

**Oracle® Communications Order and Service
Management**

Installation Guide

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Contents

Preface	xiii
Audience	xiii
Related Documents	xiii
Accessing Oracle Communications Documentation	xiii
Documentation Accessibility	xiii
Document Revision History	xiv
1 OSM Production Installation Overview	
Overview of OSM Installed Components	1-1
Overview of the OSM Production Installation Procedure	1-1
Installation Options	1-2
Ensuring a Successful OSM Installation	1-2
Directory Placeholders Used in This Guide	1-3
2 OSM System Requirements	
Software Requirements	2-1
About Critical Patch Updates	2-3
Oracle Application Integration Architecture for Communications Alignment	2-3
Design Studio Installation and Version Compatibility	2-3
Oracle VM Support	2-4
Information Requirements	2-4
Oracle Database Information	2-4
WebLogic Server Information	2-5
OSM Server Information	2-5
3 Planning Your OSM Production Installation	
Overview of Planning Your OSM Production Installation	3-1
Types of Systems	3-1
High Availability Architecture	3-1
Initial Sizing Based on Order Complexity and Performance Needs	3-3
Planning the Solution Architecture, System Deployment, and Maintenance	3-4
Planning the Physical Architecture	3-4
OSM COM Hardware Sizing Guidelines for RODOD Orders	3-5
Sizing Guidelines for Simple RODOD COM Orders	3-5
Sizing Guidelines for Complex RODOD COM Orders	3-6

OSM SOM Hardware Sizing Guidelines for RSDOD Orders.....	3-7
Simple Order Hardware Sizing Guidelines (Non-RODOD or -RSDOD)	3-8
General Hardware Sizing and Configuration Recommendations	3-9
OSM Installer and Application Server System Sizing	3-9
Application Server Hardware Sizing	3-9
Running Multiple WebLogic Servers on the Same System	3-9
Shared Storage for the WebLogic Server	3-9
Database Hardware Sizing	3-10
Shared Storage for the Database	3-10
RAID Recommendations for the Database.....	3-10
Understanding Order Affinity	3-11
About Order Affinity and Ownership in an OSM WebLogic Cluster	3-11
About Load Balancing for OSM and Order Affinity	3-12
About the Performance Differences Between JMS and HTTP or HTTPS.....	3-12
About Order Affinity and Ownership in an Oracle RAC Database.....	3-13
Planning the Network Infrastructure	3-14
Planning Network IP Addresses.....	3-14
Planning Bi-Directional Network and Firewall Access.....	3-14
Network Latency Between WebLogic Server and the Database.....	3-14
Network Latency and NFS Configuration for WebLogic Server Shared Storage	3-14
Operating System Planning	3-15
Installing OSM on Unix, Linux, or Windows System.....	3-15
Database Planning	3-15
Oracle RAC Database Active-Active Deployments	3-15
Database Partitioning	3-16
Database Failover with Oracle RAC.....	3-16
Listener Considerations for Oracle RAC	3-16
Remote Listener Considerations.....	3-17
Local Listener Considerations.....	3-17
WebLogic Server Planning	3-17
Understanding the WebLogic Cluster Configuration	3-18
About Cluster Domain Management.....	3-18
About the WebLogic Messaging Mode and OSM Cluster Size.....	3-18
About Coherence and Unicast	3-19
Understanding the Administration Server.....	3-19
Understanding Node Manager Configuration	3-20
Understanding JMS Messaging.....	3-20
JMS Distributed Destinations.....	3-21
About WebLogic Server JMS T3 and T3S Load Balancing	3-21
About JMS Load Balancing Schema Options.....	3-22
Understanding Whole Server Migration for High Availability	3-23
Managing WebLogic Transactions	3-24
Persistent Store: JMS File Store and JDBC Store.....	3-25
Understanding Hardware or Software HTTP and HTTPS Load Balancing Options	3-25
About HTTP and HTTPS Load Balancing and Session ID Configuration	3-26
About Oracle Coherence	3-26

4 Installing and Configuring the Oracle RAC Database

Database Information You Should Record	4-1
Creating the Oracle Database for OSM	4-1
Setting Up the Database and Clusterware for Oracle RAC	4-2
Memory Settings for the OSM Database.....	4-2
Character Sets	4-3
Database Parameters.....	4-3
Configuring Time Zone Settings in the Database	4-4
Preventing Stuck Orders Due to Inactive Database Sessions	4-4
Tablespace and Schema Considerations for OSM Production Systems	4-5
Sizing the OSM Database Schemas.....	4-5
Tablespaces	4-5

5 Installing and Configuring the WebLogic Server Cluster

Preparing WebLogic Server for an OSM Cluster Installation	5-1
Preparing the Operating System	5-1
Installing WebLogic Server Software	5-2
WebLogic Server Software Installation Overview	5-2
Creating Database Schemas Using RCU	5-3
Creating the WebLogic Server Domain	5-4
Replicating the Domain on Other Machines	5-10
Starting and Configuring Credentials on the First Machine	5-10
Creating a Domain Template for Use on Other Machines.....	5-11
Replicating the Domain Template on Other Machines	5-11
Starting the Administration Server	5-12
Configuring the Domain and Managed Servers	5-12
Configuring Oracle Coherence for an OSM Cluster	5-12
Increasing Buffer Sizes to Support Coherence.....	5-12
Preventing Unnecessary Use of Swap Space	5-13
Securing Coherence	5-13
Configuring Node Manager on All Machines in the Domain	5-13
Configuring Node Manager for Starting and Stopping Managed Servers	5-13
Configuring Node Manager for Whole Server Migration	5-13
Configured Whole Server Migration Floating IP Controls.....	5-14
Enrolling Each Machine with the Domain	5-16
Starting Node Manager on Each Machine	5-16
Configuring a Multicast IP Address for the Cluster Messaging Mode.....	5-16
Preventing Connection Timeout when Using a Remote Database.....	5-18
Recommended Configuration for WebLogic Servers for Production Systems.....	5-19
Configuring Managed Server Startup Parameters.....	5-20
Configuring Cluster Settings	5-22
Configuring Server Settings.....	5-22
Starting and Verifying all Machines in the Cluster	5-23
Configuring Whole Server Migration	5-24
Creating the Leasing Tablespace and Active Table in the Database	5-24
Create the Leasing Multi Data Source	5-26

Configure the Cluster for Whole Server Migration	5-27
Configure Managed Servers for Whole Server Migration	5-28
Testing Whole Server Migration.....	5-29
Migrating a Managed Server Back	5-30
Installing OSM in a Clustered Environment.....	5-31

6 Performing an Interactive Installation of OSM

Installing OSM	6-1
Handling an OSM Database Schema Installation Failure	6-18

7 Performing a Silent Installation of OSM

Prerequisites	7-1
Configuring the installOptions.txt and install_cfg.xml Files	7-1
Configuring the installOptions.txt File	7-1
Configuring the install_cfg.xml File	7-3
Performing a Silent Installation	7-3

8 Performing OSM Post-Installation Tasks

OSM Client Configuration Post Installation Tasks	8-1
Enabling Graphical Display on UNIX or Linux Systems	8-1
Connection, File Store, and Thread Configuration Post Installation Tasks.....	8-2
Customizing OSM Runtime Parameters.....	8-2
Preventing Connection Timeout Issues During Cartridge Deployment	8-2
Configuring OSM JDBC Connections	8-3
Creating and Configuring Persistent File Stores	8-4
Configuring and Monitoring Coherence Threads.....	8-6
Externalizing the Coherence Thread Configuration File	8-8
Monitoring Coherence Threads	8-9
Copying Metric Rule Files	8-10
Relocating ADML Files Without Restarting the Server.....	8-11
Registering Oracle HTTP Server Instance	8-12
Queue Configuration Post Installation Tasks	8-12
Creating the Queue for the Account Manager.....	8-12
Configuring Distributed Queues for an OSM Solution.....	8-12
OSM Integration with External Systems	8-14
Integrating OSM and ASAP or IP Service Activator Using SAF Agent and JMS Bridging ..	8-14
Integrating OSM and UIM Using SAF Agent	8-15
Deploying Custom Plug-Ins When Running on Managed Server.....	8-16
Changing the WebLogic Server of Oracle RAC Database Size.....	8-16
Connecting Oracle RAC with JDBC Multi Data Source	8-16
Adding Oracle RAC Instances	8-18
Manually Configuring Additional Data Sources for an Oracle RAC Instance.....	8-20
Manually Creating and Configuring Data Sources	8-21
Configuring Connection Pool Properties	8-24
Adding Data Sources to Multi Data Sources	8-24
Adding a New Managed Server to a Clustered Environment	8-26

Configuring a New Managed Server that uses JMS Service Migration.....	8-30
Removing a Managed Server from a Clustered Environment.....	8-31
Preparing to Remove a Managed Server from a Clustered Environment.....	8-31
Removing a Managed Server from a WebLogic Cluster.....	8-33

9 Troubleshooting OSM Installation Problems

Coherence Configuration Error: ORA-00001: unique constraint	9-1
Coherence Configuration Error: [STUCK] ExecuteThread	9-1
Error About T3 After Initial OSM Startup	9-1
Node Manager Does Not Create IP Address for Whole Server Migration	9-2
Database Connection Problems During Installation	9-2
DataDictionary Expansion Level.....	9-2
JMS Server Connection Problems	9-2
Problems When Running Multiple WebLogic Domains on One Host.....	9-3
JDBC Errors When First Order Submitted	9-3
Unable to Bring Up Managed Server After Database Failure	9-3
Slow Query Performance in OSM Web Clients.....	9-3
Delayed JMS Messages	9-4
Error Message For Events From a JMS Topic in a Cluster	9-4
JMS Message Delivery Failure	9-4
OSM and RCU Installers Are Slow to Run Database Tablespace Query	9-5
OSM Installer Issues for UNIX or Linux.....	9-5
Command for unpack.jar Fails with a Write Error	9-6
JBoss Cache Timeouts	9-6

10 Verifying the OSM Installation

Checking the State of All Installed Components	10-1
Verifying the OSM Clients	10-1
Configuring and Verifying HTTPS Connectivity for OSM Client Browsers	10-2
Configuring OSM to Evaluate System Configuration Compliance.....	10-3
Manually Installing Compliance Files	10-3
Configuring Compliance for an OSM Cluster	10-4
Evaluating System Configuration Compliance	10-5
Running the Compliance Tool	10-5
Cluster Considerations.....	10-6
Evaluating Compliance Results	10-6

11 OSM Pre-Production Testing and Tuning

OSM Performance Testing and Tuning Overview.....	11-1
Guidelines for the Performance Test Environments.....	11-2
About Configuring the Environment for Performance Testing.....	11-3
About Work Managers, Work Manager Constraints, and the JDBC Connection Pool .	11-4
About the JBoss and Coherence Order Cache	11-4
Synchronizing Time Across Servers.....	11-4
Determining Database Size.....	11-5
Setting Up Emulators	11-5

Setting Up a Test Client for Load Generation.....	11-5
Example Managed Server Configuration.....	11-6
Guidelines for Performance Testing and Tuning.....	11-9
General Guidelines for Running Tests and Analyzing Test Performance.....	11-9
Example Performance Tests on OSM Managed Servers	11-10
Setting the Order Volatility Level.....	11-10
Warming Up the OSM System.....	11-11
Determining the Sustainable Order Rate for a Managed Server	11-15
Tuning Work Manager Constraints and the Maximum Connection Pool Capacity....	11-18
Tuning the JBoss and Coherence Maximum Order Cache	11-20
Sizing the Redo Log Files.....	11-21
Additional Performance Testing Options	11-21
Performance Related Features for Large Orders	11-21
Distribution of High-Activity Orders.....	11-22
Measuring Order Throughput	11-22
Using the OM_ORDER_NODE_ANCESTRY Table	11-23
Enabling the OM_ORDER_NODE_ANCESTRY Table.....	11-25
Disabling the OM_ORDER_NODE_ANCESTRY Table.....	11-26

12 Upgrading to OSM 7.3.1

About OSM Upgrades	12-1
Supported Upgrade Paths.....	12-2
About Backing Up Your Data.....	12-2
About Upgrading Oracle Database	12-2
About OSM Customizations.....	12-2
About Creating a New Localization JAR File	12-3
About Installer Disk Space.....	12-3
About Execute Queues and Work Managers.....	12-3
Preparing for an OSM Upgrade.....	12-3
Preparing the Environment	12-3
Upgrading or Creating the WebLogic Domain	12-4
Upgrading the OSM 7.2.2 or OSM 7.2.4 WebLogic Domain to Fusion Middleware 12.1.3	12-4
Creating a New 12.1.3 WebLogic Domain	12-6
Updating the WebLogic Domain.....	12-7
Updating JMS Security Policy Settings.....	12-7
Upgrading the Database	12-8
Updating Coherence Properties for Managed Servers.....	12-8
Upgrading the SDK Library Names.....	12-9
Upgrading OSM to 7.3.1.....	12-10
Upgrading the Database Schema for OSM Versions 7.2.2.0 through 7.2.2.3 Only	12-10
Recovering from a Database Upgrade Failure.....	12-10
Finding the Issue that Caused the Failure.....	12-11
Fixing the Issue that Caused the Failure	12-11
Restarting the Upgrade from the Point of Failure	12-11
Performing the OSM Upgrade	12-12
XQuery Model Changes.....	12-17

Using java.util.Map as an Argument or Return Type	12-17
Using java.util.Collection as a Return Type.....	12-18
Invoking Overloaded Methods of Same Number of Arguments with Ambiguous Types	12-19
Handling Null Values from Java Functions.....	12-19
Converting OSM Data Source Configurations	12-19
Oracle RAC Active-Passive to Active-Active	12-19
Oracle RAC Active-Active to Active-Passive	12-20
Oracle RAC Active-Active to Active-Active	12-21
Additional Configuration for JMS Service Migration.....	12-21
Configuring Attachment Location for Whole Server Migration.....	12-22
Upgrading the Development and Administration Environment	12-23
Upgrading Pre-7.3.1 Cartridges to OSM 7.3.1	12-23
Cartridge Upgrade Prerequisites	12-23
Cartridge Upgrade Procedure.....	12-23
Upgrade Impacts on Cartridges from Previous Releases to OSM 7.3.1.....	12-26
Updating the Common Data Dictionary Manually	12-26
Modeling Order Components to Use Calculated Start Dates.....	12-27
Turning On Inheritance of Keys and Significance for Existing Cartridges	12-27
Creating the Common Data Dictionary Project in Your Workspace.....	12-29
Updating Cartridges to a Five-Digit Version.....	12-30
Specifying Task Views for Order-Related Automation.....	12-30
Configuring Order Lifecycle Policy Transition Error Messages	12-30
Modeling Data Entries Above the 1000-Character Limit	12-31

13 Updating Order-to-Activate Cartridges

System Requirements.....	13-1
Preparing to Update the Order-to-Activate 7.0.3, 7.2.0, 2.0.1, 2.1.0, and 2.1.0.2 Cartridges	13-1
Ensuring Order-to-Activate Cartridge Compatibility	13-2
Getting the Latest Patch for Your Version of the Cartridges.....	13-2
Updating the oms-config.xml File When Updating Order-to-Activate 7.0.3 Cartridges	13-2
Setting Design Studio Preferences	13-3
Downloading the Migration Package	13-3
Importing the Migration Package Cartridge.....	13-4
Updating the Order-to-Activate Cartridges	13-5
Updating Unmodified or Modified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges to Run on OSM 7.3.1	13-5
Importing the Installation Cartridge for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2	13-5
Importing Unmodified OSM Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges	13-6
Importing Modified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges.....	13-8
Migrating the Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges.....	13-8
Configuring WebLogic Server Resources for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2	13-9
Updating Unmodified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1	13-14
Updating Modified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1	13-17
Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates.....	13-29
Setting Up the Configuration File for Connecting to Oracle AIA.....	13-29

Setting Up the Configuration File for OSM on WebLogic Cluster	13-29
Setting Up the Configuration File for OSM on Standalone WebLogic Server	13-30
Running the config_All Target.....	13-31
Deploying the Updated Order-to-Activate Cartridges	13-35

14 Uninstalling OSM

Uninstalling OSM Components.....	14-1
OSM Uninstall: Additional Tasks	14-2
Performing a Silent Uninstall.....	14-4

A Production Checklist

About Using the Production Checklist	A-1
Checking for a Current OSM Patch Before Going Into Production.....	A-1
Checking for Deployment Architecture	A-2
Checking the OSM Production System Configuration	A-3
Checking for Performance Expectations.....	A-3
Checking for a Migration Strategy and Production Schedule	A-5
Checking for Database Management Procedures.....	A-5
Checking for Database Optimizer Statistics Schedule.....	A-7
Checking for Outage and Order Failure Plans.....	A-8
Checking for Change Control Management Plans.....	A-8
Checking for Performance Monitoring Procedures.....	A-9

B Upgrading OSM to an Oracle RAC Environment

Upgrading OSM After Converting the Database to Oracle RAC.....	B-1
Upgrading OSM to Oracle RAC Using Data Pump Import and Export.....	B-1
Upgrade Overview	B-1
Shutting Down the OSM Server.....	B-2
Turning Off the Notification Engine	B-2
Exporting and Importing the Database Data	B-2
Running the OSM Installer	B-3
Restarting the Notification Engine	B-3
Restarting the OSM Server.....	B-3

C OSM Development System Guidelines and Best Practices

OSM Development Planning Overview.....	C-1
Installing OSM Components on a Windows System.....	C-2
Hardware Requirements for Development Systems	C-2
Preparing the Database	C-3
Oracle Database Kernel Configuration	C-3
Downloading and Installing the Oracle Database	C-3
Database Configuration Considerations for Development Instances	C-3
Database Parameters	C-3
Tablespaces	C-3
Preparing WebLogic Server.....	C-3
Installing WebLogic Server Software.....	C-4

WebLogic Server Software Installation Overview	C-4
Creating Database Schemas Using RCU.....	C-4
Creating the WebLogic Server Domain	C-6
Increasing the Memory Settings for WebLogic Servers	C-7
Configuring the WebLogic Server Domain.....	C-9
Configuring WebLogic Server for 64-Bit Java on Solaris	C-9
Preventing Connection Timeout when Using a Remote Database.....	C-9
Other Supported High Availability Options.....	C-10
Configuring Oracle Database with Clusterware	C-10
Setting Up the Database and Clusterware for Cold Standby	C-11
Configuring WebLogic for Cold Cluster Failover	C-11
Oracle RAC Active-Passive	C-12
Cold Cluster Failover.....	C-12
JMS Service Migration.....	C-12

D Silent Installation install_cfg.xml Parameters

WebLogic Parameters	D-1
OSM Parameters.....	D-4
Database Parameters.....	D-5

E Installing OSM on Engineered Systems

JDBC Recommendations	E-1
Configuring Exalogic	E-2
Exalogic User Process Limit	E-2
Exalogic Kernel Parameters.....	E-2
OSM WebLogic Server Configuration	E-4
JVM Options	E-4
Tuning Oracle Database	E-5
Configuring Database Schema Partitioning.....	E-5
Multi-database Source Configuration Using N-RAC Nodes.....	E-5
Database Storage	E-6

Preface

This document describes how to install Oracle Communications Order and Service Management (OSM).

Audience

This document is intended for system administrators, system integrators, database administrators, and other individuals who are responsible for installing OSM and ensuring that the software is operating in the manner required for your business. This guide assumes that users have a good working knowledge of the operating systems they will be using, the Oracle Database, Oracle WebLogic Server, and Java J2EE software.

Related Documents

For information about installing Oracle Communications Design Studio, see *Oracle Communications Design Studio Installation Guide*.

Accessing Oracle Communications Documentation

OSM documentation and additional Oracle documentation (such as database and WebLogic Server documentation) is available from the Oracle Help Center website:

<http://docs.oracle.com>

Additional Oracle Communications documentation is available from the Oracle software delivery website:

<https://edelivery.oracle.com>

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For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at

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Document Revision History

The following table lists the revision history for this guide:

Version	Date	Description
E68889-01	April 2016	Initial release
E68889-02	October 2016	Porting over OSM 7.3 Installation Guide improvements such as the new Planning Your OSM Production Installation chapter, the new OSM Pre-Production Testing and Tuning chapter, and the new Production Checklist appendix.

OSM Production Installation Overview

This chapter provides an overview of the Oracle Communications Order and Service Management (OSM) production installation process.

Overview of OSM Installed Components

During the installation process, you install and configure the following components:

- Oracle Grid Infrastructure
- Oracle Database
- Oracle Fusion Middleware Infrastructure that includes Oracle WebLogic Server, Oracle Coherence, and Oracle Application Development Framework (ADF)
- JBoss Cache (required third-party component)
- GraphViz (optional third-party component, to use with the modeldoc tool)
- Ant
- OSM server software and OSM clients

Overview of the OSM Production Installation Procedure

The OSM production installation should be performed only by qualified personnel. You must be familiar with the operating system on which OSM is to be installed and with WebLogic Server. The installation and configuration of Oracle Database should be performed by an experienced database administrator.

You set up OSM in your production environment by performing the following tasks:

1. Plan your OSM production installation. See ["Planning Your OSM Production Installation"](#).
2. Ensure your system meets the minimum system requirements. See ["OSM System Requirements"](#) for system requirements and configuration information you need before installing OSM.
3. Perform pre-installation tasks such as:
 - a. Install and configure the Oracle RAC Database Server. See ["Installing and Configuring the Oracle RAC Database"](#).
 - b. Install and configure Oracle WebLogic Server Cluster. See ["Installing and Configuring the WebLogic Server Cluster"](#).
4. Install OSM. See ["Performing an Interactive Installation of OSM"](#) or ["Performing a Silent Installation of OSM"](#).
5. Perform post-installation tasks. See ["Performing OSM Post-Installation Tasks"](#).
6. Verify the installation. See ["Verifying the OSM Installation"](#).
7. Test and Tune the OSM Installation. See ["OSM Pre-Production Testing and Tuning"](#).

This document is intended to help you install an OSM production environment. However, you can use OSM with the default installation settings for product evaluation, development, demonstration, or process modeling. For more information, see [Appendix C, "OSM Development System Guidelines and Best Practices"](#).

Installation Options

When installing OSM, you can do one of the following:

- Perform an interactive installation. See ["Performing an Interactive Installation of OSM"](#).
- Perform a silent installation. See ["Performing a Silent Installation of OSM"](#).

To perform a silent installation, perform an interactive installation and use that installation as a basis for silent installations. If you intend to perform further installations using silent install, ensure that you select **Save Configuration** on the Configuration Overview screen during the interactive installation. This will provide you with a configuration file that contains the settings you used in the interactive installation. You can use this file as a sample for your silent installations.

Ensuring a Successful OSM Installation

As you install each component (for example, Oracle Database and WebLogic Server), verify that the component installed successfully before continuing the installation.

Pay close attention to the system requirements. Before you begin installing software, make sure your system has the required base software. In addition, make sure that you know all of the required configuration values, such as host names and port numbers.

As you create new configuration values, write them down. In some cases, you might need to re-enter configuration values later in the procedure. Also, some values will need to be communicated to all users of OSM.

Directory Placeholders Used in This Guide

The following placeholders are used in this guide:

Table 1–1 Placeholders Used in This Guide

Placeholder	Directory Description
<i>OSM_home</i>	The directory in which the OSM software is installed. This directory contains the SDK directory (if the SDK was installed) and various installation-related files.
<i>Middleware_home</i>	The location where Oracle Fusion Middleware components are installed. This directory contains the base directory for WebLogic Server and the oracle_common directory, among other files and directories.
<i>WebLogic_home</i>	The base directory for the WebLogic Server core files. It is located in the <i>Middleware_home</i> directory; for example, <i>Middleware_home/wlserver</i> .
<i>domain_home</i>	The directory that contains the configuration for the domain into which OSM is installed. The default is <i>Middleware_home/user_projects/domains/domain_name</i> (where <i>domain_name</i> is the name of the OSM domain), but it is frequently set to some other directory at installation.

OSM System Requirements

This chapter describes the Oracle Communications Order and Service Management (OSM) system requirements. It also describes information you need during the installation procedure.

Software Requirements

Table 2–1 describes the software required to support the OSM components. Use the My Oracle Support Certifications tab to access the latest software platform support information. See knowledge article 1491004.1 and knowledge article 2170105.1 *Recommended Patches for OSM Software Components* on the Oracle support website for additional information:

<https://support.oracle.com>

Note: For all operating systems, check the Oracle Database documentation for any additional operating system patches required to support the database.

Table 2–1 OSM Required Software

Component	Product	Version	Notes
Server Operating System	Oracle Linux (64-bit)	Linux 5 update 8 or higher (such as Linux 5.8, 5.9, or 5.10) Linux 6 update 2 or higher (such as Linux 6.2, 6.3, or 6.4)	Unbreakable Enterprise Kernel R2 (2.6.39) required. Oracle recommends the latest available update, because later updates may provide modest performance gains.
Server Operating System	Red Hat Enterprise Linux (64-bit)	5.8 and 6.2	Also supported on minor releases higher than 5.8 and 6.2.
Server Operating System	Oracle Solaris	10 and 11	Supported on Sparc platforms only.
Server Operating System	IBM AIX	6.1 (TL6 SP2)	NA
Server Operating System	HP-UX Itanium	11.31	NA

Table 2–1 (Cont.) OSM Required Software

Component	Product	Version	Notes
Server Operating System	Windows 7 (64-bit)	SP1	For development, demonstration, and test environments. Not for production use.
Client Operating System	Windows 7 (64-bit)	SP1	For Windows-only components.
OSM web client Browser	Internet Explorer	11	NA
Account Manager, Customer Asset Manager, and Order Lifecycle Manager Browser	Google Chrome	45.0.2454	NA
Account Manager, Customer Asset Manager, and Order Lifecycle Manager Browser	Mozilla Firefox	ESR 38	N/A
Account Manager, Customer Asset Manager, and Order Lifecycle Manager Browser	Apple Safari	6.1.6	N/A
Database Server	Oracle Grid Infrastructure	12c (12.1.0.2)	NA
Database Server	Oracle Database	12c (12.1.0.2)	Install the latest patch for your Oracle Database version.
Java Standard Edition: 64-bit JDK for the application server	For Linux, Solaris, or Windows	1.7.0 with the latest Critical Patch Update	Do not use any Java version that might be included with the Oracle Fusion Middleware Infrastructure. Oracle JRockit is not supported for OSM.
Java: 64-bit JDK (Java SE) for the application server	For AIX	7 (Release 1 or greater)	7 SR6 corresponds to the 1.7.0_45 Oracle Java fix. Do not use any Java version that might be included with the Application Server.
Java: 64-bit JDK (Java SE) for the application server	For HP UX	1.7 or greater	Do not use any Java version that might be included with the Application Server.

