Oracle® Fusion Middleware

2 Day Administration Guide

11*g* Release 1 (11.1.1)

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Oracle Fusion Middleware 2 Day Administration Guide, 11*g* Release 1 (11.1.1)

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Preface

This book is an administration quick-start guide that teaches you how to perform day-to-day administrative tasks for Oracle Fusion Middleware.

Audience

This book is intended for anyone who wants to perform day-to-day administrative tasks for Oracle Fusion Middleware. Prior knowledge or experience with Oracle Fusion Middleware or application servers is not required. The only requirement is a knowledge of computers.

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Related Documents

For more information, see the following documents in the Oracle Fusion Middleware 11*g* Release 1 (11.1.1) documentation set:

- *Oracle Fusion Middleware Administrator's Guide*
- *Oracle Fusion Middleware Concepts*
- *Oracle Fusion Middleware Security Guide*
- *Oracle Fusion Middleware Introduction to Oracle WebLogic Server*

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

Introduction to Oracle Fusion Middleware

Oracle Fusion Middleware is a comprehensive family of products ranging from application development tools and integration solutions to identity management, collaboration, and business intelligence reporting.

This chapter provides an introduction to Oracle Fusion Middleware and contains the following topics:

1.1 About This Book

This book is an administration quick start guide that teaches you how to perform day-to-day administrative tasks for Oracle Fusion Middleware. The goal of this book is to help you understand the concepts behind Oracle Fusion Middleware. It teaches you how to perform common administration tasks needed to keep the application server operational, including how to perform basic troubleshooting and performance monitoring activities.

The primary administrative interface used in this book is Oracle Enterprise Manager Fusion Middleware Control.

1.1.1 What This Book Is Not

This book is task oriented. The objective is to describe why and when administrative tasks need to be performed. Where appropriate, it describes the concepts necessary for understanding and completing the task at hand, assuming the reader has no prior knowledge of Oracle Fusion Middleware and the application server.

This book is not an exhaustive discussion of all Oracle Fusion Middleware concepts. For this type of information, refer to *Oracle Fusion Middleware Concepts*.

1.1.2 How to Use This Book with Related Material

This book is part of a comprehensive set of learning material for administering Oracle Fusion Middleware, including other documentation and Oracle University classes.

At the end of each chapter in this book, you will find pointers to additional information.

1.2 About Oracle Fusion Middleware

Oracle Fusion Middleware is a comprehensive family of products ranging from Java EE and development tools, to integration solutions, to identity management, collaboration, and business intelligence reporting. Oracle Fusion Middleware offers complete support for development, deployment, and management.

Oracle Fusion Middleware provides the following components:

- Oracle WebLogic Server, an enterprise-ready Java application server that supports the deployment of mission-critical applications in a robust, secure, highly available, and scalable environment. Oracle WebLogic Server is an ideal foundation for building applications based on Service Oriented Architecture (SOA).

  See Also: *Oracle Fusion Middleware Introduction to Oracle WebLogic Server*

- Oracle SOA Suite, a complete set of service infrastructure components for designing, deploying, and managing composite applications. Oracle SOA Suite enables services to be created, managed, and orchestrated into composite applications and business processes. Composites enable you to easily assemble multiple technology components into one SOA composite application.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle SOA Suite*

- Oracle WebCenter, an integrated set of components with which you can create social applications, enterprise portals, collaborative communities, and composite applications, built on a standards-based, service-oriented architecture. Oracle WebCenter combines dynamic user interface technologies with which to develop rich internet applications, the flexibility and power of an integrated, multi-channel portal framework, and a set of horizontal Enterprise 2.0 capabilities delivered as services that provide content, collaboration, presence and social networking capabilities. Based on these components, Oracle WebCenter also provides an out-of-the-box enterprise-ready customizable application, WebCenter Spaces, with a configurable work environment that enables individuals and groups to work and collaborate more effectively.

  See Also: *Oracle Fusion Middleware Developer's Guide for Oracle WebCenter*

- Oracle HTTP Server, which provides a Web listener for Java EE applications and the framework for hosting static and dynamic pages and applications over the Web. Based on the proven technology of the Apache HTTP Server, Oracle HTTP Server includes significant enhancements that facilitate load balancing, administration, and configuration.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle HTTP Server*

- Oracle Web Cache, a content-aware server accelerator, or reverse proxy, that improves the performance, scalability, and availability of Web sites that run on Oracle Fusion Middleware.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle Web Cache*

- Oracle Identity Management, which provides a shared infrastructure for all Oracle applications. It also provides services and interfaces that facilitate third-party enterprise application development. These interfaces are useful for application developers who need to incorporate identity management into their applications.

  See Also: *Oracle Fusion Middleware Integration Guide for Oracle Identity Management*

- Oracle Internet Directory, a general purpose directory service that enables fast retrieval and centralized management of information about dispersed users and network resources. It combines Lightweight Directory Access Protocol (LDAP) Version 3 with the high performance, scalability, robustness, and availability of an Oracle Database.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle Internet Directory*

- Oracle Virtual Directory, an LDAP version 3 enabled service that provides virtualized abstraction of one or more enterprise data sources into a single directory view. Oracle Virtual Directory provides the ability to integrate LDAP-aware applications into diverse directory environments while minimizing or eliminating the need to change either the infrastructure or the applications. It supports a diverse set of clients, such as Web applications and portals, and it can connect to directories, databases, and Web Services.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle Virtual Directory*

- Oracle Identity Federation, a self-contained federation solution that provides the infrastructure that enables identities and their relevant entitlements to be propagated across security domains—this applies to domains existing within an organization as well as between organizations.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle Identity Federation*

- Oracle Web Services Manager, which provides a way to centrally define and manage policies that govern Web services operations, including access control (authentication and authorization), reliable messaging, Message Transmission Optimization Mechanism (MTOM), WS-Addressing, and Web services management. Policies can be attached to multiple Web services, requiring no modification to the existing Web services.

  See Also: *Oracle Fusion Middleware Security and Administrator's Guide for Web Services*

- Oracle Platform Security Services (OPSS), which provides enterprise product development teams, systems integrators, and independent software vendors (ISVs) with a standards-based, portable, integrated, enterprise-grade security framework for Java Standard Edition (Java SE) and Java Enterprise Edition (Java EE) applications.

  OPSS provides an abstraction layer in the form of standards-based application programming interfaces (APIs) that insulate developers from security and identity management implementation details. With OPSS, developers do not need to know the details of cryptographic key management or interfaces with user repositories

and other identity management infrastructures. Using OPSS, in-house developed applications, third-party applications, and integrated applications benefit from the same uniform security, identity management, and audit services across the enterprise.

OPSS is available in both JavaEE and JavaSE environments. OPSS is standards-based and designed to be portable to third-party application servers.

See Also: *Oracle Fusion Middleware Security Guide*

- Oracle Portal, a Web-based tool for building and deploying e-business portals. It provides a secure, manageable environment for accessing and interacting with enterprise software services and information resources. A portal page makes data from multiple sources accessible from a single location.

  See Also: *Oracle Fusion Middleware Administrator's Guide for Oracle Portal*

- Oracle Business Intelligence, a complete, integrated solution that addresses business intelligence requirements. Oracle Business Intelligence includes Oracle Business Intelligence Reporting and Publishing, Oracle Business Intelligence Discoverer, and Oracle Business Intelligence Publisher.

  See Also: *Oracle Fusion Middleware Configuration Guide for Oracle Business Intelligence Discoverer*

1.3 Understanding Key Oracle Fusion Middleware Concepts

Oracle Fusion Middleware provides two types of components:

- A **Java component,** which is an Oracle Fusion Middleware component that is deployed as one or more Java EE applications and a set of resources. Java components are deployed to an Oracle WebLogic Server domain as part of a domain template. Examples of Java components are the Oracle SOA Suite and Oracle WebCenter components.
- A **system component**, which is a manageable process that is not deployed as a Java application. Instead, a system component is managed by the Oracle Process Manager and Notification (OPMN). System components include Oracle Internet Directory, Oracle HTTP Server, Oracle Web Cache, and Java Standard Edition (JSE) components, such as Oracle BI Enterprise Edition.

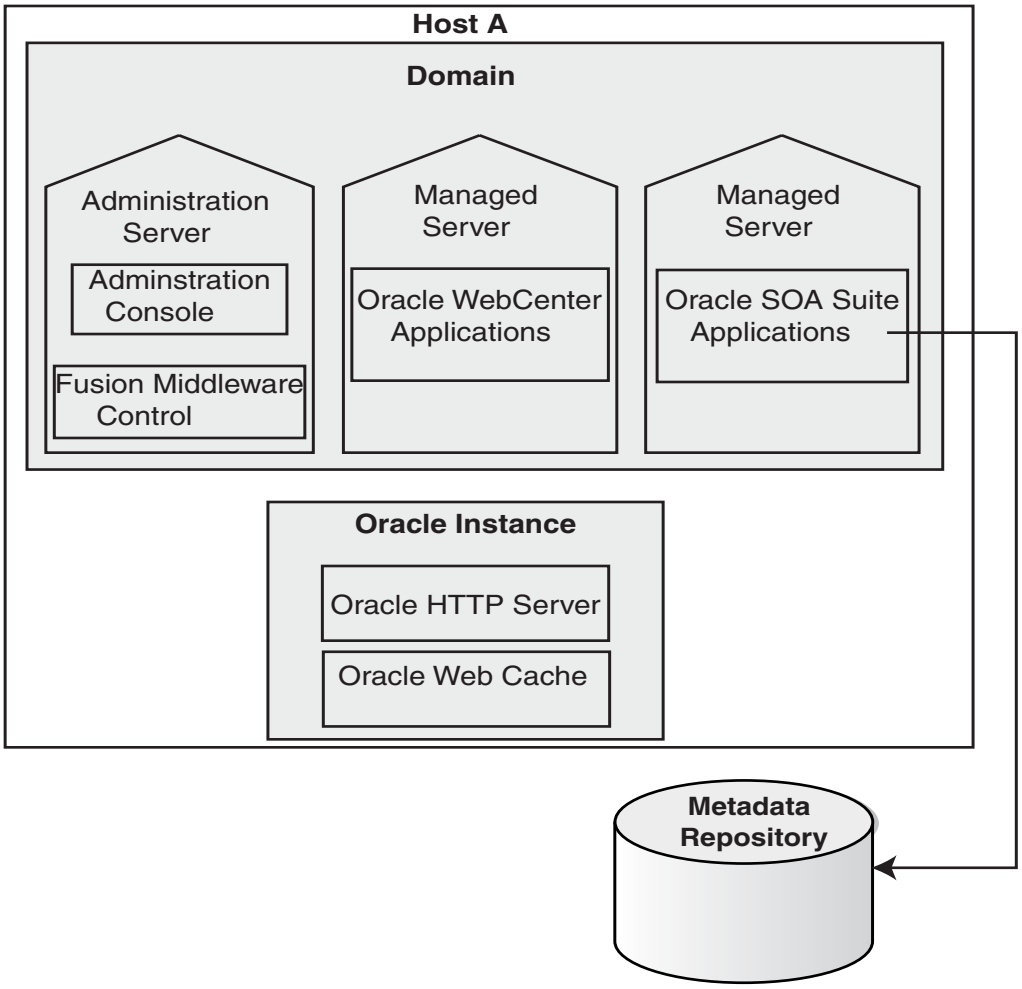
A Java component and a system component are peers.

After you install and configure Oracle Fusion Middleware, your Oracle Fusion Middleware environment contains the following:

- An Oracle WebLogic Server domain, which contains one Administration Server and one or more Managed Servers. The Administration Server contains the Oracle WebLogic Server Administration Console and Oracle Enterprise Manager Fusion Middleware Control. The Managed Servers contain components, such as Oracle WebCenter and Oracle SOA Suite. See Section 1.3.1 for more information about domains.
- If your environment includes system components, one or more Oracle instances. See Section 1.3.2 for more information about Oracle instances.
- A metadata repository, if the components you installed require one. For example, Oracle SOA Suite requires a metadata repository.

Figure 1–1 shows an Oracle Fusion Middleware environment with an Oracle WebLogic Server domain that contains an Administration Server and two Managed Servers, and an Oracle instance. The environment also includes and a metadata repository.

Figure 1–1 Oracle Fusion Middleware Environment



Your environment also includes a Middleware home, which consists of the Oracle WebLogic Server home, and, optionally, one or more Oracle homes. See Section 1.3.3 for more information about a Middleware home.

1.3.1 What Is an Oracle WebLogic Server Domain?

A WebLogic Server administration **domain** is a logically related group of Java components. A domain includes a special WebLogic Server instance called the **Administration Server,** which is the central point from which you configure and manage all resources in the domain. Usually, you configure a domain to include additional WebLogic Server instances called **Managed Servers.** You deploy Java components, such as Web applications, EJBs, and Web services, and other resources to the Managed Servers and use the Administration Server for configuration and management purposes only.

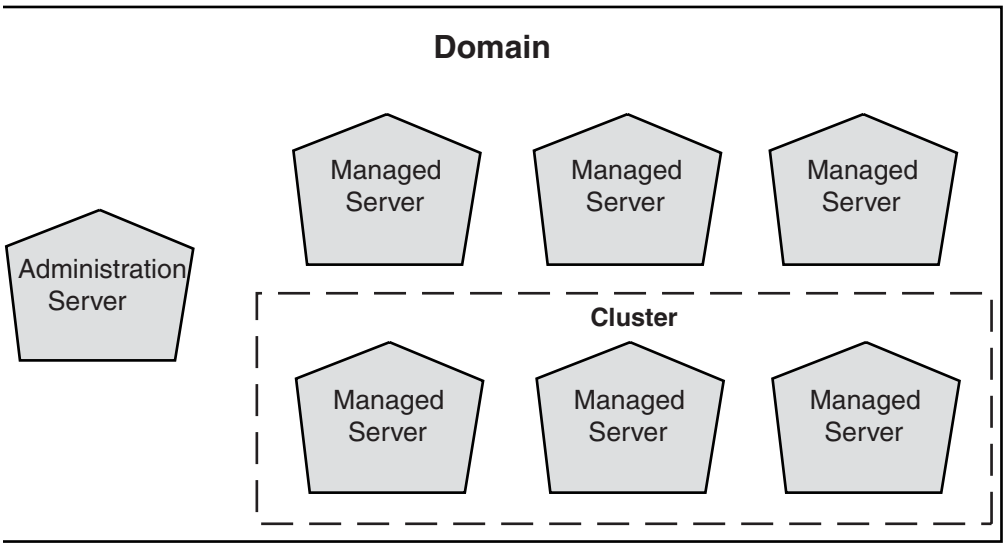
Managed Servers in a WebLogic Server domain can be grouped together into a cluster.

The directory structure of a WebLogic Server domain is separate from the directory structure of the WebLogic Server home. It can reside anywhere; it need not be within the Middleware home directory.

An Oracle WebLogic Server domain is a peer of an Oracle instance. Both contain specific configurations outside of their Oracle homes.

Figure 1–2 shows an Oracle WebLogic Server domain with an Administration Server, three standalone Managed Servers, and three Managed Servers in a cluster.

Figure 1–2 Oracle WebLogic Server Domain



See Also: *Oracle Fusion Middleware Understanding Domain Configuration for Oracle WebLogic Server* for more information about domain configuration

1.3.1.1 What Is the Administration Server?

The **Administration Server** operates as the central control entity for the configuration of the entire WebLogic Server domain. It maintains the domain's configuration documents and distributes changes in the configuration documents to Managed Servers. The Administration Server serves as a central location from which to monitor all resources in a domain.

Each Oracle WebLogic Server domain must have one server instance that acts as the Administration Server.

To interact with the Administration Server, you can use the Oracle WebLogic Server Administration Console, Oracle WebLogic Scripting Tool (WLST), or create your own JMX client. In addition, you can use Oracle Enterprise Manager Fusion Middleware Control for some tasks.

Fusion Middleware Control and the WebLogic Administration Console run in the Administration Server. Fusion Middleware Control is a Web-based administration console used to manage Oracle Fusion Middleware, including components such as Oracle HTTP Server, Oracle SOA Suite and Oracle WebCenter, Oracle Portal, and Oracle Identity Management components. Oracle WebLogic Server Administration Console is the Web-based administration console used to manage the resources in an Oracle WebLogic Server domain, including the Administration Server and Managed Servers.

See Also:

- Section 2.1.1 for more information about Fusion Middleware Control
- Section 2.1.2 for more information about Oracle WebLogic Server Administration Console

1.3.1.2 What Are Managed Servers and Managed Server Clusters?

Managed Servers host business applications, application components, Web services, and their associated resources. To optimize performance, Managed Servers maintain a read-only copy of the domain's configuration document. When a Managed Server starts, it connects to the domain's Administration Server to synchronize its configuration document with the document that the Administration Server maintains.

When you create a domain, you create it using a particular domain template. That template supports a particular component or group of components, such as Oracle SOA Suite. The Managed Servers in the domain are created specifically to host those particular Oracle Fusion Middleware components.

Java-based Oracle Fusion Middleware components (such as Oracle SOA Suite, Oracle WebCenter, and some Identity Management components), as well as customer-developed applications, are deployed to Managed Servers in the domain.

If you want to add other components, such as Oracle WebCenter, to a domain that was created using a template that supports another component, you can extend the domain by creating additional Managed Servers in the domain, using a domain template for the component which you want to add. See Section 9.2.

For production environments that require increased application performance, throughput, or high availability, you can configure two or more Managed Servers to operate as a cluster. A **cluster** is a collection of multiple WebLogic server instances running simultaneously and working together to provide increased scalability and reliability. In a cluster, most resources and services are deployed identically to each Managed Server (as opposed to a single Managed Server), enabling failover and load balancing. A single domain can contain multiple WebLogic Server clusters, as well as multiple Managed Servers that are not configured as clusters. The key difference between clustered and non-clustered Managed Servers is support for failover and load balancing. These features are available only in a cluster of Managed Servers.

See Also: *Oracle Fusion Middleware Using Clusters for Oracle WebLogic Server*

1.3.2 What Is an Oracle Instance?

An **Oracle instance** contains one or more system components, such as Oracle Web Cache, Oracle HTTP Server, or Oracle Internet Directory. The system components in an Oracle instance must reside on the same computer. An Oracle instance directory contains updatable files, such as configuration files, log files, and temporary files.

An Oracle instance is a peer of an Oracle WebLogic Server domain. Both contain specific configurations outside of their Oracle homes.

The directory structure of an Oracle instance is separate from the directory structure of the Oracle home. It can reside anywhere; it need not be within the Middleware home directory.

1.3.3 What Is a 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.

See Section 1.3.4 for information about WebLogic Server home. See Section 1.3.5 for information about Oracle home.

1.3.4 What Is a 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.

1.3.5 What Is an 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.

1.3.6 What Is the Oracle Metadata Repository?

The Oracle Metadata Repository contains metadata for Oracle Fusion Middleware components, such as Oracle BPEL Process Manager, Oracle B2B, and Oracle Portal. It can also contain metadata about the configuration of Oracle Fusion Middleware and metadata for your applications.

A metadata repository can be database-based or file-based. If it is database-based, it can be installed into an existing database using the Repository Creation Utility (RCU).

Oracle Fusion Middleware supports multiple repository types. A repository type represents a specific schema or set of schemas that belong to a specific Oracle Fusion Middleware component (for example, Oracle SOA Suite or Oracle Internet Directory.)

A particular type of repository, the Oracle Metadata Services (MDS) repository, contains metadata for most Oracle Fusion Middleware components, such as Oracle B2B, and for certain types of applications.

See:

- Section 3.2.1 for information about creating a metadata repository
- "Managing the Oracle Metadata Repository" in the *Oracle Fusion Middleware Administrator's Guide* for information about managing a metadata repository

1.4 Common Administration Tasks

As an administrator for Oracle Fusion Middleware, you can expect to be involved in the following tasks:

- Installing Oracle Fusion Middleware software
- Performing the initial configuration of the software

- Configuring a metadata repository
- Deploying applications
- Managing administrative accounts
- Monitoring the environment
- Backing up and recovering your Oracle Fusion Middleware environment

1.5 Tools for Administering Oracle Fusion Middleware

The following are some of the products, tools, and utilities that you can use in administering Oracle Fusion Middleware:

- **Oracle Enterprise Manager Fusion Middleware Control**

  Oracle Enterprise Manager Fusion Middleware Control, a web-based interface, is one of the primary tools for managing your Oracle Fusion Middleware environment. With it, you can check the status of the components, start and stop components, deploy Java EE applications, and perform other administrative tasks, such as creating clusters and managing log files. See Section 2.1.1.

- **Oracle WebLogic Server Administration Console**

  The Oracle WebLogic Server Administration Console is a Web browser-based, graphical user interface that you use to manage an Oracle WebLogic Server domain. See Section 2.1.2.

- **WebLogic Scripting Tool (WLST)**

  The WebLogic Scripting Tool (WLST) is a command-line scripting environment that you can use to create, manage, and monitor Oracle WebLogic Server domains. See Section 2.1.3.1.

- **Oracle Process Manager and Notification Server (OPMN)**

  Oracle Process Manager and Notification Server (OPMN) manages and monitors a particular type of Oracle Fusion Middleware components, referred to as system components. See Section 2.1.3.2.

- **Oracle Fusion Middleware Metadata Repository Creation Utility**

  The Repository Creation Utility (RCU) is a tool that you use to create a metadata repository in an existing database. You can use it to create a repository for overall configuration information and for configuration information for particular components. Not all Oracle Fusion Middleware components need a database-based metadata repository, but some, like the Oracle SOA Suite, do. See Section 3.2.1 for more information about RCU.

- **System MBean browser**

  An MBean is a Java object that represents a JMX manageable resource. Each manageable resource within the application server, such as an application or a resource adapter, is managed through an instance of the appropriate MBean. Each MBean exposes a management interface that is accessible through the System MBean Browser in Fusion Middleware Control. You can set MBean attributes, execute operations to call methods on an MBean, subscribe to notifications of errors or specific events, and display execution statistics.

  For more information, see the section "Using the Fusion Middleware Control MBean Browser" in the *Oracle Fusion Middleware Administrator's Guide*.

2

Getting Started with Management Tools

When you install Oracle Fusion Middleware, you install the binary files, such as executable files, jar files, and libraries. Then, you use configuration tools to configure the software. This chapter provides information you need to get started managing Oracle Fusion Middleware, including information about the tools you use.

It includes the following topics:

- Getting Started with Oracle Fusion Middleware Management Tools
- Managing Oracle Fusion Middleware: A Roadmap
- Learn More

2.1 Getting Started with Oracle Fusion Middleware Management Tools

After you install and configure Oracle Fusion Middleware, you can use the graphical user interfaces or command-line tools to manage your environment.

Oracle offers the following primary tools for managing your Oracle Fusion Middleware installations:

- Oracle Enterprise Manager Fusion Middleware Control. See Section 2.1.1.
- Oracle WebLogic Server Administration Console. See Section 2.1.2
- The Oracle Fusion Middleware command-line tools. See Section 2.1.3.

In addition, you can use the Fusion Middleware Control MBean Browser, which is described in the section "Using the Fusion Middleware Control MBean Browser" in the *Oracle Fusion Middleware Administrator's Guide*.

Note that you should use these tools, rather than editing configuration files, to perform all administrative tasks unless a specific procedure requires you to edit a file. Editing a file may cause the settings to be inconsistent and generate problems.

Both Fusion Middleware Control and Oracle WebLogic Server Administration Console are graphical user interfaces that you can use to monitor and administer your Oracle Fusion Middleware environment. You can perform some tasks with either tool, but, for other tasks, you can only use one of the tools. Table 2–1 lists some common tasks with the recommended tool.

Table 2–1 Comparison of Fusion Middleware Control and WebLogic Server Administration Console

Task	Tool to Use
Manage Oracle WebLogic Server	**Use:**

Table 2–1 (Cont.) Comparison of Fusion Middleware Control and WebLogic Server Administration Console

Task	Tool to Use
Create additional Managed Servers	WebLogic Server Administration Console
Clone Managed Servers	WebLogic Server Administration Console
Cluster Managed Servers	WebLogic Server Administration Console
Start and stop Oracle WebLogic Server	Fusion Middleware Control or WebLogic Server Administration Console
Add users and groups	WebLogic Server Administration Console if using the default embedded LDAP or use the LDAP server's tool when using another LDAP server
Manage Data Sources	**Use:**
Create data sources	WebLogic Server Administration Console
Create connection pools	WebLogic Server Administration Console
Manage JMS Resources	**Use:**
Create JMS queues	WebLogic Server Administration Console
Advanced queuing	WebLogic Server Administration Console
Manage SOA environment	**Use:**
Deploy SOA Composite applications	Fusion Middleware Control
Monitor SOA Composite applications	Fusion Middleware Control
Modify Oracle BPEL Process Manager MBean properties	Fusion Middleware Control
Debug applications such as Oracle BPEL Process Manager applications	Fusion Middleware Control
ADF Applications	**Use:**
Deploy ADF applications	Fusion Middleware Control
Java EE applications	**Use:**
Deploy Java EE applications	WebLogic Server Administration Console
Security	**Use:**
Configure and manage auditing	Fusion Middleware Control
Configure SSL	WebLogic Server Administration Console for Oracle WebLogic Server Fusion Middleware Control for Java components and system components. See "SSL Configuration in Oracle Fusion Middleware" in the *Oracle Fusion Middleware Administrator's Guide*.
Change passwords	WebLogic Server Administration Console
Manage Components	**Use:**
View and manage log files	Fusion Middleware Control for most log files WebLogic Server Administration Console for some Oracle WebLogic Server logs

Table 2–1 (Cont.) Comparison of Fusion Middleware Control and WebLogic Server Administration Console

Task	Tool to Use
Change ports	WebLogic Server Administration Console for Oracle WebLogic Server and Java components For some system components, Fusion Middleware Control. See the Administration Guide for the component.
Manage Oracle HTTP Server	Fusion Middleware Control
Manage Oracle Web Cache	Fusion Middleware Control
Start and stop components	Fusion Middleware Control
Start and stop applications	Fusion Middleware Control

2.1.1 Getting Started with Oracle Enterprise Manager Fusion Middleware Control

Oracle Enterprise Manager Fusion Middleware Control is a web-based interface from which you can monitor and administer a farm.

A **farm** is a collection of components managed by Fusion Middleware Control. It can contain Oracle WebLogic Server domains, one Administration Server, one or more Managed Servers, clusters, and the Oracle Fusion Middleware components that are installed, configured, and running in the domain.

Fusion Middleware Control organizes a wide variety of performance data and administrative functions into distinct, Web-based home pages for the farm, domain, servers, components, and applications. The Fusion Middleware Control home pages make it easy to locate the most important monitoring data and the most commonly used administrative functions—all from your Web browser.

2.1.1.1 Displaying Fusion Middleware Control

To display Fusion Middleware Control, you enter the during the installation. The following shows the format of the URL:

`http://`*`hostname.domain`*`:`*`port`*`/em`

For some installation types, such as the Web Tier, if you saved the installation information by clicking Save on the last installation screen, the URL for Fusion Middleware Control is included in the file that is written to disk (by default to your home directory).

For other installation types, such as Oracle SOA Suite, the information is displayed on the Create Domain screen of the Configuration Wizard when the configuration completes.

