias <AliasName>
   -file <CAFileLocation> -keystore <KeyStoreLocation>
   ```

### 7.4.4 Configuring Node Manager to Use the Custom Keystores

Follow these steps to configure the Node Manager to use the custom keystores.

1. Add the following lines to the end of the `nodemanager.properties` file located in the `WL_HOME/common/nodemanager` directory.

   ```
   KeyStores=CustomIdentityAndCustomTrust

   CustomIdentityKeyStoreFileName=<Identity KeyStore>

   CustomIdentityKeyStorePassPhrase=<Identity KeyStore Passwd>

   CustomIdentityAlias=<Identity Key Store Alias>

   CustomIdentityPrivateKeyPassPhrase=<Private Key used when
   creating Certificate>
   ```

   Make sure to use the correct value for `CustomIdentityAlias` on each node. For example on SOAHOST2, use "appIdentity2", and on VIPHOST1, use "appIdentity2".

   Example for Node 1:

   ```
   KeyStores=CustomIdentityAndCustomTrust

   CustomIdentityKeyStoreFileName=ORACLE_BASE/admin/<domain_
   name>/aserver/<domain_name>/certs/appIdentityKeyStore.jks

   CustomIdentityKeyStorePassPhrase=welcome1

   CustomIdentityAlias=appIdentity1

   CustomIdentityPrivateKeyPassPhrase=welcome1
   ```

**Note:** The passphrase entries in the `nodemanager.properties` file get encrypted when you start Node Manager, as described in Section 7.5, "Starting the Node Manager on SOAHOST2."

For security reasons, you want to minimize the time the entries in the `nodemanager.properties` file are left unencrypted. After you edit the file, you should start Node Manager as soon as possible so that the entries get encrypted.

## 7.5 Starting the Node Manager on SOAHOST2

Run these commands to start Node Manager on SOAHOST2:

**Note:** If you have not configured and started Node Manager for the first time yet, run the *setNMProps.sh* script as specified in section Section 4.15, "Starting Node Manager on SOAHOST2." This will enable the use of the start script which is required for SOA and/or BAM.

```
SOAHOST2> cd WL_HOME/server/bin
SOAHOST2> ./startNodeManager.sh
```

# 8 Server Migration

In this enterprise topology, you must configure server migration for the WLS_SOA1 and WLS_SOA2 managed servers. The WLS_SOA1 managed server is configured to restart on SOAHOST2 should a failure occur. The WLS_SOA2 managed server is configured to restart on SOAHOST1 should a failure occur. For this configuration, the WLS_SOA1 and WLS_SOA2 servers listen on specific floating IPs that are failed over by WLS Server Migration. Configuring server migration for the WLS_SOA*n* managed servers consists of the following steps:

- Step 1: Setting Up a User and Tablespace for the Server Migration Leasing Table
- Step 2: Creating a Multi-Data Source Using the Oracle WebLogic Server Administration Console
- Step 3: Enabling Host Name Verification Certificates between SOAHOST1 and SOAHOST2 and the Administration Server
- Step 4: Editing the Node Manager's Properties File
- Step 5: Setting Environment and Superuser Privileges for the wlsifconfig.sh Script
- Step 6: Configuring Server Migration Targets
- Step 7: Testing the Server Migration

## 8.1 Setting Up a User and Tablespace for the Server Migration Leasing Table

The first step is to set up a user and tablespace for the server migration leasing table:

1. Create a tablespace called `leasing`. For example, log on to SQL*Plus as the sysdba user and run the following command:

```
SQL> create tablespace leasing
       logging datafile 'DB_HOME/oradata/orcl/leasing.dbf'
       size 32m autoextend on next 32m maxsize 2048m extent management local;
```

2. Create a user named `leasing` and assign to it the leasing tablespace.

```
SQL> create user leasing identified by welcome1;

SQL> grant create table to leasing;

SQL> grant create session to leasing;

SQL> alter user leasing default tablespace leasing;

SQL> alter user leasing quota unlimited on LEASING;
```

3. Create the leasing table using the `leasing.ddl` script.
   a. Copy the `leasing.ddl` file located in either the `WL_HOME/server/db/oracle/817` or the `WL_HOME/server/db/oracle/920` directory to your database node.
   b. Connect to the database as the `leasing` user.
   c. Run the `leasing.ddl` script in SQL*Plus.

```
SQL> @copy_location/leasing.ddl;
```

## 8.2 Creating a Multi-Data Source Using the Oracle WebLogic Server Administration Console

The second step is to create a multi-data source for the leasing table from the Oracle WebLogic Server Administration Console:

You create a data source to each of the RAC database instances during the process of setting up the multi-data source, both for these data sources and the global leasing multi-data source. When you create a data source:

- Make sure that this is a non-xa data source
- The names of the multi-data sources are in the format of *<MultiDS>-rac0*, *<MultiDS>-rac1*, and so on
- Use Oracle's Driver (Thin) Version 9.0.1, 9.2.0, 10, 11
- Use Supports Global Transactions, One-Phase Commit, and specify a service name for your database
- Target these data sources to the SOA cluster
- Make sure the datasources' connection pool initial capacity is set to **0**. To do this, select **Services**, **JDBC**, and then **Datasources**. In the Datasources screen, click the **Datasource Name**, then click the **Connection Pool** tab, and enter **0** in the **Initial capacity** field.

### Creating a Multi-Data Source

To create a multi-data source, complete these steps:

1. From Domain Structure window in the Oracle WebLogic Server Administration Console, expand the **Services** node, then expand the **JDBC** node.
2. Click Multi Data Sources. The Summary of JDBC Multi Data Source page appears.
3. Click **Lock and Edit**.
4. Click **New**.

   The Create a New JDBC Multi Data Source page appears.
5. Enter leasing as the Name
6. Enter jdbc/leasing as the JNDI name.
7. Select **Failover as algorithm (default)**.
8. Click **Next.**
9. Select **SOA_Cluster** as the target.
10. Click **Next**.

11. Select **non-XA driver (the default)**.
12. Click **Next**.
13. Click **Create New Data Source**.
14. Enter *leasing-rac0* as name. Enter *jdbc/leasing-rac0* as JNDI name. Enter *oracle* as the database type. For the driver type, enter *Oracle Driver (Thin) for RAC server-Instance connection Version 10,11.*

    **Note:** When creating the multi-datasources for the leasing table, enter names in the format of <*MultiDS*>-*rac0*, <*MultiDS*>-*rac1*, and so on.

15. Click **Next**.
16. Deselect **Supports Global Transactions**.
17. Click **Next**.
18. Enter the service name, database name, host port, and password for your leasing schema.
19. Click **Next**.
20. Click **Test Configuration** and verify the connection works.
21. Click **Next**.
22. Target the data source to SOA_Cluster.
23. Select the data source and add it to the right screen.
24. Click **Create a New Data Source** for the second instance of your RAC database, target it to SOA_Cluster, repeating the steps for the second instance of your RAC database.
25. Add the second data source to your multi-data source.
26. Click **Activate Changes**.

## 8.3 Enabling Host Name Verification Certificates between SOAHOST1 and SOAHOST2 and the Administration Server

The third step is to create the appropriate certificates for host name verification between the Node Manager and the Administration Server. This procedure is described in Section 7.2, "Enabling Host Name Verification Certificates for Node Manager in SOAHOST1" and Section 7.4, "Enabling Host Name Verification Certificates for the Node Manager in SOAHOST2."

## 8.4 Editing the Node Manager's Properties File

The fourth step is to edit the Node Manager's properties file. This needs to be done for the node managers in both nodes where server migration is being configured:

```
Interface=eth0

NetMask=255.255.255.0

UseMACBroadcast=true
```

- `Interface`

This property specifies the interface name for the floating IP (for example, eth0).

> **Note:** Do not specify the sub interface, such as `eth0:1` or `eth0:2`. This interface is to be used without the `:0`, or `:1`. The Node Manager's scripts traverse the different `:X` enabled IPs to determine which to add or remove. For example, the valid values in Linux environments are `eth0`, `eth1`, or, `eth2`, `eth3`, `eth`*n*, depending on the number of interfaces configured.

- `NetMask`

  This property specifies the net mask for the interface for the floating IP. The net mask should the same as the net mask on the interface; 255.255.255.0 is used as an example in this document.

- `UseMACBroadcast`

  This property specifies whether or not to use a node's MAC address when sending ARP packets, that is, whether or not to use the -b flag in the `arping` command.

Verify in Node Manager's output (shell where Node Manager is started) that these properties are being used, or problems may arise during migration. You should see something like this in the Node Manager's output:

```
...
StateCheckInterval=500
Interface=eth0
NetMask=255.255.255.0
...
```

> **Note:** The steps below are not required if the server properties (start properties) have been properly set and the Node Manager can start the servers remotely.

1. Set the following property in the `nodemanager.properties` file.

   - `StartScriptEnabled`

     Set this property to `true`. This is required for the shiphome to enable the Node Manager to start the managed servers.

2. Start the Node Manager on Node 1 and Node 2 by running the `startNodeManager.sh` script located in the `WL_HOME/server/bin` directory.

> **Note:** When running Node Manager from a shared storage installation, multiple nodes are started using the same `nodemanager.properties` file. However, each node may require different `NetMask` or `Interface` properties. In this case, specify individual parameters on a per-node basis using environment variables. For example, to use a different interface (eth3) in SOAHOSTn, use the `Interface` environment variable as follows: `SOAHOSTn> export JAVA_OPTIONS=-DInterface=eth3` and start Node Manager after the variable has been set in the shell.

## 8.5 Setting Environment and Superuser Privileges for the wlsifconfig.sh Script

The fifth step is to set environment and superuser privileges for the `wlsifconfig.sh` script:

1. Ensure that your PATH environment variable includes these files:

***Table 8–1 Files Required for the PATH Environment Variable***

| File | Located in this directory |
|---|---|
| `wlsifconfig.sh` | `ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>/bin/server_migration` |
| `wlscontrol.sh` | `WL_HOME/common/bin` |
| `nodemanager.domains` | `WL_HOME/common` |

2. Grant sudo configuration for the `wlsifconfig.sh script`.
   - Configure sudo to work without a password prompt.
   - For security reasons, sudo should be restricted to the subset of commands required to run the `wlsifconfig.sh` script. For example, to set the environment and superuser privileges for the `wlsifconfig.sh` script, complete these steps:
     a. Grant sudo privilege to the WebLogic user ('oracle') with no password restriction, and grant execute privilege on the */sbin/ifconfig* and */sbin/arping* binaries.
     b. Make sure the script is executable by the WebLogic user ('oracle'). The following is an example of an entry inside */etc/sudoers* granting sudo execution privilege for `oracle` and also over `ifconfig` and `arping`:

```
oracle ALL=NOPASSWD: /sbin/ifconfig,/sbin/arping
```

**Note:** Ask the system administrator for the sudo and system rights as appropriate to this step.

## 8.6 Configuring Server Migration Targets

The sixth step is to configure server migration targets. Configuring Cluster Migration sets the `DataSourceForAutomaticMigration` property to true. Follow the steps below to configure cluster migration in a migration in a cluster:

1. Log into the Oracle WebLogic Server Administration Console (`http://<host>:<adminPort>/console`. Typically, `adminPort` is 7001 by default).
2. In the Domain Structure window, expand **Environment** and select **Clusters**. The Summary of Clusters page appears.
3. Click the cluster for which you want to configure migration (**SOA_Cluster**) in the Name column of the table.
4. Click the **Migration** tab.
5. Click **Lock and Edit**.

6. In the **Available** field, select the machine to which to allow migration and click the right arrow. In this case, select **SOAHOST1** and **SOAHOST2**.
7. Select the data source to be used for automatic migration. In this case select the leasing data source.
8. Click **Save**.
9. Click **Activate Changes**.
10. Set the Candidate Machines for Server Migration. You must perform this task for all of the managed servers as follows:
    a. In Domain Structure window of the Oracle WebLogic Server Administration Console, expand **Environment** and select **Servers**.
    b. Select the server for which you want to configure migration.
    c. Click the **Migration** tab.
    d. In the **Available** field, located in the Migration Configuration section, select the machines to which to allow migration and click the right arrow. For **WLS_SOA1**, select **SOAHOST2**. For **WLS_SOA2**, select **SOAHOST1**.
    e. Select **Automatic Server Migration Enabled**. This enables the Node Manager to start a failed server on the target node automatically.
    f. Click **Save**.
    g. Click **Activate Changes**.
    h. Restart the Administration Server and the servers for which server migration has been configured.

    **Tip:** Click **Customize this table** in the Summary of Servers page, move Current Machine from the Available Window to the Chosen window to view the machine on which the server is running. This will be different from the configuration if the server gets migrated automatically.

## 8.7 Testing the Server Migration

The seventh and final step is to test the server migration. To verify that Server Migration is working properly, follow these steps:

**From Node 1:**

1. Stop the WLS_SOA1 managed server.

   To do this, run this command:

   ```
   SOAHOST1> kill -9 <pid>
   ```

   *pid* specifies the process ID of the managed server. You can identify the pid in the node by running this command:

   ```
   SOAHOST1> ps -ef | grep WLS_SOA1
   ```

2. Watch the Node Manager console: you should see a message indicating that WLS_SOA1's floating IP has been disabled.
3. Wait for the Node Manager to try a second restart of WLS_SOA1. Node Manager waits for a fence period of 30 seconds before trying this restart.

4. Once Node Manager restarts the server, stop it again. Now Node Manager should log a message indicating that the server will not be restarted again locally.

**From Node2:**

1. Watch the local Node Manager console. After 30 seconds since the last try to restart WLS_SOA1on Node 1, Node Manager on Node 2 should prompt that the floating IP for WLS_SOA1 is being brought up and that the server is being restarted in this node.
2. Access the soa-infra console in the same IP.

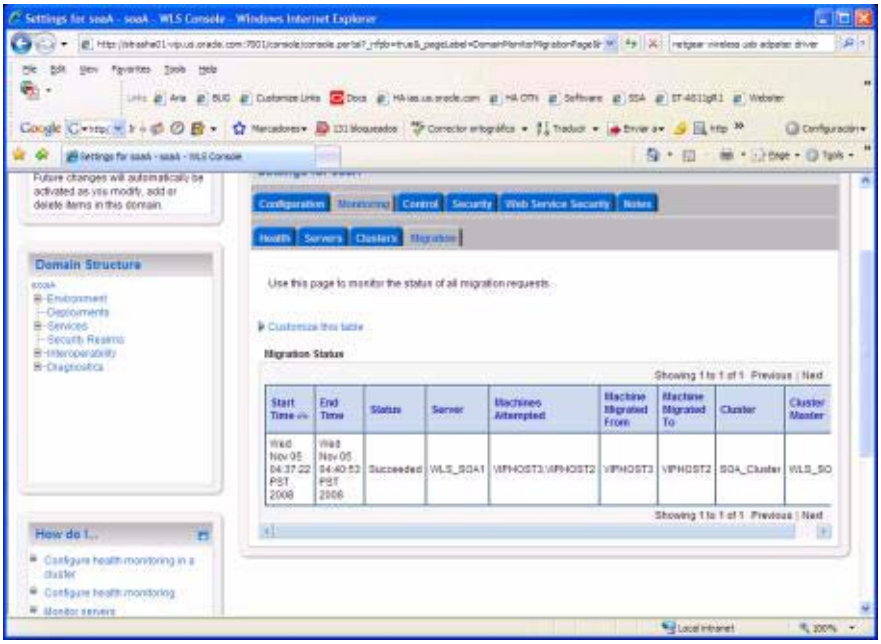
### Verification From the Administration Console

Migration can also be verified in the Administration Console:

1. Log into the Administration Console.
2. Click on **Domain** on the left console.
3. Click the **Monitoring** tab and then the **Migration** subtab.

   The Migration Status table provides information on the status of the migration.

***Figure 8–1 Migration Status Screen in the Administration Console***




Screenshot of the Migration Status screen in the Administration Console.

**********

# 9 Integration With Oracle Identity Management

This chapter describes how to integrate Oracle SOA Suite with Oracle Identity Management. It contains the following sections:

- Section 9.1, "Credential and Policy Store Configuration"
- Section 9.2, "Oracle Access Manager Integration"
- Section 9.3, "Backing Up the Installation"

## 9.1 Credential and Policy Store Configuration

The following topics describe credential and policy store configuration in detail:

- Section 9.1.1, "Overview of Credential and Policy Store Configuration"
- Section 9.1.2, "Credential Store Configuration"
- Section 9.1.3, "Policy Store Configuration"
- Section 9.1.4, "Reassociation of Credentials and Policies"

### 9.1.1 Overview of Credential and Policy Store Configuration

Oracle Fusion Middleware allows using different types of credential and policy stores in a WebLogic domain. Domains can use stores based on an XML file or on different types of LDAP providers. When a domain uses an LDAP store, all policy and credential data is kept and maintained in a centralized store. However, when using XML policy stores, the changes made on Managed Servers are not propagated to the Administration Server unless they use the same domain home. The Oracle Fusion Middleware SOA Suite EDG topology uses different domain homes for the Administration Server and the Managed Server, thus Oracle requires the use of an LDAP store as policy and credential store for integrity and consistency. By default Oracle WebLogic Server domains use an XML file for the policy store. The following sections describe the steps required to change the default store to Oracle Internet Directory LDAP for credentials or policies.

---

**Note:** The backend repository for the policy store and the credential store must use the same kind of LDAP server. To preserve this coherence, note that reassociating one store implies reassociating the other one, that is, the reassociation of both the credential and the policy stores is accomplished as a unit using the Fusion Middleware Control or the WLST command `reassociateSecurityStore`. For more information, see Section 9.1.4, "Reassociation of Credentials and Policies."

---

## 9.1.2 Credential Store Configuration

A credential store is a repository of security data (credentials). A credential can hold user name and password combinations, tickets, or public key certificates. Credentials are used during authentication, when principals are populated in subjects, and, further, during authorization, when determining what actions the subject can perform. In this section, steps are provided to configure Oracle Internet Directory LDAP as a credential store for the Oracle Fusion Middleware SOA Suite EDG topology. For more details on credential store configuration, refer to the "Configuring the Credential Store" chapter in the *Oracle Fusion Middleware Security Guide*.

The following section describe credential store configuration:

- Section 9.1.2.1, "Creating the LDAP Authenticator"
- Section 9.1.2.2, "Moving the WebLogic Administrator to LDAP"
- Section 9.1.2.3, "Reassociating the Domain Credential Store"

### 9.1.2.1 Creating the LDAP Authenticator

To be safe, before you create the LDAP authenticator, you should first back up the relevant configuration files:

```
ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/config/config.xml
ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/config/fmwconfig/jps-config.xml
ORACLE_BASE/admin/<domain_name>/aserver/<domain_
name>/config/fmwconfig/system-jazn-data.xml
```

Also back up the `boot.properties` file for the Administration Server.

To configure the credential store to use LDAP, set the proper authenticator using the WebLogic Server Console:

1. Log in to the WebLogic Server Console.
2. Click the **Security Realms** link on the left navigational bar.
3. Click the **myrealm** default realm entry to configure it.
4. Open the **Providers** tab within the realm.
5. Observe that there is a `DefaultAuthenticator` provider configured for the realm.
6. Click the **New** button to add a new provider.
7. Enter a name for the provider such as **OIDAuthenticator** or **OVDAuthenticator** depending on whether Oracle Internet Directory or Oracle Virtual Directory will be used.
8. Select the **OracleInternetDirectoryAuthenticator** or **OracleVirtualDirectoryAuthenticator** type from the list of authenticators depending on whether Oracle Internet Directory or Oracle Virtual Directory will be used.
9. Click **OK**.
10. In the Providers screen, click the newly created Authenticator.
11. Set the control flag to **SUFFICIENT**. This indicates that if a user can be authenticated successfully by this authenticator, then it should accept that authentication and should not continue to invoke any additional authenticators. If the authentication fails, it will fall through to the next authenticator in the chain.

Make sure all subsequent authenticators also have their control flag set to **SUFFICIENT**; in particular, check the DefaultAuthenticator and set that to **SUFFICIENT**.

12. Click **Save** to save this setting.
13. Open the **Provider Specific** tab to enter the details for the LDAP server.
14. Enter the details specific to your LDAP server, as shown in the following table:

| Parameter | Value | Value Description |
|---|---|---|
| Host | For example: `oid.mycompany.com` | The LDAP server's server ID. |
| Port | For example: `636` | The LDAP server's port number. |
| Principal | For example: `cn=orcladmin` | The LDAP user DN used to connect to the LDAP server. |
| Credential | NA | The password used to connect to the LDAP server |
| SSL Enabled | Checked | Specifies whether SSL protocol is used when connecting to LDAP server. |
| User Base DN | For example: `cn=users,dc=us,dc=mycompany,dc=com` | Specify the DN under which your Users start. |
| Group Base DN | For example: `cn=groups,dc=us,dc=mycompany,dc=com` | Specify the DN that points to your Groups node. |
| Use Retrieved User Name as Principal | Checked | Must be turned on. |

Click **Save** when done.

15. Click **Activate Changes** to propagate the changes.

**9.1.2.1.1 Setting the Order of Providers** Reorder the OID/OVD Authenticator and Default Authenticator and ensure that the control flag for each authenticator is set as follows:

- OID LDAP Authenticator: **SUFFICIENT**
- Default Authenticator: **SUFFICIENT**

Restart the Administration Server so that the changes are effective, as follows:

1. Stop the Administration Server:

```
SOAHOST1> cd ORACLE_BASE/admin/domainName/aserver/domainName/bin
SOAHOST1> ./stopWebLogic.sh
```

2. Start the Administration Server:

```
SOAHOST1> ./startWebLogic.sh
```

### 9.1.2.2 Moving the WebLogic Administrator to LDAP

This section provides details for provisioning a new administrator user and group for managing the Oracle Fusion Middleware SOA Suite EDG WebLogic Domain. This section describes the following tasks:

- Section 9.1.2.2.1, "Provisioning Admin Users and Groups in an LDAP Directory"
- Section 9.1.2.2.2, "Assigning the Admin Role to the Admin Group"
- Section 9.1.2.2.3, "Updating the boot.properties File and Restarting the System"

**9.1.2.2.1 Provisioning Admin Users and Groups in an LDAP Directory** As mentioned in the introduction to this section, users and groups from multiple WebLogic domains may be provisioned in a central LDAP user store. In such a case, there is a possibility that one WebLogic admin user may have access to all the domains within an enterprise. This is not a desirable situation. To avoid this, the users and groups provisioned must have a unique distinguished name within the directory tree. In this guide, the admin user and group for the SOA EDG WebLogic domain will be provisioned with the DNs below:

- Admin User DN:

  ```
  cn=weblogic_soa,cn=Users,dc=us,dc=mycompany,dc=com
  ```

- Admin Group DN:

  ```
  cn=SOA Administrators,cn=Groups,dc=us,dc=mycompany,dc=com
  ```

Follow these steps to provision the admin user and admin group in Oracle Internet Directory:

1. Create an ldif file named `admin_user.ldif` with the contents shown below and then save the file:

   ```
   dn: cn=weblogic_soa, cn=Users, dc=us, dc=mycompany, dc=com
   orclsamaccountname: weblogic_soa
   givenname: weblogic_soa
   sn: weblogic_soa
   userpassword: Welcome1
   obver: 10.1.4.0
   mail: weblogic_soa
   objectclass: top
   objectclass: person
   objectclass: organizationalPerson
   objectclass: inetorgperson
   objectclass: orcluser
   objectclass: orcluserV2
   objectclass: oblixorgperson
   uid: weblogic_soa
   cn: weblogic_soa
   description: Admin User for the IDM Domain
   ```

2. Run the `ldapadd` command located under the *ORACLE_HOME*`/bin` directory to provision the user in Oracle Internet Directory.

   **Note:** The ORACLE_HOME used here is the ORACLE_HOME for the Identity Management installation where Oracle Internet Directory resides.

   For example (the command is shown as two lines in the example below for readability purposes, but you should enter the command on a single line):

   ```
   OIDHOST1> ORACLE_HOME/bin/ldapadd -h oid.mycompany.com -p 389 -D
   cn="orcladmin" -w welcome1 -c -v -f admin_user.ldif
   ```

3. Create an ldif file named `admin_group.ldif` with the contents shown below and then save the file:

```
dn: cn=SOA Administrators, cn=Groups, dc=us, dc=mycompany, dc=com
displayname: SOA Administrators
objectclass: top
objectclass: groupOfUniqueNames
objectclass: orclGroup
uniquemember: cn=weblogic_soa,cn=users,dc=us,dc=mycompany,dc=com
cn: SOA Administrators
description: Administrators Group for the SOA Domain
```

4. Run the `ldapadd` command located under the ORACLE_HOME/bin/ directory to provision the group in Oracle Internet Directory (the command is shown as two lines in the example below for readability purposes, but you should enter the command on a single line):

```
OIDHOST1> ORACLE_HOME/bin/ldapadd -h oid.mycompany.com -p 389 -D
cn="orcladmin" -w welcome1 -c -v -f admin_group.ldif
```

**9.1.2.2.2 Assigning the Admin Role to the Admin Group** After adding the users and groups to Oracle Internet Directory, the group must be assigned the Admin role within the WebLogic domain security realm. This enables all users that belong to the group to be administrators for that domain. Follow these steps tassign the Admin role to the Admin group:

1. Log into the WebLogic Administration Server Console.
2. In the left pane of the console, click **Security Realms**.
3. On the Summary of Security Realms page, click **myrealm** under the Realms table.
4. On the Settings page for myrealm, click the Roles & Policies tab.
5. On the Realm Roles page, expand the Global Roles entry under the Roles table. This brings up the entry for Roles. Click on the **Roles** link to bring up the Global Roles page.
6. On the Global Roles page, click the Admin Role to bring up the Edit Global Role page:
   a. On the Edit Global Roles page, under the Role Conditions table, click the **Add Conditions** button.
   b. On the Choose a Predicate page, select **Group** from the drop down list for predicates and click **Next**.
   c. On the Edit Arguments Page, specify **SOA Administrators** in the **Group Argument** field and click **Add**.
7. Click **Finish** to return to the Edit Global Rule page.
8. The Role Conditions table now shows the SOA Administrators Group as an entry.
9. Click **Save** to finish adding the Admin Role to the SOA Administrators Group.
10. Validate that the changes were successful by bringing up the WebLogic Administration Server Console using a web browser. Log in using the credentials for the weblogic_soa user.

**9.1.2.2.3 Updating the boot.properties File and Restarting the System** The `boot.properties` file for the Administration Server should be updated with the

WebLogic admin user created in Oracle Internet Directory. Follow the steps below to update the `boot.properties` file:

1. On SOAHOST1, go the following directory:

   ```
   SOAHOST1>cd ORACLE_BASE/admin/domainName/aserver/domainName/servers/
   AdminServer/security
   ```

2. Rename the existing `boot.properties` file:

   ```
   SOAHOST1> mv boot.properties boot.properties.backup
   ```

3. Use a text editor to create a file called `boot.properties` under the security directory. Enter the following lines in the file:

   ```
   username=adminUser
   password=adminUserPassword
   ```

4. Save the file.

5. Stop the Administration Server:

   ```
   SOAHOST1> cd ORACLE_BASE/admin/domainName/aserver/domainName/bin
   SOAHOST1> ./stopWebLogic.sh
   ```

6. Start the Administrator Server:

   ```
   SOAHOST1> ./startWebLogic.sh
   ```

#### 9.1.2.3 Reassociating the Domain Credential Store

The reassociation of both the Credential and the Policy stores is accomplished as a unit using Fusion Middleware Control or the WLST command `reassociateSecurityStore`. See Section 9.1.4, "Reassociation of Credentials and Policies" for detailed steps

### 9.1.3 Policy Store Configuration

The domain policy store is the repository of system and application-specific policies. In a given domain, there is one store that stores all policies that all applications deployed in the domain may use. This section provides the steps to configure Oracle Internet Directory LDAP as the policy store for the Oracle Fusion Middleware SOA Suite EDG topology. For more details on policy store configuration, refer to the "OPSS Authorization and the Policy Store" chapter in the Oracle Fusion Middleware Security Guide. *Oracle Fusion Middleware Security Guide*.

#### 9.1.3.1 Prerequisites to Using an LDAP-Based Policy Store

In order to ensure the proper access to an LDAP server directory (Oracle Internet Directory) used as a policy store, you must set a node in the server directory.

An Oracle Internet Directory administrator must follow these steps to create the appropriate node in an Oracle Internet Directory Server:

1. Create an LDIF file (assumed to be `jpstestnode.ldif` in this example) specifying the following DN and CN entries:

   ```
   dn: cn=jpsroot_soa
   cn: jpsroot_soa
   objectclass: top
   objectclass: OrclContainer
   ```

The distinguished name of the root node (illustrated by the string `jpsroot_soa` above) must be distinct from any other distinguished name. One root node can be shared by multiple WebLogic domains. It is not required that this node be created at the top level, as long as read and write access to the subtree is granted to the Oracle Internet Directory administrator.

2. Import this data into Oracle Internet Directory server using the command `ldapadd`, as illustrated in the following example (the command is shown as two lines in the example below for readability purposes, but you should enter the command on a single line):