Table 2–1 (Cont.) OSM Required Software

Component	Product	Version	Notes
Application Server	Oracle Fusion Middleware Infrastructure	12c (12.1.3)	Fusion Middleware Infrastructure is included in the OSM software media pack. It includes Oracle WebLogic Server, Oracle Coherence, and Oracle Application Development Framework (ADF).
Third-Party Components	JBoss Cache	1.4.1 SP13	Download from the SourceForge website: http://sourceforge.net/projects/jboss/files/JBossCache/JBossCache%201.4.1.SP13/
Third-Party Components	GraphViz	2.8	Optional, to support the modeldoc tool. Download from the Graphviz website: http://www.graphviz.org/pub/graphviz/stable/windows/graphviz-2.8.exe
Build Tool	Ant	1.9.2 or greater.	Ant is required for using various tools in the OSM SDK including OSM's cartridge management tools. To ensure tools function correctly, all copies of Ant in use must have the same version number.

About Critical Patch Updates

OSM is supported on all Oracle Critical Patch Updates. You should install all Critical Patch Updates as soon as possible. To download Critical Patch Updates, find out about security alerts, and enable email notifications about Critical Patch Updates. See the "Security" topic on the Oracle Technology Network website:

<http://www.oracle.com/technetwork/topics/security/whatsnew/index.html>

Oracle Application Integration Architecture for Communications Alignment

See *OSM Cartridge Guide for Oracle Application Integration Architecture* for information about compatibility between OSM software, OSM Order-to-Activate cartridges, and Oracle Application Integration Architecture (AIA) for Communications. The OSM Order-to-Activate cartridges are used with the Oracle Communications Order to Cash Integration Pack for Oracle Communications Order and Service Management.

For more information about the Order to Cash business process see *Oracle Communications Order to Cash Integration Pack Implementation Guide for Siebel CRM*, *Oracle Order and Service Management*, and *Oracle Billing and Revenue Management* in the Oracle Application Integration Architecture documentation.

Design Studio Installation and Version Compatibility

For Oracle Communications Design Studio plug-in installation information, see *Design Studio Installation Guide*.

See *Design Studio Compatibility Matrix* (included in the Design Studio media pack) for Design Studio for Order and Service Management compatibility information. The *Design Studio Compatibility Matrix* also provides information about OSM to Oracle Communications ASAP integration using the Design Studio Activation Task. The same information is also relevant to OSM to Oracle Communications IP Service Activator integration using the Design Studio Activation Task.

Oracle VM Support

OSM is supported on Oracle VM Release 3.0 with Oracle Linux.

Information Requirements

You must supply configuration-related information when you install OSM. Some of this information is determined during the installation. However, some information should already have been determined before the OSM installation is begun. Gather this information in advance.

Note: You can obtain most of the required configuration information from your Oracle database administrator (DBA) and your system administrator.

Oracle Database Information

The information in [Table 2–2](#) is needed to connect to an Oracle database instance.

Table 2–2 Oracle Database Connection Information

Information Type	Description
Database Instance Host	The IP address or DNS name of the database instance on which the OSM schema will be installed. If you plan to use an Oracle RAC database, you need the Single Client Access Name (SCAN) for this field.
Database Instance Port	The port on which the database instance to which the OSM schema will be installed is listening.
Database Instance SID	The SID of the database instance on which the OSM schema will be installed.
Database Service Name	The name of the service used for OSM client connections.

If the OSM database users have been created prior to the OSM installation, you need to gather the information in [Table 2–3](#) before installing OSM. If they have not been created, you can determine the following information during the installation.

Table 2–3 Oracle Database Credential Information

Information Type	Description
Core Schema User name	The OSM core schema username.
Core Schema Password	The OSM core schema username password.
Rule Engine Schema User name	The OSM rule engine schema username.
Rule Engine Schema Password	The OSM rule engine schema username password.
Reporting Schema User name	The OSM Reporting Interface schema username.
Reporting Schema Password	The OSM Reporting Interface schema username password.
Database Admin User name	The user name of the Oracle DBA.
Database Admin Password	The password of the Oracle DBA.

Table 2–4 shows the information used to indicate the tablespaces being used for the installation.

Table 2–4 Oracle Database Tablespace Information

Information Type	Description
Default Tablespace	The tablespace to use if your data will all be on the same permanent tablespace.
Temporary Tablespace	If your database instance has only one temporary tablespace, the installer will find its name automatically. If there is more than one temporary tablespace in the database instance, you need to know which one OSM is supposed to use.
Model Data Tablespace	The name of the tablespace to use for model data, if different from the default tablespace.
Model Index Tablespace	The name of the tablespace to use for the indexes for the model data, if different from the default tablespace.
Order Data Tablespace	The name of the tablespace to use for order data, if different from the default tablespace.
Order Index Tablespace	The name of the tablespace to use for the indexes for the order data, if different from the default tablespace.

WebLogic Server Information

Table 2–5 shows the WebLogic Server information needed to connect to a WebLogic server.

Table 2–5 WebLogic Server Information

Data	Description
WebLogic Host Name	The name or IP address of the computer where WebLogic Server is installed.
WebLogic Port Number	The port number of the WebLogic server.
WebLogic SSL Port Number	The SSL port number of the WebLogic server.
WebLogic Admin User	The user name of the WebLogic system administrator.
WebLogic Admin Password	The password of the WebLogic system administrator.

OSM Server Information

Table 2–6 shows the information related to the OSM server installation. The following information is used to specify the SMTP mail server and the administrative e-mail addresses to deliver notifications via e-mail.

Table 2–6 Email Notification

Data	Description
Notification Email server	DNS name or IP address of your e-mail server.
Notification Email server Port	Port that the e-mail server is listening.
Administrator Email Address	OSM Administrator's e-mail address.

Planning Your OSM Production Installation

This chapter describes how to plan an Oracle Communications OSM production installation.

Overview of Planning Your OSM Production Installation

Before you can install OSM in a highly available production environment, hardware, software, and networking configurations must be in place. This section provides an overview of the planning process that you must perform to identify and acquire the hardware, software, and networking equipment and configurations required to run OSM in a highly available production environment.

When you plan your installation, you need to consider such options as the type of OSM system you need, the types of orders you must process, the hardware you need, the amount of memory, CPU, and I/O required, the networking equipment and configuration needed, the database, WebLogic Server, and operating system configuration requirements.

Types of Systems

Planning an OSM installation depends on the purpose of the OSM system. You can define the following OSM systems:

- **Development Systems:** The purpose of a development system is to develop, deploy, test, and demonstrate new OSM solution functionality. For more information about development systems, see "[OSM Development System Guidelines and Best Practices](#)".
- **Production Systems:** The purpose of a production system is to process orders in an overall OSM solution. Production systems must be highly available, scalable, and secure. Before you go live with a production system, you must simulate the production system environment and expected order volume as closely as possible. You can use a pre-production environments to generate performance data, to test system tuning procedures, and to provide a staging environment before moving to a production system.

High Availability Architecture

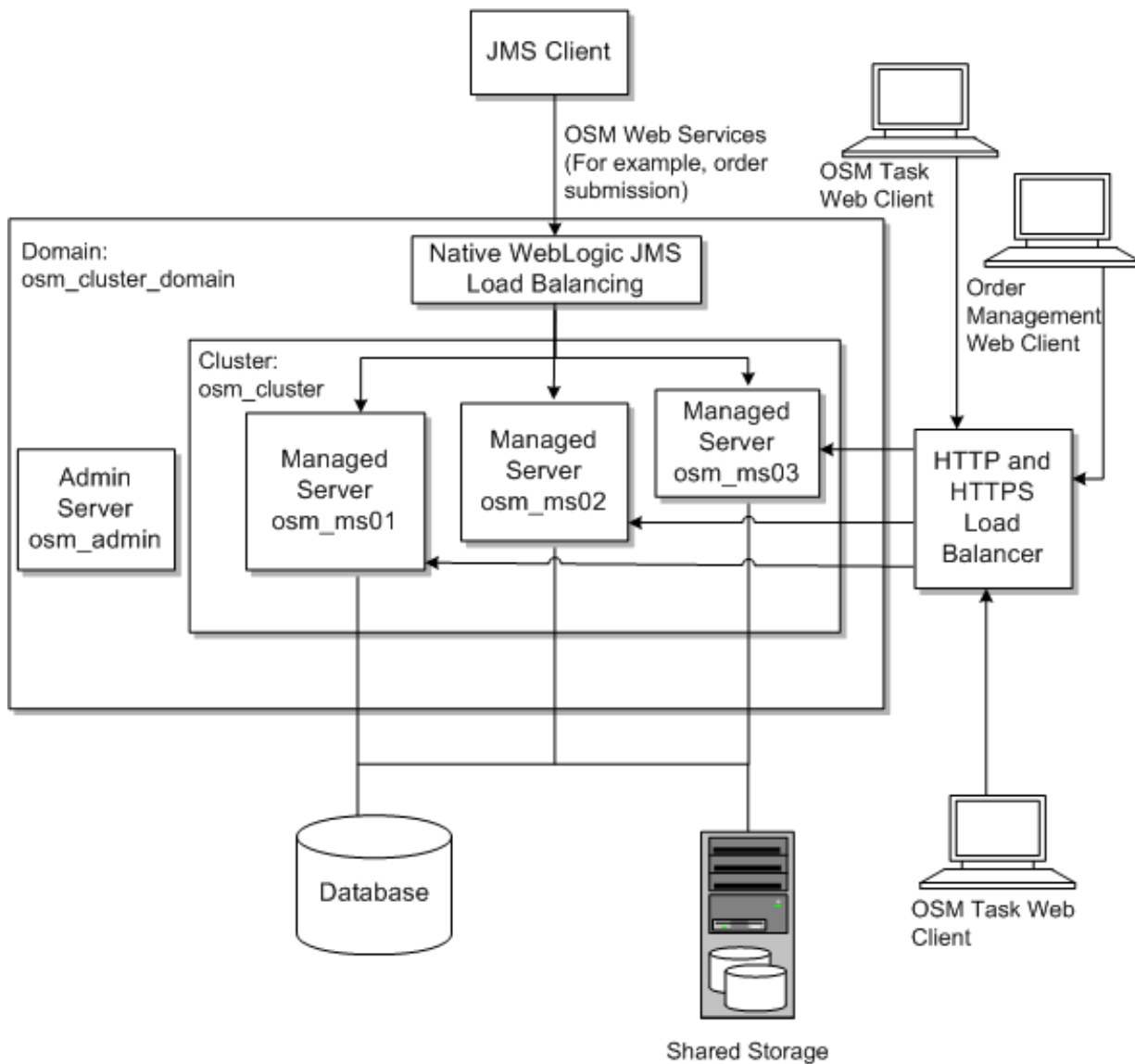
In a highly-available OSM deployment, redundancy is built in at each layer to ensure there is no single point of failure. A OSM system that is deployed into a high-availability architecture consists of the following:

- The application server layer, which hosts the WebLogic Server cluster that manages the OSM application.

- The database server layer, which hosts a highly-available Oracle RAC database instances.
- A shared storage system that the database servers use to access the database files.
- A shared storage system for the application servers for whole server migration in case of a server failure.
- An HTTP load balancer in fault-tolerant mode.

Figure 3–1 shows an example of a highly-available OSM production system topology. This system is deployed across multiple physical servers at the application server layer.

Figure 3–1 OSM High-Availability Test or Production System Topology



The system includes a WebLogic Server cluster with four managed servers, an administration server, a JMS client sending orders to OSM, and an HTTP load balancer that load balances HTTP and HTTPS messages to OSM from various OSM Web clients. Each physical server can host one or more managed servers. The managed servers

form the WebLogic server cluster that runs OSM. At the database server layer, OSM supports a partitioned active-active deployment of two or more Oracle Real Application Clusters (Oracle RAC) instances with shared storage.

For increased availability for the WebLogic Server, Oracle recommends that you configure managed servers in the cluster with whole server migration. Whole server migration enables a managed server that unexpectedly terminates and cannot be restarted to migrate and start up on a different machine. The standby machine can be empty or host an existing OSM managed server. If the machine hosts an existing managed server, then the machine must have sufficient capacity to run a second OSM managed server. You must acquire and configure shared storage to ensure the persistence of managed server data when a managed server migrates to another machine.

Initial Sizing Based on Order Complexity and Performance Needs

The size of an OSM production system depends on the overall complexity of the solution. Complexity can be determined using criteria such as:

- The average number of orders per day
- The order creation rate during peak hour
- The number of days the order must be retained
- The number of order line items per order
- The number of order components per order
- The number of tasks per order
- The number of data elements and their complexity per order
- The number of tasks per second (throughput)
- Expected order lifetime (from creation to completion in seconds)
- Number of manual users

The most common measure of OSM performance is order throughput. OSM must fulfill orders at the rate that is determined by business need. OSM throughput is measured in task transitions per second (TPS).

Although the TPS metric varies for each deployment, it is useful for you to consider the following approximate guidelines and adjust them as your circumstances require:

- **Simple orders**, which typically complete less than 10 tasks per order.
- **Moderate orders**, which complete approximately 25 tasks per order.
- **Complex orders**, which complete approximately 100 tasks per order.
- **Very complex orders**, which complete approximately 1000 tasks per order.

Given this criteria, you can create an initial estimate of the hardware requirements for an OSM production installation. See "[Planning the Physical Architecture](#)" for more information about estimating hardware requirements.

Note: The solution architecture impacts the size of orders, the number of tasks, and so on. This enables you to do the initial sizing, but you must still confirm this sizing with actual performance testing. For more information, see "[OSM Pre-Production Testing and Tuning](#)".

Planning the Solution Architecture, System Deployment, and Maintenance

A solution architecture, which refers to the structure, interaction, and abstraction of software applications, needs to be devised. It represents how the various components, including OSM, interact. It also showcases issues such as:

- What role does each component or product play in the solution?
- Who can access and use this component?
- How is it secured?

For more information, see *OSM Modeling Guide*.

In addition to the hardware and software requirements, you must also plan system deployment and ongoing maintenance considerations such as:

- How will the OSM in the central order management (COM), service order management (SOM), and technical order management (TOM) roles map to the physical architecture? Will there be multiple instances of OSM?

OSM in the COM role is typically deployed in a separate WebLogic Server cluster and OSM in the SOM and TOM roles are typically in the same WebLogic Server clusters. You must do performance tests for each OSM instance in your network. Oracle recommends that OSM is deployed on dedicated machines. Sharing machines makes troubleshooting much more difficult.

- What is the backup and restore strategy?
- How will application performance monitoring and operational maintenance activities, such as log file clearing, be handled?
- How will business continuity be maintained in the event of an application failure?
- What are the data retention requirements and the data purge strategy?
- How will errors and failures in other interfacing applications be handled?
- How will the production environment be deployed? Is there a requirement for automated deployment?

Planning the Physical Architecture

The following sections describe hardware sizing guidelines for OSM using RODOD, RSDOD, and very simple non-RODOD or RSDOD solution examples on Oracle Linux 5.x or 6.x. These sections provide guidelines for estimating the hardware required to achieve similar daily order volumes with your own OSM solutions. It also includes general sizing guidelines applicable to any solution type.

These guidelines are intended to assist in estimating OSM's total system requirements in very early stages of implementation, before OSM is installed. These guidelines do **not** contain express or implied warranties of any kind. After you install OSM and build a solution, you must do performance tests to validate whether the hardware selected is sufficient for production order volumes. For more information, see "[OSM Pre-Production Testing and Tuning](#)".

The hardware recommendations below cover only the OSM part of the solution. For all recommendations a day is considered to be 10 hours. The database storage service time is expected to be less than 5 milliseconds. Each managed server in the cluster has 32 GB. The values in the tables are approximate.

Generally, the more complex your orders are, the fewer orders your OSM system can process per day, per managed server, and per database instance. To increase the number of orders you can process per day, you can either:

- Simplify your orders, or
- Acquire additional managed servers, database instances, and hardware.

OSM COM Hardware Sizing Guidelines for RODOD Orders

You can use two models for RODOD COM sizing: simple and complex. They are different in number of sales lines and components, and, as a result, in the number of tasks and number of orders that can be completed per day.

Sizing Guidelines for Simple RODOD COM Orders

Table 3–1 shows sizing guideline assumptions for simple RODOD COM orders. One order contains:

- 20 automated tasks
- five components
- five sales lines

Table 3–1 Hardware Sizing Guidelines for Simple RODOD COM Orders

Deployment Size	Server	Small	Medium	Large
Orders/day	Not Applicable	<= 250,000	250,000 <= 1,000,000	1,000,000 <= 2,000,000
Reference server model	Application	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Application	1 (2)	1 (2)	2 (3)
CPUs	Application	1 Intel(R) Xeon(R) E5-2630 v3 2.4 GHz (8-core)	2 Intel(R) Xeon(R) E5-2660 v3 2.6 GHz (10-core)	2 Intel(R) Xeon(R) E5-2690 v3 2.6 GHz (12-core)
RAM (DDR4, GB)	Application	96	192	192
Internal disk space (GB)	Application	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)
Number of WebLogic Server managed servers (HA configuration in parentheses)	Application	2 (4)	4 (8)	8 (12)
Shared storage IOPS (for failover purposes), total for all nodes	Application	5000	17500	35000
Reference server model	Database	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Database	1 (2)	1 (2)	2 (3)

Table 3–1 (Cont.) Hardware Sizing Guidelines for Simple RODOD COM Orders

Deployment Size	Server	Small	Medium	Large
CPUs	Database	1 Intel(R) Xeon(R) E5-2660 v3 10-core (2.6 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 18-core (2.3 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 2.3 GHz (18-core)
RAM (DDR4, GB)	Database	32	128	128
Database storage IOPS, total for all nodes	Database	10000	35000	70000

Sizing Guidelines for Complex RODOD COM Orders

Table 3–1 shows sizing guideline assumptions for complex RODOD COM orders. One order contains:

- 40 automated tasks
- 15 components
- 20 sales lines

Table 3–2 Hardware Sizing Guidelines for Complex RODOD COM Orders

Deployment Size	Server	Small	Medium	Large
Orders/day	Not Applicable	<= 50,000	50,000 <= 200,000	200,000 <= 400,000
Reference server model	Application	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Application	1 (2)	1 (2)	2 (3)
CPUs	Application	1 Intel(R) Xeon(R) E5-2660 v3 2.6 GHz (10-core)	2 Intel(R) Xeon(R) E5-2699 v3 18-core (2.3 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 2.3 GHz (18-core)
RAM (DDR4, GB)	Application	96	192	192
Internal disk space (GB)	Application	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)
Number of WebLogic Server managed servers (HA configuration in parentheses)	Application	2 (4)	4 (8)	8 (12)
Shared storage IOPS (for failover purposes), total for all nodes	Application	5000	17500	35000
Reference server model	Database	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Database	1 (2)	1 (2)	2 (3)

Table 3–2 (Cont.) Hardware Sizing Guidelines for Complex RODOD COM Orders

Deployment Size	Server	Small	Medium	Large
CPUs	Database	1 Intel(R) Xeon(R) E5-2660 v3 10-core (2.6 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 18-core (2.3 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 2.3 GHz (18-core)
RAM (DDR4, GB)	Database	64	128	128
Database storage IOPS, total for all nodes	Database	10000	35000	70000

OSM SOM Hardware Sizing Guidelines for RSDOD Orders

Table 3–3 shows sizing guideline assumptions for RSDOD SOM orders. One order contains:

- 20 automated tasks
- Five components
- 10 sales lines

Table 3–3 Hardware Sizing Guidelines for RSDOD SOM Orders

Deployment Size	Server	Small	Medium	Large
Orders/day	Not Applicable	<= 250,000	250,000 <= 1,000,000	1,000,000 <= 2,000,000
Reference server model	Application	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Application	1 (2)	1 (2)	2 (3)
CPUs	Application	1 Intel(R) Xeon(R) E5-2630 v3 2.4 GHz (8-core)	2 Intel(R) Xeon(R) E5-2660 v3 2.6 GHz (10-core)	2 Intel(R) Xeon(R) E5-2690 v3 2.6 GHz (12-core)
RAM (DDR4, GB)	Application	96	192	192
Internal disk space (GB)	Application	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)
Number of WebLogic Server managed servers (HA configuration in parentheses)	Application	2 (4)	4 (8)	8 (12)
Shared storage IOPS (for failover purposes), total for all nodes	Application	5000	17500	35000
Reference server model	Database	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Database	1 (2)	1 (2)	2 (3)

Table 3–3 (Cont.) Hardware Sizing Guidelines for RSDOD SOM Orders

Deployment Size	Server	Small	Medium	Large
CPUs	Database	1 Intel(R) Xeon(R) E5-2660 v3 10-core (2.6 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 18-core (2.3 GHz)	2 Intel(R) Xeon(R) E5-2699 v3 2.3 GHz (18-core)
RAM (DDR4, GB)	Database	32	128	128
Database storage IOPS, total for all nodes	Database	10000	35000	70000

Simple Order Hardware Sizing Guidelines (Non-RODOD or -RSDOD)

Table 3–4 shows sizing guideline assumptions for simple (Non-RODOD or -RSDOD) orders. One order contains:

- Five automated tasks
- Five components
- 10 sales lines

Table 3–4 Hardware Sizing Guidelines for Simple Orders

Deployment Size	Server	Small	Medium	Large
Orders/day	Not Applicable	<= 2,000,000	2,000,000 <= 5,000,000	5,000,000 <= 10,000,000
Reference server model	Application	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Application	1 (2)	1 (2)	2 (3)
CPUs	Application	1 Intel(R) Xeon(R) E5-2630 v3 2.4 GHz (8-core)	2 Intel(R) Xeon(R) E5-2660 v3 2.6 GHz (10-core)	2 Intel(R) Xeon(R) E5-2660 v3 2.6 GHz (10-core)
RAM (DDR4, GB)	Application	48	192	192
Internal disk space (GB)	Application	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)	2x600 SAS-3 HDD (RAID1)
Shared storage IOPS (for failover purposes), total for all nodes	Application	500	1000	2000
Number of WebLogic Server managed servers (HA configuration in parentheses)	Application	2 (4)	4 (8)	8 (12)
Reference server model	Database	Oracle Server X5-2	Oracle Server X5-2	Oracle Server X5-2
Number of servers (HA configuration in parentheses)	Database	1 (2)	1 (2)	2 (3)
CPUs	Database	1 Intel(R) Xeon(R) E5-2630 v3 2.4 GHz (8-core)	1 Intel(R) Xeon(R) E5-2690 v3 2.6 GHz (12-core)	2 Intel(R) Xeon(R) E5-2690 v3 2.6 GHz (12-core)

Table 3–4 (Cont.) Hardware Sizing Guidelines for Simple Orders

Deployment Size	Server	Small	Medium	Large
RAM (DDR4, GB)	Database	32	128	128
Database storage IOPS, total for all nodes	Database	3000	6500	13000
Number of RAC nodes (HA configuration in parentheses)	Database	1 (2)	1 (2)	2 (3)

General Hardware Sizing and Configuration Recommendations

The following sections provide general hardware sizing and configuration recommendations.

OSM Installer and Application Server System Sizing

Ensure you have a minimum of 20 GB of available disk space for installing and deploying all OSM required packages, creating a domain, and deploying the OSM application.

Application Server Hardware Sizing

Your cluster should be equally distributed across the number of Oracle RAC database instances that OSM uses. For example, if your order volume requirements mandates that you need three managed servers and two Oracle RAC database instances, you must round up the number of managed servers to four so that each database instance has an equal number of managed servers. Each managed servers should have 32 GB of memory. Oracle recommends that you use the managed server startup parameters and memory configuration specified in "[Configuring Managed Server Startup Parameters](#)".

Running Multiple WebLogic Servers on the Same System

You can run multiple WebLogic servers in a cluster on the same system so as to maximize the use of available resources while keeping the heap size of the associated JVM instances to a reasonable level. Ensure that you limit the number of JVM instances to the number of available processors.

Shared Storage for the WebLogic Server

In an OSM high-availability system architecture, the WebLogic Server requires high-performance disk storage to support whole server migration. Whole server migration enables a managed server that fails on one system to migrate and startup on another system. Various files must be installed on shared storage across WebLogic managed server instances such as persistent stores.

The *OSM Installation Guide* provides instructions that specify the minimum number of WebLogic Server files that must be on shared storage to support the whole server migration functionality. All other files can be on the local file system where the managed servers or administration server are running.

Note: Other shared storage file configurations are possible depending on your business requirements. For more information about best practices for WebLogic Server on shared storage, see the following article:

<http://www.oracle.com/technetwork/database/availability/maa-fmwsharedstoragebestpractices-402094.pdf>

Use RAID 1+0 (normal redundancy) backed shared storage for installing WebLogic Server, creating the OSM domain, and deploying applications and server log files. Ensure that you have 5 GB for JMS persistent file stores. This requirement might be higher, depending on the design and the order volume.

Database Hardware Sizing

For the database, plan to have at least 500 GB of free disk space for the OSM schema. The OSM schema size is likely to be higher, depending on the design and the order volume, and you must plan for this during hardware sizing. The size of the OSM schema depends many factors such as the number orders you process per day, the duration you must retain the orders, and so on.

Shared Storage for the Database

In an OSM high-availability system architecture, the Oracle database requires high-performance shared storage to support database failover operations. In an Oracle RAC configuration, all data files, control files, and parameter files are shared for use by all Oracle RAC instances.

A high-availability storage solution that uses one of the following architectures is recommended:

- Direct Attached Storage (DAS), such as a dual ported disk array or a Storage Area Network (SAN).
- Network Attached Storage (NAS).

In terms of I/O characteristics, OSM performs a large amount of database writes compared to database reads. OSM is highly sensitive to writes performance of the Oracle Database. Ensure that the write response times of the storage do not exceed 5ms under the load.

You should also consider backup and restore hardware and software that supports mirror split and re-mirroring such as the Oracle ZFS Storage Appliance. Oracle recommends such mirroring software and hardware because the backup and restore functionality is rapid and can be done online. This functionality is especially important when performing upgrades or when purging database partitions and can reduce the length of maintenance windows or the time it takes to recover from errors. For more information about backing up and restoring OSM files and data, see *OSM System Administrator's Guide*.

RAID Recommendations for the Database

RAID (Redundant Array of Independent Disks) disk storage technology increases disk storage functions and reliability through redundancy. The use of RAID with redundant controllers is recommended to ensure there is no single point of failure and to provide better performance on the storage layer.

The database is sensitive to read/write performance of the redo logs and should be on a RAID 1, RAID 1+0, or no RAID at all because logs are accessed sequentially and performance is enhanced by having the disk drive head near the last write location.

See the *I/O Tuning with Different RAID Configurations* Doc ID 30286.1 knowledge article on the Oracle support web site for additional information:

<https://support.oracle.com>

Understanding Order Affinity

The following section provides information about load balancing.

About Order Affinity and Ownership in an OSM WebLogic Cluster

When an OSM managed server receives a new order, OSM assigns a unique order ID to the order. OSM associates the order ID to the receiving managed server instance name within the cluster. Throughout the order fulfillment life cycle, OSM processes this order only with the associated managed server. This OSM principle is called *order affinity* and ensures order data integrity and performance by preventing multiple managed server instances from processing the same order. The server instance that has control of an order owns the order. OSM routes all requests relating to the order to the owner instance.