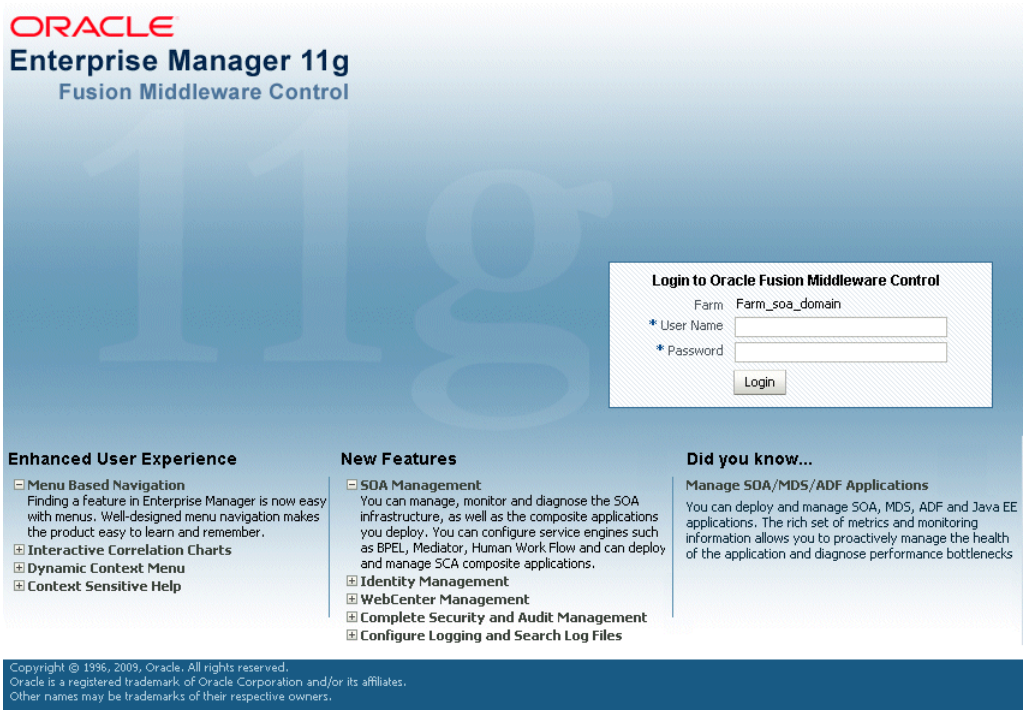
The port number is the number of the Administration Server. By default, the port number is 7001.

To display Fusion Middleware Control:

1. Display Fusion Middleware Control by entering the following URL in your Web browser. For example:

   ```
   http://host1.example.com:7001/em
   ```

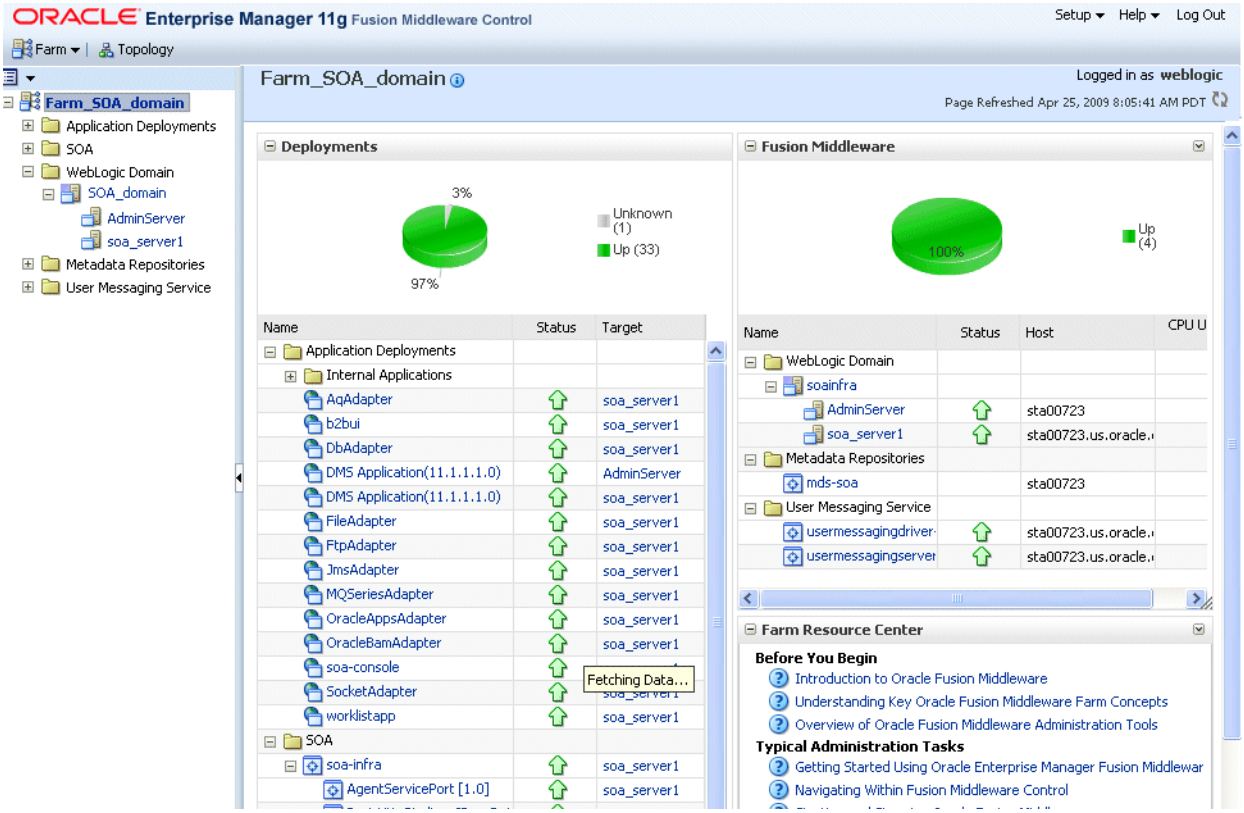
   The following shows the login page:



2. Enter the Oracle Fusion Middleware administrator user name and password and click **Login.**

   The default user name for the administrator user is `weblogic`. This is the account you can use to log in to Fusion Middleware Control for the first time. The password is the one you supplied during the installation of Oracle Fusion Middleware.

3. The Farm page is displayed, as shown in the following figure:



The Farm menu is displayed at the top of the page. From the Farm menu, you can:

- Create clusters
- View log messages
- Specify monitoring credentials

The Farm menu is always displayed, even if you have selected other targets.

You can view the Topology by selecting **Topology**. The Topology Viewer provides you with a high-level view of the topology, including WebLogic Managed Servers, deployed applications, and the routing configuration. For more information, see Section 5.4.

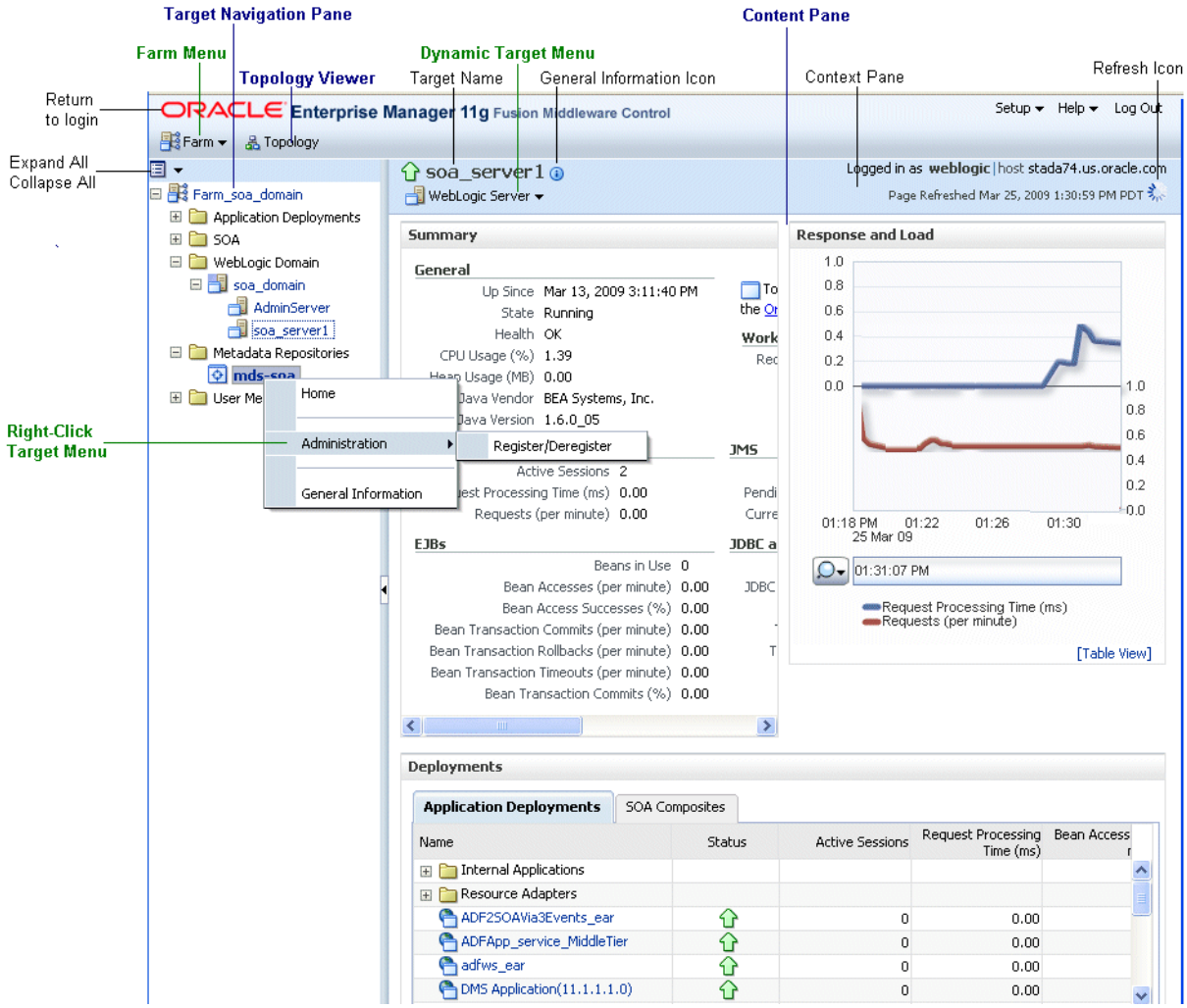
2.1.1.2 Navigating Within Fusion Middleware Control

Fusion Middleware Control displays the target navigation pane on the left and the content pane to the right. For example, when you first log in to Fusion Middleware Control, the farm home page is displayed on the right.

From the target navigation pane, you can expand the tree and select an Oracle WebLogic Server domain, an Oracle WebLogic Server Managed Server, a component, an application, or a Metadata Repository.

When you select a target, such as a Managed Server or a component, the target's home page is displayed in the content pane and that target's menu is displayed at the top of the page, in the context pane. For example, if you select a Managed Server, the WebLogic Server menu is displayed. You can also view the menu for a target by right-clicking the target in the navigation pane.

The following figure shows the target navigation pane and the home page of a Managed Server. Because a Managed Server was selected, the dynamic target menu listed in the context pane is the WebLogic Server menu.



In the preceding figure, the following items are called out:

- **Target Navigation Pane** lists all of the targets in the farm in a navigation tree.
- **Content Pane** shows the current page for the target. When you first select a target, that target's home page is displayed.
- **Farm Menu** provides a list of operations that you can perform on the farm. The Farm menu is always available.
- **Dynamic Target Menu** provides a list of operations that you can perform on the currently selected target. The menu that is displayed depends on the target you select. The menu for a specific target contains the same operations as those in the **Right-Click Target Menu.**
- **Right-Click Target Menu** provides a list of operations that you can perform on the currently selected target. The menu is displayed when you right-click the target name in the target navigation pane. In the figure, even though the WebLogic Server is selected and its home page is displayed, the right-click target menu displays the operations for a metadata repository because the user has right-clicked the metadata repository.

The menu for a specific target contains the same operations as those in the **Dynamic Target Menu.**

- **Topology Viewer** displays the topology of the farm.
- **Target Name** is the name of the currently selected target.
- **General Information Icon** provides information about the target. For example, for a domain, it displays the target name, the version, and the domain home.
- **Context Pane** provides the name of the target, the name of the current user, the host name, and the time of the last page refresh, as well as the Refresh icon.
- **Expand All/Collapse All** lets you expand or collapse the navigation tree.
- **Refresh** indicates when the page is being refreshed. Click it to refresh a page with new data. (Refreshing the browser window refreshes the page but does not retrieve new data.)
- **Return to login** takes you to the login page when you click the Oracle Enterprise Manager logo.

In addition, from Fusion Middleware Control, from the home pages of targets such as the Administration Server or Managed Servers, you can access the WebLogic Server Administration Console.

Table 2–2 describes some common ways you can navigate within Fusion Middleware Control.

Table 2–2 Navigating Within Fusion Middleware Control

To:	Take This Action:
View all of the targets in the farm	Click the **Expand All** icon at the top of the **target navigation pane**.
Navigate to the farm	Select the farm from the **target navigation pane**. The farm's home page is displayed in the content pane.
Operate on the farm	Select the **Farm menu**, which is always available at the top left of Fusion Middleware Control.
Operate on a target	Right-click the target in the **target navigation pane**. The **target menu** is displayed. Alternatively, you can select the target and use the **dynamic target menu** in the context pane.
Return to the target's home page	Click the **target name** at the top left-hand corner of the **context pane**.
Refresh a page with new data	Click the **Refresh** icon in the top right of the **context pane**.
Return to a previous page	Click the breadcrumbs, which appear below the context pane. The breadcrumbs appear when you drill down in a target. For example, choose Logs from the WebLogic Server menu, then View Log Messages. Select a log file and click View Log File. The breadcrumbs will show: Log Messages > Log Files > View Log File: *logfile_name*
View the host on which the target is running	Select the target in the **target navigation pane** and view the host name in the target's **context pane**. You can also view the host name by clicking the General Information icon.
Return to the login page	Click the **Oracle Enterprise Manager logo** at the top left of the page.
View the topology	Click **Topology.**

Table 2–2 (Cont.) Navigating Within Fusion Middleware Control

To:	Take This Action:
View a server log file	Right-click the server name in the **target navigation pane.** Choose **Logs,** and then **View Log Messages** to see a summary of log messages and to search log files.

2.1.1.3 Using Fusion Middleware Control Help

At any time while using the Fusion Middleware Control Console, you can click **Help** at the top of the page to get more information. In most cases, the Help window displays a help topic about the current page. Click **Contents** in the Help window to browse the list of help topics, or click **Search** to search for a particular word or phrase.

2.1.2 Getting Started Using Oracle WebLogic Server Administration Console

Oracle WebLogic Server Administration Console is a Web browser-based, graphical user interface that you use to manage a WebLogic Server domain. It is accessible from any supported Web browser with network access to the Administration Server.

Use the Administration Console to:

- Configure, start, and stop Oracle WebLogic Server Managed Servers
- Configure Oracle WebLogic Server clusters
- Configure Oracle WebLogic Server services, such as database connectivity (JDBC) and messaging (JMS)
- Configure security parameters, including managing users, groups, and roles
- Configure and deploy Java EE applications
- Monitor server and application performance
- View server and domain log files
- View application deployment descriptors
- Edit selected run-time application deployment descriptor elements

2.1.2.1 Displaying the Administration Console

To display the Administration Console:

1. Enter the following URL in a browser:

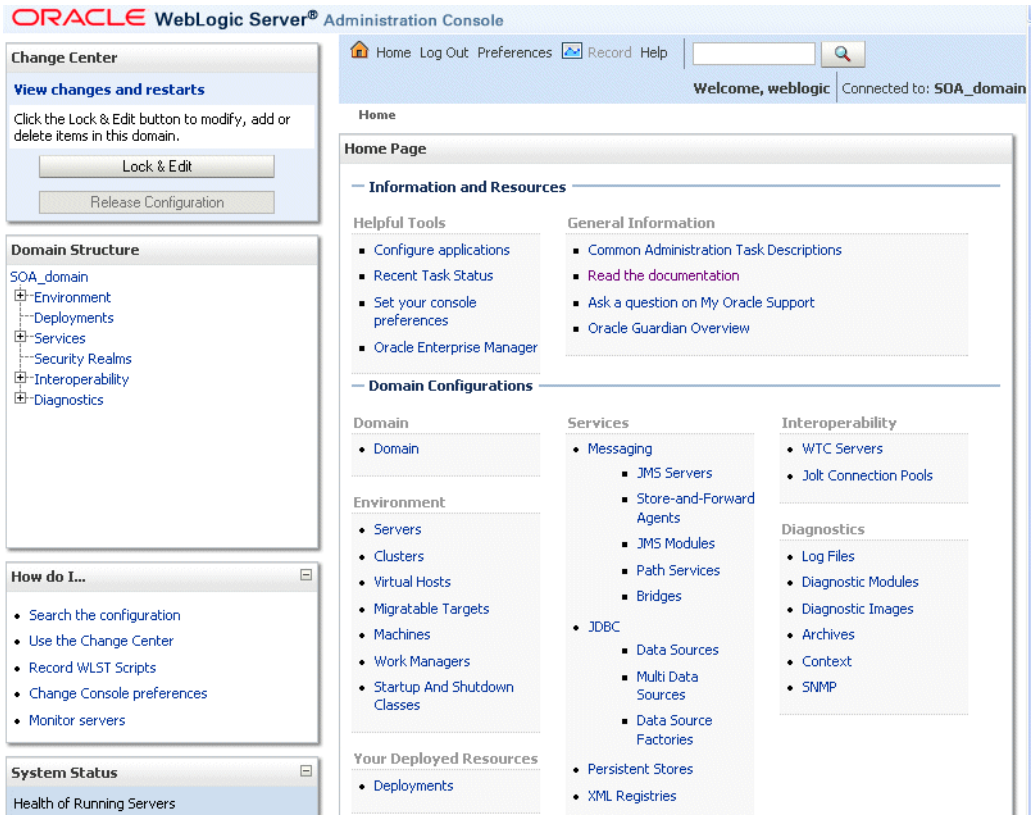
   `http://hostname:port_number/console`

   The port number is the number of the Administration Server. By default, the port number is 7001.

   The login page is displayed.

2. Log in using the user name and password supplied during installation.

   Oracle WebLogic Server Administration Console is displayed:



Alternatively, you can access the Administration Console from Fusion Middleware Control, from the home pages of targets such as the Administration Server and Managed Server.

2.1.2.2 Locking the WebLogic Server Configuration

Before you make configuration changes, lock the domain configuration, so you can make changes to the configuration while preventing other accounts from making changes during your edit session.

To lock the domain configuration:

1. Locate the Change Center in the upper left of the Administration Console screen.
2. Click **Lock & Edit** to lock the configuration edit hierarchy for the domain.

As you make configuration changes using the Administration Console, you click **Save** (or in some cases Finish) on the appropriate pages. This does not cause the changes to take effect immediately. The changes take effect when you click **Activate Changes** in the Change Center. At that point, the configuration changes are distributed to each of the servers in the domain. If the changes are acceptable to each of the servers, then they take effect. If any server cannot accept a change, then all of the changes are rolled back from all of the servers in the domain. The changes are left in a pending state; you can then either edit the pending changes to resolve the problem or revert the pending changes.

> **See Also:** "Using the Change Center" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server*

2.1.3 Getting Started with the Oracle Fusion Middleware Command-Line Tools

The following topics describe the Oracle Fusion Middleware command-line tools you can use to manage most Oracle Fusion Middleware components:

- Getting Started Using the WebLogic Scripting Tool (WLST)
- Getting Started Using Oracle Process Manager and Notification Server

2.1.3.1 Getting Started Using the WebLogic Scripting Tool (WLST)

The WebLogic Scripting Tool (WLST) is a command-line scripting environment that you can use to create, manage, and monitor Oracle WebLogic Server domains. It is based on the Java scripting interpreter, Jython. In addition to supporting standard Jython features such as local variables, conditional variables, and flow control statements, WLST provides a set of scripting functions (commands) that are specific to Oracle WebLogic Server. You can extend the WebLogic scripting language to suit your needs by following the Jython language syntax.

You can use any of the following techniques to invoke WLST commands:

- Interactively, on the command line
- In script mode, supplied in a file
- Embedded in Java code

For example, to invoke WLST interactively, and connect to the Oracle WebLogic Server, use the following commands:

```
java weblogic.WLST
connect('weblogic', 'weblogic', 'localhost:7001')
```

To display information about WLST commands and variables, enter the help command. For example, to display a list of categories for online commands, enter the following:

```
wls:/base_domain/serverConfig>  help('online')
    help('activate')            Activate the changes.
    help('addListener')         Add a JMX listener to the specified MBean.
    help('adminHome')           Administration MBeanHome.
    help('cancelEdit')          Cancel an edit session.
    help('cd')                  Navigate the hierarchy of beans.
    help('cmo')                 Current Management Object.
 .
 .
 .
```

To monitor the status, you use the WLST `state` command, using the following format:

```
state(name, type)
```

For example to get the status of the Managed Server soa_server1, use the following command:

```
wls:/SOA_domain/serverConfig> state('soa_server1', 'Server')
Current state of 'soa_server1' : RUNNING
```

> **See Also:** *Oracle Fusion Middleware WebLogic Scripting Tool Command Reference*

2.1.3.1.1 Using Custom WLST Commands Many components, such as Oracle SOA Suite, Oracle Platform Security Services (OPSS), Oracle Fusion Middleware Audit

Framework, and Oracle Metadata Service (MDS), and services such as SSL and logging, supply custom WLST commands.

To use those custom commands, you must invoke the WLST script from the Oracle home in which the component has been installed. Do not use the WLST script in the WebLogic Server home.

The script is located at:

```
(UNIX) ORACLE_HOME_for_component/common/bin/wlst.sh
(Windows) ORACLE_HOME_for_component\common\bin\wlst.cmd
```

For example, to run the custom WLST commands for Oracle SOA Suite on a Linux system, use the following commands:

```
cd ORACLE_HOME_for_SOA/common/bin
./wlst.sh
```

2.1.3.1.2 Using WLST Commands for System Components

In addition to the commands provided by WLST for Oracle WebLogic Server, WLST provides a subset of commands to manage system components. These commands are:

- startproc(*componentName* [, *componentType*] [, *componentSet*): Starts the specified component
- stopproc(*componentName* [, *componentType*] [, *componentSet*): Stops the specified component
- status(*componentName* [, *componentType*] [, *componentSet*): Obtains the status of the specified component
- proclist(): Obtain the list of components

To use these custom commands, you must invoke the WLST script from the Oracle home in which the component has been installed. Do not use the WLST script in the WebLogic Server home. The script is located at:

```
(UNIX) ORACLE_HOME_for_component/common/bin/wlst.sh
(Windows) ORACLE_HOME_for_component\common\bin\wlst.cmd
```

2.1.3.2 Getting Started Using Oracle Process Manager and Notification Server

Oracle Process Manager and Notification Server (OPMN) manages and monitors the following Oracle Fusion Middleware components, referred to as system components:

- Oracle HTTP Server
- Oracle Web Cache
- Oracle Internet Directory
- Oracle Virtual Directory
- Oracle Forms Services
- Oracle Reports
- Oracle Business Intelligence Discoverer
- Oracle Business Intelligence

OPMN provides the `opmnctl` command. The executable file is located in the following directory, which you should add to your PATH environment variable:

```
(UNIX) ORACLE_INSTANCE/bin
(Windows)ORACLE_INSTANCE\bin
```

To view the status of all system components in an Oracle instance, use the following command:

```
opmnctl status
Processes in Instance: webtier_inst
---------------------------------+--------------------+---------+---------
ias-component                    | process-type       |     pid | status
---------------------------------+--------------------+---------+---------
webcache1                        | WebCache-admin     |   19556 | Alive
webcache1                        | WebCache           |   19555 | Alive
ohs1                             | OHS                |    7249 | Alive
```

You can use OPMN to start and stop system components, monitor system components, and perform many other tasks related to process management. For example, you can use the following commands to start and stop OPMN and all OPMN-managed processes, such as Oracle HTTP Server:

```
opmnctl startall
opmnctl stopall
```

> **See Also:** *Oracle Fusion Middleware Oracle Process Manager and Notification Server Administrator's Guide*

2.2 Managing Oracle Fusion Middleware: A Roadmap

The following are the tasks that you must perform to manage your Oracle Fusion Middleware environment:

1. In an existing database, create a metadata repository. See Section 3.2.1.
2. Install and configure the software, which creates a domain, an Administration Server, one or more Managed Server, and, for system components, an Oracle instance. See Section 3.2.3.
3. Deploy Java EE applications and middleware components. See Chapter 4.
4. Monitor your Oracle Fusion Middleware environment. See Section 5.1.
5. Secure your environment by setting up additional users and configuring SSL. See Chapter 6.
6. View and search log files and configure logging. See Chapter 7.
7. Back up your environment on a regular basis. See Chapter 8.
8. Expand your environment. See Chapter 9.

2.3 Learn More

For more information on topics described in this chapter, see:

- *Oracle Fusion Middleware Administrator's Guide* for more information on using Fusion Middleware Control and the command-line tools to perform administrative tasks
- *Oracle Fusion Middleware WebLogic Scripting Tool Command Reference* and *Oracle Fusion Middleware Oracle Process Manager and Notification Server Administrator's Guide* for syntax and more information on using the command-line tools

3

Installing and Configuring Oracle Fusion Middleware

This chapter provides an overview about how to install and configure Oracle Fusion Middleware and how to start and stop Oracle Fusion Middleware processes.

This chapter contains the following topics:

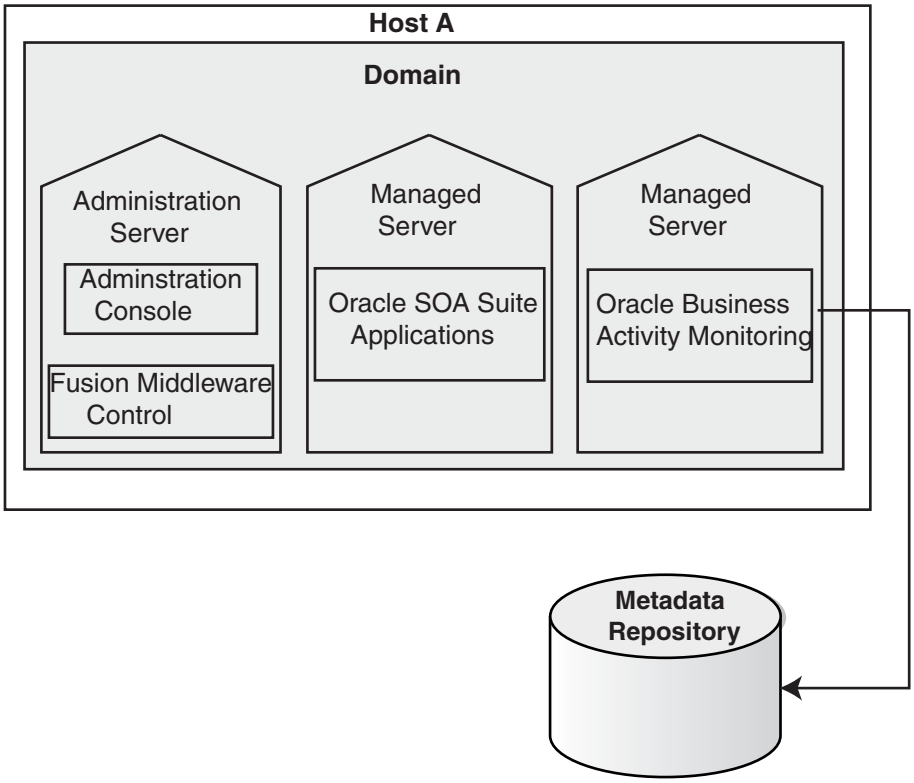
3.1 Overview of the Procedures in This Chapter

This chapter describes how to use the installation and configuration tools to create the following:

- Using the Oracle Fusion Middleware Metadata Repository Creation Utility, you create the necessary schemas in an existing database.
- Using Oracle WebLogic Server Installer, you create a Middleware home, which contains an Oracle WebLogic Server home.
- Using the installer, you create an Oracle home containing the binaries for Oracle SOA Suite.
- Using Oracle WebLogic Server Configuration Wizard, you create and configure:
  - An Oracle WebLogic Server domain
  - An Oracle WebLogic Server Administration Server
  - An Oracle WebLogic Server Managed Server in which Oracle SOA Suite is deployed
  - An Oracle WebLogic Server Managed Server in which Oracle Business Activity Monitoring is deployed

Figure 3–1 shows the domain with the Administration Server and Managed Servers.