```
OIDHOST1> ORACLE_HOME/bin/ldapadd -h ldap_host -p ldap_port -D
cn=orcladmin -w password -c -v -f jpstestnode.ldif
```

3. Verify that the node has been successfully inserted using the command `ldapsearch`, as illustrated in the following example (the command is shown as two lines in the example below for readability purposes, but you should enter the command on a single line):

```
OIDHOST1> ORACLE_HOME/bin/ldapsearch -h ldap_host -p ldap_port -D
cn=orcladmin -w password -b "cn=jpsroot_soa" objectclass="orclContainer"
```

4. When using Oracle internet Directory as the LDAP-Based Policy Store run the utility `oidstats.sql` in the INFRADBHOSTs to generate database statistics for optimal database performance:

```
OIDHOSTn> ORACLE_HOME/ldap/admin/oidstats.sql
```

The `oidstats.sql` utility must be run just once after the initial provisioning. For details about this utility, consult the *Oracle Fusion Middleware User Reference for Oracle Identity Management*.

#### 9.1.3.2 Cataloging Oracle Internet Directory Attributes

An Oracle Internet Directory attribute used in a search filter must be indexed. The command `ldapmodify`, whose syntax is illustrated below, can also be used to index attributes specified in an LDIF file (the command is shown as two lines in the example below for readability purposes, but you should enter the command on a single line):

```
OIDHOST1> ORACLE_HOME/bin/ldapmodify -h host -p port -D bindDN -w
bindPassword -v -f catalogue-modify-ldif-filename
```

For example, the above command can be used with the following sample LDIF file to catalog the attributes createtimestamp and modifytimestamp:

```
dn: cn=catalogs
changetype: modify
add: orclindexedattribute
orclindexedattribute: modifytimestamp
orclindexedattribute: createtimestamp
```

Each of the following Oracle Internet Directory attributes must be indexed:

```
orclrolescope
orclassignedroles
orclApplicationCommonName
orclAppFullName
orclCSFAlias
orclCSFKey
orclCSFName
orclCSFDBUrl
```

```
orclCSFDBPort
orclCSFCredentialType
orclCSFExpiryTime
modifytimestamp
createtimestamp
orcljpsassignee
```

#### 9.1.3.3 Reassociating the Domain Policy Store

Reassociating the policy store consists in migrating policy data from a file- or LDAP-based repository to an LDAP-based repository, that is, reassociation changes the repository preserving the integrity of the data stored. For each policy in the source policy store, reassociation searches the target LDAP directory and, if it finds a match, it updates the matching policy as appropriate. If none is found, it simply migrates the policy as is.

At any time, after a domain policy store has been instantiated, a file- or LDAP-based policy store can be reassociated into an LDAP-based policy store storing the same data. To support it, the domain has to be configured, as appropriate, to use an LDAP policy store.

The reassociation of both the credential and the policy stores is accomplished as a unit using Fusion Middleware Control or the WLST command `reassociateSecurityStore`. See Section 9.1.4, "Reassociation of Credentials and Policies" for detailed steps.

### 9.1.4 Reassociation of Credentials and Policies

To reassociate the policy and credential store with Oracle Internet Directory, use the WLST `reassociateSecurityStore` command. Follow these steps:

1. From SOAHOST1, start the `wlst` shell:

   ```
   SOAHOST1>cd ORACLE_COMMONHOME/common/bin
   SOAHOST1>./wlst.sh
   ```

2. Connect to the WebLogic Administration Server using the `wlst connect` command shown below:

   Syntax:

   ```
   connect('AdminUser',"AdminUserPassword",t3://hostname:port)
   ```

   For example:

   ```
   connect("weblogic,"welcome1","t3://SOAHOST1VHN1:7001")
   ```

3. Run the `reassociateSecurityStore` command as shown below:

   Syntax:

   ```
   reassociateSecurityStore(domain="domainName",admin="cn=orcladmin",
   password="orclPassword",ldapurl="ldap://LDAPHOST:LDAPPORT",servertype="OID",
   jpsroot_soa="cn=jpsroot_soa")
   ```

   For example:

   ```
   wls:/SOAEDGDomain/serverConfig>reassociateSecurityStore(domain="soaedg_domain",
   admin="cn=orcladmin",password="welcome1",ldapurl="ldap://oid.mycompany.com:389"
   ,servertype="OID",jpsroot_soa="cn=jpsroot_soa")
   ```

   The output for the command is shown below:

```
{servertype=OID,jpsroot_soa=cn=jpsroot_soa_idm_idmhost1,admin=cn=orcladmin,
domain=IDMDomain,ldapurl=ldap://oid.mycompany.com:389,password=welcome1}
Location changed to domainRuntime tree. This is a read-only tree with
DomainMBean as the root.

For more help, use help(domainRuntime)

Starting Policy Store reassociation.
LDAP server and  ServiceConfigurator setup done.

Schema is seeded into LDAP server
Data is migrated to LDAP server
Service in LDAP server after migration has been tested to be available
Update of jps configuration is done
Policy Store reassociation done.
Starting credential Store reassociation
LDAP server and  ServiceConfigurator setup done.
Schema is seeded into LDAP server
Data is migrated to LDAP server
Service in LDAP server after migration has been tested to be available
Update of jps configuration is done
Credential Store reassociation done
Jps Configuration has been changed. Please restart the server.
```

4. Restart the Administration Server after the command completes successfully.

---

**Note:** For credential and policy changes to take effect, the servers in the domain must be restarted.

---

## 9.2 Oracle Access Manager Integration

This section describes how to set up Oracle Access Manager as the single sign-on solution for the Oracle SOA Suite EDG topology.

### 9.2.1 Overview of Oracle Access Manager Integration

Oracle Access Manager (OAM) is the recommended single sign-on solution for Oracle Fusion Middleware 11*g* Release 1. For more information on installing and configuring an OAM installation, see *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management*. This chapter explains the procedure for configuring the SOA installation with an existing OAM installation and the underlying directory service. Oracle recommends using either Oracle Internet Directory (OID) or Oracle Virtual Directory (OVD) or both of these directory services.

---

**Note:** The SOA EDG topology described in this book uses a Single Sign-On configuration where both the SOA System and the Single Sign-On System are in the same network domain (mycompany.com) For a multi-domain configuration, please refer to the required configuration steps in "Chapter 7, Configuring Single Sign-On," of the *Oracle Access Manager Access Administration Guide*.

---

### 9.2.2 Prerequisites for Oracle Access Manager

The setup for Oracle Access Manager (OAM) assumes an existing OAM installation complete with Access Managers and a policy protecting the Policy Manager. For more

information on installing and configuring an OAM installation, see *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management*. This setup includes a directory service such as Oracle Internet Directory (OID) either as a stand-alone or as part of an Oracle Virtual Directory (OVD) configuration. This chapter will provide the necessary steps for configuring your SOA installation with either OID or OVD.

In addition, the OAM installation should have its own Web server configured with WebGate. This section also provides the steps for using the OAM Web server as a delegated authentication server.

## 9.2.3 Using the OAM Configuration Tool

The OAM Configuration Tool (oamcfg) starts a series of scripts and setup the required policies. It requires various parameters as inputs. Specifically, it creates the following:

1. A Form Authentication scheme in OAM
2. Policies to enable authentication in WebLogic Server
3. A WebGate entry in OAM to enable Oracle HTTP Server WebGates (from your Web Tier) to protect your configured application
4. A Host Identifier, depending on the scenario chosen (a default host identifier would be used, if not provided)
5. Policies to protect and unprotect application specific URLs.

This section covers the following topics:

- Section 9.2.3.1, "Collecting the Information for the OAM Configuration Tool"
- Section 9.2.3.2, "Running the OAM Configuration Tool"
- Section 9.2.3.3, "Verifying Successful Creation of the Policy Domain and AccessGate"
- Section 9.2.3.4, "Updating the Host Identifier"
- Section 9.2.3.5, "Updating the WebGate Profile"
- Section 9.2.3.6, "Adding Additional Access Servers"
- Section 9.2.3.7, "Configuring Delegated Form Authentication"

### 9.2.3.1 Collecting the Information for the OAM Configuration Tool

The following information should be collected or prepared prior to running the OAM Configuration tool:

1. **Password:** Create a secure password. This will be used as the password for the WebGate installation created later.
2. **LDAP Host:** host name of the Directory Server or Load Balancer address in the case of an HA/EDG configuration.
3. **LDAP Port:** port of the Directory Server.
4. **LDAP USER DN:** DN of the LDAP admin user. This will be a value such as "cn=orcladmin."
5. **LDAP password:** password of the LDAP admin user
6. **oam_aa_host:** host name of an Oracle Access Manager
7. **oam_aa_port:** port of the Oracle Access Manager

#### 9.2.3.2 Running the OAM Configuration Tool

The OAM Configuration Tool resides in the ORACLE_HOME/modules/oracle.oamprovider_11.1.1/ directory (ORACLE_HOME will depend on which machine you are running this). The tool can be run from any machine with the required installation files. In this case, we run it from SOAHOST1.

The OAM Configuration Tool should be run as follows (all on a single command line):

```
MW_HOME/jrockit_160_14_R27.6.4-18/bin java -jar oamcfgtool.jar mode=CREATE
app_domain="SOA_EDG"
protected_uris="$URI_LIST"
app_agent_password=<Password_to_be_provisioned_for_App_Agent>
ldap_host=OID.MYCOMPANY.COM
ldap_port=389
ldap_userdn="cn=orcladmin"
ldap_userpassword=<Password_of_LDAP_Admin_User>
oam_aaa_host=OAMHOST1
oam_aaa_port=OAMPORT1
```

The $URI_LIST variable in the above command depends on the topology:

- **SOA only:**

  $URI_LIST="/DefaultToDoTaskFlow,/integration/worklistapp, /b2b,/sdpmessaging/userprefs-ui,/em,/console,/b2bconsole"

- **BAM only:**

  $URI_LIST="/OracleBAM"

- **SOA and BAM:**

  $URI_LIST="/DefaultToDoTaskFlow,/integration/worklistapp, /b2b,/sdpmessaging/userprefs-ui,/em,/console,/OracleBAM,/b2bconsole"

> **Note:** If BAM is installed later or other additional URLs need to be protected, the OAM configuration tool should be executed again using the same app_domain and including *all* the URLs that would be protected (not just the new ones).

If your command ran successfully, you should see the following output:

```
Successfully connected to LDAP
Processed input parameters
Intialized Global Configuration
```

#### 9.2.3.3 Verifying Successful Creation of the Policy Domain and AccessGate

##### Verifying the Policy Domain

To verify the policy domain, complete these steps:

1. Log on to the Oracle Access Manager: http://OAMADMINHOST:<port>/access/oblix/
2. Click **Policy Manager**.
3. Click the **My Policy Domains** link on the left panel, you will see a list of all policy domains, among which the domain you just created will be listed. It will have the suffix _PD (for example, SOA_EDG_PD ). In the third column (URL prefixes, you will also see the URIs you specified during the creation of this domain).

4. Click the link to the policy domain you just created. you will land in the General area of this domain.
5. Click the **Resources** tab, you will see the URIs you specified. You can also click other tabs to view other settings.

#### Verifying the AccessGate Configuration

To verify the AccessGate configuration, complete these steps:

1. Click the **Access System Console** link on the top right hand side (this acts like a toggle; after you click it, it becomes the **Policy Manager** link).
2. Click the **Access System Configuration** tab.
3. Click the **AccessGate Configuration** link on the left panel.
4. Enter 'SOA_EDG' as the search criterion (or any other substring you may have used as the `app_domain` name in Section 9.2.3.2, "Running the OAM Configuration Tool"), and click **Go**.
5. Once the AccessGate for the domain you just created shows up (this will have the suffix _AG (for example, `SOA_EDG_AG`), click it, you will see the details of the AccessGate which you just created.

### 9.2.3.4 Updating the Host Identifier

The OAM Configuration Tool uses the value of the `app_domain` parameter to create a host identifier for the policy domain. This host identifier must be updated with all the host name variations for the host so that the configuration works correctly. Follow the steps below to update the host identifier created by the OAM Configuration Tool:

1. Navigate to the Access System Console by specifying the following URL in your web browser:

   `http://`*`hostname`*`:`*`port`*`/access/oblix`

   where *`hostname`* refers to the host where WebPass Oracle HTTP Server instance is running and *`port`* refers to the HTTP port of the Oracle HTTP Server instance.
2. When prompted for a username and password, log in as an administrator. Click **OK**.
3. On the Access System main page, click the **Access System Console** link.
4. On the Access System Console page, click the Access System Configuration tab.
5. On the Access System Configuration page, click **Host Identifiers** at the bottom left.
6. On the List all host identifiers page, click on the host identifier created by the OAM Configuration Tool. For example, select `SOA_EDG`.
7. On the Host Identifier Details page, click **Modify**.
8. On the Modifying host identifier page, add all the possible host name variations for the host. Click the plus and minus symbols to add or delete fields as necessary. The **Preferred HTTP Host** value used in the Access System Configuration must be added as one of the host name variations. For example: `soedg_wd`, `webhost1.mycompany.com:7777`, `admin.mycompany.com:7777`.
9. Select the check box next to Update Cache and then click **Save**.

   A message box with the following message is displayed: "Updating the cache at this point will flush all the caches in the system. Are you sure?".

Click **OK** to finish saving the configuration changes.

10. Verify the changes on the Host Identifier Details page.

#### 9.2.3.5 Updating the WebGate Profile

The OAM Configuration Tool populates the `Preferred_HTTP_Host` and hostname attributes for the WebGate profile that is created with the value of the `app_domain` parameter. Both these attributes must be updated with the proper values for the configuration to work correctly. Follow the steps below to update the WebGate profile created by the OAM CFG Tool.

1. Navigate to the Access System Console by specifying the following URL in your web browser:

   `http://`*`hostname`*`:`*`port`*`/access/oblix`

   where *`hostname`* refers to the host where WebPass Oracle HTTP Server instance is running and *`port`* refers to the HTTP port of the Oracle HTTP Server instance.

2. On the Access System main page, click the **Access System Console** link, then log in as an administrator.

3. On the Access System Console main page, click the **Access System Configuration** link to display the AccessGates Search page.

4. Enter the proper search criteria and click **Go** to display a list of AccessGates.

5. Select the AccessGate created by the OAM Configuration Tool. For example: **SOA_EDG_AG**.

6. On the AccessGate Details page, select **Modify** to display the Modify AccessGate page.

7. On the Modify AccessGate page, update:

   - **Hostname**: Update the hostname with the name of the computer where WebGate is running, for example: `webhost1.mycompany.com`.
   - **Preferred HTTP Host**: Update the Preferred_HTTP_Host with one of the hostname variations specified in the previous section, for example: `admin.mycompany.com:7777`.
   - **Primary HTTP Cookie Domain**: Update the Primary HTTP Cookie Domain with the Domain suffix of the host identifier, for example: mycompany.com

8. Click **Save**. A message box with the "Are you sure you want to commit these changes?" message is displayed.

9. Click **OK** to finish updating the configuration.

10. Verify the values displayed on the Details for AccessGate page to confirm that the updates were successful.

#### 9.2.3.6 Adding Additional Access Servers

To assign an Access Server to the WebGate:

1. Log in as the Administrator on the Access System Console.

2. Navigate to the **Details** for AccessGate page, if necessary. From the Access System Console, select **Access System Configuration**, then **AccessGate Configuration**, then the link for the WebGate (**SOA_EDG_AG**).

3. On the **Details** for AccessGate page, click **List Access Servers**.

4. A page appears showing the primary or secondary Access Servers currently configured for this WebGate.

   Click Add.

5. On the Add a New Access Server page, select an Access Server from the **Select Server** list, specify **Primary Server**, and define two connections for the WebGate.

   Click the **Add** button to complete the association.

6. A page appears, showing the association of the Access Server with the WebGate. Click the link to display a summary and print this page for later use.

7. Repeat steps 3 through 6 to associate more Access Servers to the WebGate.

#### 9.2.3.7 Configuring Delegated Form Authentication

To configure the form authentication to redirect to the WebGate that was installed with the OAM installation, complete these steps:

1. Open the Access System Console.
2. In the Access System Configuration screen, select **Authentication Management** from the left-hand bar.
3. Select **OraDefaultFormAuthNScheme**.
4. Click **Modify**.
5. In the Challenge Redirect field, enter the host and port of the IDM installation; for example: `http://sso.mycompany.com`.

A WebGate should already be installed in the IDM installation. Refer to *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle Identity Management* for details.

### 9.2.4 Installing and Configuring WebGate

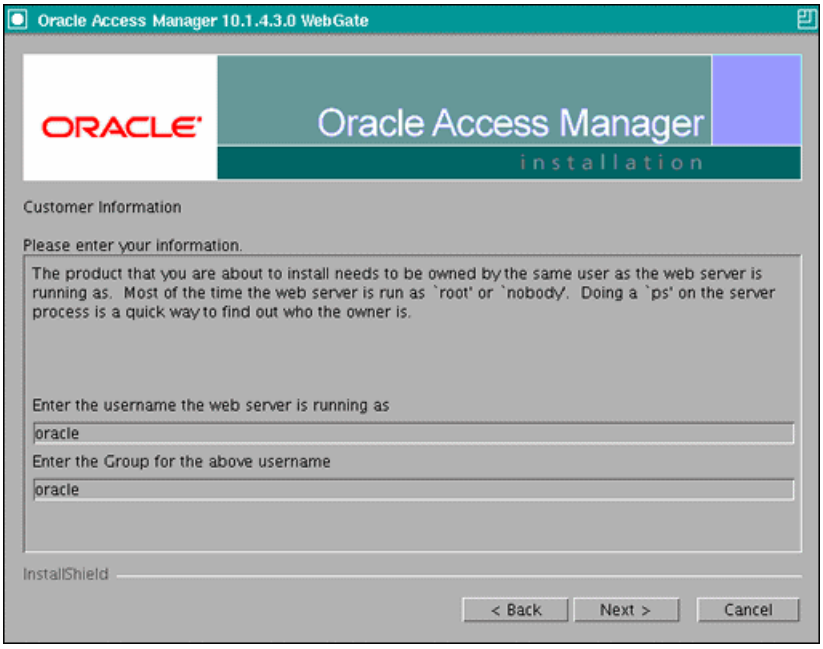
WebGate needs to be installed on each of the WEBHOST*n* machines in order to secure the web tier:

1. Launch the WebGate installer (see Section 1.5.5, "What to Install" for information on where to obtain it) using the following command:

   ```
   ./Oracle_Access_Manager10_1_4_3_0_linux_OHS11g_WebGate -gui
   ```

2. The Welcome screen is displayed. Click **Next**.
3. In the Customer Information screen (Figure 9–1), enter the user name and user group that the web server is running as. Click **Next** to continue.

***Figure 9–1 Customer Information Screen***




Screenshot of the Customer Information screen.

**********

4. In the installation target screen (Figure 9–2), specify the directory where WebGate should be installed. Click **Next** to continue.

***Figure 9–2 Installation Target Screen***


Screenshot of the installation target screen.

**********

5. In the installation summary screen, click **Next**.

6. Download the required GCC runtime libraries for WebGate as instructed in the WebGate configuration screen (Figure 9–3), and use **Browse** to point to their location on the local computer. Click **Next** to continue.

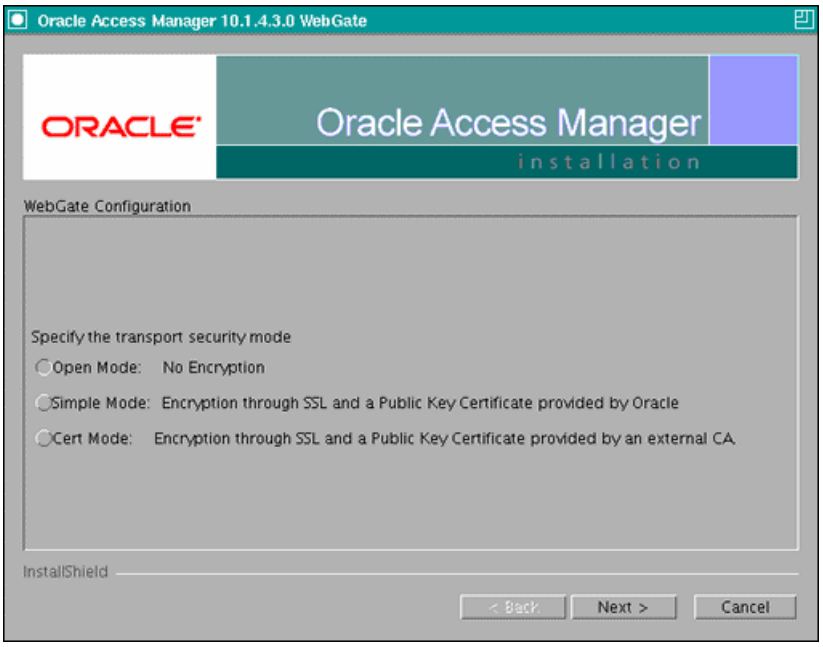
***Figure 9–3 Runtime Libraries Screen***


Screenshot of the WebGate configuration screen, which includes these instructions: "To proceed with installation of Oracle Access Manager 10.1.3.4.0 WebGate and for successfully running the product, you must install additional GCC runtime libraries, namely libgcc_s.so.1 and libstdc++.so.5. Note that these libraries should be compatible with GCC 3.3.2. The libraries are available for download from either of the following locations: http://metalink.oracle.com (requires login), or http://www.oracle.com/technology/products/ias/index.html. Once these libraries are locally available, please specify the directory containing the files and proceed with the installation."

**********

7. The installer now creates the required artifacts. After that is completed, click **Next** to continue.
8. In the transport security mode screen (Figure 9–4), select "Open Mode: No Encryption" and click **Next** to continue.

*Figure 9–4 Transport Security Mode Screen*




Screenshot of the transport security mode screen.

**********

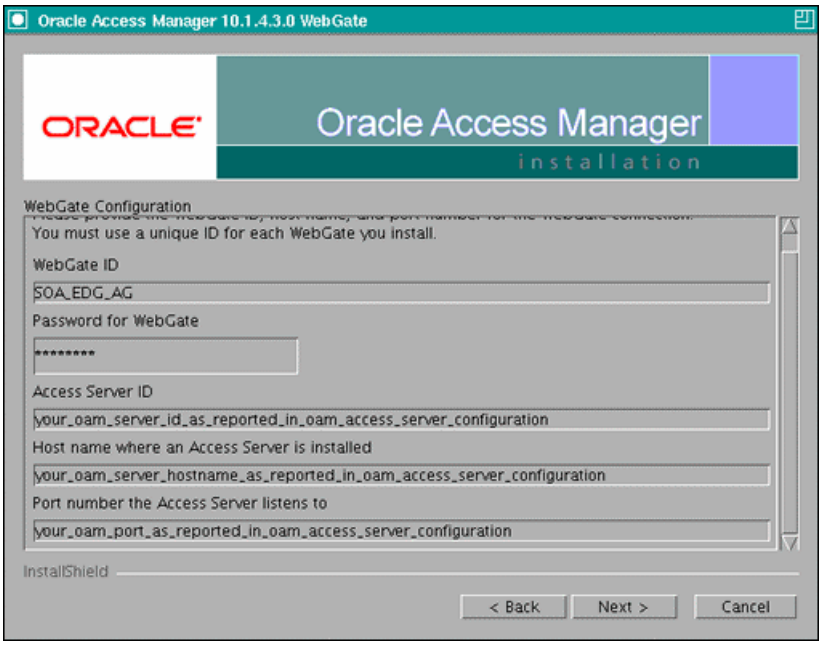
9. In the WebGate configuration screen, provide the details of the Access Server that will be used. You must provide the following information:

   - **WebGate ID**, as provided when the OAM configuration tool was executed
   - **Password for WebGate**
   - **Access Server ID**, as reported by the OAM Access Server configuration
   - **Access Server host name**, as reported by the OAM Access Server configuration
   - **Access Server port number**, as reported by the OAM Access Server configuration

   **Note:** The Access Server ID, host name, and port are all required.

   You can obtain these details from your Oracle Access Manager administrator. Click **Next** to continue.

***Figure 9–5 Access Server Configuration Screen***




Screenshot of the Access Server configuration screen.

**********

10. In the Configure Web Server screen, click **Yes** to automatically update the web server. Click **Next** to continue.
11. In the next Configure Web Server screen, specify the full path of the directory containing the `httpd.conf` file. This file is located in the following directory:

    ```
    ORACLE_BASE/admin/<OHS_Instance>/config/OHS/<OHS_ComponentName>
    ```

    For example:

    ```
    /u01/app/oracle/admin/ohs_instance2/config/OHS/ohs2/httpd.conf
    ```

    Click **Next** to continue.
12. In the next Configure Web Server page, a message informs you that the Web server configuration has been modified for WebGate. Click **Yes** to confirm.
13. Stop and start your Web server for the configuration updates to take effect. Click **Next** to continue.
14. In the next Configure Web Server screen, the following message is displayed: "If the web server is set up in SSL mode, then the httpd.conf file needs to be configured with the SSL related parameters. To manually tune your SSL configuration, please follow the instructions that come up". Click **Next** to continue.
15. In the next Configure Web Server screen, a message with the location of the document that has information on the rest of the product setup and Web server configuration is displayed. Choose **No** and click **Next** to continue.
16. The final Configure Web Server screen appears with a message to manually launch a browser and open the HTML document for further information on configuring your Web server. Click **Next** to continue.

17. The Oracle COREid Readme screen appears. Review the information on the screen and click **Next** to continue.
18. A message appears (along with the details of the installation) informing you that the installation was successful.

## 9.2.5 Setting Up WebLogic Authenticators

This section assumes that you have already set up the LDAP authenticator by following the steps in Section 9.1.2.1, "Creating the LDAP Authenticator." If you have not already created the LDAP authenticator, do it before continuing with this section.

This section includes the following topics:

- Section 9.2.5.1, "Back Up Configuration Files"
- Section 9.2.5.2, "Setting Up the OAM ID Asserter"
- Section 9.2.5.3, "Setting the Order of Providers"

### 9.2.5.1 Back Up Configuration Files

To be safe, first back up the relevant configuration files:

*ORACLE_BASE*/admin/<domain_name>/aserver/<domain_name>/config/config.xml
*ORACLE_BASE*/admin/<domain_name>/aserver/<domain_name>/config/fmwconfig/jps-config.xml
*ORACLE_BASE*/admin/<domain_name>/aserver/<domain_name>/config/fmwconfig/system-jazn-data.xml

Also back up the `boot.properties` file for the Administration Server.

### 9.2.5.2 Setting Up the OAM ID Asserter

To set up the OAM ID Asserter, complete these steps:

1. Log into Weblogic Console, if not already logged in.
2. Navigate to `SecurityRealms\<Default Realm Name>\Providers`.
3. Click **New** and Select "OAM Identity Asserter" from the dropdown menu.
4. Name the asserter (for example, "OAM ID Asserter") and click **Save**.
5. Click the newly added asserter to see the configuration screen for OAM Identity Asserter.
6. Set the control flag to 'REQUIRED' and click **Save**.
7. Open the **Provider Specific** tab to configure the following required settings:
   - **Primary Access Server:** provide OAM server endpoint information in HOST:PORT format.
   - **AccessGate Name:** name of the AccessGate (for example, `SOA_EDG_AG`).
   - **AccessGate Password:** password for the AccessGate (optional).
8. Save the settings.

### 9.2.5.3 Setting the Order of Providers

Reorder the OAM Identity Asserter, OID Authenticator, and Default Authenticator by ensuring that the control flag for each authenticator is set as follows:

- OAM Identity Asserter: REQUIRED

- OID LDAP Authenticator (or OVD LDAP Authenticator): SUFFICIENT
- Default Authenticator: SUFFICIENT

### 9.2.6 Changing the Login Form for the Administration Console Application

Change the web.xml file for the console application to direct logins to the "/" URL. To accomplish this:

1. Make a backup of your `WL_HOME/server/lib/consoleapp/webapp/WEB-INF/web.xml` file:

   ```
   SOAHOST1>cp WL_HOME/server/lib/consoleapp/webapp/WEB-INF/ web.xml WL_
   HOME/server/lib/consoleapp/webapp/WEB-INF/ web.xml.backup
   ```

2. Edit the web.xml file and change the `form-login-page` URL to "/".

   Specifically, change:

   ```
   login-config>
       <auth-method>CLIENT-CERT,FORM</auth-method>
       <form-login-config>
         <form-login-page>/login/LoginForm.jsp</form-login-page>
         <form-error-page>/login/LoginError.jsp</form-error-page>
       </form-login-config>
     </login-config>
   ```

   to:

   ```
   <login-config>
       <auth-method>CLIENT-CERT,FORM</auth-method>
       <form-login-config>
         <form-login-page>/</form-login-page>
         <form-error-page>/login/LoginError.jsp</form-error-page>
       </form-login-config>
     </login-config>
   ```

3. To enable Administration Server failover with the same SSO behavior, repeat the above steps for the installation in SOAHOST2.
4. Restart the Administration Server.

## 9.3 Backing Up the Installation

After you have verified that the extended domain is working, back up the installation. This is a quick backup for the express purpose of immediate restore in case of problems in the further steps. The backup destination is the local disk. This backup can be discarded once the enterprise deployment setup is complete. At this point, the regular deployment-specific backup and recovery process can be initiated. The *Oracle Fusion Middleware Administrator's Guide* provides further details. For information on describing the Oracle HTTP Server data that must be backed up and restored, refer to the "Backup and Recovery Recommendations for Oracle HTTP Server" section in this guide. For information on how to recover components, see "Recovery of Components" and "Recovery After Loss of Component" sections in the guide. For recommendations specific to recovering from the loss of a host, see the "Recovering Oracle HTTP Server to a Different Host" in the guide. Also refer to the *Oracle Database Backup and Recovery User's Guide* for information on database backup.

To back up the installation a this point, complete these steps:

1. Back up the web tier:

**a.** Shut down the instance using `opmnctl`.