Order ownership is transferable. OSM can transfer an order to another managed server in the following scenarios:

- If an order becomes a high-activity order, OSM can redistribute the order from the receiving managed server to another less-active managed server to better balance the load between each server in the cluster (see "[Distribution of High-Activity Orders](#)" for more information).
- If an incoming order is a revision order that arrives on a managed server different from the one processing the base order, OSM transfers order ownership so that the same managed server owns both the base order and the incoming order.
- If the incoming order has a dependency on an order owned by a server instance other than the one on which it was received. For example, a follow-on order that has a dependency on another order would be routed to the server where the previous order was processed.
- If a managed server is added or removed from a cluster, OSM notifies all server instances about topology changes to the cluster and re-runs the distribution algorithms that determine which server instance owns an order. Order ownership either remains with the previous owner or with a different owner.

Note: The reassignment of orders can temporarily impact Oracle RAC database performance when order ownership changes as the OSM WebLogic cluster resizes.

Note: Before redistribution of an order to a new or different server instance, that server instance notifies other server instances to complete pending operations on the orders to be redistributed and delete them from their order cache.

About Load Balancing for OSM and Order Affinity

Load balancing helps maximize server resource use and order throughput. It enables OSM to minimize server response time and processing delays that can occur if some servers are overloaded while others remain unused. Load balancing helps support rolling downtimes of servers for maintenance tasks or upgrade procedures without impacting clients during non-peak times.

For OSM, two types of incoming messages are important for load balancing:

- Load balancing for JMS over T3 or T3S. Inbound JMS messages to OSM can include:
 - OSM Web Service requests, such as Create Order requests from a CRM that initiates an OSM order
 - JMS messages responding to an OSM automation, such as a response to an automation plug-in JMS request messages to external fulfillment systems
- Load balancing for HTTP and HTTPS. Inbound HTTP and HTTPS messages to OSM can include:
 - OSM Web Service requests transmitted over HTTP and HTTPS, such as CreateOrder requests from a CRM that initiates an OSM order
 - OSM Web client interactions, including the Task Web client and Order Management Web client
 - XML API requests from external system

Note: OSM automations often use the XML API function calls while processing orders within a local server instance. However, OSM typically uses the XML API locally on the same server instance, because the XML API is often used to manipulate the same order owned by the local instance.

For JMS messages, OSM uses the Oracle WebLogic Server JMS distributed destinations for load balancing. See "[JMS Distributed Destinations](#)" for more information. You do not need to load balance JMS messages using an external load balancer.

For HTTP and HTTPS messages, Oracle recommends using a software or hardware load balancer outside of the OSM WebLogic cluster.

Load balancing for OSM Web Service requests is important because the OSM order affinity functionality requires that the orders are distributed appropriately among each managed server within the cluster. A managed servers that receive an order becomes the owner of the order. See "[About JMS Load Balancing Schema Options](#)" for more information about JMS load-balancing options and see "[About HTTP and HTTPS Load Balancing and Session ID Configuration](#)" for more information about HTTP and HTTPS load balancing options.

About the Performance Differences Between JMS and HTTP or HTTPS

In some order affinity scenarios, OSM must forward the requests from a receiving managed server to the owner managed server, such as when a CRM system sends a revision order and OSM receives the order on a managed server that is not the owner of the base order. This process is different depending on whether the message is delivered over JMS or over HTTP or HTTPS.

If the CRM sends the revision order over JMS, OSM re-directs the request to the owner instance. The managed server that originally received the order no longer participates in any way in the processing of the order.

If the CRM sends the revision order over HTTP or HTTPS, OSM forwards the request to the owner managed server over the internal JMS messaging queues. However, the receiving managed server must continually maintain a socket connection to the HTTP client or load balancer that sent the revision order even though another managed server is responsible for processing both the revision order and the base order. The socket connection on the receiving server must remain open until a response is generated because HTTP messages are synchronous. This restriction adds a performance overhead when sending orders over HTTP or HTTPS and increases with the size of the WebLogic Server cluster, because the probability of a message, like a revision order, arriving at the server that owns a particular order decreases as the ownership of orders is spread across more servers.

Given the above limitation, as well as the advantage of the transactional reliability of JMS message processing, Oracle recommends using the OSM Web Services over JMS messages for external client communication. Use HTTP and HTTPS messages for the OSM Order Management Web client and the OSM Task web client because human interaction with these clients are synchronous by nature.

About Order Affinity and Ownership in an Oracle RAC Database

WebLogic multi data sources support XA affinity for global transactions, which ensures that all the database operations for a global transaction performed on an Oracle RAC cluster are directed to the same Oracle RAC instance. However, XA affinity cannot span different global transactions on the same data, which is a key performance requirement for OSM. The objective is to minimize the adverse impact on performance caused by database buffer cache transfers between Oracle RAC instances. Therefore, OSM supports order affinity, which means that database operations for different global transactions on the same order are normally directed to the same Oracle RAC instance. Overall, Oracle RAC instances process database operations simultaneously, but each instance operates on a subset of orders mutually exclusive to each other.

OSM order affinity works in the following way:

- Each OSM server interacts with Oracle RAC through a WebLogic Server multi data source configured for failover with two data sources (one for each Oracle RAC instance). This setup is used for both active-passive and active-active topologies. Under normal conditions each OSM server always interacts with a single Oracle RAC instance. In an active-active topology, load balancing is achieved by reversing the order of the data sources in the multi data source for half of the OSM servers.
- If the Oracle RAC database is configured with server-side load balancing (the Oracle RAC instances register with a remote listener process), server-side load balancing must be overridden as discussed in "[Remote Listener Considerations](#)".
- Under normal conditions, the ownership and processing of each order is pinned to a single OSM server in a cluster. Because each OSM server interacts with a single Oracle RAC instance through the primary data source of its multi data source, all database operations for each order are directed to the same Oracle RAC instance. If ownership of an order is transferred to another OSM server (for example, when the cluster resizes or the order becomes a high-activity order), the processing of that order will be pinned again to the new OSM server.

Planning the Network Infrastructure

The following sections provide information about planning your network infrastructure.

Planning Network IP Addresses

The WebLogic Server cluster must have the following:

- A multicast IP address and port for the WebLogic Server cluster. Use any IP address between 224.0.0.0 and 239.255.255.255.
- IP addresses for each server in the cluster. If you are using whole server migration, the IP addresses must be available for node manager to dynamically allocate as floating IP addresses for the managed servers in the cluster.

The Oracle RAC database must have the following:

- Three IP addresses that resolve to the same SCAN hostname
- Each Oracle RAC database instance must have a public and private IP address with corresponding hostnames.

Planning Bi-Directional Network and Firewall Access

Because JMS messages are transmitted in the context of JTA transactions, make sure that the WebLogic Server client always has bi-directional network and firewall access to every OSM WebLogic managed server. If you send a message to a distributed destination, for example, the JTA coordinator used by the WebLogic Server client must be able to communicate with every managed server. Having only partial access to the managed servers in the OSM cluster can lead to inconsistent message states.

Network Latency Between WebLogic Server and the Database

To attain the fastest possible network connections, Oracle recommends that the physical servers for the WebLogic Server and Oracle Database be in the same network segment. The performance of OSM is sensitive to network latency between the WebLogic Server and the database.

Oracle recommends connecting the OSM and database servers with a minimal number of network devices in between. The switch connecting the network devices should be 10 GB capacity. This hardware configuration should produce an optimal network latency between 0.2 and 0.4 msec. Network latency above 1 msec can cause performance degradation.

Network Latency and NFS Configuration for WebLogic Server Shared Storage

The usual latency requirement from storage is service time of less than 5 msec. You must decide the IOPS (input/output per second) requirement based on hardware sizing.

For more information about recommended parameters for different levels of NFS mount robustness, see *Mount Options for Oracle files when used with NFS on NAS devices* (Doc ID 359515.1) knowledge article on the My Oracle Support Web site at:

<https://support.oracle.com>

While this KM note was written for Oracle RAC, it provides a useful overview of various combinations of NFS parameters that are also appropriate for WebLogic Server shared storage.

Operating System Planning

The following sections include operating system planning topics.

Installing OSM on Unix, Linux, or Windows System

Install OSM Server on Unix or Linux systems for production environments. OSM server can be installed on Unix, Linux, or Windows system for development, demonstration, and non-performance test systems.

If you plan to use Oracle Communications Design Studio on a Windows system, you should also install the SDK Tools component on the Windows system. If you plan to generate reports using the command line utility of the OSM Reporting Interface, you must install the SDK Tool component.

Database Planning

The following sections provide information about planning your database for the OSM system. In addition to the database planning information provided in this chapter, review the following:

- **Creating Tablespaces:** For more information about options and recommendations for creating tablespaces for OSM schemas, see ["Tablespace and Schema Considerations for OSM Production Systems"](#).
- **Using Partitioning:** For an overview of partitioning in OSM and a discussion about the benefits and pitfalls of partitioning, see *OSM System Administrator's Guide*. Oracle strongly recommends partitioning in all production deployments or production test environments, particularly those with high order volumes or any volume of large or complex orders. Moreover, partitioning is required if you plan to use active-active Oracle RAC.
- **Order Purge Strategies:** For more information about order purge strategies, see *OSM System Administrator's Guide*. You must decide on an order purge strategy before doing performance testing and before going into production.
- **Sizing Partitions:** For more information about sizing partitions for order data, see *OSM System Administrator's Guide*. Partition sizing depends on your order purge strategy.
- **Cartridge Management Strategy:** For more information about cartridge management strategies, see *OSM System Administrator's Guide*.
- **Online and Offline Maintenance:** For more information about online and offline maintenance operations, see *OSM System Administrator's Guide*.

Oracle RAC Database Active-Active Deployments

At the database-server layer, use Oracle RAC in the active-active high-availability topology for test and production systems. In active-active Oracle RAC, all active instances simultaneously process database operations. In addition to load balancing, active-active Oracle RAC can also provide high availability if the physical database server of one Oracle RAC database instance is dimensioned to handle all of the database load upon failure of the other Oracle RAC database instance.

OSM supports Oracle RAC through the use of WebLogic multi data sources. To optimize performance, OSM uses order affinity as described in the following section.

Note: OSM supports an Oracle RAC configuration of two or more nodes. OSM also supports Oracle RAC One Node.

Database Partitioning

During the installation, you specify if you need to partition the OSM database, and you provide partition sizes. Oracle strongly recommends using partitioning for production databases and production test databases.

You can change the values that you selected during the installation process. However, those updates do not affect existing partition sizes.

For information about partition sizes, see *OSM System Administrator's Guide*.

Database Failover with Oracle RAC

In an Oracle RAC configuration, all data files, control files, and parameter files are shared for use by all Oracle RAC instances. When a database instance fails, performance may be temporarily affected, but the database service continues to be available.

The use of WebLogic multi data source and JMS minimize the impact of a database failure in the following ways:

- The JDBC multi data source fails over to the secondary data source.
- In-flight WebLogic transactions are driven to completion or rolled back, based on the state of the transaction at the time of the failure. Because JMS messages are redelivered, most failed transactions are automatically retried (upon redelivery) on the secondary data source. This does not apply to failed Web services and HTTP requests (for example, failed createOrder requests must be resubmitted).

Listener Considerations for Oracle RAC

In an Oracle RAC environment, the database listener process establishes the connections between the JDBC data source of a WebLogic Server instance and an Oracle RAC instance.

To enable the listener functionality, Oracle recommends that you use remote listeners. Remote listeners are also known as SCAN listeners. With this option, each Oracle RAC instance is configured to register with a remote listener that may or may not be in the same physical server. There is no "remote listener only" scenario: local listeners must be running for the remote listener to work properly. When a request comes in, the remote listener redirects it to the local listener depending on what instance it is connecting to.

In an Oracle RAC environment, remote listeners are typically used. In 11gR2, when you create an Oracle RAC database with the Database Configuration Assistant (DBCA), the remote listener is a Single Client Access Name (SCAN) listener. The SCAN address resolves to a number of addresses (for example, using round-robin DNS).

When configuring JDBC data sources, you must be aware of your listener process setup. The OSM installer will automatically configure your JDBC data sources based on the listener process considerations discussed in the following sections. These considerations apply to both active-active and active-passive topologies.

Remote Listener Considerations

By default, server-side load balancing is configured when using remote listeners. That is, the remote listener decides how to forward connection requests based on the load of the Oracle RAC instances. OSM active-active configurations require that server-side load balancing be overridden. To achieve this, the OSM installer includes the `INSTANCE_NAME` parameter (the SID of a specific instance) in the JDBC URL of each member data source, in addition to identifying the database service by name.

For example, the following data source URLs include both `INSTANCE_NAME` and `SERVICE_NAME`:

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host1)(PORT=1521))(CONNECT_DATA=(SERVICE_NAME=OSM)(INSTANCE_NAME=SID1)))
```

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host1)(PORT=1521))(CONNECT_DATA=(SERVICE_NAME=OSM)(INSTANCE_NAME=SID2)))
```

In the example, the host and port are for the SCAN listener, the service name is the same, and the instance names are different.

The OSM installer will automatically set up the URL of each JDBC data source in the WebLogic Server instances' multi data source. However, if you choose to manually configure additional Oracle RAC instances, you must populate the SID in the JDBC URL of the member data sources in WebLogic Server. See ["Manually Configuring Additional Data Sources for an Oracle RAC Instance"](#) for details.

An alternative to overriding server-side load balancing in remote listeners is to use local listeners instead.

Local Listener Considerations

When configuring local listeners, consider the following:

- Each database instance should be configured to register only with its local listener.
- Oracle instances can be configured to register with the listener statically in the `listener.ora` file or registered dynamically using the instance initialization parameter `local_listener`, or both. Oracle recommends using dynamic registration.
- A listener can start either a shared dispatcher process or a dedicated process. Oracle recommends using dedicated processes.

WebLogic Server Planning

An OSM instance consists of an administration server, and a cluster of managed servers. Clustering ensures continuous availability of your OSM server and improves performance by enabling load balancing, scalability, and failover. You may choose to use the clustering feature in OSM if:

- You want to minimize unexpected system downtime.
- Your order volume is very high and cannot be sustained with a single WebLogic Server instance or physical host.

OSM supports the following load balancing:

- **Load balancing for JMS messages:** The native WebLogic load balancing options for Java Messaging Service (JMS) messages help OSM maximize server resource use and order throughput. Load balancing also enables OSM to minimize server response time and processing delays that can occur if some servers are overloaded with orders while others remain unused. Load balancing allows rolling

downtimes of servers without client impact, as long as a sufficient number of servers are up and running.

- **Load balancing for HTTP and HTTPS messages:** In addition to the native WebLogic support for load balancing JMS messages, Oracle recommends installing a software or hardware HTTP load balancer for balancing incoming HTTP or HTTPS messages.

To ensure high availability, the load balancing mechanisms (both the native WebLogic JMS load balancing or the HTTP load balancer) forward messages to other managed servers if one of the managed servers fails. Orders that were being processed by the failed server are delayed until that server is either restarted or migrated.

Understanding the WebLogic Cluster Configuration

Recommendations for OSM cluster include the following:

- **Messaging mode:** Oracle recommends that you use multicast messaging mode when setting up OSM. For more information about using multicast or unicast, see the topic about configuring the WebLogic server domain for an OSM cluster in *OSM Installation Guide*.
- **Load balancing:** Set up clusters to use the random algorithm.

Table 3–5 includes a summary of the recommendations for OSM cluster.

Table 3–5 Configuration Recommendations for OSM Cluster

Configuration Item	Value
Cluster Messaging Mode	multicast
Default Load Algorithm	Random

About Cluster Domain Management

Oracle recommends the following best practices when configuring managed server instances in your clustered OSM domain.

- Configure Node Manager to automatically restart all managed servers in the domain.
- Configure all managed server instances to use MSI, which is the default. This feature allows the managed servers to restart even if the administration server is unreachable due to a network, hardware, or software failure. See *Oracle Fusion Middleware Managing Server Startup and Shutdown for Oracle WebLogic Server* for more information.

About the WebLogic Messaging Mode and OSM Cluster Size

The WebLogic Server cluster messaging mode enables cluster members to remain synchronized and provides the foundation for other WebLogic Server functions such as load balancing, scalability, and high availability.

In an OSM cluster, the messaging mode can be multicast or unicast. Oracle recommends using multicast in most OSM installations because multicast is generally more reliable.

In some cases, unicast may be the only option. For example, multicast can only work over a single subnet. If a single subnet is not possible due to technological or IT policy reasons, or if the network's multicast transmission is not reliable, then unicast messaging mode becomes the best option. If you must use unicast, ensure that you

apply the WebLogic Server patches that resolve the currently known unicast issues. See "[Software Requirements](#)" for patch information.

Do not use unicast for a cluster with more than 20 managed servers. Enabling a reliable multicast network for WebLogic Server multicast messaging mode is the only option for such large cluster sizes. The broadcast nature of multicast over UDP packets works better in such large clusters than one-to-one TCP unicast connections between each pair of managed servers.

You can use unicast for cluster sizes between 10 and 20 managed servers, but consider multicast if you begin to experience poor performance or reliability issues.

About Coherence and Unicast

Oracle recommends unicast mode for Oracle Coherence. The OSM cluster performance and robustness are sensitive to the synchronization of cached data maintained by Coherence. The inherently unreliable packet delivery with UDP in multicast transmission may destabilize cache synchronization, and errors can be difficult to troubleshoot. As a result, Oracle does not recommend using Coherence in multicast mode.

Understanding the Administration Server

The administration server operates as the central control entity for the configuration of your OSM WebLogic domain.

The failure of the administration server does not affect the operation of managed servers in the domain. Furthermore, the load balancing and failover capabilities supported by the domain configuration remain available. However, it does prevent you from changing the domain's configuration, including loss of in-progress management and deployment operations and loss of ongoing logging functionality.

Oracle recommends the following best practices when configuring the administration server in your OSM WebLogic domain:

- The administration server should not participate in a cluster. Ensure that the administration server's IP address is not included in the cluster-wide DNS name.
- Start the administration server using Node Manager to ensure that the administration server restarts in the event of a failure. (If the administration server for a domain becomes unavailable, the managed servers in the domain will periodically attempt to reconnect to the administration server.) Do not deploy OSM to the administration server in a production system.

For additional clustering best practices, see *Oracle Fusion Middleware Using Clusters for Oracle WebLogic Server*.

You may also consider transforming the administration server in an existing domain for cold cluster failover.

In this active-passive topology, the administration server is installed on Node1 and then transformed to a shared disk. In the event of failure, it will be failed over to Node2. The administration server *domain_home* resides on a shared disk that is mountable by both Node1 and Node2 but is mounted by either one of the two at any given point in time. The listen address of the administration server is a virtual IP.

See the chapter on active-passive topologies in *Oracle Fusion Middleware High Availability Guide* for full details.

Understanding Node Manager Configuration

Node Manager is a Java utility that runs as a separate process from the WebLogic Server and allows you to perform common operations for a managed server, regardless of its location with respect to its administration server. The Node Manager process is associated with a machine. Thus each physical server has its own Node Manager, which can control all server instances that reside on the same machine as the Node Manager process.

Consider the following guidelines when using Node Manager:

- Run Node Manager as an operating system service on UNIX platforms, allowing it to restart automatically when the system is restarted.
- Set the **AutoRestart** attribute of the administration server and each managed server to **true** to allow Node Manager to automatically restart it in the event of failure, depending on the exit code (if the exit code is less than 0, the server is not restarted and you must diagnose the problem).
- Do not disable the Managed Server Independence (MSI) mode for a managed server (enabled by default). MSI allows Node Manager to automatically restart a managed server after failure even when the administration server is unavailable.
- To ensure that Node Manager properly restarts servers after a system crash (for example, an operating system crash), you must do the following:
 - Ensure that **CrashRecoveryEnabled** is set to **true**. This property is disabled by default.
 - Start the administration server using Node Manager. You cannot use Node Manager to start a server instance in MSI mode, only to restart it. For a routine startup, Node Manager requires access to the administration server.
 - Start all managed servers using the administration server. You can accomplish this using the WebLogic Server Scripting Tool command line or scripts or the Administration Console. A widespread practice is to start managed servers using a shell script.

See *Node Manager Administrator's Guide for Oracle WebLogic Server* for more information.

Understanding JMS Messaging

Recommendations for JMS Messaging include the following:

- JMS message persistence needs to use a file store rather than a JDBC store, which is the default in the OSM installer. For optimal performance, Oracle recommends that you use Direct-Write-With-Cache file stores, if this option is supported in your environment. For information about the best practices for configuring a WebLogic file store, see the chapter about using the WebLogic persistent store in *Oracle Fusion Middleware Configuring Server Environments for Oracle WebLogic Server*.
- In a clustered environment, WebLogic uses load balancing to distribute the workload across clusters. For OSM, set the load balancing policy for distributed JMS queues to **Random**. For more information about WebLogic JMS Random distribution, see the chapter about configuring advanced JMS system resources in *Oracle Fusion Middleware Configuring and Managing JMS for Oracle WebLogic Server*.
- OSM uses messaging bridges with Asynchronous Mode Enabled and Exactly-once quality of service. For this type of messaging bridge, you can improve throughput by increasing the **Batch Size** attribute, which reduces the number of transaction commits.

- WebLogic supports the Store and Forward (SAF) service for reliable delivery of messages between distributed applications running on different WebLogic Server instances. It is recommended that you set the Conversation Idle Time Maximum on SAF agents to a positive value to allow messages to be forwarded to other active members when the original target is down or unavailable. For more information about the WebLogic SAF service, see the chapter about understanding the SAF service in *Oracle Fusion Middleware Configuring and Managing Store-and-Forward for Oracle WebLogic Server*. Oracle recommends that you use SAF to integrate OSM with Oracle Communications ASAP, Oracle Communications IP Service Activator, and Oracle Communications Unified Inventory Management (UIM). For more information about this post OSM installation task, see "[OSM Integration with External Systems](#)".

JMS Distributed Destinations

JMS destinations, which may be JMS queues or JMS topics, serve as repositories for messages. A JMS destination provides a specific end point for messages, which a JMS client uses to specify the target of messages that it produces and the source of messages that it consumes. For example, OSM automation plug-ins can specify the JNDI names of the JMS queue and the JMS reply-to queue to produce and consume messages with external systems.

A distributed destination is a single set of destinations that are accessible as a single, logical destination to a client (for example, a distributed topic has its own JNDI name). The members of the set are typically distributed across multiple servers within a cluster, with each member belonging to a separate JMS server. When deployed to a cluster, OSM uses distributed destinations because JMS provides load balancing and failover for the members of a distributed destination in a cluster. For performance reasons, the server affinity is enabled on the connection factory to give preference to local destination members.

Note: OSM does not support uniform distributed destinations (UDDs), which are the default type of distributed destination in WebLogic. OSM supports only weighted distributed destinations (WDDs). When configuring distributed destinations in the WebLogic Server Administration Console, select **Weighted** for **Destination Type** to configure the distributed destination as a WDD.

Note: Messages sent to JMS distributed destinations will always be delivered to member queues. However, messages delivered to a member queue can get stuck in the event of a server failure. In that case, messages cannot be consumed until either the WebLogic server is restarted or the JMS server is migrated.

About WebLogic Server JMS T3 and T3S Load Balancing

WebLogic Server T3 and the secure T3S variant are transport protocols for application-level services that OSM uses for communication between client applications and the WebLogic Server. OSM typically communicates messages using T3 or T3S to distributed JMS destination for:

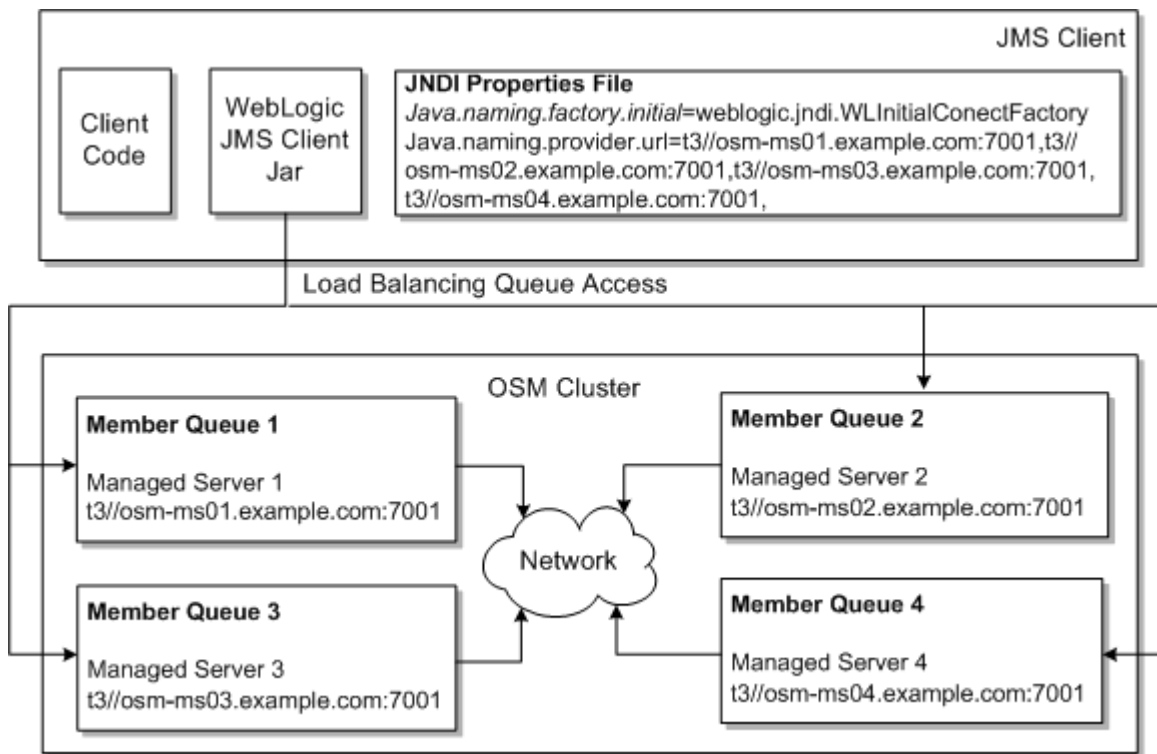
- OSM Web Service XML/SOAP messages, like an OSM CreateOrder Web Service request from a CRM that initiates an OSM order
- OSM automations that receive messages from external fulfillment systems

- OSM internal event handling. For example, `oms_events_queue` can be used for triggering data change notifications on an order.

The T3 protocol is fully implemented by the WebLogic Server and its client libraries. T3 client libraries support clustered server URLs for the initial context lookup enabling native WebLogic support for load balancing. The WebLogic Server cluster then manages load distribution based on system availability and the selected load balancing schema. See the WebLogic documentation for more information about creating a WebLogic client for communicating JMS messages to OSM over T3.

Figure 3–2 shows a JMS client with a JNDI properties file configured with the URLs for each managed server within a cluster that the client is sending messages to. WebLogic Server load balances these messages using the URLs based on a load balancing schema (see "About JMS Load Balancing Schema Options" for more information). OSM typically processes an OSM order on the managed server that receives the order, but in some cases OSM uses the managed server queues internally to redistribute orders to other managed servers after an order has been received on a managed server (see "About Order Affinity and Ownership in an OSM WebLogic Cluster" for more information).