Figure 3–1 Oracle WebLogic Server Domain with Administration Server and Managed Servers



3.2 Installing and Configuring Oracle Fusion Middleware

The following are the general steps you need to take to install and configure Oracle Fusion Middleware:

1. Many components, such as Oracle SOA Suite, require a database-based metadata repository. If you are installing these components, you must have an existing database. Then, you use RCU to create a repository in the database. Section 3.2.1 provides information about using RCU.

   For some installation types and components, you can use a file-based repository to store product metadata. The file-based repository is created during installation.

2. Install Oracle WebLogic Server. See Section 3.2.2.

3. Install other Oracle Fusion Middleware products. See Section 3.2.3.

4. Configure Oracle WebLogic Server and other Oracle Fusion Middleware products. See Section 3.2.4.

3.2.1 Creating the Oracle Metadata Repository

Most components require a database-based repository. In those cases, you must use the Oracle Fusion Middleware Metadata Repository Creation Utility (RCU) to create the Oracle Metadata Repository in an existing database. You use RCU to create schemas to hold configuration information for particular components, and optionally, for overall configuration information.

In addition, you can use RCU to create a particular type of repository, the MDS Repository, which contains metadata for certain types of deployed applications. Those

applications include custom Java applications developed by your organization and some Oracle Fusion Middleware Java components, such as Oracle B2B.

The following components do not require a database-based repository. They can store their configuration information in a file-based repository:

- Oracle HTTP Server
- Oracle Web Cache
- Oracle Web Services Manager

See:

- The appendix "Metadata Repository Schemas" in the *Oracle Fusion Middleware Administrator's Guide* for a list of schemas created for each component.
- *Oracle Fusion Middleware Repository Creation Utility User's Guide* for information about using RCU
- For information about which versions of Oracle databases are supported, and other prerequisites, see:

  `http://www.oracle.com/technology/software/products/ias/files/fusion_certification.html`

The procedure in this section assumes that you have an existing Oracle Database and that you have installed RCU.

Note: Oracle recommends that all metadata repositories reside on a database at the same site as the components to minimize network latency issues.

To create a metadata repository:

1. Invoke RCU, using the following command:

   ```
   (UNIX) RCU_HOME/bin/rcu
   (Windows) RCU_hOME\bin\rcu.bat
   ```

2. On the Welcome page, click **Next.**

   The Create Repository page appears.

3. To create the repository, which loads the component schemas into the database, select **Create**, then click **Next.**

   The Database Connection Details page appears.

4. Provide the following information about the database into which you want to load the component schemas:

   - **Database Type:** Select the type of database. This example assumes that you are using an Oracle Database.
   - **Host Name:** Enter the host name for the computer where the database is installed, for example: `myhost.example.com`.
   - **Port:** Enter the port number, for example: `1521`.
   - **Database Name:** Enter the Service Identifier (SID) for the database.

- **Username:** Enter a user name for the database which is assigned the SYSDBA role, for example: `SYS`.
- **Password:** Enter the password for the user.
- **Role:** Select **SYSDBA.**

5. Click **Next.**

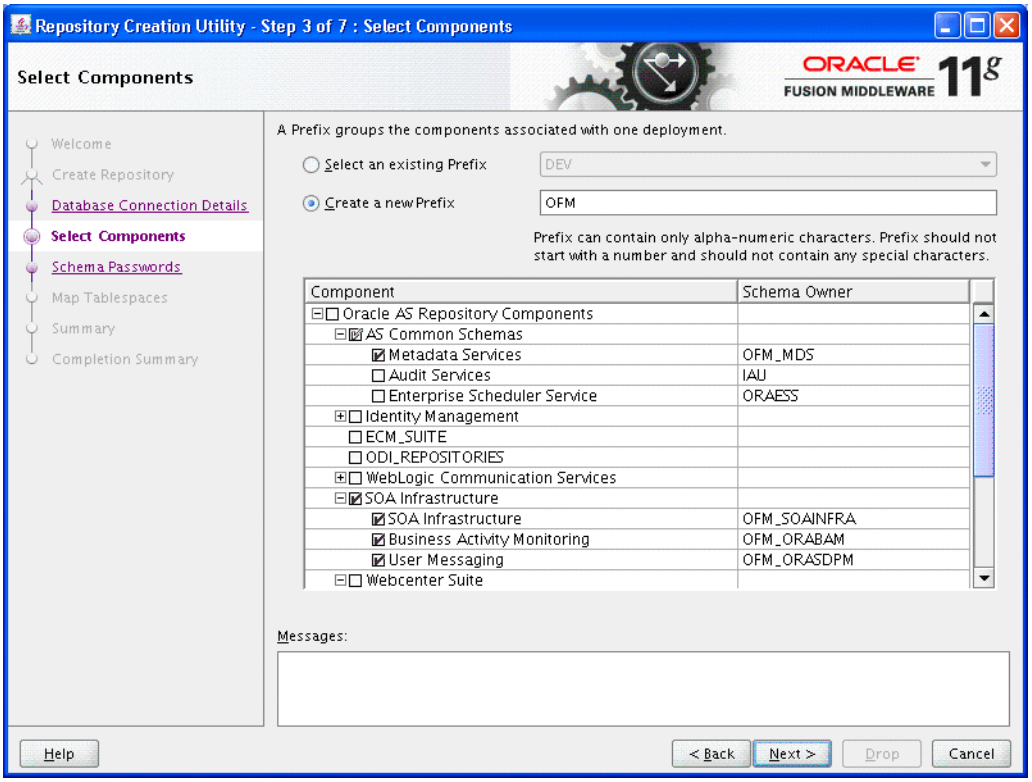
   The Checking Prerequisites dialog box is displayed.

6. When the operation completes, click **OK.**

   The Select Components page appears.

7. Provide the following information:

   - Select **Create a New Prefix,** and enter characters to be added to the beginning of the schema names. For example, if you enter OFM, the Oracle Business Activity Monitoring schemas are named OFM_ORABAM.
   - In the component table, select the components. For example, if you want to install Oracle SOA Suite components, select SOA Infrastructure, as shown in the following figure:



8. Click **Next.**

9. The Checking Prerequisites dialog box is displayed. When the operation completes, click **OK.**

   The Schema Passwords page appears.

10. You can use the same password for all schemas, or enter passwords for each schema. If you enter passwords for each schema, you can specify that auxiliary schemas use the same password as the main schema. In this case, select **Use same passwords for all schemas.** Then, enter the password and re-enter it to confirm.

11. Click **Next.**

    The Map Tablespaces page appear.

12. This page displays the default tablespaces for each schema. You can manage the tablespaces, configuring the size, storage type, and data files for the tablespaces. In addition, depending on the components you selected, you may be able to specify additional tablespaces for the components.

    For this example, assume the default tablespace is adequate. Click **Next**.

13. A dialog box is displayed that says that any tablespaces that do not already exist are created. Click **OK.**

14. A progress box is displayed. When the operation completes, click **OK.**

    The Summary page appears.

15. Review the information and click **Create.**

    A progress dialog box is displayed.

16. When it completes, note the details in the Completion Summary, and click **Close.**

Now, you have created a database-based metadata repository and have populated it with the required schemas.

> **See Also:** *Oracle Fusion Middleware Repository Creation Utility User's Guide*

3.2.2 Installing Oracle WebLogic Server

You use the Oracle WebLogic Server installation program to install Oracle WebLogic Server. For the scenarios in this book, accept the default values in the installer, creating a new Middleware home.

When the installation completes, you have a Middleware home and a WebLogic Server home. By default, the Middleware home is:

```
(UNIX) user_home/Oracle/Middleware
(Windows) user_home\Oracle\Middleware
```

> **See Also:** *Oracle Fusion Middleware Installation Guide for Oracle WebLogic Server* for more information.

3.2.3 Installing Additional Oracle Fusion Middleware Components

You use the installer to install, and, in some cases, to optionally configure Oracle Fusion Middleware.

For the procedures in this book, use the Oracle SOA Suite install type. Refer to the *Oracle Fusion Middleware Installation Guide for Oracle SOA Suite*. To make it easier to complete the procedures in this book, note the following on the Specify Installation Location page:

- For **Oracle Middleware Home,** specify the Middleware home directory that was created when you installed Oracle WebLogic Server. For example, if your Middleware home is `/scratch/oracle/Oracle/Middleware`, then specify the following:

  ```
  /scratch/oracle/Oracle/Middleware
  ```

- For **Oracle Home Directory**, specify a name for the Oracle home. For example:

```
Oracle_SOA1
```

The Oracle Home is created as a subdirectory of the Middleware home.

3.2.4 Configuring Oracle Fusion Middleware Components

You can configure some components, such as Oracle HTTP Server or Oracle Web Cache, when you install them. For other components, such as Oracle WebLogic Server, Oracle SOA Suite or Oracle WebCenter, you must configure the components using the Oracle Fusion Middleware Configuration Wizard, which is located in the following directory:

```
(UNIX) ORACLE_HOME/common/bin/config.sh
(Windows)ORACLE_HOME\common\bin\config.bat
```

To configure Oracle WebLogic Server and Oracle SOA Suite:

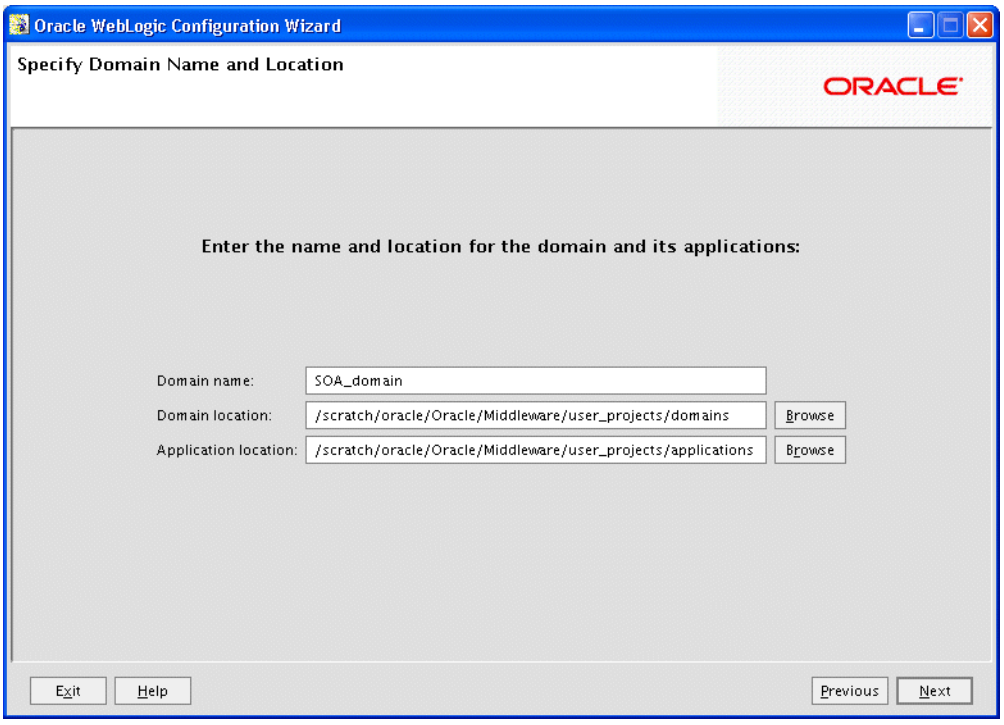
1. Invoke the Configuration Wizard:

   ```
   (UNIX) ORACLE_HOME/common/bin/config.sh
   (Windows) ORACLE_HOME\common\bin\config.cmd
   ```

2. Follow the directions in the Installation Guide for the components. For example, for Oracle SOA Suite, follow the directions in the section "Configuration Instructions" in the *Oracle Fusion Middleware Installation Guide for Oracle SOA Suite*.

   Note the following:

   - In the Welcome screen, select **Create a new WebLogic domain.**
   - In the Select Domain Source screen, select Oracle SOA Suite, Oracle Enterprise Manager, and Oracle Business Activity Monitoring. This automatically also selects Oracle JRF, and Oracle WSM Policy Manager.
   - In the Specify Domain Name screen, specify **SOA_domain** for the name of the domain and take the default for the domain location, as shown in the following figure:

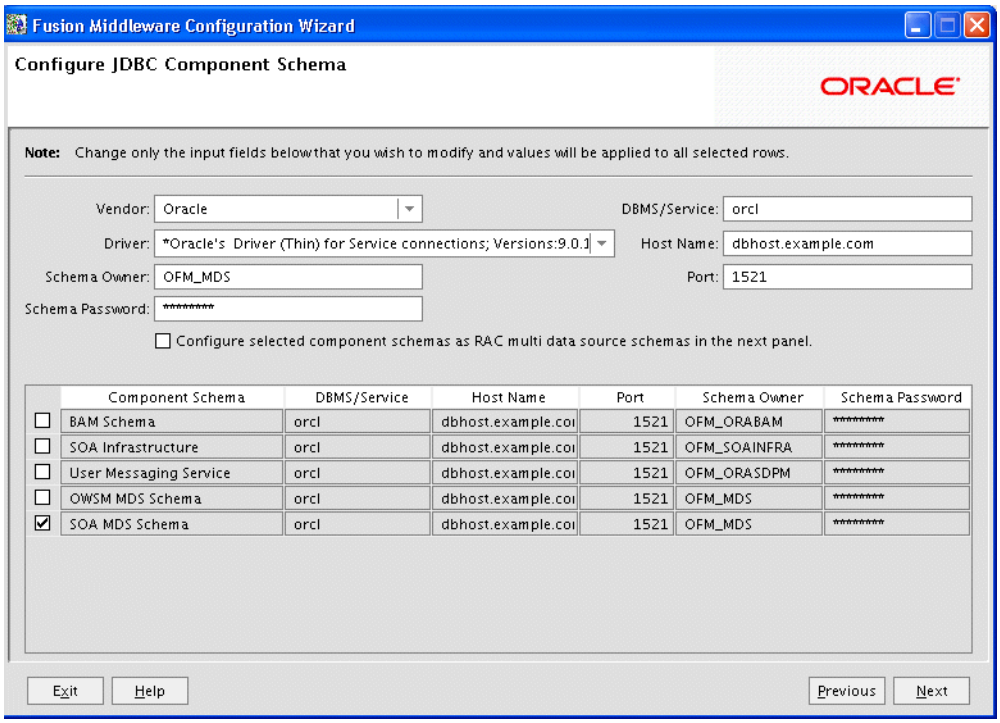


- In the Configure Administrator User Name and Password screen, use the default user name, `weblogic`, and enter a password. Then, re-enter the password.
- In the Configure Server Start Mode and JDK screen, select **Production Mode.**
- In the Configure JDBC Component Schema screen, the following instructions assume that you have the same password and database for all of the schemas:
  - Select all of the schemas.
  - For **Vendor,** select **Oracle.**
  - For **Driver,** select **Oracle's Driver (Thin) for Service connections; Versions:9.0.1,9.2.0,10,11.**
  - For **Schema Owner,** do not enter anything if the schemas listed in the table are correct. Each data source uses the user name specified in the table.

    If you need to change the schema owner, select each schema individually, then change the owner name.
  - If you used the same password when you created the schemas, enter the password in **Schema Password.**

    Alternatively, you can specify different passwords for each data source by entering them in the password column of the table.
  - With all of the schemas selected, for **DBMS/Service**, enter the SID of the database.
  - With all of the schemas selected, for **Host Name,** enter the host name of the database.
  - With all of the schemas selected, for **Port,** enter the listening port of the database.

The following figure shows the Configure JDBC Component Schema page:



- In the Select Advanced Configuration screen, take the defaults.
- In the Creating Domain screen, when the operation has completed, note the Admin Server URL. For example:

  `http://hostname.domainname.com/7001`

Now, you have created a domain, including an Administration Server and two Managed Servers, soa_server1 and bam_server1.

3. Start the Administration Server. For example, on Linux, if your domain is SOA_domain, run the following script:

```
MW_HOME/user_projects/domains/SOA_domain/bin/startWeblogic.sh
        -Dweblogic.management.username=username
         -Dweblogic.management.password=password
```

4. Start the Managed Servers. For example, on Linux, if your server is named soa_server1, run the following script:

```
MW_HOME/user_projects/domains/SOA_domain/bin/startManagedWebLogic.sh
         soa_server1 http://hostname:7001
         username password
```

When the configuration completes and you have started the Administration Server and the Managed Servers, you can view and manage Oracle Fusion Middleware using the graphical user interfaces or command-line tools. For example, to use Fusion Middleware Control to view and managed your environment, enter the Admin Server URL you noted from the Creating Domain screen, with `/em` appended. For example:

`http://hostname.domainname:port/em`

By default, the port is 7001.

Note: You can extend a domain to include the templates for other components by using the Configuration Wizard. For example, you can extend a domain that was initially created to support Oracle SOA Suite so that it can now also support Oracle WebCenter or Oracle HTTP Server. For more information, see Section 9.2.

For information about using the tools to view and managed Oracle Fusion Middleware, see:

- For graphical user interfaces: Section 2.1.1 and Section 2.1.2.
- For command-line tools: Section 2.1.3.

See Also: For more information about configuring components, see the Installation Guide for that component.

3.3 Setting Up Environment Variables

When you installed Oracle Fusion Middleware, you were logged in to your operating system as a particular user. You should always log in as this user to manage your installation because this user has permission to view and modify the files in your installation's Oracle home.

To use Oracle Fusion Middleware, you must set environment variables as shown in the following tables:

- Table 3–1, " Environment Variables for Linux and UNIX"
- Table 3–2, " Environment Variables for Windows"

Table 3–1 Environment Variables for Linux and UNIX

Environment Variable	Value
DISPLAY	*hostname*:*display_number*.*screen_number* Beginning with Oracle Application Server 10g, very few tools, such as `oidadmin`, require the DISPLAY variable.

LD_LIBRARY_PATH	On Solaris, make sure the value contains the following directory:
	`$ORACLE_HOME/lib32`
	On Linux and HP-UX, make sure the value contains the following directory:
	`$ORACLE_HOME/lib`
	On IBM AIX, make sure this environment variable is not set.

(IBM AIX only)
LIBPATH
	If the calling application is a 32-bit application, make sure the value contains the following directory:
	`$ORACLE_HOME/lib32`
	If the calling application is a 64-bit application, make sure the value contains the following directory:
	`$ORACLE_HOME/lib`

(Solaris only) LD_LIBRARY_PATH_64	Make sure the value contains the following directory: `$ORACLE_HOME/lib`
(HP-UX only) SHLIB_PATH	Make sure the value contains the following directory: `$ORACLE_HOME/lib32`

Table 3–1 (Cont.) Environment Variables for Linux and UNIX

Environment Variable	Value
MW_HOME	Set to the full path of the installation's Middleware home. Do not use a trailing slash in the definition. The following example shows the full path: `/scratch/Oracle/Middleware`
ORACLE_HOME	Set to the full path of the installation's Oracle home. Do not use a trailing slash in the definition. The following example shows the full path: `/scratch/Oracle/Middleware/ORACLE_HOME_SOA1`
ORACLE_INSTANCE	Optional. Set to the full path of an Oracle instance. Do not use a trailing slash in the definition. Setting this is useful if you have only one Oracle instance in your environment or you will be working with just that one instance. The following example shows the full path of a Web Tier installation: `scratch/Oracle/Middleware/WebTier/instances/instance1`
PATH	Make sure the value contains the following directory, which contains basic commands used by all installations: `$ORACLE_HOME/bin` When you start to work with specific components, you may want to add additional directories to your path, as recommended by the component documentation.
JAVA_HOME	Make sure the value contains the following directory: *MW_HOME*`/jdk`*n*
CLASSPATH	Make sure the value contains the following directory: `$ORACLE_HOME/lib`

Table 3–2 shows the environment variables for Windows.

Table 3–2 Environment Variables for Windows

Environment Variable	Value
MW_HOME	Set to the full path of the installation's Middleware home. Do not use a trailing slash in the definition. The following example shows the full path: `C:\oracle\Middleware`
ORACLE_HOME	Set to the full path of the installation's Oracle home. Do not use a trailing backslash in the definition. The value is automatically set during installation.
ORACLE_INSTANCE	Optional. Set to the full path of an Oracle instance. Do not use a trailing slash in the definition. Setting this is useful if you have only one Oracle instance in your environment or you will be working with just that one instance. The following example shows the full path of a Web Tier installation: `C:\oracle\Middleware\WebTier\instances\instance1`
PATH	Make sure the value contains the following directory, which contains basic commands used by all installations: *ORACLE_HOME*`\bin`
JAVA_HOME	Make sure the value contains the following directory: *MW_HOME*`\jdk`*n*

Table 3–2 (Cont.) Environment Variables for Windows

Environment Variable	Value
CLASSPATH	Make sure the value contains the following directory: *MW_HOME*\jdk*n*
TEMP	Set to your temp directory, for example, C:\temp.
TMP	Set to your temp directory, for example, C:\temp.

3.4 Starting and Stopping Servers, Components, and Applications

You can start and stop servers, components, and applications using the command line, the Oracle WebLogic Server Administration Console, or Fusion Middleware Control. The following topics describe how to start and stop these entities using Fusion Middleware Control, the command line, or both:

- Starting and Stopping Oracle WebLogic Server Administration Server
- Starting and Stopping Oracle WebLogic Server Managed Servers
- Configuring Node Manager to Start Managed Servers
- Starting and Stopping Components
- Starting and Stopping Applications
- Starting and Stopping Fusion Middleware Control
- Starting and Stopping Oracle Management Agent

3.4.1 Starting and Stopping Oracle WebLogic Server Administration Server

You can start and stop Oracle WebLogic Server Administration Servers using the WLST command line. When you do so, you also stop the processes running in the Administration Server, including the Oracle WebLogic Server Administration Console and Fusion Middleware Control.

To start an Oracle WebLogic Server Administration Server, use the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/startWebLogic.sh
   -Dweblogic.management.username=weblogic
   -Dweblogic.management.password=password
   -Dweblogic.system.StoreBootIdentity=true
```

To stop an Oracle WebLogic Server Administration Server, use the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/stopWeblogic.sh
    username password admin_url
```

3.4.2 Starting and Stopping Oracle WebLogic Server Managed Servers

Fusion Middleware Control, as well as the Oracle WebLogic Server Administration Console, use Node Manager to start Managed Servers. If you are starting a Managed Server that does not contain Oracle Fusion Middleware products other than Oracle WebLogic Server, you can start the servers using the procedure in this section.

However, if the Managed Server contains other Oracle Fusion Middleware products, such as Oracle SOA Suite, Oracle WebCenter, or Oracle JRF, you must first configure Node Manager, as described in Section 3.4.3.

See Also: *Oracle Fusion Middleware Oracle WebLogic Scripting Tool*

To start or stop a Managed Server using Fusion Middleware Control:

1. From the navigation pane, expand the farm, then **WebLogic Domain,** and then the domain.
2. Select the Managed Server.
3. From the WebLogic Server menu, select **Control,** then **Start Up** or **Shut Down.**

WLST Commands:

To start a Managed Server:

```
MW_HOME/user_projects/domains/domain_name/bin/startManagedWebLogic.sh
         server_name admin_url username password
```

To stop a Managed Server:

```
MW_HOME/user_projects/domains/domain_name/bin/stopManagedWeblogic.sh
          username password admin_url
```

3.4.3 Configuring Node Manager to Start Managed Servers

If a Managed Server contains other Oracle Fusion Middleware products, such as Oracle SOA Suite, Oracle WebCenter, or Oracle JRF, the Managed Servers environment must be configured to set the correct classpath and parameters. This environment information is provided through the start scripts, such as startWebLogic and setDomainEnv, that are located in the domain directory.

If the Managed Servers are started by Node Manager, (as is the case when the servers are started by the Oracle WebLogic Server Administration Console or Fusion Middleware Control) Node Manager must be instructed to use these start scripts so that the server environments are correctly configured. Specifically, Node Manager must be started with the property `StartScriptEnabled=true`.

There are several ways to ensure that Node Manager starts with this property enabled. As a convenience, Oracle Fusion Middleware provides the following script, which adds the property `StartScriptEnabled=true` to the nodemanager.properties file:

```
(UNIX) ORACLE_HOME/common/bin/setNMProps.sh.
(Windows) ORACLE_HOME\common\bin\setNMProps.cmd
```

For example, on Linux, execute the setNMProps script and start Node Manager:

```
ORACLE_HOME/common/bin/setNMProps.sh
MW_HOME/wl_server_n/server/bin/startNodeManager.sh
```

When you start Node Manager, it reads the nodemanager.properties file with the `StartScriptEnabled=true` property, and uses the start scripts when it subsequently starts Managed Servers. Note that you need to run the setNMProps script only once.

See Also: "Using Node Manager" in the *Oracle Fusion Middleware Node Manager Administrator's Guide for Oracle WebLogic Server* for other methods of configuring and starting Node Manager

3.4.4 Starting and Stopping Components

You can start and stop a component from the dynamic target menu in Fusion Middleware Control.

To start or stop Java components, such as Oracle Business Activity Monitoring:

1. From the navigation pane, expand the farm.
2. Expand the component type, such as BAM, then select the component.
3. From the dynamic target menu, choose **Control,** then **Start Up** or **Shut Down.**

To start or stop restart system components, such as Oracle HTTP Server:

1. From the navigation pane, expand the farm and then the installation type, such as **Web Tier**.
2. Select the component, such as **ohs1.**
3. From the dynamic target menu, choose **Control,** then **Start Up** or **Shut Down.**

Commands:

To start and stop system components:

```
opmnctl startproc ias-component=component
opmnctl stopproc ias-component=component
opmnctl restartproc ias-component=component
```

To start and stop Java components:

```
startApplication(appName, [options])
stopApplication(appName, [options])
```

3.4.5 Starting and Stopping Applications

You can start or stop an application deployed in Oracle Fusion Middleware from the Application Deployment menu of Fusion Middleware Control.

To start or stop an application:

1. From the navigation pane, expand **Application Deployment.**
2. Select the application.
3. From the Application Deployment menu, choose **Control,** then **Start Up** or **Shut Down.**

WLST Commands:

```
startApplication(appName, [options])
stopApplication(appName, [options])
```

3.4.6 Starting and Stopping Fusion Middleware Control

If Fusion Middleware Control is configured for a domain, it is automatically started when you start an Oracle WebLogic Server Administration Server, as described in Section 3.4.1.

If Fusion Middleware Control is configured for a domain, it is automatically stopped when you stop an Oracle WebLogic Server Administration Server, as described in Section 3.4.1.

3.4.7 Starting and Stopping Oracle Management Agent

Oracle Management Agent is designed specifically for monitoring Oracle Fusion Middleware system components, such as Oracle HTTP Server and Oracle Web Cache.