```
ORACLE_BASE/admin/<instance_name>/bin/opmnctl stopall
```

**b.** Back up the Middleware Home on the web tier using the following command (as root):

```
tar -cvpf BACKUP_LOCATION/web.tar $MW_HOME
```

**c.** Back up the Instance Home on the web tier using the following command (as root):

```
tar -cvpf BACKUP_LOCATION/web_instance.tar $ORACLE_INSTANCE
```

**d.** Start the instance using `opmnctl`:

```
ORACLE_BASE/admin/<instance_name>/bin/opmnctl startall
```

**2.** Back up the AdminServer domain directory. Perform a backup to save your domain configuration. The configuration files all exist under the `ORACLE_BASE/admin/<domain_name>` directory.

```
SOAHOST1> tar -cvpf edgdomainback.tar ORACLE_BASE/admin/<domain_name>
```

# 10

# 10 Managing the Topology

This chapter describes some operations that you can perform after you have set up the topology. These operations include monitoring, scaling, and backing up your topology.

This chapter contains the following sections:

- Section 10.1, "Monitoring the Topology"
- Section 10.2, "Deploying Composites and Artifacts in SOA Enterprise Deployment Topology"
- Section 10.3, "Configuring UMS Drivers"
- Section 10.4, "Scaling the Topology"
- Section 10.5, "Performing Backups and Recoveries"
- Section 10.6, "Troubleshooting"
- Section 10.7, "Best Practices"

## 10.1 Monitoring the Topology

For information on monitoring the topology, see chapters 7 and 8 of the *Oracle Fusion Middleware Administrator's Guide for Oracle SOA Suite*.

## 10.2 Deploying Composites and Artifacts in SOA Enterprise Deployment Topology

When deploying SOA composites to a SOA Enterprise Deployment Topology, deploy to a specific server's address and not to the LBR address (soa.mycompany.com). Deploying to the LBR address may require direct connection from the deployer nodes to the external LBR address which may require additional ports to be opened in the firewalls used by the system.

For B2B, deploy agreements and purge/import metadata ONLY from the GUI available in B2B console instead of using the command line utility. Using the command line utility for these operations may cause inconsistencies and errors in the B2's system.

When deploying SOA Fusion Order Demo, the following additional steps are required in addition to the deployment steps provided in the FOD's README file).

1. Change the nostage property to **false** in the `build.xml` file of the Web applications so that ear files are copied to each node. Edit the `CreditCardAuthorization` and `OrderApprvalHumanTask` `build.xml` files, located at `FOD_dir\CreditCardAuthorization\bin` and `FOD_`

dir\OrderApprovalHumanTask\bin directories, and change the following field:

```
<target name="deploy-application">
     <wldeploy action="deploy" name="${war.name}"
       source="${deploy.ear.source}" library="false"
       nostage="false"
       user="${wls.user}" password="${wls.password}"
       verbose="false" adminurl="${wls.url}"
       remote="true" upload="true"
       targets="${server.targets}" />
   </target>
```

To:

```
<target name="deploy-application">
     <wldeploy action="deploy" name="${war.name}"
       source="${deploy.ear.source}" library="false"
       nostage="true"
       user="${wls.user}" password="${wls.password}"
       verbose="false" adminurl="${wls.url}"
       remote="true" upload="true"
       targets="${server.targets}" />
   </target>
```

2. Change the target for the Web applications so that deployments are targeted to the SOA Cluster and not to an individual server. Edit the build.properties file for FOD, located in the FOD_Dir/bin directory, and change the following field:

```
# wls target server (for shiphome set to server_soa, for ADRS use AdminServer)
server.targets=SOA_Cluster (the SOA cluster name in your SOA EDG)
```

3. Change the JMS seed templates so that instead of regular Destinations, Uniform Distributed Destinations are used and the JMS artifacts are targeted to the EDG JMS Modules. Edit the createJMSResources.seed file, located in the FOD_DIR\bin\templates directory, and change:

```
# lookup the SOAJMSModule - it's a system resource
     jmsSOASystemResource = lookup("SOAJMSModule","JMSSystemResource")

     jmsResource = jmsSOASystemResource.getJMSResource()

     cfbean = jmsResource.lookupConnectionFactory('DemoSupplierTopicCF')
     if cfbean is None:
         print "Creating DemoSupplierTopicCF connection factory"
         demoConnectionFactory =
 jmsResource.createConnectionFactory('DemoSupplierTopicCF')
         demoConnectionFactory.setJNDIName('jms/DemoSupplierTopicCF')
         demoConnectionFactory.setSubDeploymentName('SOASubDeployment')
 .
     topicbean = jmsResource.lookupTopic('DemoSupplierTopic')
     if topicbean is None:
         print "Creating DemoSupplierTopic jms topic"
         demoJMSTopic = jmsResource.createTopic("DemoSupplierTopic")
         demoJMSTopic.setJNDIName('jms/DemoSupplierTopic')
         demoJMSTopic.setSubDeploymentName('SOASubDeployment')
```

To:

```
# lookup the SOAJMSModule - it's a system resource
     jmsSOASystemResource = lookup("SOAJMSModuleUDDs","JMSSystemResource")
```

```
    jmsResource = jmsSOASystemResource.getJMSResource()