Figure 3–2 JMS Load Balancing



About JMS Load Balancing Schema Options

At the WebLogic Server cluster level, you can select between three load balancing schemas for JMS load balancing. WebLogic supports only one load balancing schema selection per cluster even if the cluster hosts multiple applications. The load balancing schema you select effects OSM both on its external and internal messaging interfaces such as incoming messages from an external system or messages exchanged between managed servers within the cluster.

The following lists the WebLogic Server load balancing options:

- Round-robin: OSM distributes the JMS messages evenly across the managed servers in the cluster by periodically circulating the list of available managed servers. Each server is treated equally.
- Random-based: Before routing a JMS message, the random-based load balancing schema generates a random number and selects one of the candidate servers as the message destination based on the random number.
- Weight-based: If the OSM cluster consists of managed servers hosted on systems with varying hardware resource capacity, you can assign load balancing weights to each WebLogic Server instance.

Oracle recommends that you use random-based load balancing. The OSM Installer automatically configures random based load balancing.

Understanding Whole Server Migration for High Availability

OSM's automation framework uses WebLogic Java Message Service (JMS) to support messaging between automation components and external systems. In addition, upstream systems can access OSM Web services with JMS as one of the transport protocols. Thus, it is critical that JMS be highly available. JMS high availability is achieved by using JMS distributed destinations (see "[JMS Distributed Destinations](#)") as well as planning for whole server migration in the event of failure.

WebLogic Server migration is the process of moving a managed server instance elsewhere in the event of failure. In the case of whole server migration, the server instance is migrated to a different physical machine upon failure. Whole server migration is the preferred and recommended approach because all JMS-related services are migrated together.

WebLogic Server provides migratable servers to make JMS and the JTA transaction system highly available. Migratable servers (clustered server instances that migrate to target servers) provide for both automatic and manual migration at the server level, rather than at the service level.

When a migratable server becomes unavailable (for example, if it hangs, loses network connectivity, or its host machine fails), migration is automatic. Upon failure, a migratable server is automatically restarted on the same machine if possible. If the migratable server cannot be restarted on the machine where it failed, it is migrated to another machine. In addition, an administrator can manually initiate migration of a server instance.

The target server for the migration can be a spare server on which Node Manager is running. This server does not participate in the cluster until a migratable server is migrated to it.

Another option for the target server is a server that is hosting a WebLogic Server instance. In the event of failure, the migratable server will be migrated to it, resulting in the two instances (which now run on the same server) competing for CPU, memory, and disk resources. In this case, performance could be impacted.

Before you configure automatic whole server migration, be aware of the following requirements:

- All servers hosting migratable servers are time-synchronized. Although migration works when servers are not time-synchronized, time-synchronized servers are recommended in a clustered environment.

- To ensure file availability, use a disk that is accessible from all machines. If you cannot share disks between servers, you must ensure that the contents of *domain_home/bin* are copied to each machine.
- Ensure that the user account that runs the managed servers can work without a password prompt.
- Ensure that the user account that runs the managed servers have execute privilege on the */sbin/ifconfig* and */sbin/arping* binaries that are involved in creating floating IP address.
- Use high-availability storage for state data. For highest reliability, use a shared storage solution that is itself highly available; for example, a storage area network (SAN). For more information, see *Oracle Fusion Middleware Using Clusters for Oracle WebLogic Server*.
- For capacity planning in a production environment, keep in mind that server startup during migration taxes CPU utilization. You cannot assume that because a machine can handle a certain number of servers running concurrently that it also can handle that same number of servers starting up on the same machine at the same time.

For additional requirements, see *Oracle Fusion Middleware Using Clusters for Oracle WebLogic Server*.

Managing WebLogic Transactions

Transactions are a means to guarantee that database changes are completed accurately. The WebLogic Server transaction manager is designed to recover from system crashes with minimal user intervention and makes every effort to resolve transaction branches with a commit or roll back, even after multiple crashes or crashes during recovery.

To facilitate recovery after a crash, the WebLogic Server Transaction Recovery Service automatically attempts to recover transactions on system startup. On startup, the Transaction Recovery Service parses all transaction log records for incomplete transactions and completes them as described in *Oracle Fusion Middleware Programming JTA for Oracle WebLogic Server*.

Oracle recommends the following guidelines:

- If a server crashes and you do not expect to be able to restart it within a reasonable period of time, you can migrate either the whole server or the Transaction Recovery Service to another server in the same cluster. The transaction log records are stored in the default persistent store for the server. If the default persistent store is a file store (the default), it must reside in a shared storage system that is accessible to any potential machine to which a failed migratable server might be migrated. See "[Persistent Store: JMS File Store and JDBC Store](#)" for high-availability considerations.
- Configure server instances using DNS names rather than IP addresses. A server instance is identified by its URL (IP address or DNS name plus the listening port number). Changing the URL by moving the server to a new machine or changing its listening port on the same machine effectively moves the server, so the server identity may no longer match the information stored in the transaction logs. Consequently, *any pending transactions stored in the transaction log files will be unrecoverable*. This is also critical if firewalls are used to avoid address translation issues.
- If automatic migration of the Transaction Recovery Service is not configured, first attempt to restart a crashed server and allow the Transaction Recovery Service to handle incomplete transactions (rather than move it to a new machine). However,

if the server exited with a code less than 0, do not attempt to restart it unless you diagnose the problem. In this case, the server did not terminate in a stable condition; for example, due to invalid configuration.

See *Oracle Fusion Middleware Programming JTA for Oracle WebLogic Server* for more information.

Persistent Store: JMS File Store and JDBC Store

WebLogic's persistent store provides a built-in, high-performance storage solution for WebLogic Server subsystems and services that require persistence. For example, it can store persistent JMS messages or temporarily store messages sent using the Store-and-Forward feature. The persistent store supports persistence to a file-based store or to a JDBC-enabled database. The persistent store is important for OSM because it stores all of the JMS messages from the JMS service.

There is a trade-off in performance and ease of backup when choosing between JMS file store and JDBC store:

- JMS file store provides better performance than JDBC store. However, you cannot perform an online backup of OSM data consistent with the JMS file store. You must first shut down OSM and then back up the JMS file store and the database at the same time. Otherwise, inconsistent message states and database states may result, and the backup cannot be used to restore OSM.
- The benefit of JDBC store is that online database backups can obtain consistent snapshots of both OSM data and JMS messages. Currently, however, WebLogic does not offer a mechanism for consistent backup of persistent stores and transaction logs. This is because the transaction logs can only be file-based.
- In an Oracle Communications environment where ASAP, IP Service Activator, or UIM is running in the same OSM WebLogic domain, the JDBC store may yield a more consistent backup strategy across the domain and may outweigh performance considerations. However, you cannot take a consistent backup of OSM because the data is distributed across the database and file system.

To realize high availability for the file store, it should reside on shared disk storage that is itself highly available, for example, a storage area network (SAN).

If you choose JMS file store, Oracle recommends that you configure one custom file store for each managed server.

Understanding Hardware or Software HTTP and HTTPS Load Balancing Options

Oracle recommends that you use an HTTP Server to load balance HTTP and HTTPS messages for OSM clusters in production environments that require high availability for HTTP messages (for example, for the OSM Web Clients or for OSM messages over HTTP).

Note: These recommendations only apply to HTTP and HTTPS messages. JMS messages should be load balanced using the WebLogic Server native support for JMS T3 and T3S load balancing (see "[About WebLogic Server JMS T3 and T3S Load Balancing](#)").

For development systems or if you do not require high-availability for HTTP traffic in a production system, you can create a managed server and use it as an HTTP proxy that is managed by the WebLogic Server Administration Console, but remains outside of the cluster.

You can also consider a hardware load-balancing solution for load balancing HTTP and HTTPS messages. A hardware load balancer can use any algorithm supported by the hardware, including advanced load-based balancing strategies that monitor the utilization of individual machines. If you choose to use hardware to load balance HTTP and HTTPS sessions, the hardware must support a compatible passive or active cookie persistence mechanism and SSL persistence.

The following lists possible software load-balancer options for OSM HTTP and HTTPS messages:

- Oracle HTTP Server
- Oracle Weblogic proxy plug-ins for the following standard Web server solutions
 - Oracle iPlanet Web Server (7.0.9 and later)
 - Apache HTTPD 2.2.x
 - Microsoft Internet Information Services 6.0 and 7.0
- Dedicated software load-balancing solutions like Oracle Traffic Director. Oracle recommends this option for running OSM with Oracle Exalogic and Oracle SuperCluster.

The following lists possible hardware load-balancer options for OSM HTTP and HTTPS messages:

- F5 Big-IP
- Cisco ACE

About HTTP and HTTPS Load Balancing and Session ID Configuration

Round-robin load balancing for HTTP and HTTPS messages is the only supported option for software load balancers because WebLogic does not propagate managed server weights externally.

Note: The WebLogic cluster load balancing schema options (see "[About JMS Load Balancing Schema Options](#)") have no effect for load balancing HTTP messages because an HTTP load balancer is outside of the cluster.

When running OSM in a cluster, you must enable the proxy-plug-in option at the cluster level as opposed to the managed-server level, otherwise session drops may occur and login to the OSM Web UI may not be possible.

You must ensure that the chosen HTTP load-balancing solution supports WebLogic session IDs and custom HTTP headers. All WebLogic plug-ins, including the Oracle HTTP Server, support sticky sessions, but they do not support session ID failover if the server the ID is connected to fails.

About Oracle Coherence

Oracle Coherence plays a major role in providing grid services to OSM. OSM employs the Coherence Invocation service as well as local and distributed Coherence caches. The Coherence Invocation service is a feature of the Coherence Application Edition or Grid Edition.

Oracle Coherence must be configured to avoid conflicts in a clustered OSM environment. See the WebLogic documentation for guidelines and best practices.

Installing and Configuring the Oracle RAC Database

This chapter provides information about the installation and configuration of Oracle Real Application Cluster (Oracle RAC) Database that is specific to Oracle Communications Order and Service Management (OSM). For complete installation instructions and general information about installing and configuring the Oracle Database, see the Oracle Database documentation.

Database Information You Should Record

Some of the information that you set in installing Oracle Database will be needed during the OSM installation. Record the following information and provide it to the OSM installer:

- Oracle RAC database instance hosts
- Oracle RAC database instance ports
- Oracle RAC database instance SIDs
- Oracle RAC database service name
- Primary Schema User name/Password (The OSM installer creates these)
- Rule Engine Schema User name/Password (The OSM installer creates these)
- Reporting Interface Schema User name/Password (The OSM installer creates these)
- Database Admin User name/Password
- Information about all tablespaces created for OSM

Creating the Oracle Database for OSM

This section describes how to create and configure an Oracle database for OSM. It also gives installation and configuration guidelines to improve OSM performance. Although these guidelines can help improve OSM performance, the hardware and configuration used for Oracle Server running the OSM database schema have the largest impact on performance.

You can install OSM using Oracle Database Release 12c pluggable databases (PDB) within a multitenant container database (CDB) or using a non-container database.

A higher level of availability and performance is offered by Oracle Real Application Clusters (Oracle RAC). For OSM production environments, Oracle recommends Oracle RAC in the active-active mode. The data files that comprise the database must reside

on shared storage that is accessible to all servers in the database cluster. If a node in the cluster fails, Oracle Database continues to run on the surviving nodes.

OSM supports Oracle RAC through WebLogic multi data sources. For each WebLogic managed server, one database instance is configured as the primary instance (in the WebLogic multi data source) and the others as secondary instances. WebLogic monitors the status of the primary instance and fails over to a secondary instance in the event of failure.

Setting Up the Database and Clusterware for Oracle RAC

The following procedure describes how to set up Oracle Database and Clusterware to support Oracle RAC.

1. Install Oracle Clusterware on all nodes:
 - For Linux, see *Oracle Grid Infrastructure Installation Guide for Linux*.
 - For Solaris, see *Oracle Grid Infrastructure Installation Guide for Solaris Operating System*.
 - For AIX, see *Oracle Grid Infrastructure Installation Guide for AIX*.
2. Install Oracle Database with Real Application Clusters on all nodes.
For Linux, Solaris, and AIX, see *Oracle Real Application Clusters Installation Guide for Linux and UNIX*.
3. Create an ASM instance and disk group with shared storage accessible to all nodes.
4. Use Database Configuration Assistant (DBCA) to create an Oracle RAC database on all nodes, using the ASM disk group created in the previous step as storage.
5. Create virtual IP addresses for the database instances, and one Single Client Access Name (SCAN) for the database cluster.

In an Oracle RAC environment, remote listeners are typically used. When you create the database, the remote listener is created as a SCAN listener. The SCAN resolves to multiple IP addresses in the cluster.
6. Start the database and listeners on all nodes.
7. Download and install database patches. See "[Software Requirements](#)" for information about the patches needed for the database for your platform. Ensure that all of the patches have been downloaded from Oracle support and installed before installing OSM.

You have now configured your database instances to support Oracle RAC. When you run the OSM installer, you have the option to create the WebLogic multi data source and data sources required for this configuration. See [Chapter 6, "Performing an Interactive Installation of OSM"](#) for more information.

Memory Settings for the OSM Database

It is a good idea to allocate as much memory as possible to the database. Use memory guidelines provided in "[Planning the Physical Architecture](#)" then confirm your memory requirements with performance testing and tuning.

Oracle recommends the use of automatic shared memory management to manage the memory on your system in production environments. ASMM is a better option than AMM because AMM can cause performance problems.

Character Sets

Oracle recommends using the AL32UTF8 character set for the OSM database instance. However, if OSM is the only application that will be using the database instance, you can use the default character set for your location.

The national character set can be left to the default value for your location.

Database Parameters

This section outlines suggested Relational Database Management System (RDBMS) server configurations for OSM.

Note: This section provides suggested values for use with OSM in a production system. The suggested values are guidelines only. The values you use will depend on your system type and actual processing requirements.

Table 4–1 shows the parameters that should be set for all databases.

Table 4–1 Suggested Oracle Database Parameters for All Systems

Parameter values	Description
O7_DICTIONARY_ACCESSIBILITY	TRUE You can set this parameter to TRUE before running the OSM installer if you are planning to use sys as the database administrator user to use during the OSM installation. If you do this, you should consider setting the option back to the default of FALSE after installation of OSM is complete. If you do not set this parameter to TRUE, you can append as sysdba to the user name when entering the database administrator credentials in the OSM installer. You may find it more convenient to set this parameter (rather than appending as sysdba) if you are installing multiple instances of OSM to the same database or if you think you may be running the installer multiple times.
db_block_size	8192 (default) For large commercial application packages on raw disks, this value should be 8 KB. It is optimized for an environment with both Online Transaction Processing (OLTP) and Decision Support Systems (DSS). If you expect only OLTP operation, that is, no reporting or large queries, you can reduce this value to 4 KB.
processes	150 (default) Sets the total number of processes that can be connected simultaneously to the Oracle server.
cursor_space_for_time	False Caution! This parameter is deprecated and will generate warnings and alert logs if set. Oracle recommends that you do not specify this parameter. If you do use it, set it to FALSE (the default value).
open_cursors	1500 Maximum number of open cursors a session can have at once.
job_queue_processes	20 Specifies the number of processes that can be created for the execution of jobs.

Table 4–1 (Cont.) Suggested Oracle Database Parameters for All Systems

Parameter values	Description
db_writer_processes (SPARC T3 and T4 only)	4 If you are using a SPARC T3 or T4, the default value of this parameter can cause severe performance degradation.
cursor_sharing	FORCE This parameter must be set to FORCE to avoid library cache lock, which is a result for scenarios where there are a large number of statements in the shared pool that differ only in the values of their literals, and database response time is low due to a very high number of library cache misses (for example, because of hard parses and library cache latch contention).
distributed_lock_timeout	This value should be equal to the WebLogic Server domain Java Transaction API Timeout (JTA) setting plus 2. You set this value when you create the WebLogic Server cluster. For more information, see "Preventing Connection Timeout when Using a Remote Database" . Setting this value above the JTA value avoids situations where a database table locks timeout expires prior to WebLogic Server JTA or JDBC XA transaction timeout. This can result in getting ORA-02049 errors ("timeout: distributed transaction waiting for lock").

Oracle recommends that you do not use the Shared Server configuration (called Multi-Threaded Server, or MTS in previous versions of Oracle Database) for production systems running OSM, for performance reasons. OSM implements its own connection multiplexing.

Configuring Time Zone Settings in the Database

The database server running OSM must not use Daylight Savings Time (DST); otherwise date and schedule calculations will be incorrect during Daylight Savings Time. You can avoid this problem in the following ways:

- Set the time zone of the database to UTC (Coordinated Universal Time, formerly Greenwich Mean Time)
- Set the time zone of the database as an offset to UTC, in the format +/-hh:mm.

Ensure that the operating system time zone setting of the user starting the database processes is set using the considerations above.

Preventing Stuck Orders Due to Inactive Database Sessions

When a machine on which OSM is running is abruptly shut down, OSM orders may become stuck due to inactive database sessions that may not be cleaned for an extended period of time. When this happens, locks associated with these sessions are not released.

To avoid this problem, do the following:

1. Configure your database machine so that these inactive database sessions are automatically killed after 10 minutes. Do the following:
 - Add **enable=broken** in **tnsnames.ora**.
 - Add **SQLNET.EXPIRE_TIME=10** in **sqlnet.ora**.
2. On a Linux system, as root, configure TCP keepalive as follows:

```
sysctl -w net.ipv4.tcp_keepalive_time=600
sysctl -w net.ipv4.tcp_keepalive_intvl=60
```

Note: This change can be made permanent by adding the following lines to `/etc/sysctl.conf`:

```
net.ipv4.tcp_keepalive_time=600
net.ipv4.tcp_keepalive_intvl=60
```

Tablespace and Schema Considerations for OSM Production Systems

This section contains information and settings for use when creating any instance of the Oracle database to be used by OSM, including production and development systems.

If you are creating the database from the Database Configuration Assistant, Oracle recommends that you use the "Custom Database" template.

Sizing the OSM Database Schemas

The OSM installer creates the following schemas:

- The core schema, which contains order cartridge metadata, order data, configuration, and other data.
- The rule engine schema, which contains logic for rule processing.
- The reporting schema, which is used for reporting.

The sizing of production systems is multi-dimensional and dependent on many variables that vary greatly from customer to customer, such as daily transaction volume and amount of historical data to be maintained.

For help determining the sizing of your production system, contact Oracle Support.

OSM allows you to add additional partitions to store order data as needed. This means that as orders are entered into the system and the available storage is used, additional partitions on new tablespaces can be added to your environment. The space needed for these additional partitions does not need to be calculated at installation time. Orders can also be purged from the system based on the partition they are in.

For the initial sizing details about the overall Oracle Database disk space requirements, see "[Planning the Physical Architecture](#)". For more information about sizing the core schema, see the discussion on managing the OSM database schema in the *OSM System Administrator's Guide*.

Tablespaces

The OSM installer prompts connect to a database using a user account with the sysdba privilege. You then select the following permanent database tablespaces:

- The default tablespace for all OSM schemas.
- Model Data and Model Indexes tablespaces: Used mainly for cartridge metadata and configuration data.
- Order Data and Order Indexes: Used for order data and auxiliary order-related tables.

For production instances, a minimum of two tablespaces should be created; one permanent and one temporary. For performance reasons and to facilitate backup and recovery, you should not share the permanent tablespaces for OSM with other applications. You should put model data and indexes on different tablespaces than order data and indexes.

For a production environment, you must partition your schema when running the OSM installer. If you choose the same tablespace for order data and order indexes, the OSM installer creates local index partitions with tablespace `DEFAULT`, which means that local index partitions are stored in the same tablespace as table partitions.

You can also create new table partitions in different tablespaces for increased administration and availability, for example on a rotation basis. If a tablespace is damaged, the impact and restoration effort could be limited to one or just a few partitions. See the discussion in the *OSM System Administrator's Guide* on adding partitions online or offline for more information.

Oracle recommends the following:

- Create tablespaces dedicated to OSM, so that OSM performance and availability are not affected by other applications, for example due to I/O contention or if a tablespace must be taken offline. Store the datafiles of these tablespaces on different disk drives to reduce I/O contention with other applications.
- Create locally managed tablespaces with automatic segment space management by specifying `EXTENT MANAGEMENT LOCAL` and `SEGMENT SPACE MANAGEMENT AUTO` in the `CREATE TABLESPACE` statement. Both options are the default for permanent tablespaces because they enhance performance and manageability.
- Configure automatic database extent management by using the `AUTOALLOCATE` clause of the `CREATE TABLESPACE` statement. This is the default. For production deployments, avoid `UNIFORM` extent management for OSM order data and indexes because the volume of data varies widely from table to table.
- If you use smallfile tablespaces, do not create hundreds of small datafiles. These files need to be checkpointed, resulting in unnecessary processing. Note that Oracle Database places a limit on the number of blocks per datafile depending on the platform. The typical limit is 222-1, which limits the datafile size to 32GB for 8k blocks.

Additional considerations if you use bigfile tablespaces:

- If data is stored in bigfile tablespaces instead of traditional tablespaces, the performance of database opens, checkpoints, and DBWR processes should improve. However, increasing the datafile size might increase time to restore a corrupted file or create a new datafile. You can mitigate the risk of corruption by using multiple tablespaces for partitions, for example on a rotating basis.
- Bigfile tablespaces are intended to be used with Automatic Storage Management (Oracle ASM) or other logical volume managers that supports striping or RAID, and dynamically extensible logical volumes.
- Avoid creating bigfile tablespaces on a system that does not support striping because of negative implications for parallel query execution and RMAN backup parallelization.
- Using bigfile tablespaces on platforms that do not support large file sizes is not recommended and can limit tablespace capacity.

For more information about managing tablespaces, see *Oracle Database Administration Guide*.

OSM data is placed in the permanent tablespace(s) and the temporary tablespace is used by the Oracle database as a workspace while processing OSM commands. The OSM data can be placed in one tablespace for a minimum installation, but OSM performs better when data is distributed across multiple tablespaces. You can use up to five tablespaces when initially installing the system.

It is possible to spread the OSM database over more than five tablespaces by altering the database installation and upgrade scripts. This must only be completed by an experienced Oracle DBA. For more information, contact Oracle.

In a high throughput system, each tablespace should be created on a different physical disk. This limits disk contention and IO bottlenecks to improve performance. It is recommended that the Oracle 'redo' log files be placed on a separate, dedicated physical disk. You should not have any other load on this disk.

In a production system, a RAID device should be used for physical storage. In this case, there is no advantage to placing tablespaces on different physical RAID drives as long as space is available.

You can create tablespaces in either a traditional database instance or in a pluggable database instance.

The following is a bigfile tablespace creation script sample for a small installation model on an ASM diskgroup called +DATA.

```
create bigfile tablespace model_data
datafile '+DATA' size 100M;

create bigfile tablespace model_index
datafile '+DATA' size 100M;

create bigfile tablespace order_data
datafile '+DATA' size 200G;

create bigfile tablespace order_index
datafile '+DATA' size 200G;
```

Note: If you are using Chinese UTF8 characters, the Block Size for the tablespaces used by the OSM database must be configured for 8K at database instance creation.

Installing and Configuring the WebLogic Server Cluster

This chapter describes how you can install and configure a WebLogic Server cluster in preparation for an Oracle Communications Order and Service Management (OSM) installation.

Preparing WebLogic Server for an OSM Cluster Installation

You prepare a WebLogic Server clustered environment for an OSM installation by doing the following:

1. Prepare the operating system that will host WebLogic Server. See "[Preparing the Operating System](#)".
2. Install WebLogic Server. See "[Installing WebLogic Server Software](#)".
3. Create required database schemas using the Repository Creation Utility (RCU). See "[Creating Database Schemas Using RCU](#)".
4. Create the WebLogic Server domain and configure the required server instances and cluster. See "[Creating the WebLogic Server Domain](#)".
5. Replicate the WebLogic Server domain on all the machines within the domain. See "[Replicating the Domain on Other Machines](#)".
6. Configure the WebLogic Server domain and managed servers. See "[Configuring the Domain and Managed Servers](#)".

Preparing the Operating System

Use the following system and user limits:

- **Core file size:** Limit core file size to zero. If a core dump occurs or the JVM crashes, very large memory and data heaps might be written to the disk. Oracle recommends setting a positive value for core file size only if a crash occurs and must be debugged on the next occurrence.
- **Number of open files:** OSM typically references and loads large numbers of internal and third-party JAR files. Also, each application opens and maintains several configuration files, log files, and numerous network socket and JDBC connections. All these activities use a large number of open files, during startup and during application deployment and redeployment. Oracle recommends increasing the number of open file limits for OSM.
- **Number of user processes:** For the same reasons as increasing the number of open files, Oracle recommends increasing the limit for user processes.

- **Socket buffers:** To help minimize packet loss for the Coherence cluster, Oracle recommends setting the socket buffers of the operating system to at least 2 MB.

Table 5–1 summarizes of the recommendations for configuring the operating system.

Table 5–1 Configuration Recommendations for the Operating System

Configuration Item	Solaris	Linux
core file size (soft)	0	0
core file size (hard)	0	0
open files (soft)	8192	65536
open files (hard)	65536	65536
max_user_processes (soft)	29995	774889
max_user_processes (hard)	29995	774889

Note: With engineered systems, such as Sparc SuperCluster or Exadata, most of the operating system tuning is preconfigured with appropriate values by default.

Installing WebLogic Server Software

The software for WebLogic Server and Application Development Framework (ADF) is included in the OSM software media pack. You download the OSM software media pack from the Oracle software delivery website:

<https://edelivery.oracle.com/>

You install WebLogic Server on all machines that will participate in your domain. The installation directories must be the same on all machines. For complete installation instructions and general information about installing and configuring WebLogic Server, see the WebLogic Server documentation.

Note: See Table 2–1, "OSM Required Software" for WebLogic Server version and patch information. Ensure that you use the WebLogic Server documentation specific to the required WebLogic Server version.

WebLogic Server Software Installation Overview

To install WebLogic Server:

1. Ensure that you have installed the 64-bit version of Java and the Java Development Kit (JDK) that is supported by OSM, not the version included with WebLogic Server.
2. Set environment variables for the version of Java that is supported by OSM, not the version included with WebLogic Server. Do the following:
 - Set JAVA_HOME to the location of the supported Java version.
 - On a UNIX system, add \$JAVA_HOME/bin to the PATH variable.
 - On a Windows system, add %JAVA_HOME%/bin to the PATH variable.

3. Install the WebLogic Server software as described in *Oracle Fusion Middleware Installing and Configuring Oracle WebLogic Server and Coherence*. When prompted for the installation type, select **Complete**.
4. Download and install any necessary patches from Oracle support. Follow the instructions in the **README.txt** file that is included with the patch.

Creating Database Schemas Using RCU

After you install the WebLogic Server software, create schemas in the database. You create the schemas using the Repository Creation Utility (RCU), which is included in the WebLogic Server installation.

The schemas are required for creating the WebLogic Server domain. Each schema can be used by only one domain. If you create a new domain, you must also create new schemas.