To start Oracle Management Agent, use the following command:

```
opmnctl startproc ias-component=EMAGENT
```

To stop Oracle Management Agent, use the following command:

```
opmnctl stopproc ias-component=EMAGENT
```

3.5 Learn More

For more information about the topics covered in this chapter, see:

- *Oracle Fusion Middleware Repository Creation Utility User's Guide*
- *Oracle Fusion Middleware Installation Planning Guide*
- "Starting and Stopping Oracle Fusion Middleware" in the *Oracle Fusion Middleware Administrator's Guide*

4 Deploying Applications

Deployment is the process of packaging application files as an archive file and transferring them to a target application server. This chapter describes how to deploy Java EE applications to Oracle Fusion Middleware.

It contains the following topics:

4.1 Overview of Deploying Applications

Oracle WebLogic Server provides a Java EE-compliant infrastructure for deploying, undeploying, and redeploying Java EE-compliant applications and modules.

You can deploy the following into Oracle WebLogic Server:

- A complete Java EE application packaged as an Enterprise Archive (EAR) file.
- Standalone modules packaged as Java Archive files (JARs) containing Web Services, Enterprise JavaBeans (EJBs), application clients (CARs), or resource adapters (RARs).
- An ADF application. Oracle Application Development Framework (Oracle ADF) is an end-to-end application framework that builds on Java Platform, Enterprise Edition (Java EE) standards and open-source technologies to simplify and accelerate implementing service-oriented applications.
- An Oracle SOA Suite composite application. A SOA composite application is a single unit of deployment that greatly simplifies the management and lifecycle of SOA applications.
- An Oracle WebCenter application. WebCenter applications differ from traditional Java EE applications in that they support run-time customization, including the application's pages, the portlets contained within these pages, and document libraries.

A Metadata Archive (MAR) is a compressed archive of selected metadata, such as the application-level deployment profile, for an application. A MAR is used to deploy metadata content to the metadata service (MDS) repository. The following application types use a MAR as a container for content that is deployed to the MDS repository: ADF applications, SOA composite applications, and Oracle WebCenter applications.

You can use Fusion Middleware Control, Oracle WebLogic Server Administration Console, Oracle JDeveloper, or the command line to deploy, undeploy, or redeploy an application. Which method you use depends on the type of application, as described in Table 4–1. This chapter describes how to deploy an application using Fusion Middleware Control.

Table 4–1 Tools to Deploy Applications

Type of Application	Tools to Use
Pure Java EE application	Oracle WebLogic Server Administration Console
	Fusion Middleware Control: Deployment Wizard
	Oracle JDeveloper
	WLST command line
ADF application	Fusion Middleware Control: Deployment Wizard
	Oracle JDeveloper
	WLST command line
SOA Composite application	Fusion Middleware Control: SOA Composite Deployment Wizard
	Oracle JDeveloper
	WLST command line
WebCenter application	Fusion Middleware Control: Deployment Wizard
	Oracle JDeveloper
	WLST command line

4.2 Understanding Data Sources

A **data source** is a Java object that application components use to obtain connections to a relational database. Specific connection information, such as URL or user name and password, are set on a data source object as properties and do not need to be explicitly defined in an application's code. This abstraction allows applications to be built in a portable manner, because the application is not tied to a specific back-end database. The database can change without affecting the application code.

Applications use the Java Naming and Directory Interface (JNDI) API to access a data source object. The application uses a JNDI name that is bound to the data source object. The JNDI name is logical and can be mapped to any data source object. Like data source properties, using JNDI provides a level of abstraction, since the underlying data source object can change without any changes required in the application code. The end result is the details of accessing a database are transparent to the application.

> **See Also:** *Oracle Fusion Middleware Configuring and Managing JDBC for Oracle WebLogic Server* for more information about data sources

When you configure certain Oracle Fusion Middleware components, such as Oracle SOA Suite or Oracle WebCenter, using the Oracle WebLogic Server Configuration Wizard, you specify the data source connection information. If the components use the MDS Repository, the Configuration Wizard prepends "mds-" to the data source name to indicate that the data source is a system data source used by MDS Repository.

> **See Also:** *Oracle Fusion Middleware Creating Domains Using the Configuration Wizard* for information about specifying data sources with the Configuration Wizard

To create an MDS data source, you should use Fusion Middleware Control or WLST to set the correct attributes for the data source. The MDS data source is displayed in the navigation pane in Fusion Middleware Control and in the domain structure in the Administration Console. If your application uses an MDS Repository, you must register the repository with the Oracle WebLogic Server domain before you deploy your application.

If you are using RAC or Oracle Fusion Middleware Cold Failover Cluster, you must configure multi data sources. To do so, you must use the Oracle WebLogic Server Administration Console. Note that if you create a multi data source and you add an existing MDS data source to it, the data source you added is no longer considered a valid MDS repository. The repository is not displayed in Fusion Middleware Control or Oracle WebLogic Server Administration Console. For example, the MDS repository is not listed in the Fusion Middleware Control navigation pane and is not displayed as a choice for a target metadata repository when you deploy an application.

> **See Also:** *Oracle Fusion Middleware Configuring and Managing JDBC for Oracle WebLogic Server* for more information about configuring multiple data sources

4.3 Deploying and Undeploying Java EE Applications

The following topics describe using Fusion Middleware Control to deploy, undeploy, or redeploy a Java EE application:

- Deploying Java EE Applications
- Undeploying Java EE Applications
- Redeploying Java EE Applications

> **See Also:** *Oracle Fusion Middleware Deploying Applications to Oracle WebLogic Server* for information about deploying using Oracle WebLogic Server Administration Console and for more information about using the WLST command line

4.3.1 Deploying Java EE Applications

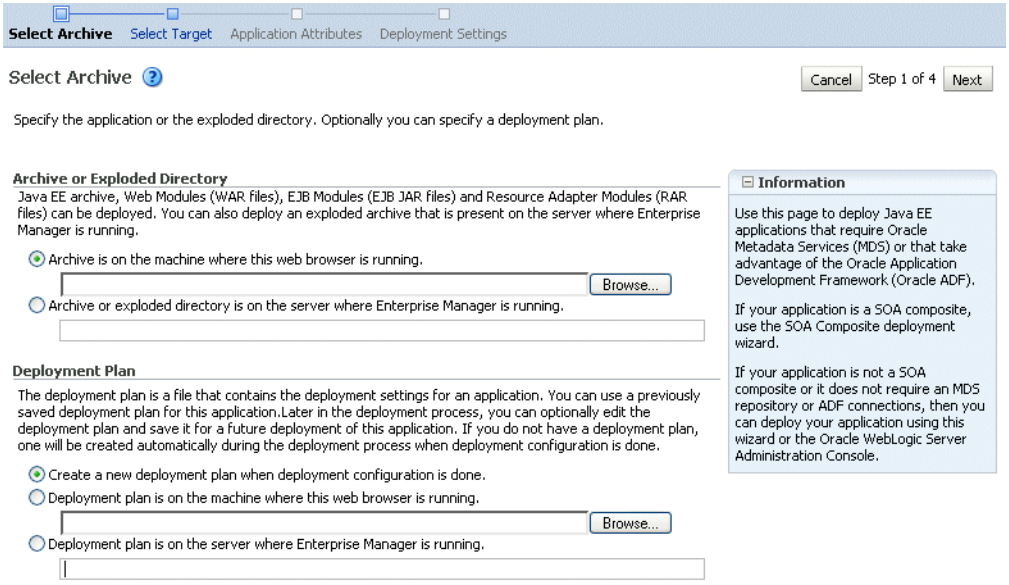
You can deploy an application to a Managed Server or a cluster. This section describes how to deploy an application to a Managed Server.

To deploy a Java EE application to a Managed Server:

1. From the navigation pane, expand the farm, then **WebLogic Domain,** and then the domain.
2. Select the server in which you want to deploy the application.

   The server home page is displayed.
3. From the WebLogic Server menu, select **Application Deployment,** then **Deploy.**

   The Deployment Wizard, Select Archive page is displayed, as shown in the following figure:



4. In the Archive or Exploded Directory section, you can select one of the following:
   - **Archive is on the machine where this browser is running.** Enter the location of the archive or click **Browse** to find the archive file.
   - **Archive or exploded directory is on the server where Enterprise Manager is running.** Enter the location of the archive or click **Browse** to find the archive file.
5. In the Deployment Plan section, you can select one of the following:
   - **Create a new deployment plan when deployment configuration is done.**
   - **Deployment plan is on the machine where this web browser is running.** If you select this option, enter the path to the plan.
   - **Deployment plan is on the server where Enterprise Manager is running.** If you select this option, enter the path to the plan.
6. Click **Next.**

   The Select Target page is displayed.
7. Select the target to which you want to deploy the application. The Administration Server, Managed Servers, and clusters are listed. You can select a cluster, one or more Managed Server in the cluster, or a Managed Server that is not in a cluster. Although the Administration Server is shown in the list of targets, you should not deploy an application to it. The Administration Server is intended only for administrative applications such as the Oracle WebLogic Server Administration Console.
8. Click **Next.**

   The Application Attributes page is displayed.
9. In the Application Attributes section, for **Application Name,** enter the application name.
10. In the Context Root of Web Modules section, specify the context root for your application if you have not specified it in application.xml. The context root is the URI for the web module. Each web module or EJB module that contains web services may have a context root.

11. If the application's adf-config.xml file archive contains MDS configuration, the Target Metadata Repository section is displayed. It allows you to choose the repository and partition for this application:
    - To change the repository, click the icon next to the **Repository Name.** In the Metadata Repositories dialog box, select the repository and click **OK.**
    - To change the partition, enter the partition name in **Partition Name.**
12. If the application's adf-config.xml file archive contains MDS configuration for an MDS shared repository, the Shared Metadata Repository section is displayed. It allows you to choose the repository and partition for this application.
13. In the Distribution section, you can select one of the following:
    - **Distribute and start application (servicing all requests)**
    - **Distribute and start application in admin mode (servicing only admin requests)**
    - **Distribute only**
14. Click **Next.**

    The Deployment Wizard, Deployment Settings page is displayed.
15. On this page, you can perform common tasks before deploying your application or you can edit the deployment plan or save it to a disk. Depending on the type of application, you can:
    - Configure Web modules: Click **Go to Task** in the Configure Web Modules row. The Configure Web Modules page is displayed. Click **Configure General Properties** to view and edit the general configuration for the Web Module or **Map Resource References** to map the resource references.

      For example, you can change the session invalidation interval or the maximum age of session cookies.
    - Configure application security. Click **Go to Task** in the Configure Application Security row. Depending on what type of security is used, different pages are displayed.

      If the application contains jazn-data.xml or cwallet.sso, the Configure Application Security page displays the following sections:
      - If it contains jazn-data.xml, the page displays the Application Policy Migration section.
      - If it contains cwallet.sso, the page displays the Application Credential Migration section.
      - If it contains both, the page displays both sections.

      For information about these settings, see "Deploying JavaEE and ADF Applications with Oracle Enterprise Manager" in the *Oracle Fusion Middleware Security Guide*.

      If the application contains neither of these files, the Configure Application Security page displays the following options:
      - DD Only: Use only roles and policies that are defined in the deployment descriptors.
      - Custom Roles: Use roles that are defined in the Administration Console; use policies that are defined in the deployment descriptor.

  - Custom Roles and Policies: Use only roles and policies that are defined in the Administration Console.
  - Advanced: Use a custom model that you have configured on the realm's configuration page.
- Configure EJB modules: Click **Go to Task** in the Configure EJB modules row. The Configure EJB Modules page is displayed. Click **Configure EJB Properties** to view and edit the general configuration for the EJBs or **Map Resource References** to map the resource preferences.

  For example, you can configure the maximum number of beans in the free pool or the network access point.
- Configure ADF Connections. To modify the ADF connections, click **Go to Task** in the Configure ADF Connections row. The Configure ADF Connections page is displayed, showing the current connection information. To modify a connection type, click the **Edit** icon for a particular row. For example, to modify the connection information for an external application. For more information about ADF connections, see *Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework*

For a simple Java EE application, only the first three options may be displayed.

16. Expand **Deployment Plan.**

    You can edit and save the deployment plan, if you choose. If you edit the deployment plan and change descriptor values, those changes are saved to the deployment plan. In addition, the following configurations are saved to the deployment plan:

    - Application attributes
    - Web module configuration
    - EJB configuration

    Application attributes related to MDS are stored in the file adf-config.xml. Application security attributes are stored in weblogic-application.xml.

    Fusion Middleware Control updates the relevant files and repackages the .ear file.

17. Click **Deploy.**

    Fusion Middleware Control displays processing messages.

18. When the deployment is completed, click **Close.**

To deploy an application to multiple servers at the same time, navigate to the domain. Then, from the WebLogic Domain menu, select **Application Deployment,** then **Deploy.** The deployment wizard displays a page where you can select the servers.

To deploy an application to a cluster, select the cluster. Then, from the Cluster menu, select **Application Deployment,** then **Deploy.**

WLST Command:

```
deploy(app_name,path, [targets] [stageMode], [planPath], [options])
```

4.3.2 Undeploying Java EE Applications

You can undeploy an application from a Managed Server or a cluster. This section describes how to undeploy an application from a Managed Server. If an application

has been deployed to multiple servers, when you undeploy it using Fusion Middleware Control, the application is undeployed from all the servers.

To undeploy a Java EE application from a Managed Server:

1. From the navigation pane, expand **Application Deployments,** then the application to undeploy.

   The application home page is displayed.

2. From the Application Deployment menu, select **Application Deployment,** then **Undeploy.**

   The confirmation page is displayed.

3. Click **Undeploy.**

   Processing messages are displayed.

4. When the operation completes, click **Close.**

Alternatively, you can navigate to the domain, Managed Server, or cluster, then, from the target's menu, choose **Application Deployment,** then **Undeploy.** In the Select Application page, select the application you want to undeploy.

WLST Command:

```
undeploy(app_name,path, [targets] [options])
```

4.3.3 Redeploying Java EE Applications

You can redeploy an application to a Managed Server or a cluster. This section describes how to redeploy an application to a Managed Server.

To redeploy a Java EE application to a Managed Server:

1. From the navigation pane, expand the farm, then **Application Deployments.**
2. Select the application.

   The application home page is displayed.

3. From the Application Deployment menu, choose **Application Deployment,** and then **Redeploy.**

   The Select Application page is displayed.

4. Click **Next.**
5. In the Archive or Exploded Directory section, you can select one of the following:
   - **Archive is on the machine where this browser is running.** Then, enter the location of the archive or click **Browse** to find the archive file.
   - **Archive or exploded directory is on the server where Enterprise Manager is running.** Then, enter the location of the archive or click **Browse** to find the archive file.
6. In the Deployment Plan section, you can select one of the following:
   - **Create a new deployment plan when deployment configuration is done.**
   - **Deployment plan is on the machine where this web browser is running.** If you select this option, enter the path to the plan.

- **Deployment plan is on the server where Enterprise Manager is running.** If you select this option, enter the path to the plan.

7. Click **Next.**

   The Application Attributes page is displayed.

8. Click **Next.**

   The Deployment Wizard, Deployment Settings page is displayed.

9. On this page, you can perform common tasks before deploying your application or you can edit the deployment plan or save it to a disk. Depending on the type of application, you can:

   - Configure Web modules
   - Configure application security
   - Configure EJB modules
   - Configure ADF connections

   For a simple Java EE application, only the first three options are displayed.

10. Expand **Deployment Plan.**

    You can edit and save the deployment plan, if you choose. If you edit the deployment plan and change descriptor values, those changes are saved to the deployment plan. In addition, the following configurations are saved to the deployment plan:

    - Application attributes
    - Web module configuration
    - EJB configuration

    Application attributes related to MDS are stored in the file adf-config.xml. Application security attributes are stored in weblogic-application.xml.

    Fusion Middleware Control updates the relevant files and repackages the .ear file.

11. Click **Redeploy.**

    Processing messages are displayed.

12. When the operation completes, click **Close.**

To redeploy an application to a cluster, select the cluster. Then, from the target's menu, select **Application Deployment,** then **Redeploy.**

WLST Command:

```
redeploy(app_name,planpath,  [options])
```

4.4 Managing Deployment Plans

A **deployment plan** is a client-side aggregation of all the configuration data needed to deploy an archive into Oracle WebLogic Server. Once created, you can save a deployment plan as a file. Then, you can reuse it for redeploying the application or for deploying other applications. If an existing deployment plan is not applied to an application at the time of deployment, a new plan is created by default.

You can create a deployment plan when you deploy an application, as described in Section 4.3.1.

You can edit it on the Deployment Settings page of the Application Deployment wizard.

4.5 Learn More

For more information about the topics covered in this chapter, see:

- The chapter "Deploying Applications" in the *Oracle Fusion Middleware Administrator's Guide*
- *Oracle Fusion Middleware Deploying Applications to Oracle WebLogic Server*
- *Oracle Fusion Middleware Configuring and Managing JDBC for Oracle WebLogic Server* for more information about configuring multi data sources

5 Monitoring Oracle Fusion Middleware

This chapter describes how to perform basic monitoring tasks for Oracle Fusion Middleware.

It contains the following topics:

5.1 Overview of Monitoring Oracle Fusion Middleware

Monitoring the health of your Oracle Fusion Middleware environment and ensuring that it performs optimally is an important task for the administrator.

Oracle Fusion Middleware provides the following methods for monitoring the status of your environment:

- You can monitor the status of Oracle WebLogic Server domains, clusters, servers, Java components, and applications using Oracle WebLogic Server Administration Console. From the Administration Console, navigate to the entity's page. See "Overview of the Administration Console" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information on monitoring using the console.
- You can monitor the status of Oracle WebLogic Server domains, clusters, servers, Java components, system components, and applications using Fusion Middleware Control. Navigate to the entity's home page, for example, to the home page for an Oracle HTTP Server instance.
- You can monitor the status of your environment using the command line.

  To monitor the status of Java components with the command line, use the WLST `state` command, using the following format:

  ```
  state(name, type)
  ```

  For example, to get the status of the Managed Server server1, use the following command:

  ```
  wls:/mydomain/serverConfig> state('server1','Server')
  Current state of "server1": SUSPENDED
  ```

To monitor the status of system components with the command line, use the `opmnctl status` command, using the following format:

```
opmnctl status  [scope] [options]
```

For example, to view the status of all processes monitored by OPMN, use the following command:

```
opmnctl status
```

5.2 Monitoring the Status of Oracle Fusion Middleware

You can monitor the status of Oracle Fusion Middleware using the Oracle WebLogic Server Administration Console. The Administration Console provides details about the health and performance of the domain.

> **See Also:** *Overview of the Administration Console* in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information about monitoring servers using the Administration Console

You can also view the overall status of the farm and the status of individual servers and components using Fusion Middleware Control, as described in the following topics:

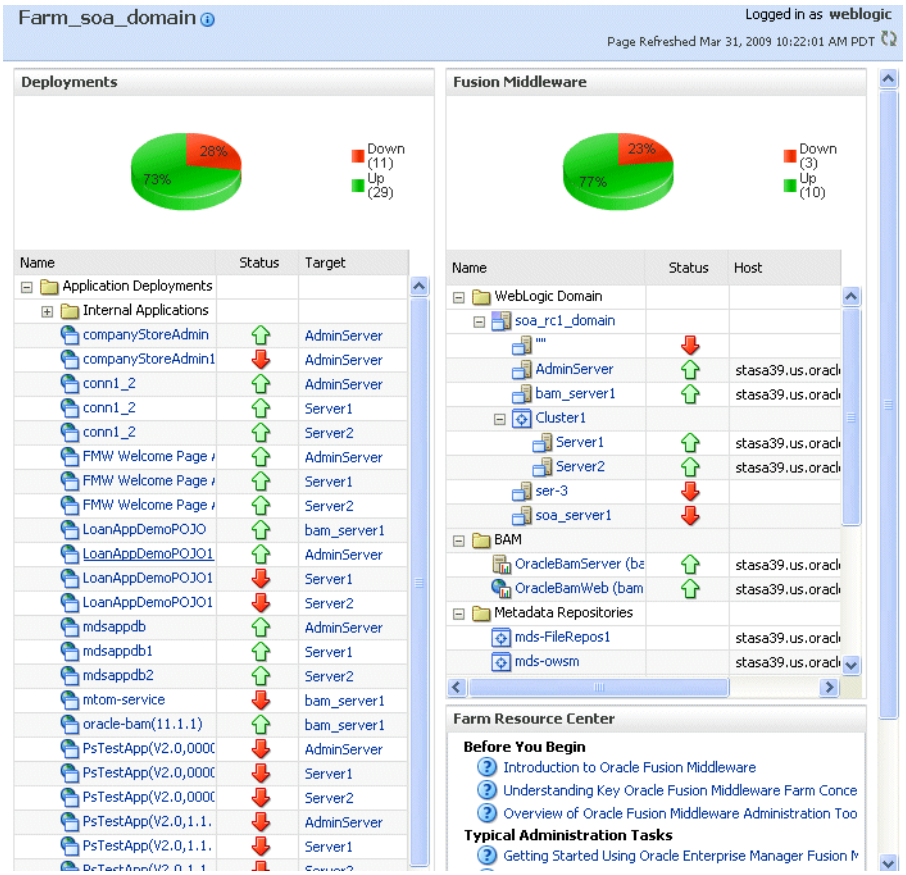
- Viewing General Information
- Monitoring an Oracle WebLogic Server Domain
- Monitoring an Oracle WebLogic Server Administration Server or Managed Server
- Monitoring a Component
- Monitoring Applications

5.2.1 Viewing General Information

You can view the overall status of the Oracle Fusion Middleware environment from the home page of the farm using Fusion Middleware Control. This page lists the availability of all components, an application deployment summary, including SOA composites, if any SOA composite applications are deployed.

To view the status, from the navigation pane, select the farm.

The farm home page is displayed, as shown in the following figure:



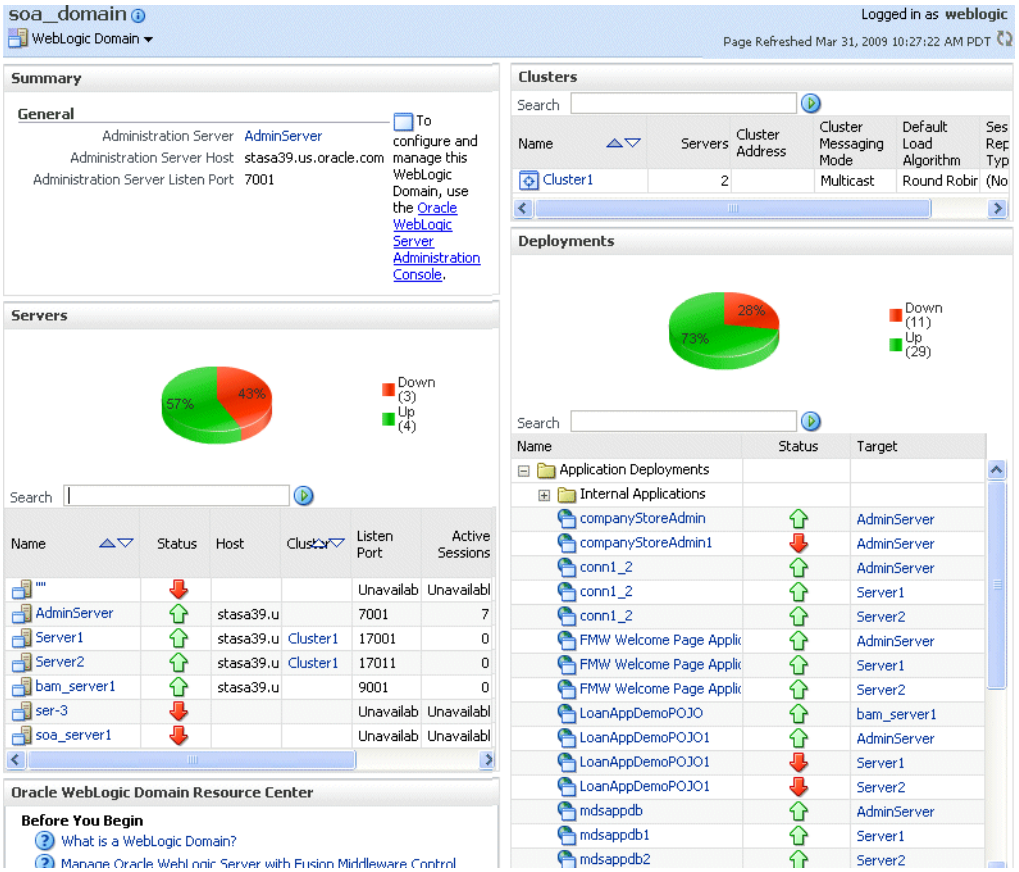
5.2.2 Monitoring an Oracle WebLogic Server Domain

You can view the status of a domain, including the servers, clusters, and deployments in the domain from the domain home page of Fusion Middleware Control

To view the status of a domain:

1. From the navigation pane, expand the farm, then **WebLogic Domain.**
2. Select the domain.

   The domain home page is displayed, as shown in the following figure:



This page shows the following:

- A general summary of the domain, along with a link to the Oracle WebLogic Server Administration Console
- Information about the servers, both the Administration Server and the Managed Servers in the domain
- Information about the clusters in the domain
- Information about the deployments in the domain
- A Resource Center, which provides links to more information

> **See Also:** "Overview of the Administration Console" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information about monitoring an Oracle WebLogic Server domain using the Oracle WebLogic Server Administration Console. The Administration Console provides details about the health and performance of the domain.

5.2.3 Monitoring an Oracle WebLogic Server Administration Server or Managed Server

You can view the status of an Oracle WebLogic Server Administration Server or Managed Server using Fusion Middleware Control.

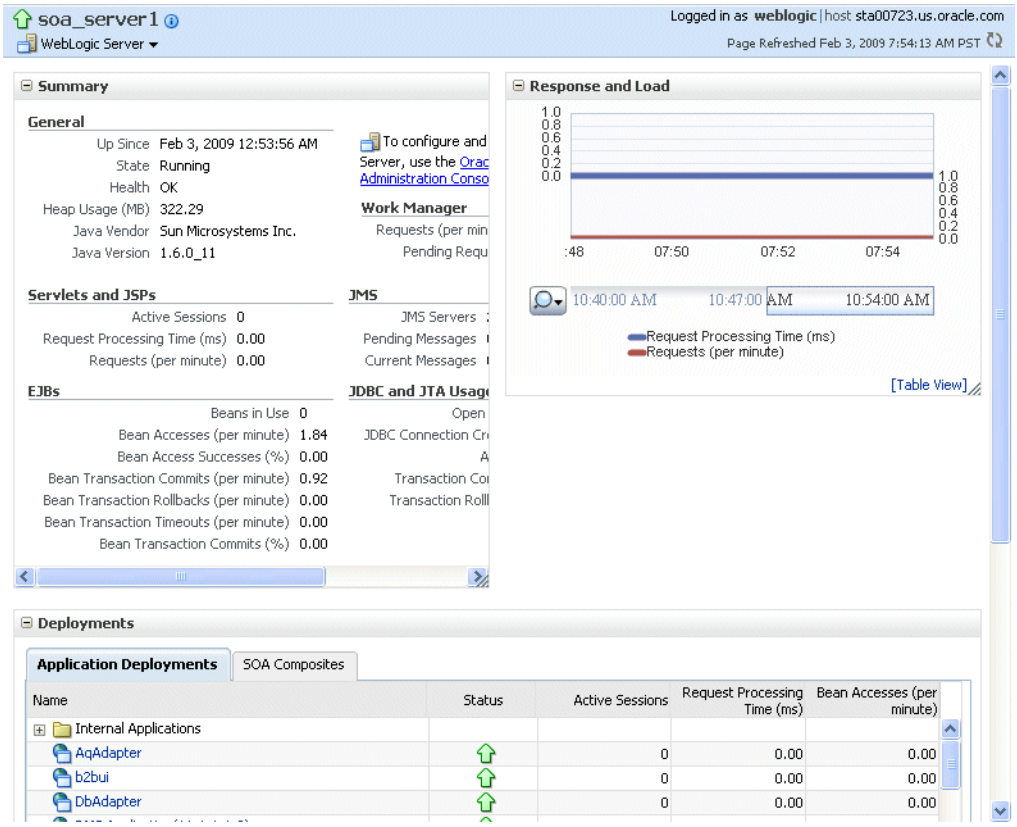
To view the status of an Administration Server or a Managed Server:

1. From the navigation pane, expand the farm, then **WebLogic Domain.** Then expand the domain.

2. Select the server.

   The server home page is displayed.