    cfbean = jmsResource.lookupConnectionFactory('DemoSupplierTopicCF')
    if cfbean is None:
        print "Creating DemoSupplierTopicCF connection factory"
        demoConnectionFactory =
jmsResource.createConnectionFactory('DemoSupplierTopicCF')
        demoConnectionFactory.setJNDIName('jms/DemoSupplierTopicCF')
        demoConnectionFactory.setSubDeploymentName('SOAJMSSubDM')
.
    topicbean = jmsResource.lookupTopic('DemoSupplierTopic')
    if topicbean is None:
        print "Creating DemoSupplierTopic jms topic"
        demoJMSTopic =
jmsResource.createDistributedTopic("DemoSupplierTopic")
        demoJMSTopic.setJNDIName('jms/DemoSupplierTopic')
        demoJMSTopic.setSubDeploymentName('SOAJMSSubDM')
```

## 10.3 Configuring UMS Drivers

UMS driver configuration is not automatically propagated in a SOA or BAM cluster. This implies that users need to:

1. Apply the configuration of UMS drivers in each and every one of the servers in the EDG topology that is using the driver.
2. When server migration is used, servers are moved to a different node's domain directory. It is necessary to pre-create the UMS driver configuration in the failover node. The UMS driver configuration file location is:

   ```
   ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>/servers/<server_name>/
   tmp/_WL_user/<ums_driver_name>/*/configuration/driverconfig.xml
   ```

   (where '*' represents a directory whose name is randomly generated by WLS during deployment, for example, "3682yq").

In order to create the file in preparation for possible failovers, users can force a server migration and copy the file from the source node. For example, for BAM:

1. Configure the driver for WLS_BAM1 in BAMHOST1.
2. Force a failover of WLS_BAM1 to BAMHOST2. Verify the directory structure for the UMS driver configuration in the failover node:

   ```
   cd ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>/servers/<server_
   name>/tmp/_WL_user/<ums_driver_name>/*/configuration/
   ```

   (where '*' represents a directory whose name is randomly generated by WLS during deployment, for example, "3682yq").

3. Do a remote copy of the driver configuration file from BAMHOST1 to BAMHOST2:

   ```
   BAMHOST1> scp ORACLE_BASE/admin/<domain_name>/mserver/<domain_
   name>/servers/<server_name>/tmp/_WL_user/<ums_driver_
   name>/*/configuration/driverconfig.xml
   oracle@BAMHOST2:ORACLE_BASE/admin/<domain_name>/mserver/<domain_
   name>/servers/<server_name>/tmp/_WL_user/<ums_driver_name>/*/configuration/
   ```

It is required to restart the driver for these changes to take effect (that is, for the driver to consume the modified configuration). To restart the driver:

1. Log on to the Oracle WebLogic Administration console.
2. Expand the environment node on the navigation tree.
3. Click on **Deployments**.
4. Select the driver.
5. Click **Stop->When work completes** and confirm the operation.
6. Wait for the driver to transition to the "Prepared" state (refresh the administration console page, if required).
7. Select the driver again, and click **Start->Servicing all requests** and confirm the operation.

Make sure that you verify in Oracle Enterprise Manager Fusion Middleware Control that the properties for the driver have been preserved.

## 10.4 Scaling the Topology

You can scale out and or scale up the enterprise topology. When you scale up the topology, you add new managed servers to nodes that are already running on one or more managed servers. When you scale out the topology, you add new managed servers to new nodes.

This section covers includes the topics:

- Section 10.4.1, "Scaling Up the Topology (Adding Managed Servers to Existing Nodes)"
- Section 10.4.2, "Scaling Out the Topology (Adding Managed Servers to New Nodes)"

### 10.4.1 Scaling Up the Topology (Adding Managed Servers to Existing Nodes)

When you scale up the topology, you already have a node that runs a managed server that is configured with SOA components or a managed server with WSM-PM. The node contains a WebLogic Server home and an Oracle Fusion Middleware SOA home in shared storage. Use existing these installations (such as WebLogic Server home, Oracle Fusion Middleware home, and domain directories), when you create the new managed servers called WLS_SOA and WLS_WSM. You do not need to install WLS or SOA binaries at a new location or to run `pack` and `unpack`.

> **Note:** Because the BAM Server runs in active-passive, you cannot scale a BAM Server Managed Server. You can scale a BAM Web Applications server. The untargeting described in Section 6.7, "Untargeting the BAM Server System from WLS_BAM2" is required. The JMS configuration and the JMS configuration detailed in this section is not required.

1. Using the Oracle WebLogic Server Administration Console, clone WLS_SOA1 or WLS_WSM1 into a new managed server. The source managed server to clone should be one that already exists on the node where you want to run the new managed server.

   To clone a managed server, complete these steps:

a. From the Domain Structure window of the Oracle WebLogic Server Administration Console, expand the **Environment** node and then **Servers**. The Summary of Servers page appears.

b. Click **Clone**.

Name the new managed server WLS_SOA*n*, where *n* is a number that identifies the new managed server. In this case, assume that you are adding a new server to Node 1, where WLS_SOA1 was running.

The remainder of the steps assume that you are adding a new server to SOAHOST1, which is already running WLS_SOA1.

2. For the listen address, assign the host name or IP to use for this new managed server. If you are planning to use server migration as recommended for this server, enter the VIP (also called a floating IP) to enable it to move to another node. The VIP should be different from the one used by the managed server that is already running.

3. Create JMS servers for SOA and UMS on the new managed server.

> **Note:** These steps are not required for scaling up the WSM_PM managed server, only for WLS_SOA managed servers. They are not required either to scale up the BAM Web Applications system.

Create the JMS servers for SOA and UMS as follows:

a. Use the Oracle WebLogic Server Administration Console to create a new persistent store for the new SOAJMSServer (which will be created in a later step) and name it, for example, **SOAJMSFileStore_N**. Specify the path for the store as recommended in Section 2.3, "Shared Storage and Recommended Directory Structure" as the directory for the JMS persistent stores:

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

> **Note:** This directory must exist before the managed server is started or the start operation will fail.

b. Create a new JMS server for SOA: for example, **SOAJMSServer_N**. Use the SOAJMSFileStore_N for this JMS server. Target the SOAJMSServer_N server to the recently created managed server (WLS_SOA*n*).

c. Create a new persistence store for the new UMS JMS server (which will be created in a later step) and name it, for example, **UMSJMSFileStore_N**. Specify the path for the store as recommended in Section 2.3, "Shared Storage and Recommended Directory Structure" as the directory for the JMS persistent stores:

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

> **Note:** This directory must exist before the managed server is started or the start operation will fail.

**Note:** It is also possible to assign SOAJMSFileStore_N as the store for the new UMS JMS servers. For the purpose of clarity and isolation, individual persistent stores are used in the following steps.

**d.** Create a new JMS Server for UMS: for example, **UMSJMSServer_N**. Use the UMSJMSFileStore_N for this JMS server. Target the UMSJMSServer_N server to the recently created managed server (WLS_SOA*n*).

**e.** Update the SubDeployment targets for the SOA JMS Module to include the recently created SOA JMS Server. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click SOAJMSModuleUDDs (represented as a hyperlink in the Names column of the table). The Settings page for SOAJMSModuleUDDs appears. Open the SubDeployments tab. The SOAJMSSubDM subdeployment appears.

**Note:** This subdeployment module results from updating the JMS configuration for the first two servers (WLS_SOA1 and WLS_SOA2) with the Uniform Distributed Destination Script (*soa-createUDD.py*), which is required for the initial EDG topology setup.

Click on it. Add the new JMS Server for SOA called SOAJMSServer_N to this subdeployment. Click **Save**.

**f.** Target the UMSJMSSystemResource to the SOA_Cluster as it may have changed during extend operations. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click UMSJMSSytemResource and open the Targets tab. Make sure all of the servers in the SOA_Cluster appear selected (including the recently cloned WLS_SOA*n*).

**g.** Update the SubDeployment Targets for UMSJMSSystemResource to include the recently created UMS JMS server. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click UMSJMSSystemResource (represented as a hyperlink in the Names column of the table). The Settings page for UMSJMSSystemResource appears. Open the SubDeployments tab. The UMSJMSSubDMSOA subdeployment appears.

**Note:** This subdeployment module results from updating the JMS configuration for the first two servers (WLS_SOA1 and WLS_SOA2) with the Uniform Distributed Destination Script (*soa-createUDD.py*), which is required for the initial EDG topology setup.

Click on it. Add the new JMS Server for UMS called UMSJMSServer_N to this subdeployment. Click **Save**.

**4.** Start and test the new managed server from the Oracle WebLogic Server Administration Console.

**a.** Shut down the existing managed servers in the cluster.

**b.** Ensure that the newly created managed server, WLS_SOAn, is running.

**c.** Access the application on the newly created managed server (`http://vip:port/soa-infra or http://vip:port/wsm-pm`). The application should be functional.

**5.** Configure the appropriate coherence "well-known addresses list" as start parameters for the server as described in Section 5.4, "Configuring Oracle Coherence for Deploying Composites."

**6.** Configure server migration for the new managed server.

> **Note:** Because this is a scale-up operation, the node should already contain a Node Manager and environment configured for server migration that includes netmask, interface, wlsifconfig script superuser privileges, and so on. The floating IP for the new SOA managed server should also be already present.

To configure server migration using the Oracle WebLogic Server Administration Console, complete these steps:

**a.** In the Domain Structure window, expand the **Environment** node and then click **Servers**. The Summary of Servers page appears.

**b.** Click the name of the server (represented as a hyperlink) in Name column of the table for which you want to configure migration. The settings page for the selected server appears.

**c.** Click the **Migration** subtab.

**d.** In the Migration Configuration section, select the servers that participate in migration in the Available window by clicking the right arrow. Select the same migration targets as for the servers that already exist on the node.

For example, for new managed servers on SOAHOST1, which is already running WLS_SOA1, select SOAHOST2. For new managed servers on SOAHOST2, which is already running WLS_SOA2, select SOAHOST1.

> **Note:** The appropriate resources must be available to run the managed servers concurrently during migration.

**e.** Choose the **Automatic Server Migration Enabled** option. This enables the Node Manager to start a failed server on the target node automatically.

**f.** Click **Save**.

**g.** Restart the Administration Server, managed servers, and Node Manager.

**7.** Test server migration for this new server. To test migration, perform the following from the node where you added the new server:

**a.** Stop the WLS_SOAn managed server.

To do this, `run kill -9 <pid>` on the PID of the managed server. You can identify the PID of the node using `ps -ef | grep WLS_SOAn`.

**b.** Monitor the Node Manager Console for a message indicating that WLS_SOA1's floating IP has been disabled.

c. Wait for the Node Manager to attempt a second restart of WLS_SOAn. Node Manager waits for a fence period of 30 seconds before trying this restart.

d. Once Node Manager restarts the server, stop it again. The Node Manager should log a message indicating that the server will not be restarted again locally.

## 10.4.2 Scaling Out the Topology (Adding Managed Servers to New Nodes)

When you scaling out the topology, you add new managed servers configured with SOA and or WSM-PM to new nodes.

Before performing the steps in this section, check that you meet these requirements:

#### Prerequisites

- There must be existing nodes running managed servers configured with SOA and WSM-PM within the topology
- The new node can access the existing home directories for WebLogic Server and SOA. (Use the existing installations in shared storage for creating a new WLS_SOA or WLS_WSM managed server. You do not need to install WebLogic Server or SOA binaries in a new location but you do need to run `pack` and `unpack` to bootstrap the domain configuration in the new node.)
- When an ORACLE_HOME or WL_HOME is shared by multiple servers in different nodes, it is recommended that you keep the Oracle Inventory and Middleware home list in those nodes updated for consistency in the installations and application of patches. To update the oraInventory in a node and "attach" an installation in a shared storage to it, use *ORACLE_HOME/oui/bin/attachHome.sh*. To update the Middleware home list to add or remove a WL_HOME, edit the *<user_home>/bea/beahomelist* file. See the steps below.

To scale out the topology, complete these steps:

1. On the new node, mount the existing FMW Home, which should include the SOA installation and the domain directory, and ensure that the new node has access to this directory, just like the rest of the nodes in the domain.
2. To attach ORACLE_HOME in shared storage to the local Oracle Inventory, execute the following command:

   ```
   SOAHOSTn>cd ORACLE_HOME/
   SOAHOSTn>./attachHome.sh -jreLoc ORACLE_BASE/fmw/jrockit_160_14_R27.6.4-18
   ```

   To update the Middleware home list, create (or edit, if another WebLogic installation exists in the node) the *$HOME/bea/beahomelist* file and add `MW_HOME` to it.
3. Log in to the Oracle WebLogic Administration Console.
4. Create a new machine for the new node that will be used, and add the machine to the domain.
5. Update the machine's Node Manager's address to map the IP of the node that is being used for scale out.
6. Use the Oracle WebLogic Server Administration Console to clone WLS_SOA1/WLS_WSM1 into a new managed server. Name it WLS_SOAn/WLS_WSM-PMn, where *n* is a number.

**Note:** These steps assume that you are adding a new server to node *n*, where no managed server was running previously.

7. Assign the host name or IP to use for the new managed server for the listen address of the managed server.

   If you are planning to use server migration for this server (which Oracle recommends) this should be the VIP (also called a floating IP) for the server. This VIP should be different from the one used for the existing managed server.

8. Create JMS servers for SOA and UMS on the new managed server.

   **Note:** These steps are not required for scaling out the WSM_PM managed server, only for WLS_SOA managed servers. They are not required either to scale up the BAM Web Applications system.

   Create the JMS servers for SOA and UMS as follows:

   a. Use the Oracle WebLogic Server Administration Console to create a new persistent store for the new SOAJMSServer (which will be created in a later step) and name it, for example, **SOAJMSFileStore_N**. Specify the path for the store as recommended in Section 2.3, "Shared Storage and Recommended Directory Structure" as the directory for the JMS persistent stores:

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

      **Note:** This directory must exist before the managed server is started or the start operation will fail.

   b. Create a new JMS server for SOA, for example, SOAJMSServer_N. Use the SOAJMSFileStore_N for this JMS server. Target the SOAJMSServer_N Server to the recently created managed server (WLS_SOA*n*).

   c. Create a new persistence store for the new UMSJMSServer, and name it, for example, **UMSJMSFileStore_N**. As the directory for the persistent store, specify the path recommended in Section 2.3, "Shared Storage and Recommended Directory Structure" as the directory for the JMS persistent stores:

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

      **Note:** This directory must exist before the managed server is started or the start operation will fail.

      **Note:** It is also possible to assign SOAJMSFileStore_N as the store for the new UMS JMS servers. For the purpose of clarity and isolation, individual persistent stores are used in the following steps.

   d. Create a new JMS server for UMS: for example, **UMSJMSServer_N**. Use the UMSJMSFileStore_N for this JMS server. Target the UMSJMSServer_N Server to the recently created managed server (WLS_SOA*n*).

**e.** Update the SubDeployment targets for the SOA JMS Module to include the recently created SOA JMS server. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click SOAJMSModuleUDDs (represented as a hyperlink in the Names column of the table). The Settings page for SOAJMSModuleUDDs appears. Open the SubDeployments tab. The SOAJMSSubDM subdeployment appears.

---

**Note:** This subdeployment module results from updating the JMS configuration for the first two servers (WLS_SOA1 and WLS_SOA2) with the Uniform Distributed Destination Script (*soa-createUDD.py*), which is required for the initial EDG topology setup.

---

Click on it. Add the new JMS server for SOA called SOAJMSServer_N to this subdeployment. Click **Save**.

**f.** Target the UMSJMSSystemResource to the SOA_Cluster as it may have changed during extend operations. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click UMSJMSSytemResource and open the Targets tab. Make sure all of the servers in the SOA_Cluster appear selected (including the recently cloned WLS_SOA*n*).

**g.** Update the SubDeployment targets for UMSJMSSystemResource to include the recently created UMS JMS Server. To do this, expand the **Services** node and then expand the **Messaging** node. Choose JMS Modules from the Domain Structure window of the Oracle WebLogic Server Administration Console. The JMS Modules page appears. Click UMSJMSSystemResource (represented as a hyperlink in the Names column of the table). The Settings page for UMSJMSSystemResource appears. Open the SubDeployments tab. The UMSJMSSubDMSOA subdeployment appears.

---

**Note:** This subdeployment module results from updating the JMS configuration for the first two servers (WLS_SOA1 and WLS_SOA2) with the Uniform Distributed Destination Script (*soa-createUDD.py*), which is required for the initial EDG topology setup.

---

Click on it. Add the new JMS Server for UMS called UMSJMSServer_N to this subdeployment. Click **Save**.

**9.** Run the `pack` command on SOAHOST1 to create a template pack as follows:

```
SOAHOST1> cd ORACLE_COMMON_HOME/common/bin

SOAHOST1> ./pack.sh -managed=true -domain=ORACLE_BASE/admin/aserver/
-template=soadomaintemplateScale.jar -template_name=soa_domain_templateScale
```

Run the following command on SOAHOST1 to copy the template file created to SOAHOSTN

```
SOAHOST1> scp soadomaintemplateScale.jar oracle@SOAHOSTN:/ ORACLE_COMMON_
HOME/common/bin
```

Run the `unpack` command on SOAHOSTN to unpack the template in the managed server domain directory as follows:

```
SOAHOSTN> cd ORACLE_COMMON_HOME/common/bin

SOAHOSTN> ./unpack.sh -domain=ORACLE_BASE/admin/<domain_name>
/mserver/<domain_name>/
-template=soadomaintemplateScale.jar
-app_dir=ORACLE_BASE/admin/<domain_dir>/mserver/apps
```

10. Start the Node Manager on the new node. To start the Node Manager, use the installation in shared storage from the already existing nodes and then start Node Manager by passing the host name of the new node as a parameter as follows:

    ```
    NEW_NODE> WL_HOME/server/bin/startNodeManager <new_node_ip>
    ```

    If you used the paths shown in Section 4.1.1, "Installing Oracle WebLogic Server", WL_HOME would be `ORACLE_BASE/wls`.

11. Disable host name verification for the new managed server.Before you can start and verify the WLS_SOAN managed server, you must disable host name verification. You can re-enable it after you have configured server certificates for the communication between the Oracle WebLogic Administration Server and the Node Manager in SOAHOStn. For information on server certificates, see Chapter 7, "Setting Up Node Manager."

    Perform these steps to disable host name verification:

    a. In the Oracle Enterprise Manager Console, select **Oracle WebLogic Server Administration Console**.

    b. Expand the **Environment** node in the Domain Structure window.

    c. Click **Servers**. The Summary of Servers page appears.

    d. Select **WLS_WSM2** in the Names column of the table. The Settings page for AdminServer(admin) appear.

    e. Click the **SSL** tab.

    f. Click **Advanced**.

    g. Set Hostname Verification to **None**.

    h. Click **Save**.

12. Start and test the new managed server from the Oracle WebLogic Server Administration Console.

    a. Shut down all the existing managed servers in the cluster.

    b. Ensure that the newly created managed server, WLS_SOAn, is running.

    c. Access the application on the newly created managed server (`http://vip:port/soa-infra` or `http://vip:port/wsm-pm`). The application should be functional.

13. Configure the appropriate coherence "well known addresses list" as start parameters for the server as described in Section 5.4, "Configuring Oracle Coherence for Deploying Composites."

14. Configure server migration for the new managed server.

> **Note:** Because this new node uses an existing shared storage installation, the node already is using a Node Manager and an environment configured for server migration that includes netmask, interface, wlsifconfig script superuser privileges. The floating IP for the new SOA Managed Server is already present in the new node.

Log into the Oracle WebLogic Server Administration Console and configure server migration following these steps:

**a.** Expand the **Environment** node in the Domain Structure windows and then choose Servers. The Summary of Servers page appears.

**b.** Select the server (represented as hyperlink) for which you want to configure migration from the Names column of the table. The Setting page for that server appears.

**c.** Click the **Migration** tab.

**d.** In the Available field of the Migration Configuration section, click the right arrow to select the machines to which to allow migration.

> **Note:** Specify the least-loaded machine as the migration target for the new server. The required capacity planning must be completed so that this node has enough available resources to sustain an additional managed server.

**e.** Select **Automatic Server Migration Enabled**. This enables the Node Manager to start a failed server on the target node automatically.

**f.** Click **Save**.

**g.** Restart the Administration Server, managed servers, and the Node Manager.

## 10.5 Performing Backups and Recoveries

Table 10–1 lists the static artifacts to back up in the 11*g* SOA enterprise deployment.

***Table 10–1 Static Artifacts to Back Up in the 11g SOA Enterprise Deployment***

| Type | Host | Location | Tier |
|---|---|---|---|
| ORACLE HOME (DB) | CUSTDBHOST1 and CUSTDBHOST | The location is user-defined. | Data Tier |
| MW HOME (OHS) | WEBHOST1 and WEBHOST2 | `ORACLE_HOME/fmw` | Web Tier |
| MW HOME (this includes the SOA home as well) | SOAHOST1 and SOAHOST2 | `MW_HOME`<br>The SOA home is also under MW_HOME: `ORACLE_HOME` | Application Tier |
| Installation-related files | | OraInventory, `<user_home>/bea/beahomelist`, `oraInst.loc`, oratab | N/A |

Table 10–2 lists the runtime artifacts to back up in the 11*g* SOA enterprise deployment.

*Table 10–2 Run-Time Artifacts to Back Up in the 11g SOA Enterprise Deployment*

| Type | Host | Location | Tier |
|---|---|---|---|
| DOMAIN HOME | SOAHOST1 and SOAHOST2 | ORACLE_BASE/admin/<domain_name>/mserver/<domain_name>/ | Application Tier |
| Application artifacts (EAR and WAR files) | SOAHOST1 and SOAHOST2 | Find the application artifacts by viewing all of the deployments through administration console | Application Tier |
| OHS instance home | WEBHOST1 and WEBHOST2 | ORACLE_BASE/admin/<instance_name> | Web Tier |
| RAC databases | CUSTDBHOST1 and CUSTDBHOST2 | The location is user-defined | Data Tier |

For more information on backup and recovery of Oracle Fusion Middleware components, see *Oracle Fusion Middleware Administrator's Guide*.

**Note:** ORACLE_HOME should be backed up if any changes are made to the XEngine configuration that are part of your B2B setup. These files are located under ORACLE_HOME/soa/thirdparty/edifecs/XEngine. To back up ORACLE_HOME, execute the following command:

```
SOAHOST1> tar -cvpf fmwhomeback.tar MW_HOME
```

## 10.6 Troubleshooting

This section covers the following topics:

- Section 10.6.1, "Access to BAM Results in HTTP Error 404"
- Section 10.6.2, "Page Not Found When Accessing soa-infra Application Through Load Balancer"
- Section 10.6.3, "Error While Retrieving Oracle B2B Document Definitions"
- Section 10.6.4, "Soa-infra Application Fails to Start Due to Deployment Framework Issues (Coherence)"
- Section 10.6.5, "Incomplete Policy Migration After Failed Restart of SOA Server"
- Section 10.6.6, "SOA, BAM, or WMS Servers Fail to Start Due to Maximum Number of Processes Available in Database"
- Section 10.6.7, "Administration Server Fails to Start After a Manual Failover"
- Section 10.6.8, "Error While Activating Changes in Administration Console"
- Section 10.6.9, "SOA/BAM Server Not Failed Over After Server Migration"
- Section 10.6.10, "SOA/BAM Server Not Reachable From Browser After Server Migration"
- Section 10.6.11, "SOA Server Stops Responding after Being Active and Stressed for a Period of Time."
- Section 10.6.12, "Exceptions While Performing Deploy/Purge/Import Operations in the B2B Console."
- Section 10.6.13, "OAM Configuration Tool Does Not Remove URLs"

- Section 10.6.14, "Redirecting of Users to Login Screen After Activating Changes in Administration Console"
- Section 10.6.15, "Redirecting of Users to Administration Console's Home Page After Activating Changes to OAM"
- Section 10.6.16, "Configured JOC Port Already in Use"
- Section 10.6.17, "Restoring a JMS Configuration"

### 10.6.1 Access to BAM Results in HTTP Error 404

If accessing the BAM application results in the HTTP 404 error ("Not Found"), a probable cause is that the BAM server was started before the start of the database instance where BAM schemas reside. In this case, shut down the BAM instance and restart it after ensuring that the database is already up.

### 10.6.2 Page Not Found When Accessing soa-infra Application Through Load Balancer

**Problem:** A 404 "page not found" message is displayed in the web browser when you try to access the soa-infra application using the load balancer address. The error is intermittent and SOA Servers appear as "Running" in the WLS Administration Console.

**Solution:** Even when the SOA managed servers may be up and running, some of the applications contained in them may be in Admin, Prepared or other states different from Active. The soa-infra application may be unavailable while the SOA server is running. Check the Deployments page in the Administration Console to verify the status of the soa-infra application. It should be in "Active" state. Check the SOA Server's output log for errors pertaining to the soa-infra application and try to start it from the Deployments page in the Administration Console.

### 10.6.3 Error While Retrieving Oracle B2B Document Definitions

**Problem:** Error happens when trying to retrieve a document definition XSD from Oracle B2B. B2B resides in a cluster and is accessed through a load balancer. B2B console report the following:

```
An error occured while loading the document definitions.
java.lang.IllegalArgumentException: Cluster address must be set when clustering is
enabled.
```

**Solution:** This occurs if you do not set the frontend HTTP host and port for the Oracle WebLogic cluster where Oracle B2B resides. To eliminate this error, set the front end address for the SOA Cluster:

1. In the WebLogic Server Administration Console, in the Change Center section, click **Lock & Edit**.
2. In the left pane, choose the **Environment in the Domain Structure** window and then choose **Clusters**. The Summary of Clusters page appears.
3. Select the `WLS_SOA` cluster.
4. Select **HTTP**.
5. Set the values for the following:
   - **Frontend Host:** `soa.mycompany.com`
   - **Frontend HTTPS Port:** `443`

- **Frontend HTTP Port:** `80`

6. Click **Save**.
7. To activate the changes, click **Activate Changes** in the Change Center section of the Administration Console.
8. Restart the servers to make the Frontend Host directive in the cluster effective.

## 10.6.4 Soa-infra Application Fails to Start Due to Deployment Framework Issues (Coherence)

**Problem:** The soa-infra application fails to start after changes to the Coherence configuration for deployment have been applied. The SOA server output log reports the following:

```
Cluster communication initialization failed. If you are using multicast, Please
make sure multicast is enabled on your network and that there is no interference
on the address in use. Please see the documentation for more details.
```

**Solutions:**

1. When using multicast instead of unicast for cluster deployments of SOA composites, a message similar to the above may appear if a multicast conflict arises when starting the soa-infra application (that is, starting the managed server on which SOA runs). These messages, which occur when Oracle Coherence throws a runtime exception, also include the details of the exception itself. If such a message appears, check the multicast configuration in your network. Verify that you can ping multicast addresses. In addition, check for other clusters that may have the same multicast address but have a different cluster name in your network, as this may cause a conflict that prevents soa-infra from starting. If multicast is not enabled in your network, you can change the deployment framework to use unicast as described in *Oracle Coherence Developer's Guide for Oracle Coherence*.
2. When entering well-known address list for unicast (in server start parameters), make sure that the node's addresses entered for the localhost and clustered servers are correct. Error messages like:

   ```
   oracle.integration.platform.blocks.deploy.CompositeDeploymentCoordinatorMessage
   s errorUnableToStartCoherence
   ```

   are reported in the server's output log if any of the addresses is not resolved correctly.

## 10.6.5 Incomplete Policy Migration After Failed Restart of SOA Server

**Problem:** The SOA server fails to start through the administration console *before* setting the Node Manager property `startScriptEnabled=true`. The server does not come up after the property is set either. The SOA Server output log reports the following:

```
SEVERE: <.> Unable to Encrypt data
Unable to Encrypt data.
Check installation/post-installation steps for errors. Check for errors during SOA
server startup.

ORABPEL-35010
 .
Unable to Encrypt data.
```

```
Unable to Encrypt data.
Check installation/post-installation steps for errors. Check for errors
 during SOA server startup.
 .
 at
oracle.bpel.services.common.util.EncryptionService.encrypt(EncryptionService.java:
56)
...
```

**Solution:** Incomplete policy migration results from an unsuccessful start of the first SOA server in a cluster. To enable full migration, edit the `<jazn-policy>` element the *system-jazn-data.xml* file to grant permission to *bpm-services.jar*:

```
<grant>
  <grantee>
    <codesource>
<url>file:${oracle.home}/soa/modules/oracle.soa.workflow_11.1.1/bpm-
services.jar</url>
    </codesource>
  </grantee>
  <permissions>
    <permission>
      <class>java.security.AllPermission</class>
    </permission>
  </permissions>
</grant>
```

## 10.6.6 SOA, BAM, or WMS Servers Fail to Start Due to Maximum Number of Processes Available in Database

**Problem:** SOA, WSM or BAM Server fails to start. The domain has been extended for new types of managed server (for example, SOA extended for BAM) or the system has been scaled up (added new servers of the same type). The SOA/BAM or WSM Server output log reports the following:

```
<Warning> <JDBC> <BEA-001129> <Received exception while creating connection for
pool "SOADataSource-rac0": Listener refused the connection with the following
error:

ORA-12516, TNS:listener could not find available handler with matching protocol
stack >
```

**Solution:** Verify the number of processes in the database and adjust accordingly. As the SYS user, issue the SHOW PARAMETER command:

```
SQL> SHOW PARAMETER processes
```

Set the initialization parameter using the following command:

```
SQL> ALTER SYSTEM SET processes=300 SCOPE=SPFILE
```

Restart the database.

> **Note:** The method that you use to change a parameter's value depends on whether the parameter is static or dynamic, and on whether your database uses a parameter file or a server parameter file. See the *Oracle Database Administrator's Guide* for details on parameter files, server parameter files, and how to change parameter values.

### 10.6.7 Administration Server Fails to Start After a Manual Failover

**Problem:** Administration Server fails to start after the Administration Server node failed and manual failover to another nodes is performed. The Administration Server output log reports the following:

```
<Feb 19, 2009 3:43:05 AM PST> <Warning> <EmbeddedLDAP> <BEA-171520> <Could not
obtain an exclusive lock for directory: ORACLE_BASE/admin/soadomain/aserver/
soadomain/servers/AdminServer/data/ldap/ldapfiles. Waiting for 10 seconds and then
retrying in case existing WebLogic Server is still shutting down.>
```

**Solution:** When restoring a node after a node crash and using shared storage for the domain directory, you may see this error in the log for the Administration Server due to unsuccessful lock cleanup. To resolve this error, remove the file *ORACLE_BASE/admin/<domain_name>/aserver/<domain_name>/servers/AdminServer/data/ldap/ldapfiles/EmbeddedLDAP.lok*.

### 10.6.8 Error While Activating Changes in Administration Console

**Problem:** Activation of changes in Administration Console fails after changes to a server's start configuration have been performed. The Administration Console reports the following when clicking "Activate Changes":

```
An error occurred during activation of changes, please see the log for details.
 [Management:141190]The commit phase of the configuration update failed with an
exception:
In production mode, it's not allowed to set a clear text value to the property:
PasswordEncrypted of ServerStartMBean
```

**Solution:** This may happen when start parameters are changed for a server in the Administration Console. In this case, either provide username/password information in the server start configuration in the Administration Console for the specific server whose configuration was being changed, or remove the `<password-encrypted></password-encrypted>` entry in the *config.xml* file (this requires a restart of the Administration Server).

### 10.6.9 SOA/BAM Server Not Failed Over After Server Migration

**Problem:** After reaching the maximum restart attempts by local Node Manager, Node Manager in the failover node tries to restart it, but the server does not come up. The server seems to be failed over as reported by Node Manager's output information. The VIP used by the SOA Server is not enabled in the failover node after Node Manager tries to migrate it (if config in the failover node does not report the VIP in any interface). Executing the command "sudo ifconfig $INTERFACE $ADDRESS $NETMASK" does not enable the IP in the failover node.

**Solution:** The rights and configuration for `sudo` execution should not prompt for a password. Verify the configuration of `sudo` with your system administrator so that `sudo` works without a password prompt.

### 10.6.10 SOA/BAM Server Not Reachable From Browser After Server Migration

**Problem:** Server migration is working (SOA/BAM Server is restarted in the failed over node) but the *<Virtual Hostname>:8001/soa-infra* URL is not reachable in the web browser. The server has been "killed" in its original host and Node Manager in the failover node reports that the VIP has been migrated and the server started. The VIP used by the SOA Server cannot be pinged from the client's node (that is, the node where the browser is being used).

**Solution:** The `arping` command executed by Node Mnager to update ARP caches did not broadcast the update properly. In this case, the node is not reachable to external nodes. Either update the *nodemanager.properties* file to include the MACBroadcast or execute a manual arping:

```
/sbin/arping -b -q -c 3 -A -I $INTERFACE $ADDRESS > $NullDevice 2>&1
```

Where `$INTERFACE` is the network interface where the Virtual IP is enabled and `$ADDRESS` is the virtual IP address.

## 10.6.11 SOA Server Stops Responding after Being Active and Stressed for a Period of Time

**Problem**: WLS_SOA starts properly and functions for a period of time, but becomes unresponsive after running an application that uses the Oracle File Adapter or Oracle FTP Adapter. The log file for the server reports the following:

```
<Error> <Server> <BEA-002606> <Unable to create
a server socket for listening on channel "Default". The address
X.X.X.X might be incorrect or another process is using port 8001:
@ java.net.SocketException: Too many open files.>
```

**Solution**: For composites with Oracle File and FTP Adapters, which are designed to consume a very large number of concurrent messages, set the number of open files parameter for your operating system to a greater value. For example, to set the number of open files parameter to 8192 for Linux, use the `ulimit -n 8192` command. The value must be adjusted based on the expected system's load.

## 10.6.12 Exceptions While Performing Deploy/Purge/Import Operations in the B2B Console

**Problem:** Deployment of new agreements or purging/importing new metadata fails, and the output logs for the SWLS_SOA server reports "[java] MDS-02202: Content of the metadata object" for deployment or "postTransfer: MDS-00521: error while reading document..." for purge/import.

**Solution:** This is caused by timing and load balancing mechanism in the operation. The exceptions are unlikely to happen, so a retry of the operation will typically succeed. There is no cleanup or any other additional steps required.

## 10.6.13 OAM Configuration Tool Does Not Remove URLs

**Problem:** The OAM Configuration Tool has been used and a set of URLs was added to the policies in Oracle Access Manager. One of multiple URLs had a typo. Executing the OAM Configuration Tool again with the correct URLs completes successfully; however, when accessing Policy Manager, the incorrect URL is still there.

**Solution:** The OAM Configuration Tool only adds new URLs to existing policies when executed with the same app_domain name. To remove a URL, use the Policy Manager Console in OAM. Log on to the Access Administration site for OAM, click on My Policy Domains, click on the created policy domain (SOA_EDG), then on the Resources tab, and remove the incorrect URLs.

### 10.6.14 Redirecting of Users to Login Screen After Activating Changes in Administration Console

**Problem:** After configuring OHS and LBR to access the Oracle WebLogic Administration Console, some activation changes cause the redirection to the login screen for the admin console.

**Solution:** This is the result of the console attempting to follow changes to port, channel, and security settings as a user makes these changes. For certain changes, the console may redirect to the Administration Server's listen address. Activation is completed regardless of the redirection. It is not required to log in again; users can simply update the URL to `soa.mycompany.com/console/console.portal` and directly access the home page for the Administration Console.

> **Note:** This problem will not occur if you have disabled tracking of the changes described in this section.

### 10.6.15 Redirecting of Users to Administration Console's Home Page After Activating Changes to OAM

**Problem:** After configuring OAM, some activation changes cause the redirection to the Administration Console's home page (instead of the context menu where the activation was performed).

**Solution:** This is expected when OAM SSO is configured and is the result of the redirections performed by the Administration Server. Activation is completed regardless of the redirection. If required, users may "manually" navigate again to the desired context menu.

### 10.6.16 Configured JOC Port Already in Use

**Problem:** Attempts to start a Managed Server that uses the Java Object Cache, such as OWSM or WebCenter Spaces Managed Servers, fail. The following errors appear in the logs:

```
J2EE JOC-058 distributed cache initialization failure
J2EE JOC-043 base exception:
J2EE JOC-803 unexpected EOF during read.
```

**Solution:** Another process is using the same port that JOC is attempting to obtain. Either stop that process, or reconfigure JOC for this cluster to use another port in the recommended port range.

### 10.6.17 Restoring a JMS Configuration

**Problem:** A mistake in the parameters passed to the `soa-createUDD.py` script, or some other mistake causes the JMS configuration for SOA or BAM clusters to fail.

**Solution:** Use `soa-createUDD.py` to restore the configuration. You can use this script in the following situations:

1. If a mistake is made while running the `soa-createUDD.py` script after the SOA cluster is created from the Oracle Fusion Middleware Configuration Wizard (an incorrect option is used, a target is modified, or a module is deleted accidentally). In these situations you can use the `soa-createUDD.py` script to restore the appropriate JMS configuration using the following steps:

a. Delete the existing SOA JMS resources (JMS Modules owned by the soa-infrastructure system).

b. Run the `soa-createUDD.py` again. The script assume the JMS Servers created for SOA are preserved and creates the destinations and subdeployment modules required to use Uniform Distributed Destinations for SOA. In this case, the script should be executed with the option `--soacluster`. After running the script again, verified from the WebLogic Server Administration Console that the following artifacts exist (**Domain Structure**, **Services**, **Messaging**, **JMS Modules**):

```
SOAJMSModuleUDDs        ---->SOAJMSSubDM targeted to SOAJMSServer_auto_1
and SOAJMSServer_auto_2
UMSJMSSystemResource    ---->UMSJMSSubDMSOA targeted to UMSJMSServer_auto_1
and UMSJMSServer_auto_2
```

2. If a mistake is made while running the script after extending a SOA domain to BAM (an incorrect option is used, a target is modified, or a module is deleted accidentally). In these situations you can use the `soa-createUDD.py` script to restore the appropriate JMS configuration by following these steps:

a. Delete the existing SOA and BAM JMS resources (JMS Modules owned by the soa-infrastructure system and the BAM server system).

b. Run the soa-createUDD.py again. The script assumes the JMS Servers created for SOA and BAM are preserved and creates the destinations and subdeployment modules required to use Uniform Distributed Destinations for SOA and BAM. In this case, the script should be executed with the option `--soacluster --bamcluster`. After running the script again, verified from the WebLogic Server Administration Console that the following artifacts exist (**Domain Structure**, **Services**, **Messaging**, **JMS Modules**):

```
SOAJMSModuleUDDs        ---->SOAJMSSubDM targeted to SOAJMSServer_auto_1
and SOAJMSServer_auto_2
UMSJMSModuleUDDsSOA  ---->UMSJMSSubDMSOA targeted to UMSJMSServer_auto_1
and UMSJMSServer_auto_2. (THIS IS THE DIFFERENT ONE)
BAMJMSModuleUDDs        ---->BAMJMSSubDM targeted to  BAMJMSServer_auto_1
and BAMJMSServer_auto_2
UMSJMSModuleUDDsBAM  ---->UMSJMSSubDMBAM targeted to UMSJMSServer_auto_3
and UMSJMSServer_auto_4.
```

## 10.7 Best Practices

This section covers the following topics:

- Section 10.7.1, "Preventing Timeouts for SQLNet Connections"
- Section 10.7.2, "Auditing"

### 10.7.1 Preventing Timeouts for SQLNet Connections

Much of the EDG production deployment involves firewalls. Because database connections are made across firewalls, Oracle recommends that the firewall be configured so that the database connection is not timed out. For Oracle Real Application Clusters (RAC), the database connections are made on Oracle RAC VIPs and the database listener port. You must configure the firewall to not time out such connections. If such a configuration is not possible, set the`*SQLNET.EXPIRE_TIME=n*` parameter in the `ORACLE_HOME/network/admin/sqlnet.ora` file on the database server, where `n` is the time in minutes. Set this value to less than the known

value of the timeout for the network device (that is, a firewall). For RAC, set this parameter in all of the Oracle home directories.

## 10.7.2 Auditing

Oracle Fusion Middleware Audit Framework is a new service in Oracle Fusion Middleware 11*g*, designed to provide a centralized audit framework for the middleware family of products. The framework provides audit service for platform components such as Oracle Platform Security Services (OPSS) and Oracle Web Services. It also provides a framework for JavaEE applications, starting with Oracle's own JavaEE components. JavaEE applications will be able to create application-specific audit events. For non-JavaEE Oracle components in the middleware such as C or JavaSE components, the audit framework also provides an end-to-end structure similar to that for JavaEE applications.

Figure 10–1 is a high-level architectural diagram of the Oracle Fusion Middleware Audit Framework.

***Figure 10–1 Audit Event Flow***

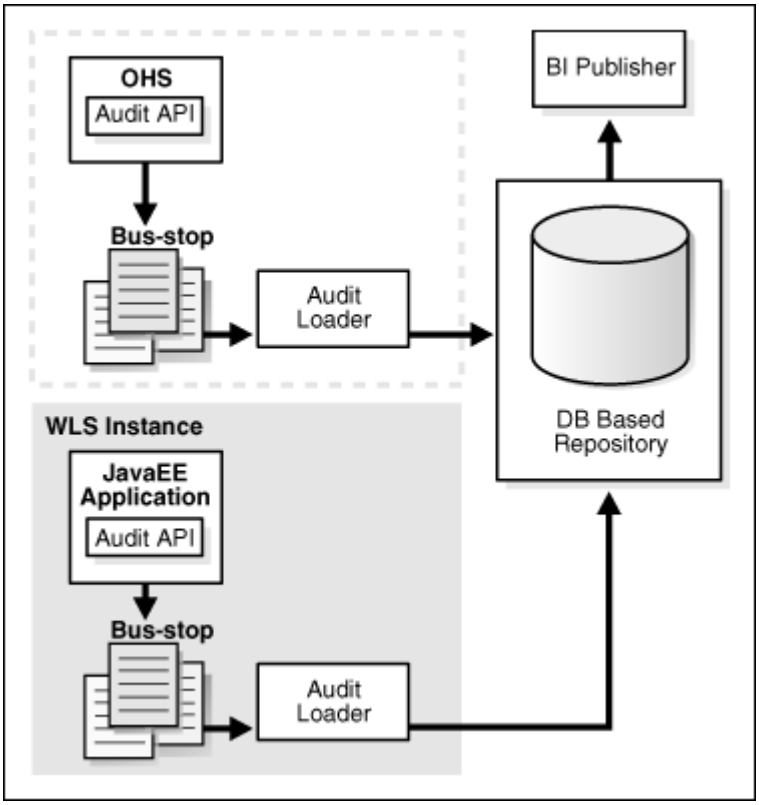



Diagram representation of the audit event flow, which is described in the text following this diagram.

**********

The Oracle Fusion Middleware Audit Framework consists of the following key components:

- **Audit APIs**

  These are APIs provided by the audit framework for any audit-aware components integrating with the Oracle Fusion Middleware Audit Framework. During

runtime, applications may call these APIs where appropriate to audit the necessary information about a particular event happening in the application code. The interface allows applications to specify event details such as username and other attributes needed to provide the context of the event being audited.

- **Audit Events and Configuration**

  The Oracle Fusion Middleware Audit Framework provides a set of generic events for convenient mapping to application audit events. Some of these include common events such as authentication. The framework also allows applications to define application-specific events.

  These event definitions and configurations are implemented as part of the audit service in Oracle Platform Security Services. Configurations can be updated through Enterprise Manager (UI) and WLST (command-line tool).

- **Audit Bus-stop**

  Bus-stops are local files containing audit data before they are pushed to the audit repository. In the event where no database repository is configured, these bus-stop files can be used as a file-based audit repository. The bus-stop files are simple text files that can be queried easily to look up specific audit events. When a DB-based repository is in place, the bus-stop acts as an intermediary between the component and the audit repository. The local files are periodically uploaded to the audit repository based on a configurable time interval.

- **Audit Loader**

  As the name implies, audit loader loads the files from the audit bus-stop into the audit repository. In the case of platform and JavaEE application audit, the audit loader is started as part of the JavaEE container start-up. In the case of system components, the audit loader is a periodically spawned process.

- **Audit Repository**

  Audit Repository contains a pre-defined Oracle Fusion Middleware Audit Framework schema, created by Repository Creation Utility (RCU). Once configured, all the audit loaders are aware of the repository and upload data to it periodically. The audit data in the audit repository is expected to be cumulative and will grow overtime. Ideally, this should not be an operational database used by any other applications - rather, it should be a standalone RDBMS used for audit purposes only. In a highly available configuration, Oracle recommends that you use an Oracle Real Application Clusters (RAC) database as the audit data store.

- **Oracle Business Intelligence Publisher**

  The data in the audit repository is exposed through pre-defined reports in Oracle Business Intelligence Publisher. The reports allow users to drill down the audit data based on various criteria. For example:

  - Username
  - Time Range
  - Application Type
  - Execution Context Identifier (ECID)

For more introductory information for the Oracle Fusion Middleware Audit Framework, see the "Introduction to Oracle Fusion Middleware Audit Framework" chapter in the *Oracle Fusion Middleware Security Guide*.

For information on how to configure the repository for Oracle Fusion Middleware Audit Framework, see the "Configuring and Managing Auditing" chapter in the *Oracle Fusion Middleware Security Guide*.

The EDG topology does not include Oracle Fusion Middleware Audit Framework configuration. The ability to generate audit data to the bus-stop files and the configuration of the audit loader will be available once the products are installed. The main consideration is the audit database repository where the audit data is stored. Because of the volume and the historical nature of the audit data, it is strongly recommended that customers use a separate database from the operational store or stores being used for other middleware components.

# 11 Miscellaneous

This chapter contains the following sections:

- Section 11.1, "Recovering Failed BPEL and Mediator Instances"
- Section 11.2, "Configuring Security in Web Services"
- Section 11.3, "Running the SOA Fusion Order Demo Application in an EDG Environment"
- Section 11.4, "Oracle Business Activity Monitoring (BAM) Configuration Properties"
- Section 11.5, "Using Shared Storage for Deployment Plans and SOA Infrastructure Applications Updates"

## 11.1 Recovering Failed BPEL and Mediator Instances

This section describes how to check and recover failed instances in BPEL, Mediator and other service engines.

> **Note:** For the steps that require you to run SQL statements, you connect to the database as the `soainfra` schema.

- To check for recoverable instances, run the following SQL statements in the database:

```
// Find recoverable activities
SQL> select * from work_item where state = 1 and execution_type != 1;

// Find recoverable invoke messages
SQL> select * from dlv_message where dlv_type = 1 and state = 0;

// Find recoverable callback messages
SQL> select * from dlv_message where dlv_type = 2 and (state = 0 or state = 1);
```

- To recover failed BPEL instances:

  In Enterprise Manager, select <*domain_name*>, then **Fusion Middleware**, then **SOA**, then **soa-infra (server_soa)**, then **Service Engine**, then **BPEL Engine**, and then **Recovery**.

- To recover failed Mediator composite:

  In Enterprise Manager, select **Mediator** composite, and then **Fault and Recoverable Instances**.

- To check for rejected messages:

  ```
  SQL> select * from rejected_message
  ```

- To check data in the instance tracking table, run the following SQL query:

  ```
  SQL> select ID, STATE from COMPOSITE_INSTANCE where CREATED_TIME > datetime
  ```

  where *datetime* specifies the date and time to narrow the query.

  The adapter enters data into the `COMPOSITE_INSTANCE` table before anywhere else.

  When the adapter publishes data to the Adapter BC, the BC inserts an entry into the `COMPOSITE_INSTANCE` table with STATE as `0`. After the message has been processed, the STATE becomes `1`. In case of errors, STATE >= `2`.

## 11.2 Configuring Security in Web Services

Configure `SCABindingProperties.xml` and `oracle-webservices.xml` to configure Web services against denial of service attack and recursive node attack.

### Configuring SCABindingProperties.xml

To prevent denial of service attacks and recursive node attacks, set the envelope size and nesting limits in `SCABBindingProperties.xml` as illustrated in Example 11–1.

***Example 11–1 Configuring Envelope Size and Nesting Limits in SCABBindingProperties.xml***

```
<bindingType type="ws">
        <serviceBinding>
                <bindingProperty>
                     <name>request-envelope-max-kilobytes</name>
                    <type>xs:integer</type>
                     <defaultValue>-1</defaultValue>
                </bindingProperty>
                <bindingProperty>
                  <name>request-envelope-nest-level</name>
                    <type>xs:integer</type>
                   <defaultValue>-1</defaultValue>
                </bindingProperty>
        </serviceBinding>
```

### Configuring oracle-webservices.xml

For standalone Web services, configure the envelope size and nesting limits in `oracle-webservices.xml`. For example:

```
<request-envelope-limits kilobytes="4" nest-level="6" />
```

**Note:** Setting the envelope and nesting limits to extremely high values, or setting no values at all, can lead to denial of service attacks.

## 11.3 Running the SOA Fusion Order Demo Application in an EDG Environment

To run the Fusion Order Demo Application (FOD) in an environment described in the Enterprise Deployment Guide, you must update the FOD's `createJMSResources.seed` file (located at `./bin/templates`) by replacing the *SOAJMSModule* with *SOAJMSModuleUDDS* as the system resource name before running the ANT task that creates the JMS artifacts required for the FulFillment Mediator demo application.

## 11.4 Oracle Business Activity Monitoring (BAM) Configuration Properties

To increase or decrease the number of times BAM retries the in-flight transactions after a RAC failover, change the `MaxDBNodeFailoverRetries` setting from its default of 5 times to another value. However, it is a best practice to maintain the default settings for `UseDBFailover` and `MaxDBNodeFailoverRetries`. To disable BAM's RAC failover retry support, set `UseDBFailover` to false. (The default value for this setting is true.) For information on using these settings, see "Oracle BAM Configuration Property Reference" in *Oracle Fusion Middleware Administrator's Guide for Oracle SOA Suite*.

## 11.5 Using Shared Storage for Deployment Plans and SOA Infrastructure Applications Updates

When redeploying a SOA infrastructure application or resource adapter within the SOA cluster, the deployment plan along with the application bits should be accessible to all servers in the cluster. SOA applications and resource adapters are installed using nostage deployment mode. Because the administration sever does not copy the archive files from their source location when the nostage deployment mode is selected, each server must be able to access the same deployment plan. Use `ORACLE_BASE/admin/<domain_name>/<cluster_name>/dp` as the location for the deployment plan and applications, which should be accessible from all nodes in the EDG topology (as per the recommendation in Section 2.3, "Shared Storage and Recommended Directory Structure").

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