Before creating the schemas, ensure that you have your database connection string, port, administrator credentials, and service name ready.

To create database schemas using RCU:

1. Go to the *Middleware_home/oracle_common/bin/* directory.
2. Start RCU using one of the following commands:
 - On UNIX:


```
./rcu
```
 - On Windows:


```
rcu.bat
```

The Repository Creation Utility Welcome screen appears.

3. Click **Next**.

The Create Repository screen is displayed.

4. Select **Create Repository** and click **Next**.

The Database Connection Details screen is displayed.

5. Enter database details in the fields provided (Database Type, Host Name, Port, and so on), and then click **Next**. Use the Hostname of one of the RAC instances. Do not use the SCAN IP address.

The installer checks the prerequisites. After the prerequisite checks are completed, click **OK**, and then click **Next**.

The Components screen is displayed.

6. Select the **Create a New Prefix** option, and enter a new prefix for the schema that will be used for the WebLogic domain.
7. In the table, expand the **AS Common Schemas** component, and select the following components:
 - Oracle Platform Security Services (*prefix_OPSS*)
 - Audit Services (*prefix_IAU*)
 - Audit Services Append (*prefix_IAU_APPEND*)
 - Audit Services Viewer (*prefix_IAU_VIEWER*)

- Common Infrastructure Services (*prefix_STB*)

where *prefix* is the prefix name you entered at step 6.

8. On the Schema Passwords screen, select the **Use the same password for all schemas** option. Enter and confirm a password to use for the schemas, and then click **Next**.

The Map Tablespaces screen is displayed. You can click the **Manage Tablespaces** button when you want to change existing tablespaces. For this procedure, click **Next**. A Repository Creation notification is displayed. Click **OK**. Tablespaces are created, and the progress is displayed in a pop-up notification. When the operation is completed, click **OK**.

The Summary screen is displayed.

9. Click **Create**.

Note: RCU may take several minutes to create the schemas. If creating the schemas takes an unusual amount of time, Oracle recommends that you purge the database recycle bin to ensure that RCU schemas are created more quickly the next time. For more information, see "[OSM and RCU Installers Are Slow to Run Database Tablespace Query](#)".

Creating the WebLogic Server Domain

This section describes how to create the WebLogic server domain and configure the required server instances and cluster using the Fusion Middleware Configuration Wizard.

For more information about WebLogic clustering, refer to the WebLogic Server documentation. For more information about the Configuration Wizard, including detailed descriptions of the Configuration Wizard screens, see *Oracle Fusion Middleware Creating WebLogic Domains Using the Configuration Wizard*.

To configure the WebLogic server domain for an OSM cluster:

1. Ensure the following:
 - If you are configuring the managed servers for whole server migration, verify that you have available interfaces on each machine hosting a managed server. For example, eth0. Ensure that the IP address you want to use for each managed server is configured with a hostname on a DNS server.

Note: After you have completed all procedure relating to whole server migration, node manager automatically creates floating IP addresses for each managed server when you start managed servers from the Administration console. For example, assuming you have configured a machine to run two managed servers, node manager would create eth0:1 for managed server 1 and eth0:2 for managed server 2.

- If you are configuring managed servers without whole server migration, ensure that you have static IP addresses and port numbers for each managed server.

Tip: Oracle recommends that you use DNS hostnames to facilitate any IP address changes during the lifetime of the domain.

2. Ensure that the WebLogic Server software has been installed on each machine that will be part of the domain.
3. Log on to the machine that will be hosting the administration server in your domain.
4. Do one of the following:
 - On a Windows platform, start the configuration wizard from the Start menu.
 - On UNIX platforms, run the following command:

```
WebLogic_home/common/bin/config.sh
```

The Configuration Wizard launches and the Configuration Type screen is displayed.

5. Ensure that **Create a new domain** is selected, and enter the path to the domain in the **Domain Location** field, and click **Next**.

The Templates screen is displayed.

6. Ensure that **Create Domain Using Product Templates** is selected, choose the following templates from the Available Templates list:

On the Templates screen:

- Select the **Oracle JRF** and **WebLogic Coherence Cluster Extension** templates.
 - Select the **Oracle Enterprise Manager** template if you want to use Oracle Enterprise Manager Fusion Middleware Control to view and manage OSM logs.
 - The **Basic WebLogic Server Domain** template is selected by default and you cannot deselect it.
7. Click **Next**.
 8. Do one of the following:
 - If you selected **Oracle Enterprise Manager**, the Application Location screen is displayed. Go to step 9.
 - If you did not select **Oracle Enterprise Manager**, The Administrator Account screen is displayed. Go to step 11.
 9. In the **Application location** field, enter the path to the application directory.
 10. Click **Next**.

The Administrator Account screen is displayed.
 11. In the **Name** field, enter the WebLogic Administrator user name.
 12. In the **Password** field and again in the **Confirm password** field, enter the WebLogic Administrator password.

Note: Alphanumeric characters are mandatory in the Password field.

13. Click **Next**.

The Domain Mode and JDK screen is displayed.

14. Select **Production Mode**. Selecting this ensures that the default optimization settings are applied.
15. Select the default JDK, or browse to the location of a 64-bit JDK, and click **Next**.
The Database Configuration Type screen is displayed.
16. Connect to the database by doing the following:
 - a. Select the **RCU Data** option.
 - b. In the **Vendor** and **Driver** drop-down lists, use the default selection.
 - c. In the **DBMS/Service** field, enter the database DBMS name, or service name if you selected a service type driver.
 - d. In the **Host Name** field, enter the name of the server hosting the database. The hostname is the RAC instance you used to create the RCU repository.
 - e. In the **Port** field, enter the port number on which the RAC instance listens.
 - f. In the **Schema Owner** field, enter the user name for connecting to the service table schema. For example:

prefix_STB

where *prefix* is the new prefix you created on the Select Components screen of RCU.
 - g. In the **Schema Password** field, enter the password that you created for the schemas on the Schema Passwords screen of RCU.
 - h. Click **Get RCU Configuration**. The Configuration Wizard tests the connection to the database and displays the results in the Connection Result Log area.
 - i. Click **Next**.

The JDBC Component Schema screen is displayed with pre-loaded configuration data for the RCU schemas.
17. Verify the pre-loaded schema configuration data for each of the following schemas in the component schema table:
 - OPSS Audit Schema
 - OPSS Audit Viewer Schema
 - OPSS Schema
 - LocalSvcTbl Schema
18. Select all schemas in the component schema table.
19. Select **Convert to RAC multi data source**.
20. Click **Next**.

The Oracle RAC Multi Data Source Component Schema screen is displayed.
21. In the first row of the **Host Name** column, enter the hostname of the second RAC instance.
22. In the first row of the **Instance Name** column, enter the SID of the second RAC instance.
23. In the first row of the **Port** column, enter the port number of the RAC listener.
24. If you have addition RAC instances, click **Add Hosts** to add new RAC instance rows and repeat steps 21 to 23.

25. In the **Service Name** field, enter the service name.
26. Click **Next**.

The JDBC Component Schema Test screen is displayed.
27. Select all of the component schemas in the table and click **Test Selected Connections**.

If any of the tests fail, go back to the previous screens and check that you entered the correct values in the fields.

When all of the tests are successful, click **Next**.

The Advanced Configuration screen is displayed.
28. Select **Administration Server, Node Manager, Managed Servers, Clusters and Coherence**, and **Deployments and Services**, and click **Next**.

The Administration Server screen is displayed.
29. In the **Server Name** field, enter a name for the administration server.
30. In the **Listen Address** field, enter a value for the listen address. For example, an IP address or DNS name. Oracle recommends that you use a specific hostname in the Listen Address field to facilitate any future IP address changes that may occur. In addition, avoid selecting All Local Addresses because this causes WebLogic Server to bind to every available IP address on the machine, potentially reducing performance.
31. In the **Listen Port** field, enter a value for the listen port.
32. (Optional) Select **Enable SSL** and enter a value for the SSL listen port in the SSL listen Port field. Oracle recommends enabling SSL and configuring an SSL listen port to ensure secure communication over the Internet.
33. Click **Next**.

The Node Manager screen is displayed.
34. Select **Per Domain Default Location** for the Node Manager type.
35. In the **Username** field, enter a user name for Node Manager.
36. In the **Password** field and again in the **Confirm Password** field, enter a password for Node Manager.

The Node Manager uses the user name and password that you provide to authenticate connections between Node Manager and clients. They are independent from the server administration credentials.
37. Click **Next**.

The Managed Servers screen is displayed.
38. Click **Add**, which creates a managed server. Repeat this step for any additional managed servers.

Note: If you are setting up a development system and you do not have a dedicated load balancer for HTTP and HTTPS messages, you must add a managed server that you can later designate as a proxy HTTP server.

39. Enter managed server names, IP addresses or hostnames (Oracle recommends DNS hostnames for high availability), and port numbers. If required, enable SSL and enter an SSL listen port. Click **Next**.

Note: If you are using a proxy HTTP server, you can also designate a managed server as the proxy HTTP server during this step.

The Clusters screen is displayed.

40. Click **Add**, which adds a cluster row.
41. In the **Name** field, enter a name.
42. In the **Cluster address** field, add the address for the cluster. The cluster address should be one of the following:
 - If you are using an external load balancer, this should be the address of the DNS name that maps to the IP addresses or DNS names of each WebLogic managed server in the cluster. The managed servers should all have addresses with different IP addresses or DNS names but the same port numbers. For information on how to set this up, please consult the documentation for your load balancer.
 - If you are using a proxy HTTP server, you can define a list that contains the DNS name (or IP address) and port of each managed server in the cluster, delimited by a comma. For example:

```
host1.example.com:9910,host1.example.com:9920,host2.example.com:9100
```

For performance reasons, this option is primarily used for development and test systems.

43. Click **Next**.

The Assign Servers to Clusters screen is displayed.

44. In the Server area, select all managed servers. Do not select the proxy HTTP server (if applicable).
45. Click the right arrow, which moves all managed servers under the cluster.
46. Click **Next**.

The HTTP Proxy Applications screen is displayed.

47. If you designated a managed server to be a proxy HTTP server, select **Create HTTP Proxy**, select the proxy HTTP server from the list, and click **Next**.

The Coherence Clusters window is displayed.

48. In the **Name** field, enter a name for the Coherence cluster.
49. In the **Unicast Listen Port** field, leave the default value of **0**.
50. Click **Next**.

The Machines screen is displayed.

51. On the **Unix Machine** tab:
 - a. Click **Add** to add any UNIX machines in your domain that will run Node Manager.
 - b. Enter machine names, Node Manager listen addresses, and Node Manager listen ports.

- c. (Optional) Select **Post bind GID enabled** and enter the UNIX group ID under which a server on this machine will run after it finishes all privileged startup actions.
 - d. (Optional) Select **Post bind UID enabled** and enter the UNIX user ID under which a server on this machine will run after it finishes all privileged startup actions.
52. Click **Next**.

The Assign Servers to Machines window is displayed.
53. Add the available servers to the appropriate machines as decided upon in your configuration details. Click **Next**.

The Deployments Targeting screen is displayed.
54. Verify that all of the deployments under the **Library** and **Application** folders are targeted to your new cluster and the administration server. If they are not, assign deployments to your cluster and administration server as follows:
 - a. In the **Targets** list, select the cluster where you want to install OSM.
 - b. In the **Deployments** list, select the **Library** and **Application** folders.

Note: Do not select any deployments to be assigned to the proxy server (if used).

- c. Click the right arrow to include the OSM components you want to install on the cluster.
55. Click **Next**.

The Services Targeting screen is displayed.
56. Target services to your cluster and proxy server as follows:
 - a. In the **Targets** list, select the cluster where you want to install OSM.
 - b. In the **Services** list, select all of the services that you want install on the cluster.
 - c. Click the right arrow to assign the services to the cluster.
 - d. If you are using a proxy server, select it in the **Targets** list.
 - e. In the **Services** list, select the **JDBC System Resources** folder.
 - f. Click the right arrow to assign the JDBC data sources to the proxy server.
 - g. Click **Next**.

The Configuration Summary screen is displayed, which provides a summary of the applications, services, and libraries to be deployed in the domain.
57. Review the information in the Configuration Summary screen and confirm that the cluster organization matches your requirements. If you find any discrepancies, click the **Previous** button to return to the appropriate screen and make the necessary changes. When you are done, click **Create**.

The Configuration Progress screen shows the progress of your domain creation.
58. When the domain creation process completes and the Configuration Success screen is displayed, click **Finish**.

Replicating the Domain on Other Machines

The newly created domain is now installed on a single machine. This section describes the steps necessary to replicate the domain installation on other machines. WebLogic provides two utilities to do this: pack and unpack.

Important: If the `unpack.jar` command fails with a write error, see ["Command for unpack.jar Fails with a Write Error"](#) for troubleshooting information.

Starting and Configuring Credentials on the First Machine

Before you can replicate the domain to another machine, you must first start nodemanager and the administration server on the first machine. You can then create a `boot.properties` file for the administration server to enable each server to start without prompting you for the administrator username and password.

To create the `boot.properties` file:

1. Open a terminal.
2. Go to `domain_home/bin` for your base domain.
3. Run the following command which starts nodemanager:

```
startNodeManager.sh
```
4. Open a second terminal.
5. Go to `domain_home/bin` for your base domain.
6. Run the following command which starts the administration server:

```
startWebLogic.sh
```
7. When the following text appears, enter the administration server username:
Enter username to boot WebLogic server:
8. When the following text appears, enter the administration server password:
Enter password to boot WebLogic server:
9. After the administration server is in the running state, open a third terminal.
10. Go to the `domain_home/servers/AdminServer` directory (where `AdminServer` is the name of the administration server.)
11. Create the following directory:

```
mkdir -p security
```
12. In the directory you just created, create the `boot.properties` file.

```
touch boot.properties
```
13. Using a text editor, add the following lines to the file:

```
username=username  
password=pwd
```

where

- *username* is the administrator user name for the WebLogic administration server.
- *pwd* is the password for the WebLogic administration server.

These values are entered in clear text but will be encrypted when you start the server for the first time.

14. Save and close the file **boot.properties** file.
15. Close the third terminal.
16. In the second terminal, stop the administration server using **Ctrl-C**.
17. Close the second terminal.
18. In the first terminal, stop node manager using **Ctrl-C**.
19. Close the first terminal.

Creating a Domain Template for Use on Other Machines

To create a domain directory (template) that can be used on other machines within the domain:

1. On the machine that contains the administration server and the definition of managed servers, go to the *WebLogic_home/common/bin* directory.
2. Run the following command:

```
pack.sh -domain=domain_home -template=template.jar -template_name="template_name"
```

where:

- *domain_home* is the full or relative path of the WebLogic domain from which the template is to be created
- *template* is the full or relative path of the template, and the filename of the template to be created
- *template_name* is a descriptive name for the template

For example:

```
pack.sh -domain=/opt/oracle/Middleware/user_projects/domains/cluster_demo
-template=/opt/oracle/Middleware/user_projects/domains/cluster_demo.jar
-template_name="cluster_demo"
```

Replicating the Domain Template on Other Machines

Use the following steps to replicate the created template file to all other machines in the domain.

1. Establish a session with the remote machine and copy the template to it.
2. Navigate to the *WebLogic_home/common/bin* directory.
3. Run the following command:

```
unpack.sh -template=template.jar -domain=domain
```

where:

- *template* is the full or relative path of the template that you copied to the remote machine
- *domain* is the full or relative path of the domain to be created

For example:

```
unpack.sh -template=/opt/oracle/Middleware/user_projects/domains/cluster_
demo.jar -domain=/opt/oracle/Middleware/user_projects/domains/cluster_demo
```

Starting the Administration Server

To start the WebLogic Server administration server:

1. Navigate to the *domain_home* directory of the machine that runs the administration server, and start the server by running the following command:

```
nohup ./startWebLogic.sh 2>&1 &
```

2. Verify that the administration server starts properly by running the following command:

```
tail -f nohup.out
```

A log entry should indicate that the server is running with the following line:

```
Server started in RUNNING mode
```

Configuring the Domain and Managed Servers

The following sections describe how you should configure the domain and managed servers.

Configuring Oracle Coherence for an OSM Cluster

This section provides configuration suggestions and best practices to avoid conflicts with Oracle Coherence in a clustered OSM environment.

For information about configuring and troubleshooting Oracle Coherence, refer to the Coherence documentation. For performance tuning details, see the Coherence Knowledge Base website:

https://docs.oracle.com/cloud/latest/fmw121300/COHAG/tune_perftune.htm#COHAG217

Increasing Buffer Sizes to Support Coherence

Oracle recommends that you configure your system for larger buffers:

On Oracle Linux and Red Hat Enterprise Linux, run the following commands as root:

```
sysctl -w net.core.rmem_max=2097152
sysctl -w net.core.wmem_max=2097152
```

On Oracle Solaris run the following command as root:

```
ndd -set /dev/udp udp_max_buf 2097152
```

On IBM AIX run the following command as root:

```
no -o rfc1323=1
```

```
no -o sb_max=4194304
```

Note: Windows does not impose a buffer size restriction by default, so no changes need to be made to increase buffer sizes on Windows.

Preventing Unnecessary Use of Swap Space

Do not use swap space in an OSM production environment for the WebLogic Servers if at all possible because it can significantly increase the duration of full garbage collection. Setting the swappiness to 0 ensures that the operating system only uses swap space when absolutely necessary.

To set swappiness to 0, do the following:

1. On a machine running a managed server, log into a terminal as root user.
2. Run the following command:


```
echo vm.swappiness=0 >> /etc/sysctl.conf
```
3. Repeat this procedure for all other machines running managed servers.

Securing Coherence

When you create a WebLogic Server with a cluster, the OSM installer automatically configures the Oracle Coherence connections and well known addresses (WKA) for the cluster, but does not automatically configure security settings for the cluster. For example, the installer does not configure authorized hosts.

Oracle recommends securing the coherence connections. For more information, see *Oracle Fusion Middleware Securing Oracle Coherence*.

Configuring Node Manager on All Machines in the Domain

This section describes how to configure the machines in your domain that will host Node Manager. OSM recommends using Node Manager to automatically restart managed servers after unexpected failure. Oracle also recommends that you configure whole server migration

Configuring Node Manager for Starting and Stopping Managed Servers

For each machine that will host Node Manager, do the following:

1. Open the `domain_home/nodemanager/nodemanager.properties` file.
2. Set the following values:

```
StartScriptEnabled=true
StopScriptEnabled=true
```

Configuring Node Manager for Whole Server Migration

You can optionally use node manager to create floating IP addresses for the managed servers in the cluster. This enables a managed server to migrate from one machine to another in the event of repeated server recover failure.

For each machine that will host Node Manager with whole server migration enabled, do the following:

1. Open the `domain_home/nodemanager/nodemanager.properties` file.

2. Set the following values:

```
CrashRecoveryEnabled=true
ethx=ip_address_range,NetMask=networkmask
UseMACBroadCast=true
```

where:

- *x* is the interface number that the floating IPs are created on. For example, eth0.
 When node manager creates the floating IP address, it adds **ethx:n** where *n* is the a number it assigns to a floating IP. For example, if a machine were to host two managed servers using the eth0 interface, node manager would create the eth0:1 and eth0:2 floating IP addresses. If a third managed server were to migrate to the machine, it would receive eth0:3. Node manager automatically creates and removes these interfaces as required.
- *ip_address_range* is the range of IP addresses associated to managed servers on the cluster that node manager can use as floating IP addresses. For example, you can specify a single IP address for a managed server, or a range of IP addresses associated to managed servers, such as 192.168.56.201-192.168.56.204, or * to specify all IP addresses of every managed server in the cluster.
- *networkmask* is the net mask for the interface for the floating IP. *networkmask* should be the same as the net mask on the interface. This parameter is optional.

Configured Whole Server Migration Floating IP Controls

For each machine with a node manager configured with whole server migration, do the following:

1. Set the UNIX PATH environment variable to the directories that contain the WebLogic Server files indicated in [Table 5–2](#).

Table 5–2 Files Required for the PATH Environment Variable

File/Folder	Located in this directory	Example (bash)
wlsifconfig.sh	<i>domain_home</i> /bin/server_migration	export WLSIFCONFIG_HOME=\$DOMAIN_HOME/bin/server_migration export PATH=\$PATH:\$WLSIFCONFIG_HOME
wlscontrol.sh	<i>domain_home</i> /bin/nodemanager	export WLSCONTROL_HOME=\$DOMAIN_HOME/bin/nodemanager export PATH=\$PATH:\$WLSCONTROL_HOME
node manager	<i>domain_home</i> /nodemanager	export NODEMANAGER_DOMAINS_HOME=\$DOMAIN_HOME/nodemanager export PATH=\$PATH:\$NODEMANAGER_DOMAINS_HOME

2. Grant sudo privileges to the WebLogic Server user account so that the **wlsifconfig.sh** script can:
 - Work without a password prompt.
 - Have execute privilege on the **/sbin/ifconfig** and **/sbin/arping** binaries that are involved in creating floating IP address.

To grant sudo privileges, do the following:

- a. Open a terminal as root user.
- b. Enter the following command:

```
/usr/sbin/visudo
```

The `/etc/sudoers` file opens in a text editor.

- c. Add the following line:

```
Defaults:weblogic_user !requiretty
weblogic_user ALL=NOPASSWD: /sbin/ifconfig,/sbin/arping
```

where `weblogic_user` is the user account you created for running WebLogic Server.

3. Run the following commands to test whether the `wlsifconfig.sh` script is functioning:

- a. List all IP addresses configured on the interface.

```
export ServerDir=/tmp
wlsifconfig.sh -listif ethx
```

where `x` is the interface number. For example

```
export ServerDir=/tmp
wlsifconfig.sh -listif eth0
eth0 192.168.56.26
```

- b. Assign a floating IP address of one of the managed servers you want to node manager to manage.

```
wlsifconfig.sh -addif ethx ip_address netmask
```

where `ip_address` and `netmask` are the floating IP address and network mask you want to configure. For example:

```
wlsifconfig.sh -addif eth0 192.168.56.124 255.255.255.0
Generated command - sudo /sbin/ifconfig eth0:1 192.168.56.124 netmask
255.255.255.0
Successfully brought 192.168.56.124 netmask 255.255.255.0 online on eth0:1
```

- c. Confirm that the floating IP address was added.

```
/sbin/ifconfig
...
eth0:1 Link encap:Ethernet HWaddr 08:00:27:5A:C0:09
       inet addr:192.168.56.124 Bcast:192.168.56.255 Mask:255.255.255.0
       UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
...
```

- d. Remove the floating IP address.

```
wlsifconfig.sh -removeif ethx ip_address
```

For example:

```
wlsifconfig.sh -removeif eth0 192.168.56.124
Successfully removed 192.168.56.124 netmask from eth0:1.
```

4. If any command fails, verify that the `/etc/sudoers` file is properly configured.

Enrolling Each Machine with the Domain

Each machine that will host Node Manager to start and stop the managed servers and proxy server must be enrolled with the domain. This procedure is applicable to all node manager configurations.

To enroll each machine that will host Node Manager:

1. Start the administration server.
2. Run `WebLogic_home/common/bin/wlst.sh` tool.
3. At the command prompts, run the following commands:

```
connect('username', 'pwd', 't3://ip_address:port')
```

```
nmEnroll('domain_home', 'domain_home/nodemanager')
```

```
exit()
```

where

- `username` is the administrator user name for the WebLogic administration server.
- `pwd` is the password for the WebLogic administration server.
- `ip_address` is the IP address for the WebLogic administration server.
- `port` is the port number for the WebLogic administration server.

Starting Node Manager on Each Machine

After Node Manager has been prepared on each machine, start them. For each machine, follow these steps:

1. Navigate to `WebLogic_home/server/bin/`.
2. Start Node Manager by running the following command:

```
nohup ./startNodeManager.sh 2>&1 &
```

3. Verify that the Node Manager starts properly by running the following command:

```
tail -f nohup.out
```

A log entry should indicate that Node Manager is running with the following line:

```
INFO: Secure socket listener started on port port
```

where `port` is the port number used by Node Manager.

Configuring a Multicast IP Address for the Cluster Messaging Mode

By default, the WebLogic Configuration Wizard enables unicast messaging mode. For greater reliability and scalability, switch to multicast cluster messaging mode. See ["About the WebLogic Messaging Mode and OSM Cluster Size"](#) for more information about which messaging mode option to choose.

To configure a multicast IP address for the cluster messaging mode:

1. Configure the multicast IP address on your machine. For example, on an Oracle Linux machine, you can do the following:
 - a. From the desktop, select **System**, then **Preferences**, then **Network Connections**.

The Network Connections screen appears.

- b. Select the interface you want to configure a multicast IP address on, and click **Edit**.

The Editing System screen appears.

- c. Click the **IPv4 Settings** tab.
- d. Click **Routes...**

The Editing IPv4 routes for System screen appears.

- e. In the **Address** field, enter the multicast IP address you want to use for cluster communications.
- f. In the **Netmask** field, enter a network mask.
- g. Click **OK**.
- h. Click **Apply**.
- i. Click **Close**.
- j. In the top right hand corner, click the Network icon.
- k. Below the interface you have configured an multicast IP address for, click **Disconnect**.
- l. When the interface has disconnected, click **Connect**.

- m. Open a terminal.
- n. Go to `WebLogic_home/server/bin`.
- o. Source the `setWLSEnv.sh` script.

```
source ./setWLSEnv.sh
```

- p. Run the following command from the machine:

```
java utils.MulticastTest -N machine_name -A multicast_ip -P multicast_port
```

where

- *machine_name* is any name that identifies the sender of the message. Use a different name for every test you start.
- *multicast_ip* is the multicast IP address you want to use for the cluster. Use any IP address between 224.0.0.0 and 239.255.255.255. If there are any running WebLogic clusters using multicast, ensure that you do not use the same IP address during this test.
- *multicast_port* is the multicast port number you want to use for the cluster. If there are any other applications running on the machine that use multicast, ensure that you do not use the same port.

For example:

```
java utils.MulticastTest -N osm_test_from_machine1 -A 239.192.0.0 -P 7521
***** WARNING ***** WARNING ***** WARNING *****
Do NOT use the same multicast address as a running WLS cluster.
```

Starting test. Hit any key to abort

Using multicast address 239.192.0.0:7521

```
Will send messages under the name osm_test_from_machine1 every 2 seconds
Will print warning every 600 seconds if no messages are received
```

```
I (osm_test_from_machine1) sent message num 1
New Neighbor sm_test_from_machine1 found on message number 1
Received message 2 from sm_test_from_machine1
I (osm_test_from_machine1) sent message num 2
Received message 3 from sm_test_from_machine1
I (osm_test_from_machine1) sent message num 3
etc...
```

2. Start the administration server as described in "[Starting the Administration Server](#)".
3. Log on to the WebLogic Server Administration Console.
4. Click **Lock & Edit**.
5. From the Domain Structure tree, expand **Environment**, and select **Clusters**.
6. From the table of clusters, select the OSM cluster.
7. From the **Configuration** tab, select the **Messaging** sub tab.
8. From the **Messaging Mode** drop-down list, select **Multicast**.
9. Expand the **Advanced** button.
10. In the **Multicast address** field, enter a multicast address. The multicast address range can be between 224.0.0.1 to 239.255.255.255.
11. In the **Multicast port** field, enter a multicast port number. The multicast port can be between 1 to 65535.
12. In the **Idle Periods Until Timeout** field, enter 5.
13. Click **Save**.
14. From the **Configuration** tab, select the **Health Monitoring** sub tab.
15. In the **Heath Check Interval** field, enter 20000.
16. Click **Save**.
17. Click **Activate Changes**.