   The following figure shows the home page for a Managed Server:



This page shows the following:

- A general summary of the server, including its state, and information about the servlets, JSPs, and EJBs running in the server
- Response and load
- Information about the applications deployed to the server

> **See Also:** "Overview of the Administration Console" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information about monitoring servers using the Oracle WebLogic Server Administration Console. The Administration Console provides details about the health and performance of the server.

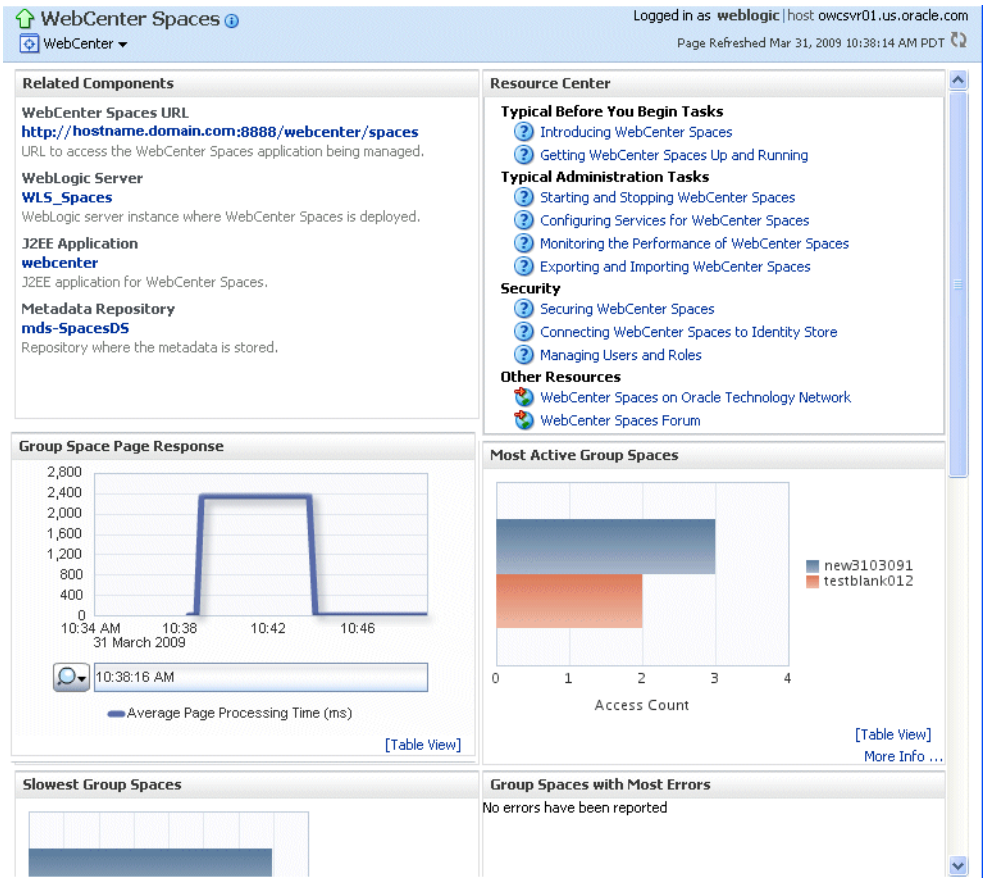
5.2.4 Monitoring a Component

You can view the status of a component, including whether the component is started or not, in the component home page in Fusion Middleware Control.

To monitor a Java component, such as WebCenter Spaces:

1. From the navigation pane, expand the farm, then the type of component, such as WebCenter, then the component, such as WebCenter Spaces.
2. Select the component. For example, select **WebCenter Spaces.**

The component home page is displayed, as shown in the following figure:

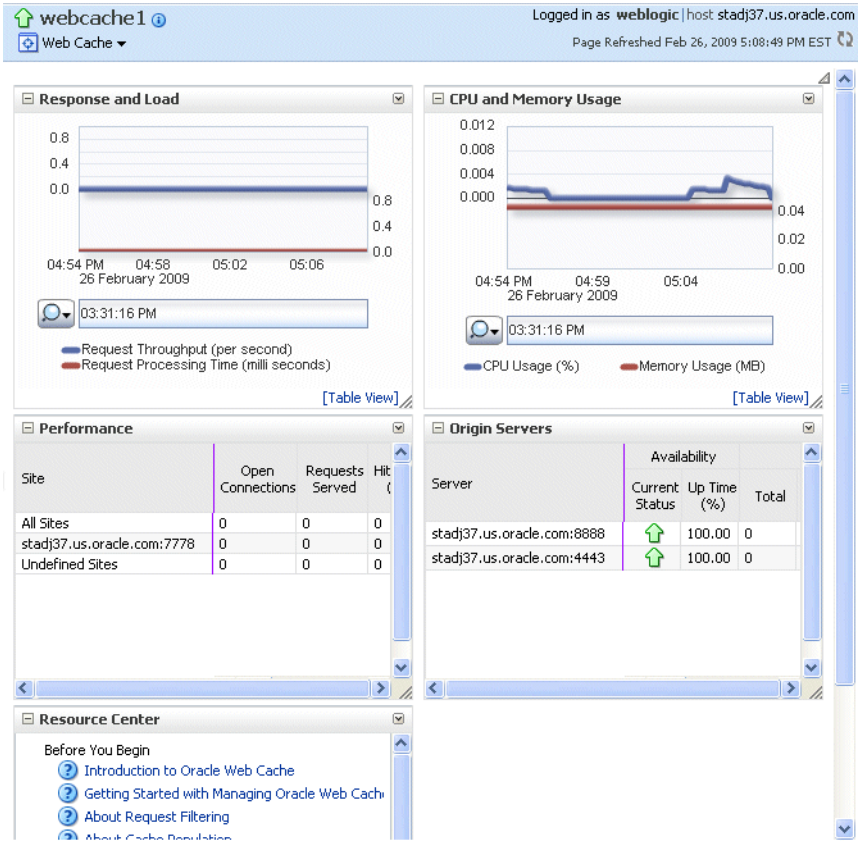


See Also: "Overview of the Administration Console" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information about using the Oracle WebLogic Server Administration Console to monitor Java components.

To view the status of a system component:

1. From the navigation pane, expand the farm, then the installation type, such as **Web Tier**.
2. Select the component, such as webcache1.

   The component home page is displayed, as shown in the following figure:



5.2.5 Monitoring Applications

You can monitor any type of application, such as a Java EE application, a SOA Composite application, or an ADF application.

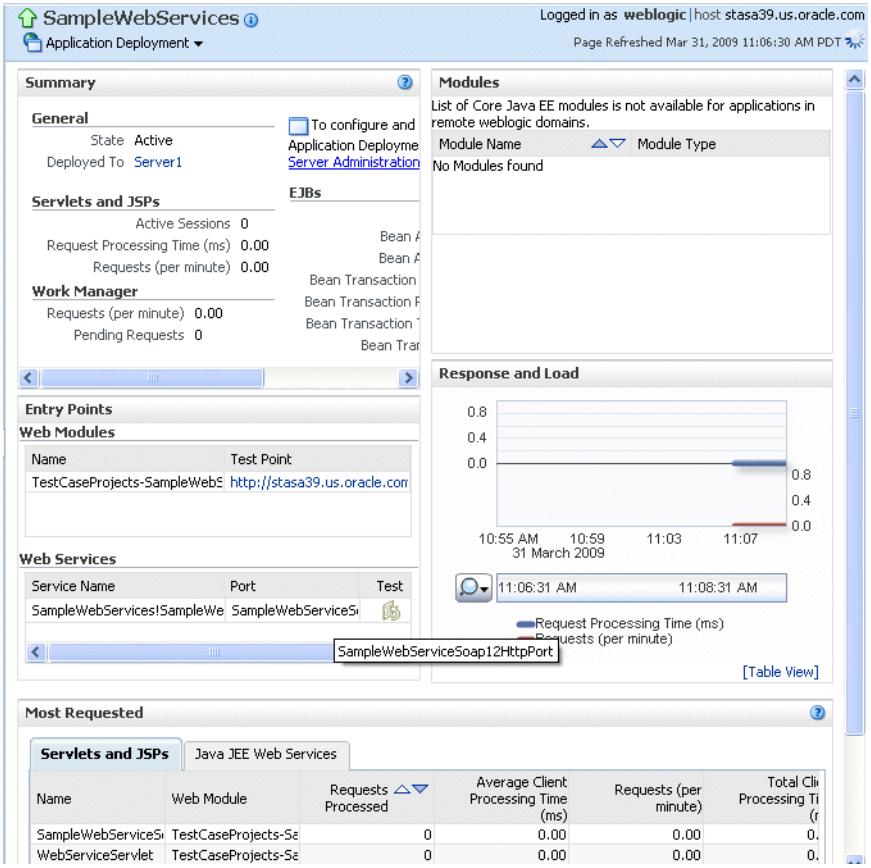
To view the status of a Java EE application using Fusion Middleware Control:

1. From the navigation pane, expand **Application Deployments,** then select the application to monitor.

   The application's home page is displayed.

2. In this page, you can view a summary of the application's status, entry points to the application, Web Services and modules associated with the application, and the response and load.

   The following figure shows a portion of the application's home page:



This page shows the following:

- A summary of the application, including its state, the Managed Server on which it is deployed, and information about active sessions, active requests, and request processing time
- Entry points, including any Web modules and Web services
- A list of modules with the type of module for each
- Response and load, which shows the requests per second and the request processing time
- A list of most requested servlets and JSPs

5.3 Monitoring the Performance of Oracle Fusion Middleware Components

If you encounter a problem, such as an application that is running slowly or is hanging, you can view more detailed performance information, including performance metrics for a particular target, to find out more information about the problem.

Oracle Fusion Middleware automatically and continuously measures run-time performance. The performance metrics are automatically enabled; you do not need to set options or perform any extra configuration to collect them.

Note that Fusion Middleware Control provides real-time data. If you are interested in viewing historical data, consider using Oracle Enterprise Manager 10*g* Grid Control.

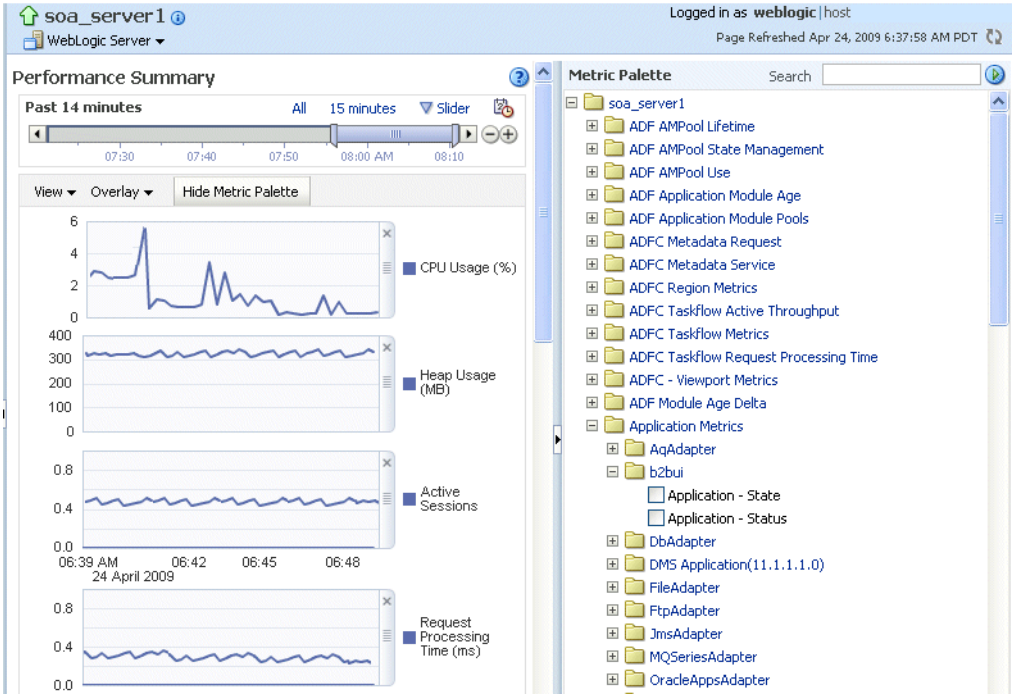
To view the performance of an Oracle Web Logic Managed Server:

1. From the navigation pane, expand the farm, then **WebLogic Domain,** and then the domain.
2. Select the server to monitor.

   The server home page is displayed.
3. From the WebLogic Server menu, choose **Performance Summary.**

   The Performance Summary page is displayed. It shows performance metrics, as well as information about response time and request processing time for applications deployed to the Oracle WebLogic Server.
4. To see additional metrics, click **Show Metric Palette** and expand the metric categories.

   The following figure show the Performance Summary page with the Metric Palette displayed:



5. Select a metric to add it to the performance summary.
6. To overlay another target, click **Overlay**, and select the target. The target is added to the charts, so that you can view the performance of more than one target at a time, comparing their performance.
7. To customize the time frame shown by the charts, you can:
   - Click **Slider** to display a slider tool that lets you specify that more or less time is shown in the charts. For example, to show the past 10 minutes, instead of the past 15 minutes, slide the left slider control to the right until it displays the last 10 minutes.
   - Select the calendar and clock icon. Then, enter the **Start Time** and **End Time.**

You can also view the performance of a components, such as Oracle HTTP Server or Oracle SOA Suite. Navigate to the component and select **Monitoring,** then **Performance Summary** from the dynamic target menu.

5.4 Viewing the Routing Topology

Fusion Middleware Control provides a Topology Viewer for the farm. The Topology Viewer is a graphical representation of routing relationships across components and elements of the farm. You can easily determine how requests are routed across components. For example, you can see how requests are routed from Oracle Web Cache, to Oracle HTTP Server, to a Managed Server, to a data source.

The Topology Viewer enables you to easily monitor your Oracle Fusion Middleware environment. You can see which entities are up and which are down.

You can also print the topology or save it to a .png file.

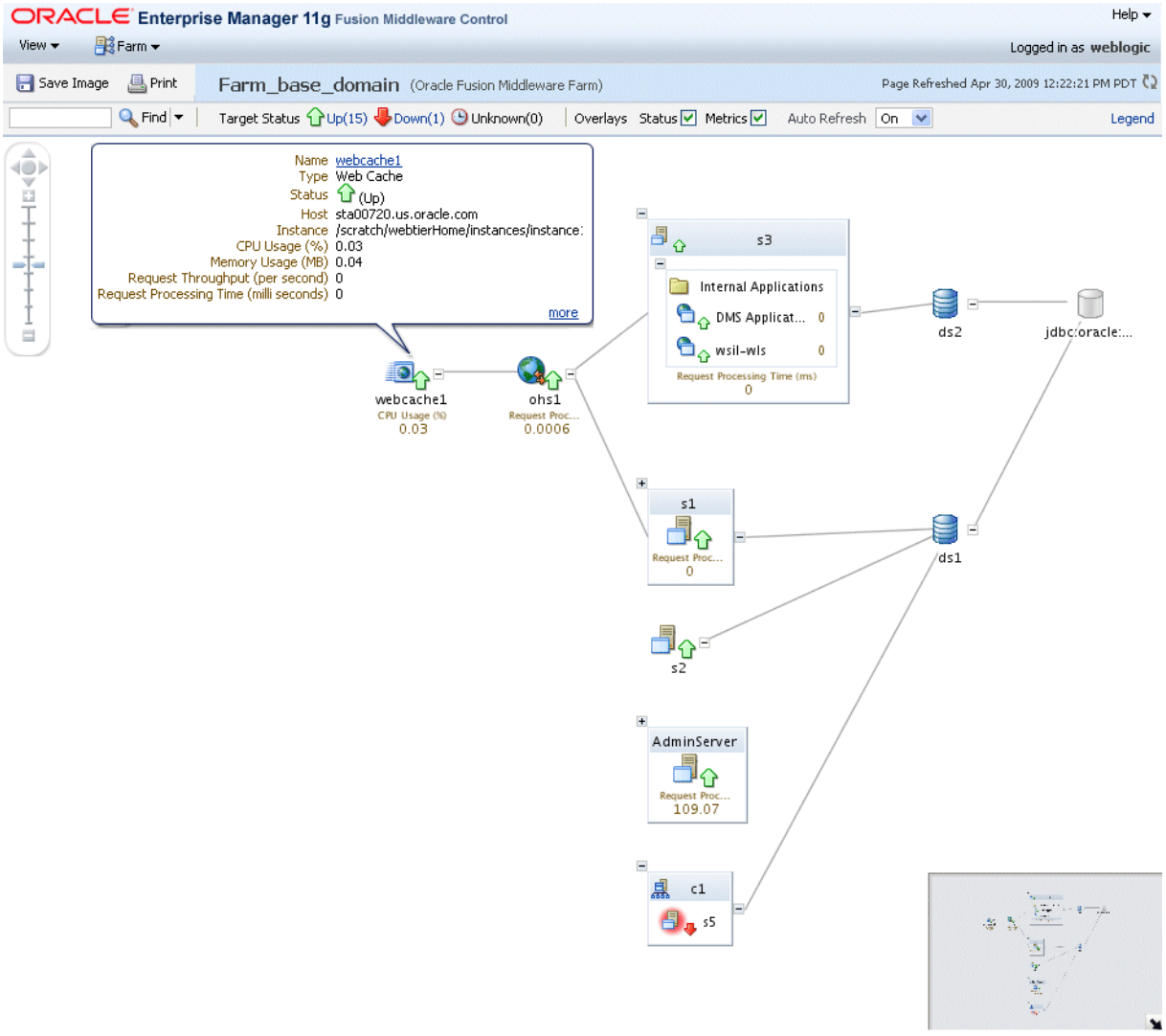
To view the topology:

1. Click **Topology.**

   The Topology Viewer is displayed in a separate window.

2. To see information about a particular target, place your mouse over the target. To view additional information, click **More.**

   The following shows the Topology Viewer window, with information about the Oracle Web Cache component webcache1:



3. From the View menu, you can save or print the image, expand or collapse all of the nodes, or change the orientation of the topology to be left to right or top to bottom.

   In addition, you can refresh the status and the metrics or update the topology. To refresh the status and metrics, click **Refresh Target Status and Metrics.** To update the topology shown in the viewer, click **Update Topology.** If a target has been added or deleted, the target list and relationships are updated. This option also updates the status and metrics.

4. From the **Auto Refresh** dropdown, you can enable or disable automatically refreshing the status and metrics. When you enable auto-refresh, the Topology Viewer refreshes the metrics every 60 seconds.

5. With Topology Viewer, you can also:

   - Search for a target within the topology. This makes it easier to find a target if you have many targets. Enter the name in the **Find** box. The target is highlighted and the topology is repositioned so you can see the target if it was not previously visible in the viewing area.
   - View the status of the targets. Choose **Up, Down,** or **Unknown** from the Target Status at the top of the page.
   - Navigate to the home page of a target. Right-click the target, and select **Home.**
   - Hide or show the status or metrics. Click **Status** or **Metrics** in the Overlays section.

     If you select Metrics, one key performance metric for the component is displayed. (You cannot change the metric that is displayed.)
   - View the routing relationships between components. For example, you can view the routing from Oracle Web Cache to Oracle HTTP Server to Oracle WebLogic Server. Clicking on the line between the two targets displays the URLs used.
   - You can perform operations directly on the target by right-clicking. The right-click target menu is displayed. For example, from this menu, you can start or stop an Oracle WebLogic Server or view additional performance metrics.

6. To change what is visible in the topology view, drag the shaded section in the navigator window, which is located in the bottom right.

Notes:

- If you use Mozilla Firefox, when you click an entity in Topology Viewer to take you back to the main Fusion Middleware Control window, focus is not returned to the main window. For example, if you right-click an entity and select logs from menu, the focus remains on the Topology Viewer window. (If you go back to the main window, the Logs page is correctly displayed.)

  To work around this problem, make the following change in Firefox:

  From the Tools menu, select **Options,** and then **Content.** Click **Advanced.** In the Advanced JavaScript Settings dialog box, select **Raise and lower windows.**

- If you use Internet Explorer, turn off the **Always Open Popups in New Tab** option.

5.5 Viewing Port Numbers

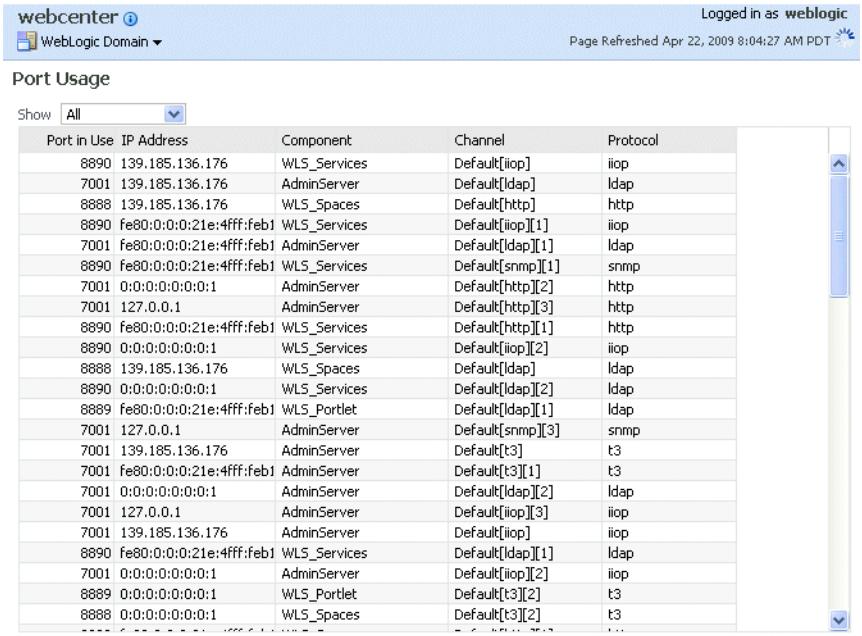
By default, Oracle Fusion Middleware assigns port numbers to various components and services during installation or when you create a component. (You can specify particular ports during installation and configuration.) You can view the assigned port numbers from the Port Usage page of Fusion Middleware Control.

You can view the port numbers of the Oracle WebLogic Server domain, the Administration Server, Managed Servers, or components, such as the SOA Infrastructure and Oracle Web Cache, using Fusion Middleware Control.

To view the port numbers that are currently used by a WebLogic domain:

1. From the navigation pane, expand the farm, then **WebLogic Domain.**
2. Select the domain.
3. From the WebLogic Domain menu, choose **Port Usage.**

   The Port Usage page is displayed, as shown in the following figure:



Port in Use	IP Address	Component	Channel	Protocol
8890	139.185.136.176	WLS_Services	Default[iiop]	iiop
7001	139.185.136.176	AdminServer	Default[ldap]	ldap
8888	139.185.136.176	WLS_Spaces	Default[http]	http
8890	fe80:0:0:0:21e:4fff:feb1	WLS_Services	Default[iiop][1]	iiop
7001	fe80:0:0:0:21e:4fff:feb1	AdminServer	Default[ldap][1]	ldap
8890	fe80:0:0:0:21e:4fff:feb1	WLS_Services	Default[snmp][1]	snmp
7001	0:0:0:0:0:0:0:1	AdminServer	Default[http][2]	http
7001	127.0.0.1	AdminServer	Default[http][3]	http
8890	fe80:0:0:0:21e:4fff:feb1	WLS_Services	Default[http][1]	http
8890	0:0:0:0:0:0:0:1	WLS_Services	Default[iiop][2]	iiop
8888	139.185.136.176	WLS_Spaces	Default[ldap]	ldap
8890	0:0:0:0:0:0:0:1	WLS_Services	Default[ldap][2]	ldap
8889	fe80:0:0:0:21e:4fff:feb1	WLS_Portlet	Default[ldap][1]	ldap
7001	127.0.0.1	AdminServer	Default[snmp][3]	snmp
7001	139.185.136.176	AdminServer	Default[t3]	t3
7001	fe80:0:0:0:21e:4fff:feb1	AdminServer	Default[t3][1]	t3
7001	0:0:0:0:0:0:0:1	AdminServer	Default[ldap][2]	ldap
7001	127.0.0.1	AdminServer	Default[iiop][3]	iiop
7001	139.185.136.176	AdminServer	Default[iiop]	iiop
8890	fe80:0:0:0:21e:4fff:feb1	WLS_Services	Default[ldap][1]	ldap
7001	0:0:0:0:0:0:0:1	AdminServer	Default[iiop][2]	iiop
8889	0:0:0:0:0:0:0:1	WLS_Portlet	Default[t3][2]	t3
8888	0:0:0:0:0:0:0:1	WLS_Spaces	Default[t3][2]	t3

Optionally, you can filter the ports shown by selecting a Managed Server from **Show.**

The Port Usage detail table shows the ports that are in use, the IP Address, the component, the channel, and the protocol.

You can also view similar pages for the Administration Server, Managed Servers, and components, such as the SOA Infrastructure and Oracle Web Cache, by navigating to the target and choosing **Port Usage** from the target's menu.

Commands:

OPMN command:

```
opmnctl status l
```

WLST commands:

```
get('AdministrationPort')
get('ListenPort')
```

5.6 Learn More

For more information about the topics covered in this chapter, see:

- "Monitoring Oracle Fusion Middleware" in the *Oracle Fusion Middleware Administrator's Guide*
- "Overview of the Administration Console" in the *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* for information on monitoring using the Oracle WebLogic Server Administration Console

6 Configuring Security

Oracle Fusion Middleware provides many security features, including accounts specifically for administrative purposes. This chapter describes how to create additional administrative accounts, create application roles, change passwords for those accounts, and how to configure SSL.

This chapter contains the following topics:

6.1 Creating Additional Administrative Users

During the Oracle Fusion Middleware installation and configuration, you must specify an administrative user and a password for the user. By default, the user name is `weblogic`. You can use this administrative account to log in to Fusion Middleware Control and the Oracle WebLogic Server Administration Console.

You can create additional administrative users using the Oracle WebLogic Server Administration Console.

To create a new administrative user with full privileges:

1. Navigate to the Oracle WebLogic Server Administration Console. (For example, from the home page of the domain in Fusion Middleware Control, select **To configure and managed this WebLogic Domain, use the Oracle WebLogic Server Administration Console.**)
2. From the navigation pane, select **Security Realms.**

   The Summary of Security Realms page is displayed.
3. Select a realm, such as **myrealm.**

   The Settings for the realm page is displayed.
4. Select the Users and Groups tab, then the Users tab. Click **New**.

   The Create a New User page is displayed.
5. For **Name,** enter the new user name. In this case, enter **admin2**.
6. Optionally, add a description for the account.