Preventing Connection Timeout when Using a Remote Database

To prevent a connection timeout when your database and server are in separate locations, do the following:

1. Increase the value of the Stuck Thread Max time parameter as follows:
 - a. Log in to the WebLogic Server Administration Console.
 - b. In the **Domain Structure** tree, expand **Environment** and then click **Servers**.
The Summary of Servers page is displayed.
 - c. Click the name of the WebLogic server where you want to deploy the cartridges.
The configuration parameters for the server are displayed on a tabbed page.
 - d. Click the **Tuning** tab, and modify the value of the **Stuck Thread Max Time** parameter to an appropriate value above 1200 seconds. WebLogic considers a thread to be stuck when the thread takes more than a specified amount of time

to process a single request. Oracle recommends that you set this value to an optimal level based on performance and stress testing.

- e. Click **Save**.
2. Increase the value of the Timeout Seconds Java Transaction API parameter (JTA timeout) as follows:
 - a. In the **Domain Structure** tree of the WebLogic Server Administration Console, click the name the WebLogic server domain.
The configuration parameters for the domain are displayed on a tabbed page.
 - b. Click the **JTA** tab, and modify the value of the **Timeout Seconds** parameter to an appropriate value. In most cases, a value of 600 seconds is sufficient.

Note: If the value is less than 600 when you run the Installer, you are prompted to increase it during installation.

- c. Click the **Security** tab and select **Anonymous Admin Lookup Enabled**.
- d. Click **Save**.

Note: The Java Transaction API parameter applies to the domain globally. After you have installed OSM, you can configure an oms-config.xml parameter that controls this value dynamically when OSM deploys or un-deploys a cartridge. For more information, see ["Preventing Connection Timeout Issues During Cartridge Deployment"](#).

See the WebLogic Server documentation for more information about these parameters.

Recommended Configuration for WebLogic Servers for Production Systems

Recommendations for creating and configuring managed servers for OSM include the following:

- **64-bit flags:** Ensure to use the **-d64** option for each server so that available native libraries or performance packs are used when you start WebLogic servers.
- **Logging:**
 - Consider limiting the number of log files, the log file maximum size, and rotation policy. Limit the number of log files to 10 and ensure log files are rotated at start up so that a fresh log file is available.
 - Consider turning off logging messages to the domain for each managed server. WebLogic server instances send messages to a number of destinations, including the local server log file and the centralized domain log, which can affect performance. For more information, see the chapter about understanding WebLogic logging services in the document *Oracle Fusion Middleware Configuring Log Files and Filtering Log Messages for Oracle WebLogic Server*.
- **JDBC logging:** Disable JDBC logging in production systems because it has a substantial impact on performance.
- **WebLogic networking:** Enable native input/output (IO). WebLogic uses software modules called muxers (multiplexers) to read incoming requests on the server and

incoming responses on the client. To maximize network socket performance, make sure to use native, platform-optimized muxers.

- **Transaction timeouts:** Set timeouts for correct rollback handling, keeping in mind that global transactions span multiple transaction sources, such as JMS and JDBC.
- **Longest transaction time:** Set the longest time a transaction can be active. The global transaction timeout, which is the longest time that a transaction can be active, is determined by the Java Transaction API (JTA) timeout. All transactions typically complete within only a few seconds (excluding the first transaction after server startup). You can determine the optimal level for your system based on performance and stress testing. Change the JTA timeout value by using the WebLogic Server Administration Console.

Note: If you are using Oracle Exalogic Elastic Cloud, enable optimizations in order to improve thread count management and request processing, and to reduce lock contention.

Oracle recommends that you do not leave the WebLogic Server listen address undefined on a computer that uses multiple IP addresses. In this case, the server binds to all available IP addresses, which slows down server startup time. Bind a WebLogic server to a fully qualified hostname, rather than an IP address. This ensures that SSL server-to-server communication works correctly without requiring hostname verification. It also allows administrators to change IP addresses without reconfiguring WebLogic.

Table 5–3 includes a summary of the recommended WebLogic server configurations.

Table 5–3 Configuration Recommendations for the Server

Configuration Item	Value	Notes
JTA Timeout	600	Set this value for better performance.
Enable Exalogic Optimizations	true	When you are using an Exalogic server.
-d64	enabled	Make sure to use 64-bit native libraries in the startup paths.
Log: Rotate log on startup	true	Not Applicable
Native IO enabled	true	Not Applicable
Log: Number of files limited	true	Not Applicable
Log: File count	10	Not Applicable
All file-based persistent stores use synchronous write policy	Direct-Write-With-Cache	Not Applicable
All JMS Servers > Persistent Stores	enabled	File-based persistence has better performance than a JDBC store, but JDBC offers consistent backup snapshots of OSM data and JMS messages.

Configuring Managed Server Startup Parameters

Oracle recommends that you use the startup parameters specified in this section for each managed server in your cluster. These ensure properly configured managed servers and settings such as the Java heap, garbage collection logging, and so on. These startup parameters only work when using node manager.

To configure the managed server startup parameters:

1. Log on to the WebLogic Administration Console.
2. Click **Lock & Edit**.
3. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
4. For each managed server, select the server name.
The Configuration tab screen is displayed.
5. Click the **Server Start** subtab.
6. In the Arguments field, enter the following settings:

```
-server
-Djava.net.preferIPv4Stack=true
-Dtangosol.coherence.ipmonitor.pingtimeout=9s
-Dtangosol.coherence.log=Domain_Home/servers/managed_server/logs/managed_
server_coherence.log
-Dweblogic.jdbc.remoteEnabled=false
-Xms31g -Xmx31g
-Xmn14g
-XX:PermSize=1023m -XX:MaxPermSize=1023m
-XX:+UseCompressedOops
-XX:-UseAdaptiveSizePolicy
-XX:SurvivorRatio=3
-XX:TargetSurvivorRatio=70
-XX:CodeCacheMinimumFreeSpace=16m
-XX:ReservedCodeCacheSize=256m
-XX:+UseParallelOldGC
-XX:ParallelGCThreads=processors
-verbose:gc
-XX:+PrintGCDetails
-XX:+PrintGCDateStamps
-XX:+PrintGCTimeStamps
-XX:+PrintTenuringDistribution
-XX:+PrintAdaptiveSizePolicy
-Xloggc:Domain_Home/servers/managed_server/logs/managed_server_gc%.log
-XX:+DisableExplicitGC
-XX:+HeapDumpOnOutOfMemoryError
-XX:HeapDumpPath=Domain_Home/servers/managed_server/logs/
-XX:+UnlockCommercialFeatures
-XX:+FlightRecorder
-XX:+ParallelRefProcEnabled
-XX:+AlwaysPreTouch
```

where:

- *processors* is the number of processors you want to allocate to the managed server. If you have more than one managed server running on the system, ensure that you have a sufficient number of processors available for each.
 - *managed_server* is the name of the managed server.
7. Click **Save**.
 8. Click **Activate Changes**.

Configuring Cluster Settings

Before you install OSM, you must prepare the domain by enabling the WebLogic plug-in, and configuring the hardware load balancer.

To prepare the domain for OSM installation:

1. Log on to the WebLogic Administration Console.
2. If you are using HTTPS for communicating with the OSM web clients, do the following:
 - a. From the Domain Structure tree, expand **Environment** and select **Servers**.
 - b. Select either the administration server or one of the managed servers.
 - c. From the **Configuration** tab, select the **General** subtab.
 - d. Expand **Advanced**.
 - e. Select **yes** from the **WebLogic Plug-In Enabled** drop-down list.
 - f. Click **Save**.
 - g. Repeat steps b to f for all managed servers and the administration server.
3. If you are running a hardware load balancer, do the following:
 - a. From the Domain Structure tree, expand **Environment** and select **Clusters**.
 - b. Select the cluster to which you are installing OSM.
 - c. From the **Configuration** tab, select the **HTTP** subtab.
 - d. In the **Frontend Host** field, enter the host name or IP address of the load balancer.
 - e. In the **Frontend HTTP Port** field, enter the HTTP port of the load balancer.
 - f. In the **Frontend HTTPS Port** field, enter the HTTPS port of the load balancer.
 - g. Click **Save**.

Configuring Server Settings

To configure server settings, do the following:

1. Log on to the WebLogic Administration Console.
2. Click **Lock & Edit**.
3. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
4. Select a server (for example, the administration server, a managed server, or a proxy server).
5. Click the **Logging** tab.
6. In the **General** sub tab, click **Advanced**.
7. In the Domain log broadcaster area, from the **Severity Level** list, select **OFF**.
8. Click **Save**.
9. Repeat steps 3 to 8 for all other servers in the cluster.
10. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.

11. Select a server.
12. In the **Configuration** tab, click the **Services** sub tab.
13. In the Default Store area, from the **Synchronous Write Policy** list, select **Direct-Write-With-Cache**.
14. Click **Save**.
15. Repeat steps 10 to 14 for all other servers in the cluster.
16. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
17. Select a server.
18. In the **Logging** tab, click the **HTTP** sub tab.
19. Deselect **HTTP access log file enabled**.
20. Click **Save**.
21. Repeat steps 16 to 20 for all other servers in the cluster.
22. Click **Activate Changes**.

Starting and Verifying all Machines in the Cluster

This section contains information about starting the WebLogic Server cluster and verifying the setup of the cluster.

To start and verify the cluster:

1. Go to *domain_home/bin* for your base domain.
2. Run the following command which starts the administration server:
`startWebLogic.sh`
3. Go to *domain_home/bin* for your base domain on each machine running a managed server.
4. Run the following command:
`startupscript.sh server_name http://IP_address:port`
where:
 - *startupscript* is the name of the startup script for the managed server you are starting.
 - *server_name* is the name of the managed server or proxy server you are starting.
 - *IP_address* is the IP address of the administration server.
 - *port* is the port number of the administration server.
5. Log in to the WebLogic Server Administration Console.
The Administration Console is displayed.
6. Click **Servers**.

The summary page shows which servers belong to the cluster along with their configured listen address, port, state, and health status.

Configuring Whole Server Migration

The procedures in the section are applicable if you want to use whole server migration and have done the following:

- Configured floating IP addresses for the managed server. See ["Creating the WebLogic Server Domain"](#) for more information.
- Configured node manager properties for whole server migration. See ["Configuring Node Manager for Whole Server Migration"](#) for more information.
- Configured wlsifconfig.sh and tested floating IP address creation. See ["Configured Whole Server Migration Floating IP Controls"](#).

Creating the Leasing Tablespace and Active Table in the Database

To create a leasing tablespace in the Oracle database, do the following:

1. Log in to the Oracle RAC database using the SCAN address. For example:

```
sqlplus sys/Password123@' (DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP) (HOST=database-cluster-scan.localdomain) (PORT=1521)
)) (CONNECT_DATA=(SERVICE_NAME=pdb1)))' as sysdba
```

2. Confirm which ASM disk group you want to use to store the leasing tablespace. For example, the following command shows that there is one ASM disk group available:

```
select group_number, name from v$asm_diskgroup;
```

```
GROUP_NUMBER NAME
-----
1 DATA
```

3. Verify the current tablespaces. For example:

```
select tablespace_name from dba_data_files;
```

```
TABLESPACE_NAME
-----
SYSTEM
SYSaux
USERS
DEV_IAS_OPSS
DEV_IAS_IAU
DEV_STB
LARGE_DATA
LARGE_INDEX
```

8 rows selected.

4. Check the available space on the disk group. For example:

```
select name, state, total_mb, free_mb from v$asm_diskgroup;
```

```
NAME          STATE          TOTAL_MB    FREE_MB
-----
DATA          CONNECTED      20456       6908
```

5. Create a tablespace for the leasing table. For example:

```
create tablespace leasing logging datafile '+DATA' size 100M extent management
local uniform size 64K;
```

6. Verify the leasing table space has been created. For example:

```
select tablespace_name from dba_data_files;
```

```
TABLESPACE_NAME
-----
SYSTEM
SYSAUX
USERS
DEV_IAS_OPSS
DEV_IAS_IAU
DEV_STB
LEASING
LARGE_DATA
LARGE_INDEX
```

```
9 rows selected.
```

7. Create a user account with permissions for the leasing tablespace. For example:

```
create user leasing identified by Password123;
grant create table to leasing;
grant create session to leasing;
alter user leasing default tablespace leasing;
alter user leasing quota unlimited on leasing;
```

8. Exit the sqlplus session. For example:

```
exit
```

9. Copy the **leasing.ddl** file from *WebLogic_home/server/db/oracle/920* on one of the WebLogic Server machines. For example, from the current database directory, you can run the following command to copy over the file:

```
scp weblogic_user@ip_address:WebLogic_home/server/db/oracle/920/leasing.ddl .
weblogic_user@ip_address's password: weblogic_password
leasing.ddl
```

where

- *weblogic_user* is the WebLogic Server user account of one of the machines running a WebLogic Server.
 - *ip_address* is the IP address of the machine running a WebLogic Server.
 - *weblogic_password* is the password of the WebLogic Server user account.
10. From the current directory where the leasing.ddl file is located, log in to the newly created leasing tablespace using the SCAN address. For example:

```
sqlplus leasing/Password123@' (DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP) (HOST=database-cluster-scan.localdomain) (PORT=1521)
)) (CONNECT_DATA=(SERVICE_NAME=pdb1)))' as sysdba
```

11. Run the **leasing.ddl** script. You can safely ignore error messages as long as the **active** table is successfully created. For example:

```
@leasing.ddl
```

12. Verify that the **active** table has been created on the leasing tablespace. For example:

```
select table_name from user_tables;
```

TABLE_NAME

ACTIVE

Create the Leasing Multi Data Source

The leasing multi data source is the WebLogic Server connections to the Oracle Database RAC instances that contain the leasing table. WebLogic Server uses this data source when migrating a managed server from one machine to another.

To create the leasing multi data source, do the following:

1. Log on to the WebLogic Administration Console.
2. From the Domain Structure tree, expand Services and Data Sources.
The Summary of JDBC Data Source screen is displayed.
3. Click **Lock & Edit**.
4. Click **New**, then **Multi Data Source**.
The Create a New JDBC Multi Data Source screen is displayed.
5. In the **Name** field, enter **leasing**.
6. In the **JNDI Name** field, enter **jdbc/leasing** as the JNDI name.
7. From the **Algorithm Type** list, select **Failover**.
8. Click **Next**.
The Select Targets screen is displayed.
9. In the **Clusters** table, select **All servers in the cluster**.
10. Click **Next**.
The Select Data Source Type screen is displayed.
11. Select **Non-XA Driver**.
12. Click **Next**.
The Add Data Sources is displayed.
13. Click **Create a New Data Source**.
The JDBC Data Source Properties screen is displayed.
14. In the **Name** field, enter **leasing-rac1**.
15. In the **JNDI Name** field, enter **jdbc/leasing-rac1**.
16. In the **Database Type** list, select **Oracle**.
17. Click **Next**.
18. In the **Database Driver** list, select **Oracle's Driver (Thin) for RAC Service-Instance connections; Versions:Any**.
19. Click **Next**.
The Transaction Options screen is displayed.
20. Deselect **Supports Global Transaction**. Keep One-Phase Commit selected.
21. Click **Next**.

Connection Properties is displayed.

22. In the **Service Name** field, enter the service name of the database.
23. In the **Database Name** field, enter the database SID of the first RAC database instance. For example, rac1.
24. In the **Host Name** field, enter the database SCAN hostname.
25. In the **Port** field, enter the port number of the SCAN hostname.
26. In the **Database User Name**, enter leasing.
27. In the **Password** and **Confirm Password** fields, enter the leasing schema password.
28. Click **Next**.

The Test Database Connection screen is displayed.

29. Click **Test Configuration** and do one of the following:
 - If the test failed, click **Back** to review the previous screens.
 - If the test succeeded, click **Next**.

The Select Targets screen is displayed.

30. In the **Clusters** table, select **All servers in the cluster**.
31. Click **Finish**.

The Add Data Sources screen is displayed.

32. Select **leasing-rac1** from the Available table and move it to the Chosen table.
33. Repeat steps 13 to 32 with the following changes:
 - In the **Name** field, enter **leasing-rac2**.
 - In the **JNDI Name** field, enter **jdbc/leasing-rac2**.
 - In the **Database Name** field, enter the database SID of the second RAC database instance. For example, rac2.
 - Select **leasing-rac2** from the Available table and move it to the Chosen table.
34. Click **Finish**.
35. Click **Activate Changes**.

Configure the Cluster for Whole Server Migration

To configure the cluster for whole server migration, do the following:

1. Log on to the WebLogic Administration Console.
2. From the Domain Structure tree, expand **Environment** and select **Clusters**.
The Summary of Clusters screen is displayed.
3. Select the OSM cluster.
The Configuration tab is displayed.
4. Select the **Migration** sub tab.
5. Click **Lock & Edit**.

6. In the Candidate Machines For Migration Servers tables, select the machines from the Available table that you want to use in whole server migration scenarios. Move the selected machines to the Chosen table.
7. From the **Migration Basis** list, select **Database**.
8. From the **Data Source For Automatic Migration** list, select **leasing**.
9. From the **Auto Migration Table Name**, enter **ACTIVE**.
10. Click **Save**.
11. Click **Activate Changes**.

Configure Managed Servers for Whole Server Migration

To configure managed servers for whole server migration, do the following:

1. Log on to the WebLogic Administration Console.
2. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
3. Click **Lock & Edit**.
4. Select a managed server from the list.
The Configuration tab is displayed.
5. Select the **Migration** sub tab.
6. In the Migration Configuration area, select **Automatic Server Migration Enabled**.

Note: This option enables node manager to automatically create and remove the floating IP addresses associated to the managed servers that it runs. It also enables node manager to migrate a managed server to another machine.

7. From the Candidate Machines area in the Available table, select the machine name that you want the managed server to primarily run on and move the machine to the Chosen table.
8. Select and move the second machine to the chosen table.

Note: If node manager cannot start the machine on the first machine in the chosen list, it will migrate the managed server to the second machine.

9. Select the **Services** sub tab.
10. In the Default Store area, in the **Directory** field, enter a path to a shared directory that is also accessible on the machine where the managed server can migrate to.

For example:

```
/mnt/shares/oracle/cluster/defaultdatastore/
```

11. Click **Save**.
12. Click on the **Advanced** link below the Default Store area.
13. Deselect **Enable File Locking**.

14. Click **Save**.
15. Click **Activate Changes**.
16. Repeat this procedure for all other managed servers that can be migrated.

Testing Whole Server Migration

To test whole server migration, do the following:

1. Open a terminal on each machine running node manager.
2. Go to `domain_home/bin` for your base domain.
3. Run the following command which starts nodemanager:


```
startNodeManager.sh
```
4. Open a second terminal on the machine running the administration server.
5. Go to `domain_home/bin` for your base domain.
6. Run the following command which starts the administration server:


```
startWebLogic.sh
```
7. Log on to the WebLogic Administration Console.
8. From the Domain Structure tree, expand **Environment** and select **Machines**.
The Summary of Machines screen is displayed.
9. Select a machine.
The Configuration tab is displayed.
10. Select the **Monitoring** tab.
11. In the Node Manager Status tab, verify that the **Status** field shows the **Reachable** state.
12. Repeat steps 8 to 11 for all other machines.
13. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
14. Click the **Control** tab.
15. Select all managed servers that you want to start.
16. Click **Start**.
17. Click **Yes**.
18. Open a terminal on one of the machines.
19. Run the following command:


```
ps -ef | grep managed_server
```

where `managed_server` is the name of the managed server you want to test for whole server migration. For example:

```
ps -ef | grep osmms1
oracle 12785 12721 9 21:13 ? 00:01:36 /usr/java/jdk1.7.0_80/bin/java ...
```
20. The first set of numbers in the response is the process ID (PID) of the managed server. Run the following command to terminate the managed server process:

```
kill -9 pid
```

where pid is the process ID of the managed sever process you want to terminate.

21. Node manager will attempt to restart the managed server on the current machine. Wait for a few minutes, then repeat steps 19 to 20.
22. After you terminate the managed server PID a second time, go to the second machine and view the output from the terminal that you used to start node manager. Node manager should begin creating new folders for the migrating managed server, then starting up the managed server and allocating the floating IP address to the second machine. For example:

```
<INFO> <wls1213_domain> <osmms1> <Creating directory
"/u01/app/oracle/config/domains/wls1213_domain/servers/osmms1/logs">
<INFO> <wls1213_domain> <osmms1> <Creating directory
"/u01/app/oracle/config/domains/wls1213_domain/servers/osmms1/security">
<INFO> <wls1213_domain> <osmms1> <Creating directory
"/u01/app/oracle/config/domains/wls1213_
domain/servers/osmms1/data/nodemanager">
<INFO> <wls1213_domain> <osmms1> <Creating directory
"/u01/app/oracle/config/domains/wls1213_domain/servers/osmms1/tmp">
...
<INFO> <Generated command - sudo /sbin/ifconfig eth0:2 192.168.56.121 netmask
255.255.255.0>
<INFO> <Successfully brought 192.168.56.121 netmask 255.255.255.0 online on
eth0:2>
<INFO> <wls1213_domain> <osmms1> <The server 'osmms1' is running now.>
```

23. Return to the WebLogic Administration Console.
24. From the Domain Structure tree, select the domain name, then the **Monitoring** tab, then the **Migration** sub tab.
25. Verify the status of your migrated server. For example, in the **Start Time** column, you can verify when the migration occurred. From the **Machines Migrated From** and the **Machines Migrated To** column, you can verify which machines node manager migrated the machine from and to. For more information about these columns, click the Help button in the WebLogic Server administration console.

Migrating a Managed Server Back

To migrate a managed server back to its original location, do the following:

1. Log on to the WebLogic Administration Console.
2. From the Domain Structure tree, expand **Environment** and select **Servers**.
The Summary of Servers screen is displayed.
3. Click the **Control** tab.
4. Select the migrated managed server.
5. Click **Shutdown** the **Force Shutdown Now**.
6. Click **Yes**.
7. When the managed server has shutdown, select the managed server again.
8. Click **Start**.
9. Click **Yes**.

10. Open a terminal on the first machine where the managed server had originally been located.
11. Run the following command and confirm that the managed server has begun running on the original machine:

```
ps -ef | grep managed_server
```

where *managed_server* is the name of the managed server you want to test for whole server migration. For example:

```
ps -ef | grep osmms1
oracle 12785 12721 9 21:13 ? 00:01:36 /usr/java/jdk1.7.0_80/bin/java ...
```

12. From the Domain Structure tree, select the domain name, then the **Monitoring** tab, then the **Migration** sub tab.
13. Verify the status of your migrated server. For example, in the **Start Time** column, you can verify when the migration occurred. From the **Machines Migrated From** and the **Machines Migrated To** column, you can verify which machines node manager migrated the machine from and to. For more information about these columns, click the Help button in the WebLogic Server administration console.

Installing OSM in a Clustered Environment

To install OSM in a clustered environment:

1. Start the administration server, at least one managed server in the cluster, and the proxy server (if used).

Note: The OSM installer requires that at least one managed server is running in the cluster during the installation process. The OSM Administration server configures any remaining managed servers when they are started.

2. Do one of the following:
 - Perform an active OSM installation using the procedure described in ["Installing OSM"](#) with the following modifications:
 - On the WebLogic Server Connection Information window, enter the IP address and port number of the administration server.
 - On the BEA WebLogic Server/Cluster Selection window, select the cluster you created from the WebLogic Server/Cluster list, and click **Next**.
 - Perform a silent OSM installation as described in ["Performing a Silent Installation of OSM"](#).

If you are using an `install_cfg.xml` file generated by a non-clustered installation, you must set the Handler-Factory parameter to the following value:

```
com.mslv.oms.handler.cluster.ClusteredHandlerFactory
```

3. After OSM is installed, restart all the servers included in the cluster.

Performing an Interactive Installation of OSM

This chapter describes how to install Oracle Communications Order and Service Management (OSM) by using the graphical user interface (GUI) Installer. It also provides information about default Oracle WebLogic Server accounts, and modifying deployment parameters.

Before installing OSM, read the following chapters:

- [OSM Production Installation Overview](#)
- [OSM System Requirements](#)
- [Installing and Configuring the Oracle RAC Database](#)
- [Installing and Configuring the WebLogic Server Cluster](#)

Installing OSM

This section describes an interactive installation of OSM. The installation procedure applies to all supported platforms.

Note: If you are localizing OSM, make a backup of your WebLogic Server configuration before running the OSM Installer. See *OSM Developer's Guide* for more information about localizing OSM. See *Administering Oracle Fusion Middleware* for backup and recovery recommendations for WebLogic Server.

Note: If you are re-using the installation directory or the operating system temporary directory from a previous installation, you might not be able to run the installer on a UNIX or Linux system. For information about how to resolve this issue, see "[OSM Installer Issues for UNIX or Linux](#)".

To install OSM:

1. Download and unpack JBoss and GraphViz to a suitable location on the same machine on which you will install OSM. See [Table 2-1, "OSM Required Software"](#) for download links.

Tip: If you intend to install more than one OSM instance on the same machine, it is a good idea to put these libraries in a location outside any *OSM_home*.

2. Download the OSM software media pack for your operating system from the Oracle software delivery website, located at:
<https://edelivery.oracle.com/>
and save it to a temporary directory.
3. Unzip the OSM software media pack.
4. Ensure that the Oracle Database and Oracle WebLogic Server instances that you intend to use for OSM are running.
5. For a Linux system, ensure that you have installed all required software packages, including Software Development Workstation. For information about the available software packages, see the latest *Oracle Linux Installation Guide*.

6. On UNIX or Linux systems:

- a. Verify that your DISPLAY environment variable is properly set.
- b. Remove the ANT_HOME environment variable if it appears.
- c. Remove any weblogic.jar file entries from the CLASSPATH variable.
- d. Verify that the OSM UNIX or Linux user has read, write, and execute permissions for the `/tmp/vfs_cache` folder.

Note: If you cannot use this folder, or the contents of the `/tmp` folder get purged periodically, you can change the location of the `/vfs_cache` folder by adding the `-Djava.io.tmpdir=new_path` argument to the OSM WebLogic Server startup scripts (where `new_path` is the new `/vfs_cache` location).

- e. Change to the temporary directory containing the installation executable file.
- f. Run the following command:

```
chmod 500 InstallOS_name.bin
```

where `OS_name` is **Linux**, **Sparc** (Solaris), **AIX**, or **HpuxItanium**, depending on your system.