7. For **Password,** enter a password for the account. Then, for **Confirm Password,** reenter the password.

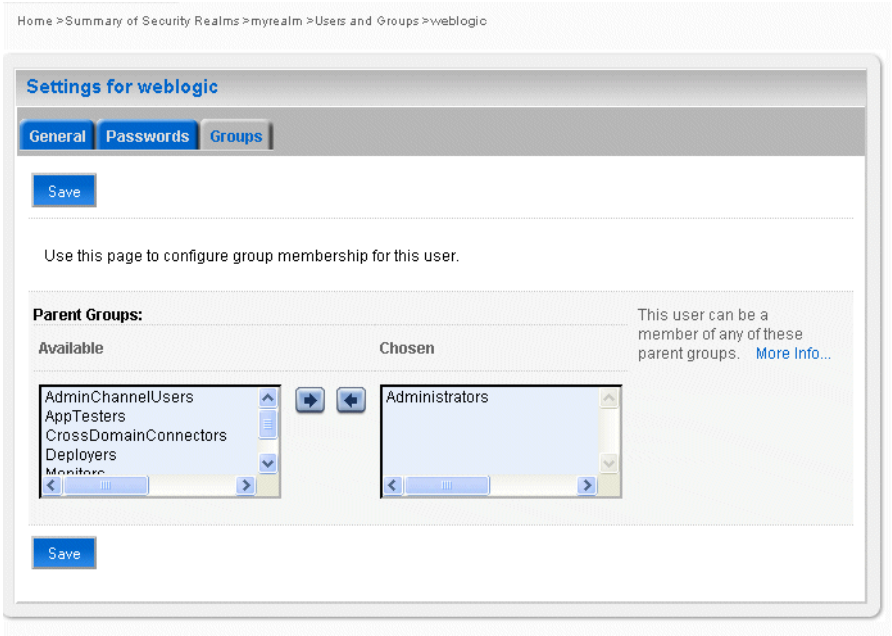
   Any passwords you assign to Oracle Fusion Middleware users:

   - Must contain at least five characters, but not more than 30 characters.
   - Must begin with an alphabetic character. It cannot begin with a number, the underscore (_), the dollar sign ($), or the number sign (#).
   - At least one of the characters must be a number.
   - Can contain only numbers, letters, and the following special characters: US dollar sign ($), number sign (#), or underscore (_).
   - Cannot contain any Oracle reserved words, such as VARCHAR.

8. Click **OK.**
9. Select the newly created user in the Users table.

   The Setting for *user* page is displayed.

10. Select the Groups tab.
11. From the Available groups, select the group. In this case, to give the new user full privileges, select **Administrator** and move it to the Chosen list, as shown in the following figure:



12. Click **Save.**

You now have a user named admin2 that has the Administrator role for the Oracle WebLogic Server domain.

You may want to give only minimal privileges to another user, allowing the user to only monitor Oracle Fusion Middleware, not to change any of the configuration.

6.2 Creating Additional Users with Specific Roles

You can create additional users and give them limited access. For example, you can create a user with privileges to deploy applications.

To create an additional user who can deploy applications:

1. Navigate to the Oracle WebLogic Server Administration Console. (For example, from the home page of the domain in Fusion Middleware Control, select **To configure and managed this WebLogic Domain, use the Oracle WebLogic Server Administration Console.**)
2. From the navigation pane, select **Security Realms.**

   The Summary of Security Realms page is displayed.
3. Select a realm, such as **myrealm.**

   The Settings for the realm page is displayed.
4. Select the Users and Groups tab, then the Users tab. Click **New**.

   The Create a New User page is displayed.
5. For **Name,** enter the new user name. In this case, enter **app_deployer**.
6. Optionally, add a description for the account.
7. For **Password,** enter a password for the account. Then, for **Confirm Password,** reenter the password.

   Any passwords you assign to Oracle Fusion Middleware users:

   - Must contain at least five characters, but not more than 30 characters.
   - Must begin with an alphabetic character. It cannot begin with a number, the underscore (_), the dollar sign ($), or the number sign (#).
   - At least one of the characters must be a number.
   - Can contain only numbers, letters, and the following special characters: US dollar sign ($), number sign (#), or underscore (_).
   - Cannot contain any Oracle reserved words, such as VARCHAR.
8. Click **OK.**
9. Select the newly created user in the Users table.

   The Setting for *user* page is displayed.
10. Select the Groups tab.
11. From the Available groups, select the group. In this case, to give the new user privileges only to deploy applications, select **Deployers** and move it to the Chosen list.
12. Click **Save.**

6.3 Changing the Administrative User Password

You can change the password of users using the Oracle WebLogic Server Administration Console.

To change the password of an administrative user:

1. Navigate to the Oracle WebLogic Server Administration Console. (For example, from the home page of the domain in Fusion Middleware Control, select **To**

configure and managed this WebLogic Domain, use the Oracle WebLogic Server Administration Console.)

2. From the navigation pane, select **Security Realms.**

   The Summary of Security Realms page is displayed.

3. Select a realm, such as **myrealm.**

   The Settings for the realm page is displayed.

4. Select the Users and Groups tab, then the Users tab. Select the user.

   The Settings for *user* page is displayed.

5. Select the Passwords tab.

6. Enter the new password, then enter it again to confirm it.

7. Click **Save.**

6.4 Configuring SSL

Secure Sockets Layer (SSL) is the most widely used protocol for securing the Internet. It uses public key cryptography to enable authentication, encryption, and data integrity. Using these tools, SSL also enables secure session key management by encrypting a unique one-time session password for use by both server and client. After this password is securely sent and received, it is used to encrypt all subsequent communications between server and client, making it infeasible for others to decipher those messages.

You can configure components, such as Oracle Web Cache, Oracle HTTP Server, Oracle WebLogic Server, Oracle Internet Directory, Oracle Virtual Directory and the Oracle Database to enable secure communications over SSL.

This section describes the following topics:

- Understanding Keystores and Wallets
- Enabling SSL Between a Browser and Oracle HTTP Server

6.4.1 Understanding Keystores and Wallets

In Oracle Fusion Middleware, all Java components and applications use the JKS keystore. Thus all Java components and applications running on Oracle WebLogic Server use the JKS-based KeyStore and TrustStore.

The Oracle Virtual Directory system component uses a JKS keystore to store keys and certificates. Configuring SSL for Oracle Virtual Directory thus requires setting up and using JKS keystores.

Other components use the Oracle wallet as their storage mechanism. An Oracle wallet is a container that stores your credentials, such as certificates, trusted certificates, certificate requests, and private keys. You can store Oracle wallets on the file system or in LDAP directories such as Oracle Internet Directory. Oracle wallets can be auto-login or password-protected wallets.

- Oracle HTTP Server
- Oracle Web Cache
- Oracle Internet Directory

6.4.2 Enabling SSL Between a Browser and Oracle HTTP Server

You can enable SSL on the communication path between a client browser and a Web server. In this case, you configure the virtual host for Oracle HTTP Server to listen in SSL mode, as described in the following topics:

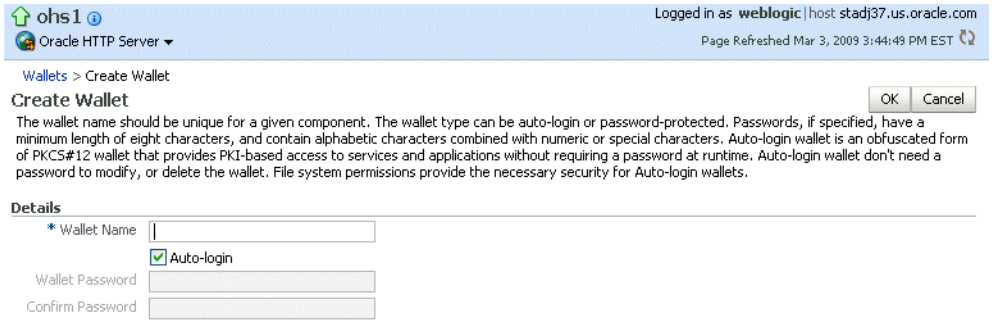
- Enabling SSL for Inbound Traffic to Oracle HTTP Server Virtual Hosts
- Enabling SSL for Outbound Traffic from Oracle HTTP Server Virtual Hosts

6.4.2.1 Enabling SSL for Inbound Traffic to Oracle HTTP Server Virtual Hosts

To enable SSL for inbound traffic to Oracle HTTP Server virtual hosts:

1. Create an Oracle wallet:
   a. In the navigation pane, expand the farm, then **Web Tier.** Select an Oracle HTTP Server instance.
   b. From the Oracle HTTP Server menu, choose **Security,** then **Wallets.**
   c. Click **Create.**

      The Create Wallet page is displayed, as shown in the following figure:



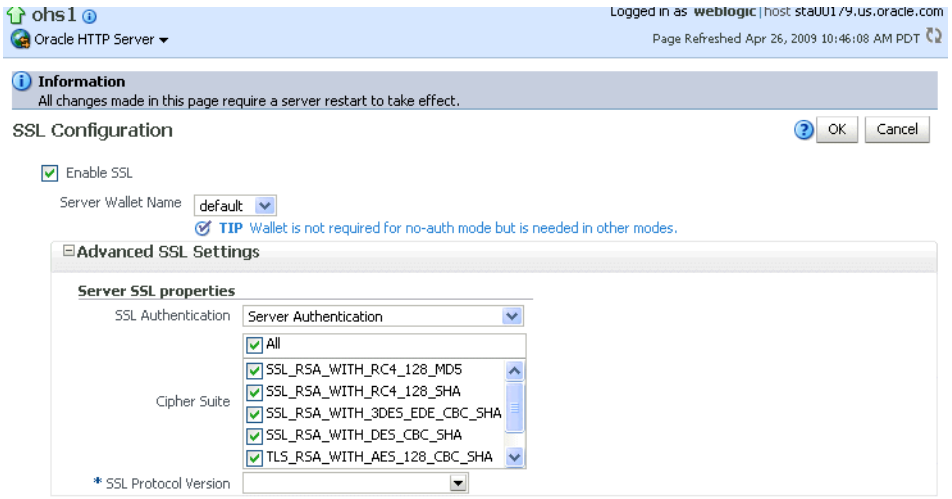
   d. For **Wallet Name,** enter a descriptive wallet name.
   e. Check or uncheck **Autologin**, depending on whether your wallet is an auto-login wallet. The default is an auto-login wallet. If you do not check Autologin, for **Wallet Password,** enter a password, then enter the same password in **Confirm Password.**
   f. Click **OK** to create the wallet.

      A confirmation box is displayed.
   g. The confirmation box asks if you want to create a certificate request. Click **Yes.**

      The Create Wallet: Add Certificate Request page is displayed.
   h. For **Common Name,** enter a name for the certificate request.
   i. Enter information about your organization.
   j. For **Key Size**, select a size.
   k. Click **OK.**
   l. To get the certificate signed by a certificate authority (CA), you must export the certificate request out of the wallet and send it to your CA. After the issued certificate is returned, you must import it back into your wallet. Now your wallet is ready to use.

2. From the HTTP Server menu, choose **Administration,** then **Virtual Hosts.**
3. Select a virtual host and choose **Configure,** then **SSL Configuration.**

   The SSL Configuration page is displayed, as shown in the following figure:



4. Select **Enable SSL.**
5. For **Server Wallet Name**, select the wallet.
6. From the Server SSL properties, select the SSL Authentication type, Cipher Suites to use, and the SSL protocol version.
7. Click **OK.**
8. Restart Oracle HTTP Server. (From the Oracle HTTP Server menu, choose **Control**, then **Restart.**)
9. Now, you can test this by visiting the OHS page over SSL in a browser. Use a URL of the form `https://host:port/`, where you replace the host and port with values relevant to your own environment.

6.4.2.2 Enabling SSL for Outbound Traffic from Oracle HTTP Server Virtual Hosts

Outbound requests from Oracle HTTP Server are handled by configuring `mod_wl_ohs`.

To configure outbound requests for SSL:

1. Generate a custom keystore for Oracle WebLogic Server containing a certificate, using the Oracle WebLogic Server Administration Console:
   a. In the left pane of the Console, expand **Environment** and select **Servers.**
   b. Select **Configuration,** then **Keystores.**
   c. Define the keystore. See the online help for information about each field.
2. Import the certificate used by Oracle WebLogic Server into the Oracle HTTP Server wallet as a trusted certificate. You can use any available utility such as `WLST` or Fusion Middleware Control for this task.
3. Edit the Oracle HTTP Server configuration file *`ORACLE_INSTANCE`*`/config/OHS/ohs1/ssl.conf` and add the following line to the SSL configuration under `mod_weblogic`:

```
WlSSLWallet  "ORACLE_INSTANCE}/config/COMPONENT_TYPE/COMPONENT_NAME/default"
```

In the line, `default` is the name of the Oracle HTTP Server wallet in Step 2.

Here is how the configuration should look:

```
<IfModule mod_weblogic.c>
      WebLogicHost myhost.example.com
      WebLogicPort 7002
      Debug ALL
      WLLogFile /tmp/weblogic.log
      MatchExpression *.jsp
      SecureProxy On
      WlSSLWallet "$(ORACLE_INSTANCE)/config/OHS/ohs1/keystores/default"
</IfModule>
```

Save the file and exit.

4. Restart Oracle HTTP Server to activate the changes.
5. Ensure that your Oracle WebLogic Server instance is configured to use the custom keystore generated in Step 1, and that the alias points to the alias value used in generating the certificate. Restart the Oracle WebLogic Server instance.

6.5 Learn More

For more information about the topics covered in this chapter and other security topics, see:

- *Oracle Fusion Middleware Administrator's Guide* for information about the following topics:
  - Secure Sockets Layer (SSL), which is an industry standard for securing communications. See "Configuring SSL."
  - Keystores, wallets, and certificates. See "Managing Keystores, Wallets, and Certificates."
- *Oracle Fusion Middleware Security Guide* for information about the following topics:
  - Oracle Platform Security, which is a security framework that runs on Oracle WebLogic Server. It provides application developers, system integrators, security administrators, and independent software vendors with a portable, integrated, and comprehensive security platform framework for Java SE and Java EE applications.
  - Common Audit Framework, which provides a uniform system for administering audits across a range of components, flexible audit policies, and prebuilt compliance-reporting features.
  - Identity, Policy, and Credential stores, which provide secure storage and management of user and role information, policies, and credentials.

7

Managing Log Files

Oracle Fusion Middleware components generate log files containing messages that record all types of events, including startup and shutdown information, errors, warning messages, access information on HTTP requests, and additional information. This chapter describes how to view and manage log files to assist in monitoring system activity and in diagnosing system problems.

This chapter contains the following topics:

7.1 Overview of Logging in Oracle Fusion Middleware

Most Oracle Fusion Middleware components write diagnostic log files in the Oracle Diagnostic Logging (ODL) format. Log file naming and the format of the contents of log files conforms to an Oracle standard and the diagnostic messages are written in text format by default.

ODL provides the following benefits:

- The capability to limit the total amount of diagnostic information saved.
- Older segment files are removed and newer segment files are saved in chronological fashion.
- Components can remain active, and do not need to be shutdown, when older diagnostic logging files are deleted.

> **Note:** Oracle WebLogic Server does not use the ODL format. For information about the Oracle WebLogic Server log format, see *Oracle Fusion Middleware Configuring Log Files and Filtering Log Messages for Oracle WebLogic Server*.

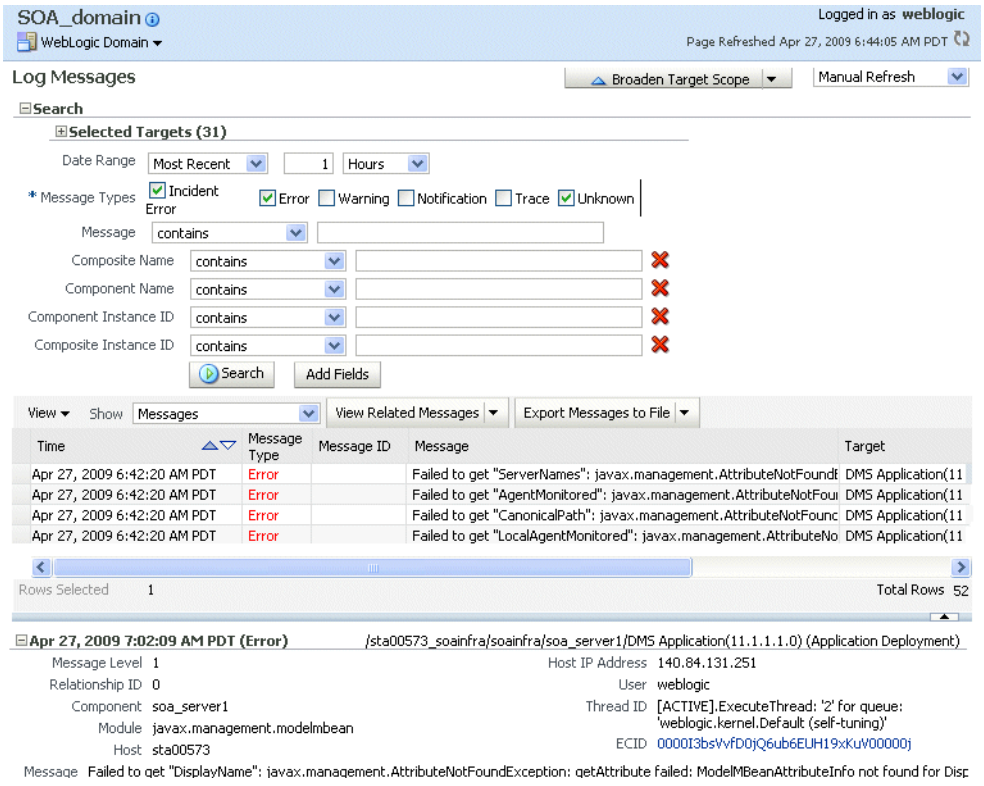
7.2 Viewing Log Messages and Summaries

You can view the messages for all of the entities in a domain, a Managed Server, a component, or an application.

To view the log files and their messages for a Managed Server:

1. From the navigation pane, expand the farm, then **WebLogic Domain**, and then the domain. Right-click the Managed Server name and choose **Logs,** then **View Log Messages.**

   The Log Messages page is displayed, as shown in the following figure:



   By default, this page shows the Incident Error and Error messages that occurred in the last 1 hour. You can modify the criteria to include other message types or other time intervals.

   By default, the messages are sorted by time, in ascending order. You can sort the messages by any of the columns, such as message type, by clicking the column name, for example **Target.**

2. To view a summary of the messages, in the table, for Show, select **Group by Message Type** or **Group by Message ID.**

> **See Also:** *Oracle Fusion Middleware Configuring Log Files and Filtering Log Messages for Oracle WebLogic Server* for information about the viewing and searching Oracle WebLogic Server log files using the Oracle WebLogic Server Administration Console

7.3 Viewing Log Files

You can view the log files associated each component and the contents of the log files using Fusion Middleware Control.

To view the log files for a specific component:

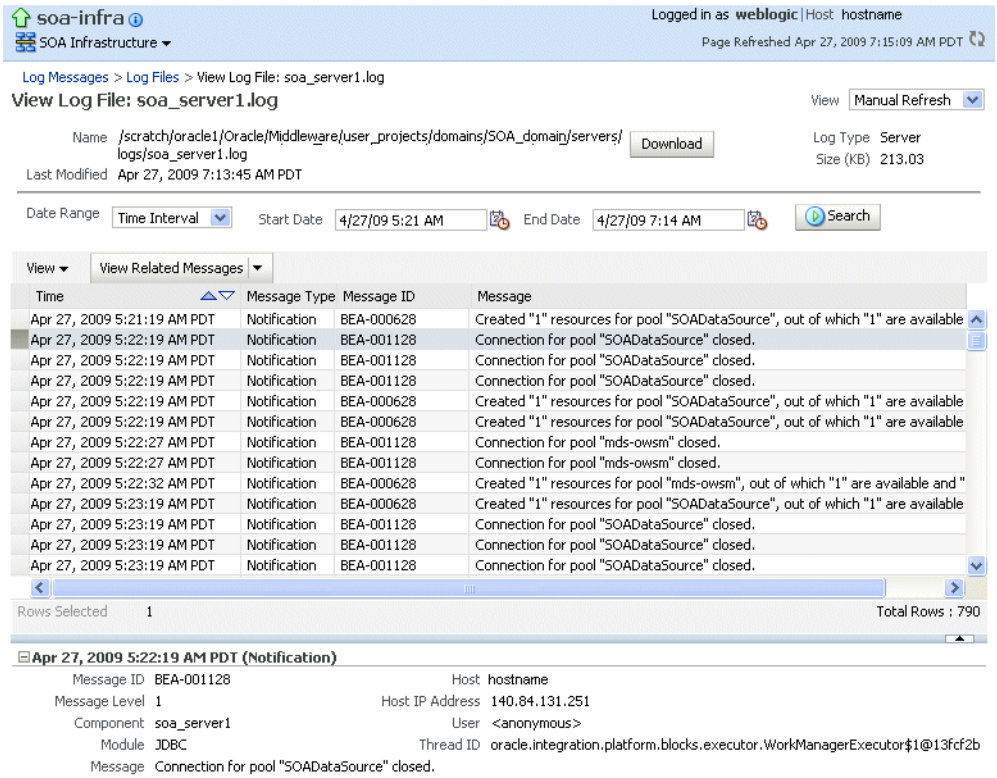
1. From the navigation pane, expand the farm. For system components, expand the installation type and select the component. For Java components, expand the farm, then the component type, and then select the component.
2. From the dynamic target menu, choose **Logs.** Then, choose **View Log Messages.**

   The Log Messages page is displayed.
3. Expand **Selected Targets** and in the row for a particular component or application, click the **Target Log Files** icon.

   The Log Files page is displayed. On this page, you can see a list of log files related to the component or application.
4. Select a file and click **View Log File**.

   The View Log Files page is displayed. On this page, you can view the list of messages, or select a message to see its details.
5. To view the details of a message, select the message.

   The details are displayed in the pane below the listing, as shown in the following figure:



WLST Command:

```
listLogs(target='target_name', oracleInstance='WLS_domain_or_instance_
home',
     [unit='size'] [fulltime])
```

7.4 Searching Log Files

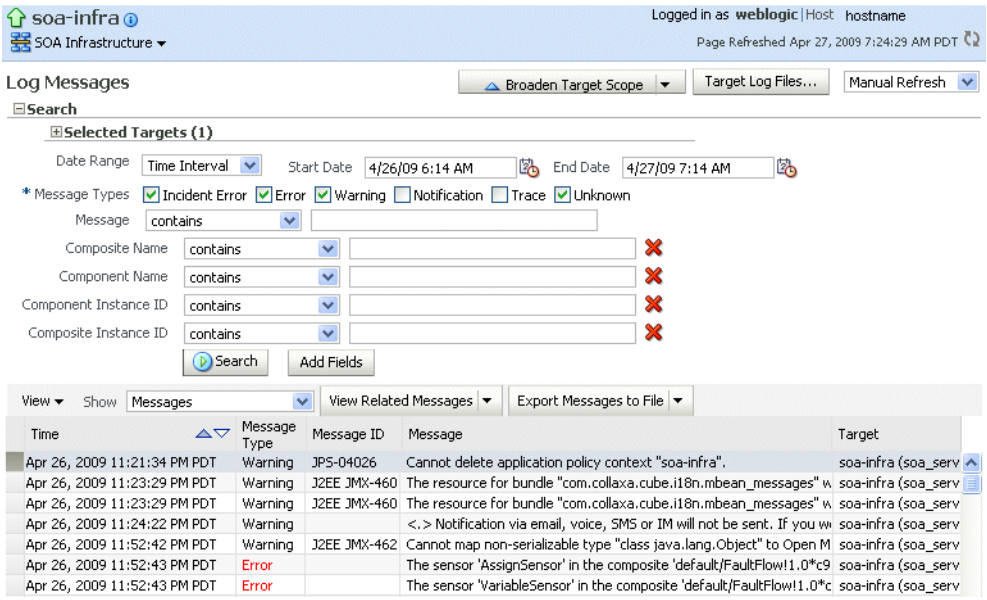
You can search for diagnostic messages by certain log file attributes by using the Log Messages page of the Fusion Middleware Control.

To search for messages:

1. From the navigation pane, expand the farm, and select the target, such as a Managed Server or Oracle HTTP Server.
2. From the dynamic target menu, choose **Logs,** then **View Log Messages.**

   The Log Messages page displays a Search section and a table that shows a summary of the messages.
3. Depending on the component you selected, this page may show targets that are related to the component. In that case, the **Selected Targets** button is displayed. To limit the targets, expand **Selected Targets,** select targets that you do not want included in the search, and click **Remove.**
4. In the Date Range section, you can select either:
   - **Most Recent:** If you select this option, select a time, such as 1 hour.
   - **Time Interval:** If you select this option, enter a **Start Date** and an **End Date.** Then, enter a **Start Time** and **End Time.**
5. In the Message Types section, select one or more of the message types.
6. Click **Search.**

   The following figure shows the Log Messages page with the results displayed:



You can also narrow your search by specifying additional criteria. For example, if you want to track a message that you saw when you viewed a log file's message (as described in Section 7.3), you can copy that message's Unique ID and use it as a search criteria. This allows you to correlate messages across components of a farm and determine which other components have messages with the same ID.

To narrow your search:

1. From the navigation pane, expand the farm. For system components, expand the installation type and select the component. For Java components, expand the farm, the domain, a Managed Server, and then select the component.
2. From the dynamic target menu, choose **Logs,** then **View Log Messages.**

   The Log Messages page displays a Search section.
3. Click **Add Fields,** select a field, then click **Add**.
4. Select an operation, such as `contains`, and enter the value. For example, if you added the field Unique ID, enter the unique ID that you copied from another message.

WLST Command:

```
displayLogs(target='target_name', oracleInstance='WLS_domain_or_instance_
home,'
      query 'MSG_TYPE eq ERROR or MSG_TYPE eq INTERNAL_ERROR',
     [groupBy='string',] [tail,] [last=num_minutes])
```

7.5 Downloading Log Files Using Fusion Middleware Control

You can download the log messages to a file, either the summary messages, messages related to a particular component or log file, or messages of a specific type.

To download the log messages to a file using Fusion Middleware Control:

1. From the navigation pane, expand the farm, then **WebLogic Domain.** Select a domain or Managed Server.
2. From the dynamic target menu, choose **Logs,** then **View Log Messages.**

   The Log Messages page is displayed.
3. Set criteria for the log messages you want displayed, as described in Section 7.4.
4. In the table, select a file type by clicking the arrow near **Export All to File.**

   You can select one of the following:

   - **As Oracle Diagnostic Log Text (.txt)**
   - **As Oracle Diagnostic Log Text (.xml)**
   - **As Comma-Separated List (.csv)**

   An Opening dialog box is displayed.
5. Either select **Open With** or **Save to Disk.** Click **OK.**

To export specific types of messages or messages with a particular Message ID to a file:

1. From the navigation pane, expand the farm, then **WebLogic Domain,** and then the domain. Select a Managed Server.
2. From the dynamic target menu, choose **Logs,** then **View Log Messages.**

   The Log Messages page is displayed.
3. Set criteria for the log messages you want displayed, as described in Section 7.4.
4. For **Show,** select **Group by Message Type** or **Group by Message ID.**

5. To download the messages into a file, if you selected Group by Message Type, select the link in one of the columns that lists the number of messages, such as the Errors column. If you selected Group by Message ID, select one of the links in the Occurrences column.

   The Messages by Message Type page or Message by Message ID is displayed.

6. Select a file type by clicking the arrow near **Export All to File.**

   You can select one of the following:

   - **As Oracle Diagnostic Log Text (.txt)**
   - **As Oracle Diagnostic Log Text (.xml)**
   - **As Comma-Separated List (.csv)**

   An Opening dialog box is displayed.

7. Either select **Open With** or **Save to Disk.** Click **OK.**

To download the log files for a specific component using Fusion Middleware Control:

1. From the navigation pane, expand the farm. For system components, expand the installation type and select the component. For Java components, expand the farm, then the component type, and then select the component.
2. From the dynamic target menu, choose **Logs,** then **View Log Messages.**

   The Log Messages page is displayed.

3. In the **Log Files** column, click a log file.

   The Log Files page is displayed. On this page, you can see a list of log files related to the component or application.

4. Select a log file and click **Download.**
5. An Opening dialog box is displayed.
6. Select either **Open With** or **Save to Disk.** Click **OK.**

WLST Command:

```
displayLogs(options, export='filename')
```

7.6 Configuring Log Settings

You can change the log settings of Managed Servers, and Java components using Fusion Middleware Control or WLST.

Note: Note that you cannot use Fusion Middleware Control or WLST to configure options for log files of system components, which are listed in Section 2.1.3.2.

To change log file settings using Fusion Middleware Control, navigate to the component's home page and choose **Logs,** then **Log Configuration** from the dynamic target menu.

You can configure the following options:

- The names and paths of log files. See Section 7.6.1.

- The size of log files: You can specify that a new file is created either when the log file reaches a certain size or when a particular time is reached. This is called **log file rotation.** See Section 7.6.2
- The log level: You can specify the amount and type of information written to log files. See Section 7.6.3.
- The log file format: You can specify whether the logs are written in text or XML format. See Section 7.6.4.

7.6.1 Changing Log File Names and Locations

By default, Oracle Fusion Middleware writes log files for Java components to the following directories:

```
(UNIX) MW_Home/user_projects/domains/domain_name/servers/server_name/logs
(Windows) MW_Home\user_projects\domains\domain_name\servers\server_name\logs
```

The default name of a log file is *server_name*-diagnostic.log.

For example, the log files for Oracle SOA Suite are:

```
(UNIX) MW_Home/user_projects/domains/domain_name/servers/server_name/logs/server_
name-diagnostic.log
(Windows) MW_Home\user_projects\domains\domain_name\servers\server_
name\logs\server_name-diagnostic.log
```

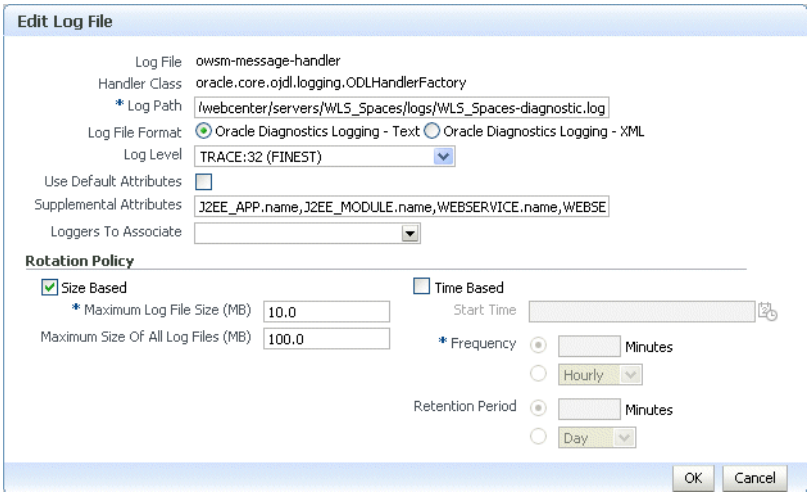
To change the name and location of a component's log file using Fusion Middleware Control, navigate to the component's home page and choose **Logs,** then **Log Configuration** from the dynamic target menu.

For example, to change the name and location of the Oracle WebCenter Spaces log file using Fusion Middleware Control:

1. From the navigation pane, expand the entities and select **WebCenter Spaces**.
2. From the WebLogic Server menu, choose **Logs,** then **Log Configuration.**

   The Log Configuration page is displayed.
3. Select the Log Files tab.
4. In the table, select the logger and click **Edit Configuration.**

   The Edit Log File dialog box is displayed, as shown in the following figure:



5. For **Log Path,** enter a new path.
6. Click **OK.**
7. In the confirmation window, click **Close.**

WLST Command:

```
configureLogHandler(name='logger_name', path='path')
```

7.6.2 Configuring Log File Rotation

An **ODL log** is a set of log files that includes the current ODL log file and zero or more **ODL Archives (segment files)** that contain older messages. As the log file grows, new information is added to the end of the log file, `log.xml`. When the log file reaches the rotation point, it is renamed and a new log file, `log.xml` is created. You specify the rotation point, by specifying the maximum ODL segment size, or, for the log files of some components, the rotation time and rotation frequency.

Segment files are created when the ODL log file `diagnostic.log` reaches the rotation point. That is, the `log.xml` is renamed to `diagnostic`*n*`.log`, where *n* is an integer, and a new `diagnostic.log` file is created when the component generates new diagnostic messages.

By default, the log files are rotated when they reach 10 MB. The maximum size of all log files for a particular component is 100 MB.

To change log file rotation for a component, navigate to the component's home page in Fusion Middleware Control and choose **Logs,** then **Log Configuration** from the dynamic target menu.

To configure log file rotation based on size:

1. From the navigation pane, expand the farm, and select the target, such as a Managed Server.
2. From the dynamic target menu, choose **Logs,** then **Log Configuration.**

   The Log Configuration page is displayed.
3. Select the Log Files tab.
4. In the table, select the logger and click **Edit Configuration.**

   The Edit Log File dialog box is displayed.
5. In the Rotation Policy section, select **Size Based.**
6. For **Maximum Log File Size,** enter the size in MB, for example, 15.
7. For **Maximum Size of All Log Files,** enter the size in MB, for example, 150.
8. Click **Apply.**

To configure log file rotation based on time:

1. From the navigation pane, expand the farm, and select the target, such as a Managed Server.
2. From the dynamic target menu, choose **Logs,** then **Log Configuration.**

   The Log Configuration page is displayed.
3. Select the Log Files tab.
4. In the table, select the logger and click **Edit Configuration.**

The Edit Log File dialog box is displayed.

5. In the Rotation Policy section, select **Time Based.**
6. For **Start Time,** enter the date when you want the rotation to start. For example, enter 10-May-2009.
7. For **Frequency,** you can select **Minutes** and enter the number of minutes, or you can select **Hourly, Daily,** or **Weekly.** In this case, select **Hourly.** The log files will be rotated each hour.
8. For **Retention Period,** you can specify how long the log files are kept. You can select **Minutes** and enter the number of minutes, or you can specify **Day, Week**, **Month,** or **Year.** In this case, select **Month.**

   Specifying a shorter period means that you will use less disk space, but will not be able to retrieve older information.
9. Click **OK.**

WLST Command:

```
configureLogHandler(name='logger_name', rotationFrequency='frequency',
                    baseRotationTime='time', retentionPeriod=minutes)
```

7.6.3 Setting Log Levels

You can configure the amount and type of information written to log files by specifying the message type and level. For each message type, possible values for message level are from 1 (highest severity) through 32 (lowest severity). The lower severity levels write more information to the log files. Generally, you need to specify only the type; you do not need to specify the level.

Table 7–1 shows the message types and the most common levels for each type.

Table 7–1 Diagnostic Message Types and Level

Message Type	Level	Description
INCIDENT_ERROR	1	A serious problem, such as one from which you cannot recover. The problem may be caused by a bug in the product and that should be reported to Oracle Support.
ERROR	1	A serious problem that requires immediate attention from the administrator and is not caused by a bug in the product.
WARNING	1	A potential problem, such as invalid parameter values or a specified file that does not exist, that should be reviewed by the administrator.
NOTIFICATION	1	A major lifecycle event such as the activation or deactivation of a primary sub-component or feature. This is the default level for NOTIFICATION.
NOTIFICATION	16	A finer level of granularity for reporting normal events.
TRACE	1	Trace or debug information for events that are meaningful to end users of the product, such as public API entry or exit points.
TRACE	16	Detailed trace or debug information that can help Oracle Support diagnose problems with a particular subsystem.

Table 7–1 (Cont.) Diagnostic Message Types and Level

Message Type	Level	Description
TRACE	32	Very detailed trace or debug information that can help Oracle Support diagnose problems with a particular subsystem.

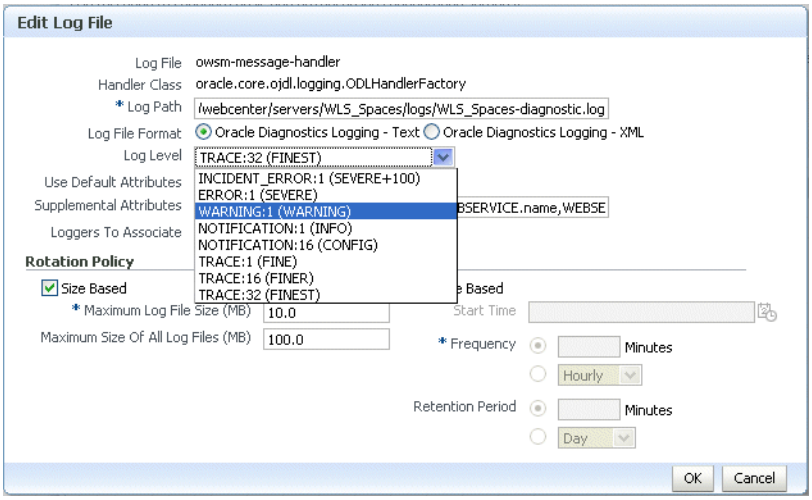
To change message level for a component, navigate to the component's home page in Fusion Middleware Control and choose **Logs,** then **Log Configuration** from the dynamic target menu.

To set the message level for a component log file:

1. From the navigation pane, expand the farm, and select the target.
2. From the dynamic target menu, choose **Logs,** then **Log Configuration.**

   The Log Configuration page is displayed.
3. Select the Log Files tab.
4. In the table, select the log file and click **Edit Configuration.**

   The Edit Log File dialog box is displayed, as shown in the following figure:

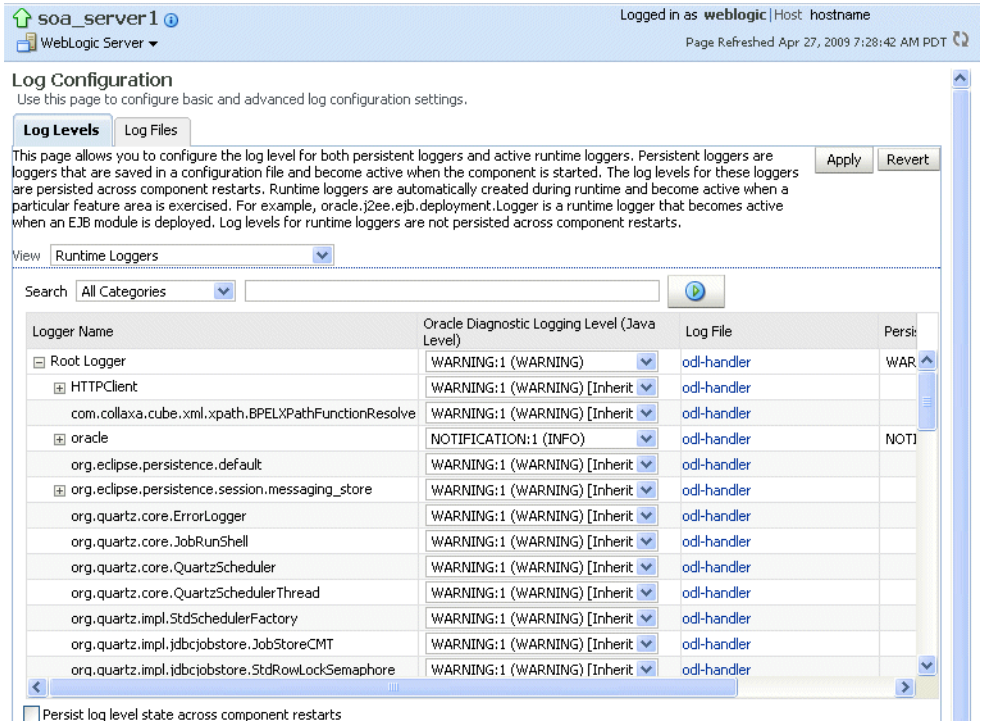


5. For **Log Level,** select the logging level. For example, select **NOTIFICATION:1 (INFO)**
6. Click **OK.**
7. In the confirmation window, click **Close.**

To set the message level for one or more loggers for a component:

1. From the navigation pane, expand the farm, and select the target.
2. From the dynamic target menu, choose **Logs,** then **Log Configuration.**

   The Log Configuration page is displayed.
3. Select the **Log Levels** tab, which is shown in the following figure:



4. For **View,** select **Runtime Loggers** or **Loggers with Persistent Log Level State.**

   Run-time loggers are loggers that are currently active. Persistent loggers are loggers that are saved in a configuration file and log levels of these loggers are persistent across component restarts. A run-time logger can also be a persistent logger, but not all run-time loggers are persistent loggers.

5. In the table, to specify the same level for all loggers, select the logging level for **Root Logger** for run-time loggers or **oracle** for persistent loggers. Then, for the child loggers, specify **Inherit from Parent.** For most situations, that is sufficient.

   However, if you need to specify the level for a particular logger, expand **Root Logger** or **oracle,** then, for the logger that you want to modify, select the logging level. For example, for the logger oracle.wsm.management.logging, select **WARNING:1 (WARNING).**

6. Click **Apply.**

WLST Command:

```
setLogLevel(target='target_name, 'logger=logger_name,
   level='type[:level], [runtime=0_or_1], [persist=0_or_1])
```

7.6.4 Specifying the Log File Format

By default, information is written to log files in ODL text format. You can change the format to ODL XML format.

To change the format of the log file using Fusion Middleware Control:

1. From the navigation pane, expand the farm, and select the target, such as a component.

2. From the dynamic target menu, choose **Logs,** then **Log Configuration.**

The Log Configuration page is displayed.

3. Select the Log Files tab.
4. In the table, select the log file and click **Edit Configuration.**

   The Edit Log File dialog box is displayed.
5. For Log File Format, select **Oracle Diagnostics Logging - XML.**
6. Click **OK.**
7. In the confirmation window, click **Close.**

WLST Command:

```
configureLogHandler(name="odl-handler", format="ODL-XML"))
```

7.7 Learn More

For more information about the topics covered in this chapter and other logging and diagnostic topics, see "Managing Log Files" in the *Oracle Fusion Middleware Administrator's Guide*.

8

Backing Up and Recovering Oracle Fusion Middleware

Backup and recovery refers to the strategies and procedures involved in guarding against hardware failures and data loss, and reconstructing data should a loss occur.

This chapter contains the following topics:

8.1 Overview of Backup and Recovery

An Oracle Fusion Middleware environment can consist of different components and configurations. A typical Oracle Fusion Middleware environment contains an Oracle WebLogic Server domain with Java component such as Oracle SOA Suite and an Oracle WebLogic Server domain with Identity Management components. It can also include one or more Oracle instances.

The installations of an Oracle Fusion Middleware environment are interdependent in that they contain configuration information, applications, and data that are kept in synchronization. For example, when you perform a configuration change, you might update configuration files in the installation. When you deploy an application, you might deploy it to all Managed Servers in a domain or cluster.

It is, therefore, important to consider your entire Oracle Fusion Middleware environment when performing backup and recovery. You should back up your entire Oracle Fusion Middleware environment at once, then periodically. If a loss occurs, you can restore your environment to a consistent state.

8.1.1 Understanding Backup Operations

To back up your Oracle Fusion Middleware environment, you can use:

- File copy utilities such as copy, xcopy, or jar.

  For example, for online backups on Windows, use copy; for offline backups on Windows, use copy, xcopy, or jar. Do not use Winzip because it does not work with long filenames or extension.

  For example, for Linux and UNIX, use tar.

Make sure that the tool you are using preserves the permissions of the files.

- Oracle Recovery Manager (RMAN) to back up database-based metadata repositories.
- Oracle WebLogic Server Pack and Unpack Utility

  The pack command creates a template archive (.jar) file that contains a snapshot of either an entire Oracle WebLogic Server domain or a subset of a domain. You can use a template that contains a subset of a domain to create an Oracle WebLogic Server domain directory hierarchy on a remote computer.

  Alternatively, you can use a template that contains an entire domain to create the the domain on a remote computer.

  See Also: *Oracle Fusion Middleware Creating Templates and Domains Using the Pack and Unpack Commands*

8.1.1.1 Types of Backups

- A **full offline backup** means that you must shut down the environment before backing up the files. When you perform an offline backup, the Administration Server, all Managed Servers in the Oracle WebLogic Server domain, and all system components in the Oracle instances should be shut down.

  Back up the environment offline immediately after installation and after applying any patches or upgrades.
- An **online backup** means that you do not shut down the environment before backing up the files. To avoid an inconsistent backup, do not make any configuration changes until the backup is completed. To ensure that no changes are made in the Oracle WebLogic Server domain, lock the WebLogic Server configuration, as described in Section 2.1.2.2.

You can perform backups on your full Oracle Fusion Middleware environment, or on the run-time artifacts, those files that change frequently.

To perform a full backup, you should back up the static files and directories, as well as run-time artifacts.

Static files and directories are those that do not change frequently. These include:

- The Middleware home, MW_HOME. A Middleware home consists of an Oracle home and a WL_HOME (the Oracle WebLogic Server product directories.) It can also contain the user_projects directories and an Oracle instance, which are not static files.
- OraInventory
- OraInst.loc and oratab files, which are located in the following directory:

  ```
  /etc
  ```

- The beahomelist file, which is located at:

  ```
  (UNIX) user_home/bea/beahomelist
  (Windows) C:\bea\beahomelist
  ```

- On Windows, the following registry key:

  ```
  HKEY_LOCAL_MACHINE\\Software\oracle
  ```

  In addition, for system components, such as Oracle Web Cache, you must back up the following Windows Registry key:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services
```

Run-time artifacts are those files that change frequently. Back up these files when you perform a full backup and on a regular basis. Run-time artifacts include:

- Domain directories of the Administration Server and the Managed Servers (by default, a domain directory resides in MW_HOME, but it can be configured by the user to point to a different location)

  In most cases, you do not need to back up Managed Server domain directories separately because the Administration Server contains information about all of the Managed Servers in its domain.

- All Oracle instance homes, which reside, by default, in the MW_HOME but can be configured to be in a different location

- Application artifacts, such as .ear or .war files

  You do not need to backup application artifacts in a Managed Server domain because they can be pulled from the Administration Server during Managed Server startup.

- Database artifacts such as the MDS repository

- Any database-based metadata repositories used by Oracle Fusion Middleware. You use Oracle Recovery Manager (RMAN) to back up an Oracle database.

- Persistent stores, such as JMS Providers and transaction logs, which reside, by default in the user_projects directory, but can be configured in a different location.

8.1.1.2 Recommended Backup Strategy

This section outlines the recommended strategy for performing backups. Using this strategy ensures that you will be able to perform the recovery procedures in this book.

- **Perform a full offline backup:** This involves backing up the entities described in Section 8.1.1.1. Perform an offline full backup at the following times:
  - Immediately after you install Oracle Fusion Middleware.
  - Immediately after an operating system software upgrade.
- **Perform an online backup of run-time artifacts:** This involves backing up the run-time artifacts described in Section 8.1.1.1. Backing up the run-time artifacts enables you to restore your environment to a consistent state as of the time of your most recent configuration and metadata backup. To avoid an inconsistent backup, do not make any configuration changes until backup completes. Perform an online backup of run-time artifacts at the following times:
  - On a regular basis. Oracle recommends that you back up run-time artifacts nightly.
  - Prior to making configuration changes to a component or cluster.
  - After making configuration changes to a component or cluster.
  - Prior to deploying a custom Java EE application to a Managed Server or cluster.
  - After a major change to the deployment architecture, such as creating servers or clusters.
- **Perform an offline backup of static files and directories:** This involves backing up the static files and directories described in Section 8.1.1.1. Perform an offline backup of static files and directories at the following times:

  - After patching your Oracle Fusion Middleware environment. This backup serves as the basis for subsequent online backups.
  - After upgrading your Oracle Fusion Middleware environment. This backup serves as the basis for subsequent online backups.

To avoid an inconsistent backup, do not make any configuration changes until the backup is completed. To ensure that no changes are made in the Oracle WebLogic Server domain, lock the Oracle WebLogic Server configuration, as described in Section 2.1.2.2.

8.1.2 Understanding Recovery Operations

Recovery strategies enable you to recover from critical failures that involve actual data loss. Depending on the type of loss, they can involve recovering any combination of the following types of files:

- Oracle software files
- Configuration files
- Metadata Repository files
- Oracle system files
- Windows Registry key
- Application artifacts

You can recover your Oracle Fusion Middleware environment while Oracle Fusion Middleware is offline.

To recover your Oracle Fusion Middleware environment, you can use:

- File copy utilities such as copy, xcopy or tar.

  When you restore the files, use your preferred tool to extract the compressed files.

  For example, for online recovery on Windows, use copy; for offline recovery on Windows, use copy, xcopy, or jar. Do not use Winzip because it does not work with long filenames or extension.

  For example, for Linux and UNIX, use tar.

- Oracle Recovery Manager (RMAN) to recover database-based metadata repositories.

8.1.2.1 Types of Recovery

You can recover your Oracle Fusion Middleware environment in part or in full. You can recover the following:

- An Oracle WebLogic Server domain
- The Oracle WebLogic Server Administration Server
- A Managed Server
- The Middleware home
- An Oracle instance
- A component, such as Oracle HTTP Server or Oracle Web Cache
- A cluster
- Deployed applications

8.1.2.2 Recommended Recovery Strategies

Note the following key points about recovery:

- Your Oracle Fusion Middleware environment must be offline while you are performing recovery.
- Rename important existing files and directories before you begin restoring the files from backup so that you do not unintentionally override necessary files.
- Although, in some cases, it may appear that only one or two files are lost or corrupted, you should restore the directory structure for the entire element, such as an Oracle instance or a component, rather than just restoring one or two files. In this way, you are more likely to guarantee a successful recovery.
- Recover the database to the most current state, using point-in-time recovery (if the database is configured in Archive Log Mode). This is typically a time right before the database failure occurred.

8.2 Backing Up Your Environment

The following sections describe how to perform different types of backups:

- Performing a Full Offline Backup
- Performing an Online Backup of Run-Time Artifacts

8.2.1 Performing a Full Offline Backup

To perform a full offline backup, you copy the directories that contain Oracle Fusion Middleware files.

Archive and compress the source Middleware home, using your preferred tool for archiving. Make sure that the tool you are using preserves the permissions of the files.

For example, for online backups on Windows, use copy; for offline backups on Windows, use copy, xcopy, or jar.

For example, for Linux and UNIX, use tar.

The following example shows how to archive and compress the source on Linux:

```
cd Source_Middleware_Home
tar cf - * | gzip > Middleware_Home.tar.gz
```

The tar utility may issue warnings if the sticky bit is set on some files. You can safely ignore these warnings.

Do not use the jar utility to archive and compress the file system. This avoids warnings or errors from the zip tool about zipping open files (for example, the *ORACLE_HOME*/jdk files).

To perform a full online backup:

1. To avoid an inconsistent backup, do not make any configuration changes until the backup is completed. To ensure that no changes are made in the Oracle WebLogic Server domain, lock the WebLogic Server configuration, as described in Section 2.1.2.2.
2. Back up the Middleware home (MW_HOME) on all hosts. For example:

   ```
   tar -cf mw_home_backup_033009.tar MW_HOME/*
   ```

3. If the domain is not located within the Middleware home, back up the Administration Server domain separately. This backs up Java components such as Oracle SOA Suite and Oracle WebCenter.

   For example:

   ```
   tar -cf domain_home_backup_033009.tar MW_HOME/user_projects/domains/domain_
   name/*
   ```

   In most cases, you do not need to backup the Managed Server directories separately, because the Administration Server domain contains information about the Managed Servers in its domain. The recommended recovery procedures for Managed Servers call for restoring the Middleware home and using the pack and unpack utilities.

4. If the Oracle instance home is not located within the Middleware home, back up the Oracle instance home. The Oracle instance home contains configuration information about system components, such as Oracle HTTP Server or Oracle Internet Directory. (See Section 2.1.3.2 for a list of system components.)

   For example:

   ```
   tar -cf instance_home_backup_033009.tar ORACLE_INSTANCE/*
   ```

5. If a Managed Server is not located within the domain, back up the Managed Server directory. For example:

   ```
   tar -cf mg1_home_backup_033009.tar MW_HOME/user_projects/domains/domain_
   name/servers/server_name/*
   ```

6. Backup the OraInventory directory. For example:

   ```
   tar -cf Inven_home_backup_033009 /scratch/oracle/OraInventory
   ```

7. Back up OraInst.loc and oratab files, which is located in the following directory:

   ```
   /etc
   ```

8. Backup the database repositories using the Oracle Recovery Manager (RMAN). For detailed steps, see the *Oracle Database Backup and Recovery User's Guide*, which is available at:

   http://www.oracle.com/technology/documentation/database.html

9. On Windows, export the following registry key:

   ```
   HKEY_LOCAL_MACHINE\Software\oracle
   ```

   In addition, for system components, such as Oracle Web Cache, export the following Windows Registry key:

   ```
   HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services
   ```

   To export a key, use the following command:

   ```
   regedit /E  FileName Key
   ```

   For example:

   ```
   regedit /E C:\oracleregistry.reg HKEY_LOCAL_MACHINE/oracle
   ```

   You can also use the Registry Editor to export the key. See the Registry Editor Help for more information.

10. Create a record of your Oracle Fusion Middleware environment. See Section 8.4.

8.2.2 Performing an Online Backup of Run-Time Artifacts

You should perform a backup of run-time artifacts on a regular basis and at the times described in Section 8.1.1.2.

To back up run-time artifacts:

1. To avoid an inconsistent backup, do not make any configuration changes until the backup is completed. To ensure that no changes are made in the Oracle WebLogic Server domain, lock the WebLogic Server configuration, as described in Section 2.1.2.2.
2. Back up the Oracle WebLogic Server domain directories. This backs up Java components such as Oracle SOA Suite and Oracle WebCenter. For example:

   ```
   tar -cf domain_home_backup_033009.tar MW_HOME/user_projects/domains/domain_name/*
   ```

3. Back up the Oracle instance home. This backs up the system components, such as Oracle HTTP Server. For example:

   ```
   tar -cf instance_home_backup_033009.tar ORACLE_INSTANCE/*
   ```

4. Backup the database repositories using the Oracle Recovery Manager (RMAN). For detailed steps, see the *Oracle Database Backup and Recovery User's Guide*, which is available at:

   http://www.oracle.com/technology/documentation/database.html

5. Create a record of your Oracle Fusion Middleware environment. See Section 8.4.

8.3 Recovering After Data Loss, Corruption, or Media Failure

This section describes recovery strategies for outages that involve actual data loss or corruption, or media failure where the disk cannot be restored. This type of failure requires some type of data restoration before the Oracle Fusion Middleware environment can be restarted and continue with normal processing. It contains the following topics:

- Recovering a Middleware Home
- Recovering an Oracle WebLogic Server Domain
- Recovering the Administration Server Configuration
- Recovering a Managed Server
- Recovering an Oracle Instance
- Recovering Components

8.3.1 Recovering a Middleware Home

You can recover a Middleware home that was corrupted or from which files were deleted.

To recover a Middleware home:

1. Stop all relevant processes. That is, stop all processes that are running from that Middleware home.

For example, stop the Oracle WebLogic Server processes and the Node Manager processes. To stop the Administration Server, use the following WLST command:

```
DOMAIN_HOME/bin/stopWeblogic.sh username password admin_url
```

2. Recover the Middleware home directory from backup. For example, on Linux:

```
cd MW_HOME
(UNIX) tar -xf mw_home_backup_033009.tar
(Windows) jar xtf mw_home_backup_033009.jar
```

3. Start all relevant processes. That is, start all processes that run in that Middleware home. For example, to start the Administration Server:

```
DOMAIN_HOME/bin/startWebLogic.sh -Dweblogic.management.username=username
 -Dweblogic.management.password=password
 -Dweblogic.system.StoreBootIdentity=true
```

8.3.2 Recovering an Oracle WebLogic Server Domain

You can recover an Oracle WebLogic Server domain that was corrupted or deleted from the file system

> **Caution:** Performing a domain-level recovery can impact other aspects of a running system and all of the configuration changes performed after the backup was taken will be lost.

To recover an Oracle WebLogic Server domain that was corrupted or deleted from the file system:

1. Stop all relevant processes. That is, stop all processes that are related to the domain. For example, stop the Administration Server and Managed Servers. You can use the Oracle WebLogic Server Administration Console, WLST, or the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/stopWeblogic.sh
      username  password admin_url
```

2. Recover the domain directory from backup.

```
cd MW_HOME/user_projects/domains/domain_name
(UNIX) tar -xf domain_backup_033009.tar
(Windows) jar xtf domain_backup_033009.jar
```

3. Start all relevant processes. That is, start all processes that are related to the domain. For example, start the Administration Server:

```
MW_HOME/user_projects/domains/domain_name/bin/startWebLogic.sh
  -Dweblogic.management.username=weblogic
 -Dweblogic.management.password=password
 -Dweblogic.system.StoreBootIdentity=true
```

8.3.3 Recovering the Administration Server Configuration

If the Administration Server configuration has been lost because of file deletion or file system corruption, the Administration Server console will continue to function if it was already started when the problem occurred. The Administration Server directory will be regenerated automatically, except for security information. As a result,

whenever you start the Administration Server, it prompts for a user name and password. To prevent this, you can recover the configuration.