7. Run the OSM Installer by doing one of the following:

- On Oracle Linux and Red Hat Enterprise Linux, run the following command:

```
InstallLinux.bin -is:javahome JAVA_HOME
```

- On Oracle Solaris, run the following command:

```
InstallSparc.bin -is:javahome JAVA_HOME
```

- On IBM AIX, run the following command:

```
InstallAix.bin -is:javahome JAVA_HOME
```

- On HP-UX Itanium, run the following command:

```
InstallHpuxItanium.bin -is:javahome JAVA_HOME
```

- On Windows, run the following command:

```
Install.exe -is:javahome JAVA_HOME
```

where *JAVA_HOME* is the location of the JDK, for example `/u01/Java/jdk1.7.0_85`. If the path to your JDK contains a space, enclose it in quotation marks, for example `"C:\Program Files\Java\jdk1.7.0_85"` on a Windows file system.

Table 6–1 gives troubleshooting information for error messages you may receive after executing the command.

Note: If you are concerned that there is insufficient temporary disk space in your current temporary directory, specify the location of a different temporary directory for the OSM Installer to use during the installation.

You can also specify a log file that logs all OSM Installer activity.

To specify a different temporary directory and specify a log file, use the following attributes when running the OSM Installer:

```
-is:tempdir temp_directory -is:log log_file.log
```

where *temp_directory* is the location for the temporary directory used by the OSM Installer and *log_file* is the log file name.

For example:

```
./InstallLinux.bin -is:tempdir /tmp/osm -is:log osmlog.log
```

Table 6–1 Troubleshooting OSM Installer Startup Errors

Error	Solution	Operating System
After running the InstallLinux.bin command: Setup.product.install, com.installshield.wizard.Standa rdWizardListener, err, could not initialize interface awt...	Set the following environment variable and run the OSM Installer again: export AWT_TOOLKIT=MToolkit	Oracle Linux or Enterprise Red Hat Linux
After running the InstallSparc.bin command: UnsatisfiedLinkError: java: fatal: libXm.so.4: open failed: No such file or directory ...	Set the following environment variable and run the OSM Installer again: export AWT_TOOLKIT=XToolkit	Oracle Solaris
After running the InstallSparc.bin command: Setup.product.install, com.installshield.wizard.Standa rdWizardListener, err, could not initialize interface awt...	Set the following environment variable and run the OSM Installer again: export AWT_TOOLKIT=MToolkit	Oracle Solaris

Table 6–1 (Cont.) Troubleshooting OSM Installer Startup Errors

Error	Solution	Operating System
After the Installer starts, on the Welcome screen: ERROR: null Installer log shows InstallShield errors. For example: <pre>[java.lang.NullPointerException] at com.installshield.wizard.service.LocalImplementorProxy.invoke(Unknown Source) ...</pre>	Delete the <code>vpd.properties</code> file located in the following directory and run the OSM Installer again: <code>userHome/InstallShield/Universal/common/Gen1/_vpddb/</code> where <code>userHome</code> is your home directory.	All

The Welcome screen is displayed.

- Review the pre-installation checklist and additional third-party component requirements.

Note: The third-party components are required for the OSM Server and software development kit (SDK) components.

- Select the **View third party readme** check box and click **Next**.

The Order and Service Management Third-party Component Information screen is displayed.

- Review the readme contents for the third-party components, then click **Next**.

The Installation Directory screen is displayed.

- Specify the installation directory for OSM by doing one of the following:

- Accept the default path provided by the Installer.
- Specify another location by entering a path name or click **Browse** to locate the directory.

Note: If you are installing to the same directory as an existing OSM 7.0.x installation, the automation module in the SDK is not upgraded. Specify a new directory to ensure complete installation of the new OSM SDK.

Click **Next**.

The Setup Type screen is displayed.

- Select which of the components listed in [Table 6–2](#) to install by doing one of the following:

Table 6–2 OSM Installation Components

Component	Description
Database Schema	The database schemas required to support OSM
Server	The OSM server application

Table 6–2 (Cont.) OSM Installation Components

Component	Description
SDK Tools	The OSM SDK, which includes the OSM Javadocs, the XML Import/Export tool, and various other files in support of OSM development activities.
SDK Samples	Sample files for use with the SDK. Includes sample code and web service requests. This also includes silent installation template files to use if you want to run subsequent silent installations. For more information about silent installations, see "Performing a Silent Installation of OSM."

- To install everything except the SDK Samples (on Windows), or to install the Database Schema and Server (on UNIX or Linux), select **Typical Installation** and click **Next**.
- To choose which components to install do the following:
 - a. Select **Custom Installation** and click **Next**.
 - b. Select the components to install and click **Next**.

The Installation Overview screen is displayed.

13. Review the upcoming stages of the installation, and click **Next**.

The Database Connection Information screen is displayed.

14. Specify the Oracle Database instance where the OSM database schema will be installed by entering the values supplied by your database administrator (DBA) in the following fields.

If you are installing an Oracle Real Application Clusters (Oracle RAC) database, specify connection information for the primary database instance. You will specify secondary database instances in a later step.

- In the **Host** field, enter the IP address or DNS name of the host where the database listens for request. For an Oracle RAC database, enter the Single Client Access Name (SCAN).
- In the **Port** field, enter the port where the database listens for requests.
- In the **Service Name** field, enter the service name of the database. If the database is a pluggable database (PDB) within a container database (CDB), use the service name of the PDB. For example, the name of either the default database service or a service created specifically for OSM.

For an Oracle RAC database instance with a remote listener (SCAN listener), you must enter both service name and SID. For other types of database, or an Oracle RAC database instance with only local listeners, you can enter either a database service name or SID, but both fields cannot be empty.

Note: If a service is configured for OSM, all WebLogic database transactions are executed against that service as expected. However, OSM jobs run by the Notification Engine are submitted to the database through the DBMS_JOB package and are not subject to any restrictions that may have been placed on the service.

- In the **Instance SID (Optional)** field, enter the name (system identifier) of the database instance. If the database is a PDB within a CDB, use the system identifier of the CDB.

For an Oracle RAC database instance with a remote listener, you must specify the SID and the service name. Otherwise, the WebLogic data source will not be able to override server-side load balancing. See "[Listener Considerations for Oracle RAC](#)" for a discussion of listener functionality.

15. Click **Next**.

The Database Administrator Credential Information screen is displayed.

16. Enter the credentials supplied by your DBA in the following fields:

- In the **Database Admin Username** field, enter the user name for the database administrator user.
- In the **Database Admin Password** field, enter the password for the database administrator user.

Note: If you choose to connect as the **sys** user and you have not set the `O7_DICTIONARY_ACCESSIBILITY` database parameter to **TRUE**, append **as sysdba** to the value in the **User Name** field.

The Database Credential Information screen is displayed.

17. Do one of the following:

- Select **Use different passwords for these accounts** to manually configure the OSM schema names and passwords:
 - a. In the **Schema** column, you can view the **Core**, **Rule Engine**, and **Reporting** schemas. These fields are read-only.
 - b. In the **Username** column, OSM generates **ordermgmt**, **ordermgmt_rule**, and **ordermgmt_report** as the default user name for the **Core**, **Rule Engine**, and **Reporting** schemas. Double-click on any default user name to edit the user name.
 - c. In the **Password** column, enter a password for each schema.
 - d. In the **Password Confirmation** column, enter the same password again.

Note: If the Oracle accounts that you enter in the **Username** fields do not exist, new accounts with these names will be created for you during installation.

- Select **Use same passwords for all accounts** to use the same password for all OSM schemas.
 - a. In the **Password** field, enter a password.
 - b. In the **Password Confirmation** field, enter the password again.

Note: If you edit the default schema user names in the **Use different passwords for these accounts** Username column, but specify the same password for all schemas using the **Use same password for all accounts** field, OSM uses the edited user names and applies the same password for each schema.

The OSM Server uses the **Core** and **Rule Engine** credentials to connect to Oracle Database schemas. You can use **Reporting** credentials with the OSM Reporting Interface to generate reports (see *OSM Reporting Interface Guide* for more information).

The Database Schema Credential Check screen is displayed.

18. Click **Next**.

19. Do one of the following:

- If **Order and Service Management Database Not Found** is displayed, click **Next**, which creates a new database.
- If **Order and Service Management Database Schema Found** is displayed, and the existing database version is the same as the version to be installed, click **Next**.
- If **Order and Service Management Database Schema Found** is displayed, and the existing database version is different from the version to be installed, you need to upgrade the database.

Do the following to review a report analyzing the impact of upgrading:

- a. On the schema status screen, click **Analyze** and click **Next** (the analysis can take a few minutes to run).

The Database Analysis Report screen is displayed.

- b. On reviewing the report, either save the report and click **Next**, or click **Back** without saving the report.

The Database Schema Localization Information screen is displayed.

20. Do one of the following:

- If you have not localized your database schema, accept the default setting (the **Use localized Order and Service Management Data** check box deselected).
- If you have localized your database schema, select the **Use localized Order and Service Management Data** check box, and click **Browse** to specify the path to your localized **.jar** file.

21. Click **Next**.

The Database Schema Tablespaces screen is displayed.

Note: If the Installer takes an unusual amount of time to progress to the Database Schema Tablespaces screen, Oracle recommends that you purge the database recycle bin to ensure the Installer progresses more quickly the next time you run it. For information, see ["OSM and RCU Installers Are Slow to Run Database Tablespace Query"](#).

22. Select tablespaces for the OSM database schemas:

- **Default Tablespace:** Specifies the tablespace for the default tablespace option <default> available to all database schemas (except for the Temporary Tablespace).
- **Temporary Tablespace:** Specifies the temporary tablespace for the database schema.
- **Model Data Tablespace:** Specifies the model data tablespace for the database schema.
- **Model Index Tablespace:** Specifies the model index tablespace for the database schema.
- **Order Data Tablespace:** Specifies the order data tablespace for the database schema.
- **Order Index Tablespace:** Specifies the order index tablespace for the database schema.

For each tablespace, you are shown how much space you have available and how much space is required. For more information, see "[Tablespaces](#)".

23. Click Next.

The Database Schema Partition Information screen is displayed.

24. Do one of the following:

- If you have a license for Oracle Partitioning, accept the default selection (**Use Oracle Partitioning features for optimal performance in high volume production environment**) and do the following:
 - a. In the **Orders per Partition** field, enter the number of orders that will be allowed in a partition.
 - b. In the **Number of Sub-partitions** field, enter the number of sub-partitions allowed in a partition.

After installation, you can change the values that you selected during the installation process by updating the **range_partition_size** and **subpartitions_number** OSM database parameters. However, updates to these parameters do not affect existing partitions.

Note: For more information about partitioning, see *OSM System Administrator's Guide*.

- If you do not want to use Oracle Partitioning, deselect the **Use Oracle Partitioning features for optimal performance in high volume production environment** check box. You may not need Oracle Partitioning features in a development environment.

Important: Oracle strongly recommends partitioning in all production deployments or production test environments, particularly those with high order volumes or any volume of large or complex orders. If you choose not to partition your OSM schema, it could be expensive to later reverse your decision. Changing a non-partitioned schema that has accumulated a large volume of data to a partitioned schema involves time-consuming and resource intensive export/import.

25. Click Next.

The Database Timezone Information screen is displayed.

26. From the **Database Timezone list, select the time zone that corresponds to the time zone for your database server, and click **Next**.**

Note: For more information on time zone settings, see *OSM System Administrator's Guide*.

The WebLogic Configuration - Configuration Type screen is displayed.

27. Select **Connect to a running WebLogic server to create resources and deploy OSM, and click **Next**.**

Note: Use the **Connect to a running WebLogic server to create resources and deploy OSM** option when you want to install the OSM server and create resources in WebLogic.

Reserve the second option, **Do not connect to a WebLogic server. Order and Service Management must be manually deployed**, for situations where OSM has already been deployed and WebLogic Server resources already configured.

The WebLogic Server Connection Information screen is displayed.

28. Do the following:

- a. In the **WebLogic Host Name** field, enter the name or IP address of the machine where WebLogic is installed.
- b. In the **WebLogic Port Number** field, enter the port where WebLogic is operating.
- c. In the **WebLogic Admin User** field, enter the name of the WebLogic administrator.
- d. In the **WebLogic Admin Password** field, enter the password of the WebLogic administrator.
- e. Select **Connect to WebLogic via SSL** to use an SSL connection to the WebLogic admin server. The server's SSL port must be enabled to use this feature. By default, a non-SSL connection is used.
- f. In the **WebLogic SSL Port Number** field, enter the port number of the WebLogic admin server.
- g. Specify the location of the key store file required for the SSL connection by typing the full path and directory, or click **Browse** to locate the directory.
The default location of the **cacerts** key store file is *WebLogic_home/***server/lib**.
- h. Click **Next**.

The WebLogic Server Deployment Target screen is displayed.

29. From the list, select the server or cluster as follows:

- If you created a single WebLogic admin server, select the admin server.
- If you created a WebLogic admin server with managed server, select the managed server.

- If you created a WebLogic cluster, select the cluster.

Note: The list shows only the targets on which ADF has been configured.

30. Click Next.

The Third-party Software Configuration Information screen is displayed.

- 31. Enter or browse to the locations for the JBoss software. The JBoss libraries are located in the `lib` directory inside the directory where you unzipped JBoss. Click Next.**
- 32. If the value of the Java Transaction API (JTA) Timeout Seconds parameter for your WebLogic domain is less than 600 seconds (the default WebLogic value is 30), the Installer prompts you to increase the Timeout Seconds value. The current value is displayed in the Timeout in Seconds field. Do one of the following:**
- Update the Timeout Seconds value to a value greater than or equal to 600 and click **Next**.
To avoid premature rollbacks, set the JTA timeout to a value of 2400 seconds. This setting can be changed after installation by using the WebLogic Server Administration Console.
 - Do not update the Timeout Seconds value and click **Next**.
A warning is displayed. Click **OK** to accept the warning and continue with installation.

For more information about the JTA Timeout Seconds parameter, see the WebLogic Server Administration Console Help.

33. Click Next.

34. Update the following fields:

- a. Front End Host and Front End Port** for Web Service HTTP requests. The Installer automatically populates these fields with the values configured for your WebLogic domain, proxy server, or load balancer.

If the WebLogic default values of `<blank>` and `0` appear, update the fields with the correct values. You must update these values to proceed with the installation.

For information about updating these fields again after installation, see the discussion about how to configure HTTP settings for a cluster in the WebLogic Server Administration Console Help.

- b. (Optional) Front End SSL Port** for Web Service HTTP requests.

35. Click Next.

The Database Connection Pool Information screen is displayed.

36. Do one of the following:

- If you selected a WebLogic cluster, the WebLogic Cluster Web Service Request Configuration screen is displayed. Go to step 34.
- If you selected an admin server or a managed server, the Third-party Software Configuration Information screen is displayed. Go to step 31.

37. If you specified a single-instance database in the Database Server Connection Information screen (step 14), the Database Connection Pool Information screen is displayed. Go to step 43.

If you specified an Oracle RAC database with its SID, the Oracle Real Application Clusters Configuration screen is displayed. Go to step 39.

38. Do one of the following:

- If you want to use Oracle RAC, select **Use Oracle RAC**. Go to step 39.

The Installer configures a single data source for the Oracle RAC instance specified in step 14, but does not create a multi data source. OSM will not use Oracle RAC for load balancing or failover.

Note: If you decide in the future to implement Oracle RAC for load balancing or failover, you must run the Installer again and select one of the other options described here. You cannot manually add and configure the primary Oracle RAC database instance.

- If you do not want to use Oracle RAC, deselect **Use Oracle RAC** and click **Next**.

The Database Connection Pool Information screen is displayed. Go to step 43.

39. Do one of the following:

- a. In the Configure WebLogic JDBC data sources area select one of the following options:

- **to use additional RAC Database instances now**

The Installer preconfigures the database connections in WebLogic.

- **manually after installation completes**

You can add more Oracle RAC database instances manually after installation. See "[Manually Configuring Additional Data Sources for an Oracle RAC Instance](#)" for configuration details.

- b. In the RAC operation mode area, select one of the following options:

- **Load Balancing (Active Active) - Order and Service Management WebLogic Cluster Installations**

The Installer groups the WebLogic Server instances according to the number of Oracle RAC database instances. Each group is configured to a separate Oracle RAC database as the primary data source, and the remaining Oracle RAC database instances as secondary data sources.

This option is available only if OSM is deployed to a WebLogic cluster.

- **Failover (Active Passive)**

The Installer configures multi data sources and data sources according to the number of Oracle RAC database instances. The first data source of each multi data source connects to the primary database instance specified in step 14, and the subsequent data sources connect to other database instances to be specified. This option preconfigures the database connections in WebLogic for warm standby.

- c. In the Listener Configuration area, select one of the following options:

- **Remote Listener (SCAN Listener)**
- **Local Listeners**

See "[Listener Considerations for Oracle RAC](#)" for a discussion on listener functionality.

d. Click **Next**.

40. Do one of the following:

- If you chose to configure WebLogic JDBC data sources manually after installation or not to use Oracle RAC, click **Next** and go to step 43.
- If you chose to use additional RAC Database instances now, continue selecting options on this screen as described in step 41.

41. Do one of the following:

- If you selected the remote listener option:
 - a. In the **SCAN Address** field, you can modify the SCAN address if required. For example, you may need to do this if you entered an incorrect address in the **Host** field in step 14.
 - b. In the **SCAN Port** field, you can modify the SCAN port if required. For example, you may need to do this if you entered an incorrect port in the **Port** field in step 14.
 - c. Add a new row and specify the same Service Name as you did for the primary instance and a unique SID for each additional Oracle RAC instance. For a container database, use the PDB service name and the CDB SID.
 - d. If you did not specify the SID of the primary Oracle RAC instance in step 14, do so now in the first row. For a container database, use the CDB SID.
- If you selected the local listeners option, add a new row for each additional Oracle RAC instance and specify:
 - a. The host and port: Each row must use a different combination of host and port. For example, if you use the same host, you must use a different port.
 - b. The service name or SID: Each row must specify either the same service name as the primary instance or a unique SID. Rows can also specify both service name and SID. Specify the same fields as you did for the primary instance. For example, if you only specified the SID for the primary instance, specify unique SIDs for the additional instances. For a container database, use the PDB service name and the CDB SID.

All instances must be in the same database.

42. Click **Next**.

The Database Connection Pool Information screen is displayed.

43. If you are not sure how to size the pool at this time, use the default settings. These settings can be tuned later from the WebLogic Server console. Do the following:

- a. In the **Initial Capacity** field, enter the number of database connections initially reserved in the WebLogic connection pool.

Note: In an Oracle RAC configuration, the initial capacity is set to 0 (read-only).

- b. In the **Maximum Capacity** field, enter the maximum number of database connections reserved in the WebLogic connection pool.
- c. In the **Capacity Increment** field, enter the number of connections added when the connection pool maintained by the WebLogic Server is exhausted.

Note: In an Oracle RAC configuration, this connection pool information will be shared.

- d. Click **Next**.

The JMS Store Information screen is displayed.

44. Accept the default setting of **JMS File Store** or select the alternate **JMS JDBC Store**.

If you choose JMS File Store, OSM will use the default WebLogic file-based persistent store as the JMS store. After installation is complete, Oracle recommends that you configure one custom file store for each managed server and JMS server. For more information, see "[Creating and Configuring Persistent File Stores](#)".

While file stores provide better performance than JDBC stores, the benefit of JDBC stores is that online database backups can obtain consistent snapshots of both OSM data and JMS messages. However, there is currently no mechanism for consistent backup of JDBC stores and transaction logs. For more information about backup strategies, see *OSM System Administrator's Guide*.

Click **Next**. If OSM is being deployed to a WebLogic cluster, the WebLogic Coherence Cluster Configuration screen is displayed. In a single server deployment, the OSM Administrator and Deployment Credentials screen is displayed; go to step 46.

45. Accept the settings for the WebLogic coherence cluster that the Installer has detected, or create a new coherence cluster by modifying the default values. The coherence cluster name is generated using the pattern: **osmCoherenceClusterNNNN**, where *NNNN* is a random four-digit number. Make sure that the **IP Address** value corresponds to the IP address or machine name of the WebLogic Server where the coherence cluster is running.

Note: Oracle recommends using unicast cluster messaging mode. The Installer uses unicast mode and does not allow you to use the Installer to change the mode to multicast. Even if the target WebLogic cluster is a member of a coherence cluster that uses multicast mode, the Installer modifies the cluster messaging mode to unicast. For information about using WebLogic to change the cluster messaging mode to multicast, see "[Configuring a Multicast IP Address for the Cluster Messaging Mode](#)".

Click **Next**. The OSM Administrator and Deployment Credentials screen is displayed.

46. The user names and passwords you provide will be used to create initial user accounts with administrator privileges and access to Oracle Communications Design Studio (the deployment tool). Do the following:
- a. In the **Admin User Name** field, enter a user name, or use the default **admin**.

- b. In the **Password** field, enter a password for the OSM Administrator user.
- c. In the **Password Confirmation** field, re-enter the password for the OSM Administrator user.
- d. In the **Deploy Admin User Name** field, enter a user name or use the default **deployAdmin**. Design Studio uses this user to deploy cartridges to OSM.
- e. In the **Password** field, enter a password for the Deploy Admin user.
- f. In the **Password Confirmation** field, re-enter the password for the Deploy Admin user.
- g. Click **Next**.

The OSM User Credential Information screen is displayed.

47. You use this screen to create passwords for the standard users that are created for the application. The **Automation User Name** and **OSM Core User Name** are provided on this screen for reference only and are not editable. The passwords you enter must meet the password requirements for your WebLogic domain. Do the following:

- a. In the **Automation User Password** field, enter the password for the oms-automation user. This is the internal automation user, used for processing OSM automation and email notifications. Re-enter the password in the second **Confirm Password** field.
- b. In the **OSM Core User Password** field, enter the password for the oms-internal user. It is used for internal processing when an operation must be performed on behalf of the application rather than on behalf of the user. Re-enter the password in the third **Confirm Password** field.
- c. Click **Next**.

The OSM Server Session Information screen is displayed.

48. The information in this screen is used to configure your OSM user sessions. Do the following:

- a. In the **Session Timeout** field, enter the time in minutes that Order Management web client and Task web client sessions remain active.
- b. In the **Server Domain Suffix** field, enter the domain suffix for the computers on which the OSM server will run.
- c. In the **Landing Page** field, select the first page that Task web client users will see after login.
- d. Click **Next**.

The Order and Service Management Remarks and Attachment Information screen is displayed.

49. The information on this screen is used to configure the text remarks and file attachments that users can add to OSM orders. Do the following:

- a. In the **Maximum Attachment Size** field, enter the maximum attachment size in MB that can be appended to a remark.
- b. In the **Remark Change Timeout** field, enter the length of time in hours that a remark can be edited before it becomes read-only.
- c. Click **Next**.

The OSM Web Client Preferences screen is displayed.

50. The information in this screen is used to configure the number of records retrieved and displayed in the Task web client's Worklist, Query list, and Notification list. Do the following:
- a. In the **Worklist Rows Retrieved** field, enter the number of rows OSM should retrieve when the worklist is refreshed.
 - b. In the **Worklist Rows per Page** field, enter the number of rows OSM should display on each Worklist page.
 - c. In the **Query Rows Retrieved** field, enter the number of rows OSM should retrieve when a query is run.
 - d. In the **Query Rows per Page** field, enter the number of rows OSM should display on each query results page.
 - e. In the **Notification Rows Retrieved** field, enter the number of rows OSM should retrieve when the notification list is refreshed.
 - f. In the **Notification Rows per Page** field, enter the number of rows OSM should display on each notification page.
 - g. Click **Next**.

The Order and Service Management Notification Emails screen is displayed.

51. The information in this screen is used to configure the email notifications for OSM. Do the following:
- a. In the **Notification Email Server** field, enter the DNS name or IP address of your email server.
 - b. In the **Notification Email Server Port** field, enter the port on which the email server is listening.
 - c. In the **Administrator Email Address** field, enter the OSM Administrator's email address.
 - d. Click **Next**.

The Task Processor Configuration screen is displayed.

52. The information in this screen is used to control the rule and delay task evaluation. You can change these settings at any time after installing OSM. See *OSM System Administrator's Guide*.

Do the following:

- a. In the **Task Processor Interval** field, enter the number of seconds between task processor polls.
- b. In the **Maximum Rule Processor Count** field, enter the maximum number of rule task processors used to evaluate rules.
- c. In the **Maximum Delay Processor Count** field, enter the maximum number of delay task processors used to evaluate delays.

Note: The total number of processors will be adjusted automatically at run time to exceed not more than 10% of the connection pool size. For a non-production environment, you can use the default values.

- d. Click **Next**.

The Order and Service Management Server Features screen is displayed.

53. Do any of the following:

Note: If you are using both Account Manager and Customer Asset Manager, they must be deployed into the *same* central order management (COM) instance.

- Select **Account Manager** if you want to install the Account Manager. If you have different instances of OSM in your solution, for example one instance for COM and one instance for service order management (SOM), you should only select this feature for the COM instance of OSM.

If you do not select this feature during installation, and you decide later that you want to use it, see the information about working with assets and accounts in the Design Studio *Modeling OSM Processes Help*.

- Select **Customer Asset Manager** if you want to install the Customer Asset Manager. If you have different instances of OSM in your solution, for example one instance for COM and one instance for SOM, you should only select this feature for the COM instance of OSM.

If you do not select this feature during installation, and you decide later that you want to use it, see the information about working with assets and accounts in the Design Studio *Modeling OSM Processes Help*.

- Select **Job Orders** if you want to install the job control order cartridges that enable the job control order feature.

If you chose to manually deploy the cartridges for this feature later, see *OSM_home/ProductCartridges/install/ReadMe.txt* for instructions to manually deploy the product cartridges after you have installed OSM.

54. Click **Next**.

The Configuration Overview screen is displayed.

55. This screen displays all of your WebLogic Server and OSM configuration settings, and allows you to save those settings to a file. Do the following:

- a. To save your settings to a silent installation configuration file for future use, select the **Save Configuration** check box. Saving your settings is optional.
- b. When you select **Save Configuration**, a field is added to the screen that allows you to enter or browse to the directory in which you would like to save the configuration file.
- c. You can also choose to save the passwords in the configuration file as clear text by selecting the **Save Password** check box.

Note: Among the configuration parameters displayed on the Configuration Overview screen, the following parameters are **for internal use only**:

- Existing-Schema-Action
- Halt-on-Warning
- Halt-on-Error
- Warning-Property
- Error-Property

Oracle recommends that you do not modify these parameters. For example, to ensure a successful installation, do not modify the Existing-Schema-Action parameter to any value other than **upgrade**, not even when creating a new OSM database schema.

d. Click Next.

A screen is displayed containing the location and components to be installed and the total size of the OSM installation.

56. Click Next.

The OSM installation begins.

When the installation completes, the installation summary displays the location of the installation and database logs, which contain detailed information about your installation, including any warnings or problems encountered.

57. Do one of the following:

- If you have selected to install OSM with product features, such as the job control order feature, the Order and Service Management Server restart required screen appears. Go to step 58.