> **Caution:** Performing a domain-level recovery can impact other aspects of a running system and all of the configuration changes performed after the backup was taken will be lost.

To recover the Administration Server configuration:

1. Stop all processes, including the Administration Server, Managed Servers, and Node Manager if they are started. You can use the Oracle WebLogic Server Administration Console, WLST, or a script. For example, to stop the Administration Server on Linux, use the following command:

   ```
   MW_HOME/user_projects/domains/domain_name/bin/stopWeblogic.sh username password
   admin_url
   ```

2. Recover the Administration Server configuration by recovering the domain home backup to a temporary location. Then, restore the config directory to the following location:

   ```
   MW_HOME/user_projects/domains/domain_name/config
   ```

3. Start the Administration Server. You can use the Oracle WebLogic Server Administration Console, WLST, or the following command:

   ```
   MW_HOME/user_projects/domains/domain_name/bin/startWebLogic.sh
   -Dweblogic.management.username=weblogic
    -Dweblogic.management.password=password
    -Dweblogic.system.StoreBootIdentity=true
   ```

4. Verify that the Administration Server starts properly and is accessible.

On the next configuration change, the configuration from the Administration Server is pushed to the Managed Servers. On each Managed Server restart, the configuration is pulled from the Administration Server.

8.3.4 Recovering a Managed Server

In this scenario, the Managed Server does not operate properly or cannot be started because the configuration has been deleted or corrupted or the configuration was mistakenly changed and you cannot ascertain what was changed.

To recover a Managed Server when it cannot be started:

1. If the Administration Server is not reachable, recover the Administration Server, as described in Section 8.3.3.
2. If the Managed Server fails to start or if the file system is lost, take the following steps:
   a. Recover the Middleware home from the backup, if required.

      ```
      tar -xf mw_home_backup_033009.tar
      ```

   b. Create a domain template jar file for the Administration Server, using the pack utility. For example:

      ```
      pack.sh -domain=/scratch/Oracle/Middleware/user_projects/domains/domain_
      name
        -template=/scratch/temp.jar -template_name=test_install
      ```

```
   -template_author=myname -log=/scratch/logs/my.log -managed=true
```

Specifying the -managed=true option packs up only the Managed Servers. If you want to pack the entire domain, omit this option.

c. Unpack the domain template jar file, using the unpack utility:

```
unpack.sh -template=/scratch/aime1/ms.jar
   -domain=/scratch/Oracle/Middleware/user_projects/domains/domain_name
   -log=/scratch/logs/new.log -log_priority=info
```

d. Make sure that the application artifacts are accessible from the Managed Server host. That is, if the application artifacts are not on the same server as the Managed Server, they must be in a location accessible by the Managed Server.

Note:

- For stage mode applications, the Administration Server takes care of pushing the bits to the stage directories in the Managed Server.
- For no-stage and external-stage applications, make sure that application files are available in the stage directories of the Managed Server.

See *Oracle Fusion Middleware Deploying Applications to Oracle WebLogic Server* for information about stage, no-stage, and external-stage mode applications.

---

e. Start the Managed Server. You can use the Oracle WebLogic Server Administration Console, WLST, or the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/startManagedWebLogic.sh
      managed_server_name admin_url username password
```

The Managed Server connects to the Administration Server and updates its configuration changes.

8.3.5 Recovering an Oracle Instance

The following topics describe how to recover an Oracle instance:

- Recovering After Oracle Instance Home Deleted from File System
- Recovering After Oracle Instance Home Deleted from Oracle Fusion Middleware

8.3.5.1 Recovering After Oracle Instance Home Deleted from File System

You can recover an Oracle instance home after it was corrupted or erroneously deleted from the file system.

To recover an Oracle instance home that was corrupted or deleted from the file system:

1. Stop all relevant processes. That is, stop all processes that are related to that Oracle instance.

   ```
   opmnctl stopall
   ```

2. Recover the Oracle instance home directory from a backup file. For example:

```
cd ORACLE_INSTANCE
(UNIX) tar -xf Instance_home_backup_033009.tar
(Windows) jar xtf Instance_home_backup_033009.jar
```

3. Start all relevant processes. That is, start all processes that are related to that Oracle instance:

```
opmnctl startall
```

8.3.5.2 Recovering After Oracle Instance Home Deleted from Oracle Fusion Middleware

You can recover an Oracle instance home after it was erroneously deleted from Oracle Fusion Middleware.

To recover an Oracle instance home that was deleted from your Oracle Fusion Middleware environment:

1. Recover the Oracle instance home directory from a backup file. For example, on Linux:

```
cd ORACLE_INSTANCE
tar -xf Instance_home_backup_033009.tar
```

2. Register the Oracle instance, along with all of its components, with the Administration Server, using the opmnctl `registerInstance` command. For example:

```
opmnctl registerInstance -adminHost admin_server_host
     -adminPort admin_server_port -adminUsername username
     -adminPassword password
     -oracleInstance ORACLE_INSTANCE_dir -oracleHome ORACLE_HOME_dir
     -instanceName Instance_name -wlserverHome Middleware_Home
```

8.3.6 Recovering Components

The following topics describe how to recover a component:

- Recovering After Component's Files Are Deleted or Corrupted
- Recovering Components After Cluster Configuration Change

8.3.6.1 Recovering After Component's Files Are Deleted or Corrupted

You can restore a component's files if they are deleted or corrupted or if the component cannot be started or is not functioning properly because the component's configuration was changed and committed. You may not be able to ascertain what change is causing the problem and you want to revert to an earlier version.

To recover a component, the steps you take depend on the type of component:

- For Java components, such as Oracle SOA Suite, you recover the Managed Server, as described in Section 8.3.4.
- For system components, such as Oracle HTTP Server or Oracle Web Cache:
  1. Stop the component. For example, to stop Oracle HTTP Server:

     ```
     opmnctl stopproc ias-component=HTTP_Server
     ```

     For information on stopping components, see Section 3.4.4.
  2. Recover the component-specific files from backup. See the *Oracle Fusion Middleware Administrator's Guide* for a list of the directories and files needed

for each component. For example, to recover Oracle HTTP Server files, you recover the following directories:

```
ORACLE_INSTANCE/config/OHS/component_name
ORACLE_INSTANCE/diagnostics/logs/OHS/component_name
ORACLE_INSTANCE/tmp/OHS/component_name
```

3. Start the component. For example, to start Oracle HTTP Server:

```
opmnctl startproc ias-component=HTTP_Server
```

For information on starting components, see Section 3.4.4.

8.3.6.2 Recovering Components After Cluster Configuration Change

You can recover components in a cluster that cannot be started or are not functioning properly because the configuration was changed and committed at the cluster level. You may not be able to ascertain what change is causing the problem and you want to revert to an earlier version.

> **Caution:** Performing a domain-level recovery can impact other aspects of a running system and all of the configuration changes performed after the backup was taken will be lost.

To recover the components:

1. Stop all processes, such as the Managed Servers and the Administration Server. You can use the Oracle WebLogic Server Administration Console, WLST or a script. For example, to stop the Administration Server on Linux, use the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/stopWeblogic.sh
       username password admin_url
```

2. Recover the Administration Server configuration by recovering the domain home backup to a temporary location. Then, restore the config directory to the following location:

```
MW_HOME/user_projects/domains/domain_name/config
```

3. Start the Administration Server. You can use the Oracle WebLogic Server Administration Console, WLST, or the following command:

```
MW_HOME/user_projects/domains/domain_name/bin/startWebLogic.sh
 -Dweblogic.management.username=weblogic
 -Dweblogic.management.password=password
 -Dweblogic.system.StoreBootIdentity=true
```

4. Start the cluster. You can use the Oracle WebLogic Server Administration Console or WLST. For example, to use the WLST start command:

```
start('clusterName', 'Cluster')
```

The latest configuration is pulled from the Administration Server to every member of the cluster.

8.4 Creating a Record of Your Oracle Fusion Middleware Configuration

In the event you need to restore and recover your Oracle Fusion Middleware environment, it is important to have all the necessary information at your disposal. This is especially true in the event of a hardware loss that requires you to reconstruct all or part of your Oracle Fusion Middleware environment on a new disk or host.

You should maintain an up-to-date record of your Oracle Fusion Middleware environment that includes the information listed in this section. You should keep this information both in hardcopy and electronic form. The electronic form should be stored on a host or e-mail system that is completely separate from your Oracle Fusion Middleware environment.

Your Oracle Fusion Middleware hardware and software configuration record should include:

- The following information for each host in your environment:
  - Host name
  - Virtual host name (if any)
  - Domain name
  - IP address
  - Hardware platform
  - Operating system release level and patch information
- The following information for each Oracle Fusion Middleware installation in your environment:
  - Installation type (for example, Oracle SOA Suite)
  - Host on which the installation resides
  - User name, userid number, group name, groupid number, environment profile, and type of shell for the operating system user that owns the Oracle home (`/etc/passwd` and `/etc/group` entries)
  - Directory structure, mount points, and full path for the Middleware home, Oracle home, Oracle WebLogic Server domain home (if it does not reside in the user_projects directory in the Middleware home), and the Oracle instance home
  - Amount of disk space used by the installation
  - Port numbers used by the installation
- The following information for the Metadata Repository:
  - Host name
  - Database version and patch level
  - Base language
  - Character set
  - Global database name
  - SID

8.5 Learn More

For more information about backing up and recovering Oracle Fusion Middleware, see the following topics in the *Oracle Fusion Middleware Administrator's Guide*:

- "Introducing Backup and Recovery," which provides more in-depth information about backup and recovery strategies
- "Backup Strategies and Procedures," which provides additional information about backing up your environment
- "Recovery Strategies and Procedures," which provides additional information about selective recovery of WebLogic Servers, Oracle instances, components, and applications. It also explains how to recover in the case of loss of host.

9

Scaling Your Environment

You can expand your environment by adding Managed Servers, expanding your WebLogic Server domain to include other products, or cloning existing Middleware homes and Oracle homes as described by the following topics:

9.1 Overview of Scaling Your Environment

Scalability is the ability of a system to provide throughput in proportion to, and limited only by, available hardware resources. A scalable system is one that can handle increasing numbers of requests without adversely affecting response time and throughput.

The growth of computational power within one operating environment is called vertical scaling. Horizontal scaling is leveraging multiple systems to work together on a common problem in parallel.

Oracle Fusion Middleware scales both vertically and horizontally. Horizontally, Oracle Fusion Middleware can increase its throughput with several Managed Servers grouped together to share a workload. Also, Oracle Fusion Middleware provides great vertical scalability, allowing you to add more Managed Servers or components in the same node.

High availability refers to the ability of users to access a system. Deploying a high availability system minimizes the time when the system is down, or unavailable and maximizes the time when it is running, or available. Oracle Fusion Middleware is designed to provide a wide variety of high availability solutions, ranging from load balancing and basic clustering to providing maximum system availability during catastrophic hardware and software failures.

High availability solutions can be divided into two basic categories: local high availability and disaster recover.

> **See Also:** *Oracle Fusion Middleware High Availability Guide* for more information about high availability

9.2 Extending a WebLogic Server Domain to Support Additional Components

When you create a WebLogic Server domain, you create it using a particular domain template. That template supports a particular component or group of components, such as the Oracle SOA Suite. If you want to add other components, such as Oracle WebCenter, to that domain, you can extend the domain by creating additional Managed Servers in the domain, using a domain template for the component which you want to add.

When you extend a domain, the domain must be offline.

To extend a domain, you use the Oracle WebLogic Server Configuration Wizard from an Oracle home into which the desired component has been installed. Then, you select the domain that you want to extend and the component you want to add.

For example, to extend a domain that was initially created to support Oracle SOA Suite so that it can now also support Oracle WebCenter:

1. Use RCU to add any required schemas for the component, as described in Section 3.2.1.
2. Install Oracle WebCenter, as described in the *Oracle Fusion Middleware Installation Guide for Oracle WebCenter*.
3. From an Oracle home that was installed for the component you want to add, (for example, for Oracle WebCenter), invoke the Configuration Wizard, using the following command:

   ```
   (UNIX) ORACLE_HOME/common/bin/config.sh
   (Windows) ORACLE_HOME\common\bin\config.cmd
   ```

   The Configuration Wizard's Welcome screen is displayed.
4. Select **Extend an existing WebLogic Domain.**
5. Click **Next.**

   The Select a WebLogic Domain Directory screen is displayed.
6. Select the directory for the domain to which you want to add the components.
7. Click **Next.**

   The Select Extension Source screen is displayed.
8. Select the source from which this domain will be extended. For example, select **Oracle WebCenter Spaces.**
9. Click **Next.**

   The Conflict Detected dialog box is displayed.
10. Select **Keep existing component** and **Apply this selection if further conflicts are detected.** Click **OK.**

    The Configure JDBC Data Sources screen is displayed.
11. Enter the following information:
    - For **Vendor,** select **Oracle.**
    - For **Driver,** select **Oracle's Driver (Thin) for Service connections; Versions:9.0.1,9.2.0,10,11.**

- For **Schema Owner,** do not enter anything. Each data source uses the user name specified in the table.
- If you used the same password when you created the schemas, select all of the schemas and enter the password in **Schema Password.**

  Alternatively, you can specify different passwords for each data source by entering them in the password column of the table.
- With all of the schemas selected, for **DBMS/Service**, enter the SID of the database.
- With all of the schemas selected, for **Host Name,** enter the host name of the database.
- With all of the schemas selected, for **Port,** enter the listening port of the database.

12. Click **Next.**

    The Customize Server and Cluster Configuration screen is displayed.
13. In this and the following customization screens, you can choose to customize. to do so, click **Yes.** If you do not want to customize the settings, click **No.**
14. Click **Next.**
15. Click **Next.**

    The Review WebLogic Domain screen is displayed.
16. In the Review WebLogic Domain screen, review the information on the screen and if it is correct, click **Next.**

    The Extend WebLogic Domain screen is displayed.
17. Click **Extend.**
18. When the operation completes, click **Done.**

> **See Also:** Oracle WebLogic Server Administration Console Online Help for more information about creating additional Managed Servers

9.3 Adding Additional Managed Servers to a WebLogic Server Domain

You can add Managed Servers to a domain to increase the capacity of your system. The Managed Server can be added to a cluster.

When a Managed Server is added to a cluster, it inherits the applications and services that are targeted to the cluster. When a Managed Server is added to a domain, it does not automatically inherit the applications and services from the template.

To add Managed Server to a domain, you can use the Oracle WebLogic Server Administration Console or WLST.

> **See:** Administration Console Online Help and *Oracle Fusion Middleware WebLogic Scripting Tool Command Reference* for complete information about adding Managed Servers.

To create an additional Managed Server using the Administration Console:

1. Display the Administration Console, as described in Section 2.1.2.1.
2. Lock the Oracle WebLogic Server configuration, as described in Section 2.1.2.2.

3. In the left pane, expand **Environment,** then select **Servers.**
4. In the Servers table, click **New.**

   The Create a New Server: Server Properties page is displayed.
5. Enter the following information:
   - For **Name,** enter a name for the server.

     Each server within a domain must have a name that is unique for all configuration objects in the domain. Within a domain, each server, computer, cluster, JDBC connection pool, virtual host, and any other resource type must be named uniquely and must not use the same name as the domain.
   - For **Listen Address,** if you want to limit the valid addresses for a server instance, enter an IP address or DNS name. Otherwise, URLs to the server can specify any of the host computer's IP address, any DNS name that maps to one of the IP addresses, or the localhost string.
   - For **Listen Port,** enter the port number from which you want to access the server instance.

     If you run multiple server instances on a single computer, each server must use its own listen port.
   - Specify whether or not this server will be a standalone server or will belong to an existing cluster or a new cluster.
     - If this server is to be a standalone server, select **No, this is a stand-alone server.**
     - If this server is to be part of an existing cluster, select **Yes, make this server a member an existing cluster.** Then, select the cluster.

       This option is not shown if there are no existing clusters.
     - If this server is to be part of a new cluster, select **Yes, create a new cluster for this server.**
6. Click **Next.**

   The Review Choices page is displayed.
7. Review the information. If it is correct, click **Finish.**
8. Apply Oracle JRF to the Managed Server or cluster as described in Section 9.3.1.

9.3.1 Applying Oracle JRF to a Managed Server or Cluster

Oracle JRF (Java Required Files) consists of those components not included in the Oracle WebLogic Server installation and that provide common functionality for Oracle business applications and application frameworks.

JRF consists of a number of independently developed libraries and applications that are deployed into a common location. The components that are considered part of Java Required Files include Oracle Application Development Framework shared libraries and ODL logging handlers.

You must apply JRF to a Managed Server or cluster in certain circumstances.You can only apply JRF to Managed Servers that are in a domain in which JRF was configured. That is, you must have selected Oracle JRF in the Configuration Wizard when you created or extended the domain.

Note the following points about when you apply JRF:

- When you add a Managed Server to an existing cluster that is already configured with JRF, you do not need to apply JRF to the Managed Server.
- When you add a Managed Server to a domain and the Managed Server requires JRF services, but the Managed Server is not part of a cluster, you must apply JRF to the Managed Server.
- When you create a new cluster and the cluster requires JRF, you must apply JRF to the cluster.
- You do not need to apply JRF to Managed Servers that are added by product templates during the template extension process (though you must select JRF in the Configuration Wizard).

You use the custom WLST command `applyJRF` to configure the Managed Servers or cluster with JRF. To use the custom WLST commands, you must invoke the WLST script from an Oracle home in which the Oracle Fusion Middleware component has been installed. See Section 2.1.3.1.1 for more information.

The format of the applyJRF command is:

```
applyJRF(target={server_name | cluster_name | *}, domainDir=domain_path,
        [shouldUpdateDomain= {true | false}])
```

You can use the `applyJRF` command online or offline:

- In online mode, the JRF changes are implicitly activated if you use the `shouldUpdateDomain` option with the value `true` (which is the default.) In online mode, this option calls the online WLST save() and activate() commands.
- In offline mode, you must restart the Administration Server and the Managed Servers or cluster. (In offline mode, if you specify the `shouldUpdateDomain` option with the value `true`, this option calls the WLST updateDomain() command.)

To configure a Managed Server with JRF, use the following command:

```
applyJRF(target='server1', domainDir='/scratch/Oracle/Middleware/user_
projects/domains/domain1')
```

To configure all Managed servers in the domain with JRF, specify an asterisk (*) as the value of the `target` option.

To configure a cluster with JRF, use the following command:

```
applyJRF(target='cluster', domainDir='/scratch/Oracle/Middleware/user_
projects/domains/domain1')
```

See Also:

- "Java Required Files Custom WLST Commands" in the *Oracle Fusion Middleware WebLogic Scripting Tool Command Reference*
- "Using a Different Version of Spring" in the *Oracle Fusion Middleware Administrator's Guide* to use a different version of Spring than that which is supplied with JRF

9.4 Cloning a Middleware Home or Oracle Home

You can expand your environment to meet growing demands by cloning existing Middleware homes and Oracle homes.

Cloning is the process of copying an existing entity to a different location while preserving its state. The cloned entity behaves the same as the source entity. For example, a cloned Oracle home can be deinstalled or patched using the installer. It can also be used as the source for another cloning operation.

You can clone a Middleware home and an Oracle home, as well as Oracle Internet Directory and Oracle Virtual Directory.

In this section, you expand your environment by cloning a Middleware home and an Oracle home, as described in the following topics. To provide better performance, you apply the clone to a different host.

- Cloning a Middleware Home
- Cloning an Oracle Home

Note that all cloning commands ask you if you want to continue whenever the `-silent true` option is not used. To continue, you must type `Yes`, which is not case sensitive. Any words other than `Yes` causes the cloning command to return an error. Also note that, even in `silent` mode, the commands prompt for passwords if they are not provided where they are needed.

> **See Also:** "Cloning Oracle Fusion Middleware" in the *Oracle Fusion Middleware Administrator's Guide* for complete information about cloning, including the syntax

9.4.1 Cloning a Middleware Home

You can clone a Middleware home, which can contain one or more Oracle homes and an Oracle WebLogic Server home. You can also clone only the Middleware home, excluding its Oracle homes.

> **Note:** The cloning operation archives only those Oracle homes that lie within a Middleware home. It does not clone Oracle homes that are located outside of the Middleware home.

To clone a Middleware home with its Oracle homes and Oracle WebLogic Server home, but excluding the log files:

1. At the source Middleware home, execute the createClone command, using the following syntax:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar createClone
         -archiveLocation  archive_location
         -sourceMWHome MW_home -excludePattern pattern
         [-invPtrLoc Oracle_Inventory_location]
```

   For example, to clone a Middleware home that is located at /scratch/oracle /Middleware1 and to exclude log files, use the following command:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar createClone
       -archiveLocation /tmp/mw_clone.jar
       -sourceMWHome /scratch/Oracle/Middleware1 -excludePattern "*.log,*.bak"
       -invPtrLoc /scratch/Oracle/oraInst.loc
```

2. If you are cloning the Middleware home to a different host, copy the files to that system. Copy the archive, as well as the cloningclient.jar file.
3. At the target, extract the files from the archive using the applyClone command. Specify the value `all` for the sourceID option. Use the following syntax:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar applyClone
         -archiveLocation archive_location
         -targetLocation target_MW_home -sourceID all
         -invPtrLoc Oracle_Inventory_location
```

For example, to apply the clone to the directory /scratch/MW_Home_clone, use the following command:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar applyClone
         -archiveLocation  /tmp/mw_clone.jar
         -targetLocation /scratch/MW_Home_clone -sourceID all
         -invPtrLoc /scratch/Oracle/oraInst.loc
```

9.4.2 Cloning an Oracle Home

When you clone an Oracle home, you copy the contents of the Oracle home. This is useful when you want a copy of an Oracle home to which patches have been applied. You can clone more than one Oracle home at the same time.

Note the following:

- If you are cloning an Oracle home to another host, you must copy the cloningclient.jar file from the source to the target host. The Java JDK, version 1.6.4 or later, must be available on that host.
- The directory that you specify for the cloned Oracle home must not exist.
- You can apply the clone to the same Middleware home or a different Middleware home.
- If the Oracle home contains Oracle SOA Suite, Oracle WebCenter, Oracle Forms Services, Oracle Reports, or Oracle Business Intelligence Discoverer, the parent of the Oracle home must be the Middleware home.
- If you are applying the clone of an Oracle SOA Suite or Oracle WebCenter Oracle home, ensure that the same type of Oracle home is not present in that Middleware home. That is, you can have only one Oracle SOA Suite Oracle home in a Middleware home and you can have only one Oracle WebCenter Oracle home in a Middleware home.
- If you are applying the clone of an Identity Management or Web Tier Oracle home, you can restore it to a directory that is not a Middleware home by using the -mwHomeValidation option with a value of false.

To clone two Oracle homes, soa_oh1, and idm_oh1:

1. At the source Oracle home, execute the createClone command, using the following syntax:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar createClone
         -archiveLocation  archive_location
         -sourceOracleHomeLoc ORACLE_HOME1,ORACLE_HOME2
         [-invPtrLoc Oracle_Inventory_location]
```

For example, to clone two Oracle homes, soa_oh1, and idm_oh1, located at /scratch/Oracle/Middleware1, use the following command:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar createClone
       -archiveLocation /tmp/oh_clone.jar
       -sourceOracleHomeLoc /scratch/Oracle/Middleware1/soa_
oh1,/scratch/Oracle/Middleware1/idm_oh1
       -invPtrLoc /scratch/Oracle/oraInst.loc
```

2. Use the listCloneArchive command to list the sourceIDs of the Oracle homes to be cloned. Note that this lists all sourceIDs in the archive. Use the following syntax:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar listCloneArchive
         -archiveLocation  archive_location
```

For example:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar listCloneArchive
              -archiveLocation  /tmp/oh_clone.jar
 Log   File :  "/tmp/CLONE2009-04-07_10-36-38AM-LOG/CLONE2009-04-07_
10-36-38AM.log" .
 Error File :  "/tmp/CLONE2009-04-07_10-36-38AM-LOG/CLONE2009-04-07_
10-36-38AM.error" .

2009-04-07_10-36-38AM : INFO  : CLONE-21039   Gathering all sourceid from
archive.
 Oracle home archive # 1 , sourceid =oraclehome1@soa_oh1,
         home location =/scratch/Oracle/Middleware/soa_oh1
 Oracle home archive # 2 , sourceid =oraclehome1@idm_oh1,
         home location =/scratch/Oracle/Middleware/idm_oh1
```

3. If you are cloning the Oracle home to a different host, copy the files to that system. Copy the archive, as well as the cloningclient.jar file.

4. At the target, extract the files from the archive using the applyClone command. Specify the value of the sourceIDs for each Oracle home. Use the following syntax:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar applyClone
         -archiveLocation archive_location
         -targetLocation target_ORACLE_HOME1,target_ORACLE_HOME1,
         -sourceID OH1_sourceID,OH2_sourceID
```

For example, to apply the clone to the directories/scratch/Oracle/Middleware1/soa_oh1_cl and /scratch/Oracle/Middleware1/soa_oh2_cl, use the following command:

```
java -jar ORACLE_HOME/jlib/cloningclient.jar applyClone
    -archiveLocation /tmp/oh_clone.jar
    -targetLocation /scratch/Oracle/Middleware1/soa_oh1_
cl,/scratch/Oracle/Middleware1/soa_oh2_cl
         -sourceID oraclehome1@soa_oh1,oraclehome2@idm_oh1
```

9.5 Learn More

For more information about the topics covered in this chapter, see:

- *Oracle Fusion Middleware High Availability Guide*
- Oracle WebLogic Server Administration Console Online Help for information about adding Managed Servers to a WebLogic Server domain
- *Oracle Fusion Middleware Installation Planning Guide* for information about extending a domain
- "Cloning Oracle Fusion Middleware" in the *Oracle Fusion Middleware Administrator's Guide*

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