Note: If you want to complete the installation without restarting the OSM server, that is, without having to wait for the OSM application to deploy a product cartridge (such as the job control cartridge), click **Cancel**, and then go to step 59.

- If you have selected to manually deploy the product cartridges later, go to step 59.

58. Manually shutdown and restart the Oracle WebLogic Server. When the Oracle WebLogic Server restarts, click Next.

The **Deploying product cartridges** progress bar appears showing the progress of the product cartridge deployment that support the selected features.

59. Click Finish.

The installation is complete.

Note: After installing OSM, shut down and restart the Oracle WebLogic Server if you have not already done so after deploying the product cartridges. To verify that OSM installed properly, see ["Verifying the OSM Installation"](#).

Handling an OSM Database Schema Installation Failure

When the installer fails during an installation, you receive an error message. Before you continue with the installation, you must find and resolve the issue that caused the failure. There are several places where you can look to find information about the issue.

The **database installation plan action spreadsheet** is a file that contains a summary of all the installation actions that are part of this OSM database schema installation or upgrade. The actions are listed in the order that they are performed. The spreadsheet includes actions that have not yet been completed. To find the action that caused the failure, go to the *OSM_home/Database/dbinstall/install/om_\$install\$plan_actions.csv* file and review the **status** column. The failed action is the first action with a status that is **FAILED**. The **error_message** column of that row contains the reason for the failure.

The **database installation log file** gives a more detailed description of all the installation actions that have been run for this installation. The issue that caused the failure is located in the *OSM_home/Database/dbinstall/install/dbInstaller.log* file. The failed action is typically at the bottom, that is, the last action that was performed.

There are also the following database tables that contain information about the database installation:

- **om_\$install\$plan_actions:** Contains the same information as the database plan action spreadsheet. Compare this table to the spreadsheet in cases of a database connection failure.
- **om_\$install\$plan:** Contains a summary of the installation that have been performed on this OSM database schema.

When you install the Oracle database schema for the first time and the database schema installation fails, you must do the following high-level steps:

1. Delete the new schema, or use a new schema user name for the subsequent installation.
2. Restart the database schema installation from the beginning.

Note: If you are upgrading the database schema, you can restart the installation from the point of failure. For more information, see ["Recovering from a Database Upgrade Failure"](#).

Performing a Silent Installation of OSM

You can install Oracle Communications Order and Service Management (OSM) using interactive install or silent (unattended) install. This chapter provides instructions on using silent install.

The silent installation procedure enables you to perform a non-interactive installation of OSM. Installation settings are pre-configured in the configuration files **install_cfg.xml** and **installOptions.txt**. The installer runs in the background without requiring any user intervention.

Note: Silent installation configuration files are created during an interactive installation of OSM when the SDK samples are included in the installation. Configuration files created on one operating system can be used on other operating systems.

During installation, save the configuration in the Save Configuration screen of the OSM installer. This saves a copy of the **install_cfg.xml** file in the location you specify. In addition, if you have installed the SDK, samples of both configuration files are stored in the *OSM_home/SDK/Samples/installation* folder.

Prerequisites

The prerequisites for a silent installation are the same as an interactive installation:

- Oracle Database is correctly set up with tablespaces created for OSM, and is running.
- Oracle WebLogic Server is running.
- The third-party plug-in JBoss is available on the target machine.

Configuring the installOptions.txt and install_cfg.xml Files

For a silent installation to run correctly, the **installOptions.txt** and **install_cfg.xml** files must be customized to reflect the specifics of your target system, and to contain your preferred installation options. These options are analogous to what you would select in an interactive installation.

Configuring the installOptions.txt File

This file contains installation options. The parameters in this file can also be specified on the command line if desired, although it is not recommended to specify all of them on the command line. However, if you wanted to have a standard file with set options

and to specify, for example, the software and log locations on the command line, that would be possible. If an option is specified both in the file and on the command line, the command-line option will take precedence over the value in the file.

If you have installed the SDK samples, a sample **installOptions.txt** file is stored in the *OSM_home/SDK/Samples/installation* folder. Further information about the options below is specified in the sample file.

To configure the **installOptions.txt** file:

1. If you have access to a sample **installOptions.txt** file, copy it to the location where the installation executables are placed. For example, if you are using the sample in the OSM SDK, copy the file from the *OSM_home/SDK/Samples/installation* directory. If you do not have a sample, you can create a new text file called **installOptions.txt** in the location where the installation executables are placed.

2. Set the name of the XML file containing the installation configuration. This file should be located in the same directory as the **installOptions.txt** file. For example, to use **install_cfg.xml** as the XML file, use:

```
-W loadConfiguration.configurationFile="install_cfg.xml"
```

3. Set the location for the OSM product to be installed. Use double-quotes if the directory contains spaces. For example, for a UNIX or Linux installation, you might have:

```
-P installLocation=/opt/osm
```

For a Windows installation, you might have:

```
-P installLocation="C:\Program Files\OSM"
```

4. Set the location of the installation log. You need to monitor this file during the silent installation, to know if the installation is progressing successfully. For example, for a UNIX or Linux installation, you might have:

```
-log # !/opt/osm/InstallLog.txt @ALL
```

For a Windows installation, you might have:

```
-log # !C:\progra~1\OSM\InstallLog.txt @ALL
```

5. The **remove** option instructs the OSM Installer to always remove files that are modified after installation while performing uninstallation. These are default settings, and Oracle recommends that you do not change them:

```
-P compsvrupd.removeOption=1
```

```
-P compadm.removeOption=1
```

6. The **replace** option instructs the OSM Installer to always replace the files with the newer version. These are default settings, and Oracle recommends that you do not change them:

```
-G replaceNewerResponse="yesToAll"
```

7. Choose the setup type, either Typical or Custom.

To choose Typical, use the following line:

```
-V IS_SELECTED_INSTALLATION_TYPE=Typical
```

To choose Custom, use the following two lines:

```
-V IS_SELECTED_INSTALLATION_TYPE=Custom
```

```
-W setupTypes.active=false
```

8. If you have selected the Custom option, select which OSM components you would like to install. [Table 7-1](#) lists the text to include in the file to install the option. To choose not to install a component, use the same option, but set the value to **false** instead of **true**. If you have selected the Typical installation option, the values below are ignored.

Table 7-1 Options for OSM Components in installOptions.txt File

OSM Component	Option to Include to Install the Component
Database Schema	-P featureds.active=true
Server	-P featuresvr.active=true
SDK Tools	-P featuresdkt.active=true
SDK Samples	-P featuresdks.active=true

9. Save and close the file.

Configuring the install_cfg.xml File

Customize the **install_cfg.xml** file to reflect your OSM, Oracle WebLogic, and Oracle database parameters. If you have saved the configuration in the Save Configuration screen of the OSM installer when installing OSM using the GUI, a copy of the **install_cfg.xml** file for that installation has been saved in the location you specified. If you have installed the SDK samples, a standard sample **install_cfg.xml** file is stored in the **OSM_home/SDK/Samples/installation** folder. For details about **install_cfg.xml** parameters, see "[Silent Installation install_cfg.xml Parameters](#)."

You can obtain this information from your WebLogic and Oracle database administrator.

Performing a Silent Installation

1. On UNIX systems:
 - a. Remove the ANT_HOME environment variable if used.
 - b. Remove any weblogic.jar file entries from the CLASSPATH variable.
 - c. Make sure that the OSM UNIX user has full access to **/tmp/vfs_cache** folder.

Note: If you cannot use this folder, or the contents of the **/tmp** folder gets purged periodically, you can change the location of the **/vfs_cache** folder by adding the **-Djava.io.tmpdir=new_path** argument to the OSM WebLogic Server startup scripts (where *new_path* is the new **/vfs_cache** location).

- d. Change to the directory containing the installation executables.
 - e. Modify the installation file attributes so it is executable.
2. On Windows systems, navigate to the directory where the installation executables are placed.
3. Do one of the following:

- On Oracle Linux and Red Hat Enterprise Linux, execute the command:

```
./InstallLinux.bin -is:javahome JAVA_HOME -options installOptions.txt -silent
```
- On Oracle Solaris, execute the command:

```
./InstallSparc.bin -is:javahome JAVA_HOME -options installOptions.txt -silent
```
- On IBM AIX, execute the command:

```
./InstallAix.bin -is:javahome JAVA_HOME -options installOptions.txt -silent
```
- On Windows, execute the command:

```
Install.exe -is:javahome JAVA_HOME -options installOptions.txt -silent
```
- On HP-UX Itanium, execute the command:

```
./InstallHpuxItanium.bin -is:javahome JAVA_HOME -options installOptions.txt -silent
```

where *JAVA_HOME* is the location of the JDK. For example:

```
Install.exe -is:javahome C:\Java\jdk1.7.0_72 -options installOptions.txt -silent
```

Note: You can optionally specify the location of the temporary directory that the OSM installer uses during the installation if you are concerned that there is insufficient temporary disk space in your current temporary directory. In addition, you can specify a log file that logs all OSM installer activity.

You can use the following attributes when running the OSM installer in silent mode:

```
-is:tempdir temp_directory -is:log log_file.log
```

where *temp_directory* is the location for the temporary directory used by the OSM installer and *log_file* is the log file name.

For example:

```
./InstallLinux.bin -is:tempdir /tmp/osm -is:log osmlog.log -options installOptions.txt -silent
```

You can monitor the progress of the installation by viewing the **InstallLog.txt** file. If a problem occurs, the installation stops and the reason for the failure is written to the **InstallLog.txt** file. Based on the error, you may have to edit the **installOptions.txt** file and restart the installation.

4. If you chose to manually deploy product cartridges, see *OSM_home/ProductCartridges/install/ReadMe.txt* for instructions about manually deploying the product cartridges after you have installed OSM.

After the installation is complete, you can verify the installation the same way you do for the interactive installation. See "[Performing an Interactive Installation of OSM](#)" for more information.

Performing OSM Post-Installation Tasks

This chapter describes Oracle Communications Order and Service Management (OSM) post-installation tasks.

OSM Client Configuration Post Installation Tasks

The following sections provide post installation instructions relating to the OSM Order Management Web client and the OSM Task web client.

Enabling Graphical Display on UNIX or Linux Systems

To display graphical representations such as Gantt charts and orchestration plans on UNIX or Linux systems, OSM requires an Xserver such as Xvfb (X virtual framebuffer), an X11 server that is available for most UNIX or Linux platforms.

The following steps apply to Oracle Solaris. For other operating systems, refer to the respective product documentation.

1. Obtain and install Xvfb for your operating system.

Refer to your OS product documentation for specifics on Xvfb. On Solaris, Xvfb is included in the SUNWxwsrv package.

2. Start the Xvfb X server.

When starting Xvfb, disable host-based access control restrictions by providing the `-ac` option on the command line. For example:

```
Xvfb :1 -ac
```

3. Set the value of the DISPLAY environment variable to the host where you want the display to show, and the display number. Export the DISPLAY variable. For example, in the `sh` shell, type:

```
export DISPLAY=localhost:1
```

Note: This command assumes X server is running on display number 1 and on the same computer where WebLogic Server is running. If you have a different configuration, specify the IP address of the computer where the X server is running instead of `localhost`.

4. For convenience, you can place the `Xvfb` and `DISPLAY` setting commands in your user account configuration shell script or in the WebLogic Server startup script (`startWebLogic.sh`) so that they run when you start OSM.

5. If you are running on Solaris 5.10, add the following statement to the Java command line in the **startWebLogic.sh** file for your WebLogic server domain:

```
-Djava.awt.headless=true
```

If the above statement is missing from the Java command line, the following error may occur:

```
-X10: fatal IO error 22 (invalid argument) on X server "localhost:
```

In addition, performance and stability issues may occur when OSM accesses the server's display.

If you are running multiple instances of OSM on the same system, set up a dedicated Xvfb server for each instance.

To set up dedicated Xvfb servers for multiple instances of OSM:

1. Start one instance of the Xvfb server on display 1:

```
Xvfb :1
```
2. Set the value of the DISPLAY environment variable in the first WebLogic server domain instance to 1:

```
DISPLAY=localhost:1
```
3. Start the first WebLogic server domain instance.
4. Repeat steps 1 to 3 for each additional OSM instance running on the same system.

Note: You must increment the Xvfb server display and the DISPLAY environment variable by one for each additional OSM instance. For example, the second instance would have a value of 2 for the Xvfb server display and the DISPLAY environment variable.

Connection, File Store, and Thread Configuration Post Installation Tasks

The following sections include post installation tasks for configuring connections, file stores, and threads.

Customizing OSM Runtime Parameters

After installation, you may want to change OSM runtime parameters. For example, you can increase the number of rows in a worklist, or update the OSM administrator's e-mail address.

OSM runtime parameters are configured in the **oms-config.xml** file. You can access this file in the *Domain_Home* directory.

For details, see the chapter describing the **oms-config.xml** file in *OSM System Administrator's Guide*.

Preventing Connection Timeout Issues During Cartridge Deployment

When deploying large cartridges to an OSM system with many managed servers, you may receive cartridge deployment timeout errors. To resolve this error, increase the cartridge deployment timeout setting. The default cartridge deployment timeout

setting is 600 seconds (10 minutes), but you can increase this value to a maximum of 3600 seconds (60 minutes).

To modify the default cartridge deployment timeout setting, change the value for the **CartridgeDeploymentTransactionTimeout** parameter in the *domain_home/oms-config.xml* file on each machine in the cluster. For example:

```
<oms-parameter>
<oms-parameter-name>com.mslv.oms.cartridgemgmt.DeployCartridgeMDB.CartridgeDeploymentTransactionTimeout</oms-parameter-name>
<oms-parameter-value>3600</oms-parameter-value>
</oms-parameter>
```

For more information about changing this **oms-config.xml** parameter, see *OSM System Administrator's Guide*.

To override this default setting for a specific cartridge, you can specify this parameter as an OSM Cartridge Management Variables in Design Studio. You must use the full parameter name.

```
com.mslv.oms.cartridgemgmt.DeployCartridgeMDB.CartridgeDeploymentTransactionTimeout
```

For more information, see the Design Studio Help.

Note: If an order has stopped processing due to a timeout, the order must be aborted. It will not resume processing even after the timeout value has been increased.

Configuring OSM JDBC Connections

The OSM installer creates JDBC connections that enable WebLogic communication to the Oracle RAC database instances.

The **Statement Timeout** value specifies the amount of times before the database terminates sql statements that are taking too long to complete. This value is the WebLogic Server domain Java transaction API (JTA) timeout value plus 2 seconds giving the database sufficient time to react to a JTA timeout. The **oracle.jdbc.ReadTimeout** value stops the database from reading a socket after the Statement Timeout. These values should not be modified without making corresponding changes to each other. For more information about setting the JTA timeout value, see "[Preventing Connection Timeout when Using a Remote Database](#)".

The **Statement Cache Size** value determines the number of sql statements that can remain in the statement cache. In a production environment, you can start this value at 30 and increasing the value only if you cannot improve parse ratios by tuning the cursors. For a development environment, the default setting of 10 is sufficient.

To configure the OSM JDBC Connections, do the following:

1. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.
2. Click **Lock & Edit**.
3. In **Domain Structure**, select **Services**, then **Data Sources**.
The Summary of JDBC Data Sources screen is displayed.

4. Select an OSM JDBC data source. The OSM JDBC data source are as follows:

```
osm_pool_sid_group_y
```

where *sid* is the Oracle RAC database instance system identifier and *y* is the group letter.

The Configuration tab is displayed

5. Click the **Connection Pools** tab.
6. Click **Advanced**.
7. In the **Properties** field, add the following:

```
oracle.jdbc.ReadTimeout=value
```

where *value* is the **Statement Timeout** value converted to milliseconds plus 2000 milliseconds.

For example, if the Statement Timeout value is 602 seconds, then the oracle.jdbc.ReadTimeout should be 604000 milliseconds.

8. In the **Statement Cache Size** field, enter a value from 30 to 40 in a production environment.
9. Click **Save**.
10. Repeat steps 3 to 9 for all other OSM JDBC connections.
11. Click **Activate Changes**.

Creating and Configuring Persistent File Stores

A persistent file store provides storage for WebLogic Server subsystems and services that require persistence. For example, a file store can store JMS messages. The OSM installer uses the default file store for each managed server and associated OSM JMS servers in the cluster.

Oracle recommends that you create a persistent file store for each managed server in the cluster and for the associated JMS server pairs of each managed server. If the managed servers are configured for whole server migration, ensure that the persistent stores are located in a shared directory.

To create and configure a persistent file store:

1. Create or ensure that a directory exists for the persistent file stores. The directory must exist on your system, so make sure it is already created.

Note: Do not locate the JMS Persistent Store data file on a ZFS file system. Locating the persistent store on a ZFS file system can impact the JMS messaging subsystem's performance. By default, the JMS file store is located in the domain directory, so Oracle recommends that the domain directory be located on a UFS file system. If your business needs require that the WebLogic Server domain be located on a ZFS file system, you should modify the domain configuration to locate the file store on a UFS file system. See the WebLogic Server documentation for more information about this configuration.

Note: When a custom file store is targeted to a migratable target, the specified directory must be accessible from all candidate server members in the migratable target. For highest reliability, use a shared storage solution that is itself highly available, for example, a storage area network (SAN) or a dual-ported SCSI disk.

2. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.
3. Click **Lock & Edit**.
4. In the Domain Structure tree, expand **Services** and select **Persistent Stores**.
The Summary of Persistent Stores page is displayed.
5. Click **New** and then click **Create FileStore**.
The Create a New File Store page is displayed.

Note: After you create a file store you cannot rename it. You must delete it and create another one with a different name.

6. Enter the following:
 - **Name:** The name of the file store.
 - **Target:** The server instance or migratable target on which you want to deploy the file store.

Note: In a clustered environment, it is recommended that you target a custom file store to the same migratable target as the migratable JMS server, so that a member server is not a single point of failure.

- **Directory:** The path name to the directory on the file system where the file store is kept.
7. Click **OK**.
 8. On the Summary of Persistent Stores page, select the file store that you just created.
 9. Click the **Configuration** tab and update Advanced parameters, as required:
 - **Logical Name:** Optional name that can be used by subsystems that need a way to refer to different stores on different servers using the same name.
 - **Synchronous Write Policy:** Specifies how this file store writes data to disk.
 10. Click **Save**.
 11. In the left pane, expand **Services** and then **Messaging**, and then select **JMS Servers**.
The Summary of JMS Servers page is displayed.
 12. In an OSM cluster, the OSM installer creates the following JMS servers in pairs:

```
oms_jms_server_managed_server  
osmJmsNonMigratableServer_managed_server
```

where *managed_server* is the managed server that the JMS server is associated with.

Note: For a non-clustered managed server, the name of the JMS server is: **oms_jms_server**.

Select the one from the managed server pair that will use the custom file store.

13. On the settings page for the JMS server, click the **Configuration** tab, and then the **General** sub-tab.
14. In **Persistent Store**, select the custom file store that you want for the JMS server.
15. Click **Save**.

For more information about configuring general JMS server properties, see WebLogic Server Administration Console Help.

16. In the Change Center of the Administration Console, click **Activate Changes**.

Note: Not all changes take effect immediately. For some changes you need to restart WebLogic Server.

17. Repeat steps 11 to 16 for the other JMS server in the JMS server pair.
18. Repeat steps 3 to 16 for each managed server in the cluster.

Configuring and Monitoring Coherence Threads

After you install OSM, you must configure threads counts to ensure performance. You can tune these threads in the **osm-coherence-cache-config.xml** in the **oms.ear** file. Oracle recommends that you externalize the **osm-coherence-cache-config.xml** file for tuning procedures described in "[OSM Pre-Production Testing and Tuning](#)".

To set these values, do the following:

1. From the machine running the administration server, open a terminal.
2. Copy the *domain_home/servers/AdminServer/upload/oms/app/oms.ear* file to another folder (where *AdminServer* is the name of the administration server).
3. Extract the **security.jar** file using the following command.


```
jar xvf oms.ear security.jar
```
4. Extract the **osm-coherence-cache-config.xml** file using the following command.


```
jar xvf security.jar osm-coherence-cache-config.xml
```
5. Open the **osm-coherence-cache-config.xml** file and set the **osm-invocation** thread-count to a value as follows.

```
<invocation-scheme>
  <scheme-name>osm-invocation</scheme-name>
  <service-name>osm-invocation</service-name>
  <thread-count>thread_count</thread-count>
  <autostart>>false</autostart>
</invocation-scheme>
```

Where *thread_number* is determined based on the following calculation $7 + ((\text{the number of Managed Servers} - 1) * 3)$. For example, clusters with 2, 4, 6, or 16 managed servers would require 10, 16, 22 and 52 threads respectively.

6. Set the osm-distributed thread-count to a value as follows: between 10 and 15 (the default is 4).

For example:

```
<distributed-scheme>
  <scheme-name>osm-distributed</scheme-name>
  <service-name>DistributedCache</service-name>
  <thread-count>
system-property="tangosol.coherence.distributed.threads">thread_
number</thread-count>
  <backing-map-scheme>
    <local-scheme>
      <scheme-ref>osm-backing-map</scheme-ref>
    </local-scheme>
  </backing-map-scheme>
  <autostart>true</autostart>
</distributed-scheme>
```

Where *thread_number* is a value between 10 and 15.

7. Save **osm-coherence-cache-config.xml** and add it back to the **security.jar** file using the following command:

```
jar uvf security.jar osm-coherence-cache-config.xml
```

8. Log in to the WebLogic Server Administration Console.
9. In the **Domain Structure** tree click **Servers**.
The Summary of Servers screen is displayed.
10. Ensure that the managed servers in the OSM cluster are in the **Running** state.
11. In the **Domain Structure** tree click **Deployments**.
The Summary of Deployments screen is displayed.
12. Click **Lock & Edit**.
13. In the Name column, select the check box beside **oms**.
14. Click **Update**.
The Update Application Assistant screen appears.
15. In the **Source path** row, click **Change Path**.
16. In the **Path** field, enter the path to the modified **oms.ear** file.
17. From the Current Location area, select **oms.ear**.
18. Click **Next**.
19. Click **Next**.
20. Click **Finish**.
21. After the **oms.ear** file has been updated, click **Activate Changes**.
22. In the **Domain Structure** tree click **Servers**.
The Summary of Servers screen is displayed.
23. Restart all managed servers in the cluster.

Externalizing the Coherence Thread Configuration File

For better access and visibility to the `osm-distributed` and `osm-invocation` thread-count values, you can also put the `osm-coherence-cache-config.xml` in a location external to the `oms.ear` file where each WebLogic server can access it. In addition, doing this enables you to specify different `osm-coherence-cache-config.xml` files for each managed server with custom thread-count settings for each managed server if you require.

To externalize `osm-coherence-cache-config.xml`:

1. From the machine running the administration server, open a terminal.
2. Extract and modify the `osm-coherence-cache-config.xml` from the `oms.ear` file as described in the previous procedure, but do not add the file back to the `security.jar`.
3. Copy the file to `domain_home/osm-coherence-cache-config.xml`.
4. Extract the `security.jar` file from the `oms.ear` file using the following command.

```
jar xvf oms.ear security.jar
```

5. Extract the `META-INF/coherence-application.xml` folder and file using the following command.

```
jar xvf security.jar META-INF/coherence-application.xml
```

6. Open the `coherence-application.xml` file and replace the existing content with the following text:

```
<?xml version="1.0"?>
<coherence-application
xmlns="http://xmlns.oracle.com/coherence/coherence-application">
  <cache-configuration-ref
override-property="cache-config/OsmGar">META-INF/osm-coherence-cache-config.xml
</cache-configuration-ref>
</coherence-application>
```

7. Save `coherence-application.xml` and add it back to the `security.jar` file using the following command:

```
jar uvf security.jar META-INF/coherence-application.xml
```

8. Log in to the WebLogic Server Administration Console.
9. In the **Domain Structure** tree, expand **Environment**, then click **Servers**.
The Summary of Servers screen is displayed.
10. Ensure that the managed servers in the OSM cluster are in the **Running** state.
11. In the **Domain Structure** tree click **Deployments**.
The Summary of Deployments screen is displayed.
12. Click **Lock & Edit**.
13. In the Name column, select the check box beside **oms**.
14. Click **Update**.
The Update Application Assistant screen appears.
15. In the **Source path** row, click **Change Path**.
16. In the **Path** field, enter the path to the modified `oms.ear` file.

17. From the Current Location area, select **oms.ear**.
18. Click **Next**.
19. Click **Next**.
20. Click **Finish**.
21. In the **Domain Structure** tree expand **Environment**, then click **Coherence Clusters**.
The Summary of Coherence Clusters screen is displayed.
22. From the Name Column, select **osmCoherenceClusternnnn** (where *nnnn* is a random number that OSM installer generates when it creates the coherence cluster for OSM).
The Configuration tab is displayed.
23. Click the **Cache Configurations** sub tab.
24. Click **New**.
25. In the **Name** field, enter a name.
26. In the **JNDI Name** field, enter **OsmaGar**.
27. In the Cache Configuration File field, enter *domain_home/osm-coherence-cache-config.xml*.
For example:

```
/u01/app/oracle/config/domains/wls1213_domain/osm-coherence-cache-config.xml
```
28. Click **Next**.
29. In the Clusters table, select **Part of the cluster**, and the select all the managed servers in the cluster.
30. Click **Finish**.
31. click **Activate Changes**.
32. In the **Domain Structure** tree, expand **Environment**, then click **Servers**.
The Summary of Servers screen is displayed.
33. Restart all managed servers in the cluster.

Monitoring Coherence Threads

Setting coherence thread values too low can result in stuck threads. To monitor threads in the OSM WebLogic server console:

1. Log into the OSM WebLogic server.
The WebLogic Administration Console is displayed.
2. Click **Server**.
The **Summary of Servers** is displayed.
3. Select any OSM server.
4. Click the **Monitoring** tab.
5. Click the **Threads** sub-tab.

The Self-Tuning Thread Pool Threads table is displayed listing the names of the threads associated to the server. If you see stuck threads, increase the `osm-invocation` and `osm-distributed thread-count` values as described in this section. In some cases, you may have to increase the thread-count values beyond 15 to resolve stuck thread issues.

Copying Metric Rule Files

A set of XML files called ADML files contains the metric rules that allow the system to collect aggregated metric data about your system. OSM Order Metrics Manager allows the data that the system gathers to be displayed in any metric client. The OSM installation includes an interface called Oracle Dynamic Monitoring Service (DMS), which displays this metric data in a set of metrics tables.

In some configurations, the `Middleware_home` location for the administration server is separate from `Middleware_home` locations for OSM managed servers. In this case, you must remotely copy the `domain-oracle_comms_osm-11.0.xml` file from the ADML directory of an OSM managed server to the ADML directory of the administration server.

The metric rules files are automatically installed in the correct directory when you first start the OSM server. Metric rules files are installed in the ADML directory, as in the following example:

```
Middleware_home/oracle_common/modules/oracle.dms_12.1.3/adml
```

If this directory is not accessible to the OSM server, you need to copy the files using the procedure in this section.

Note: You might have to run the procedure in this section several times. If the administration server does not share the domain directory or the `Middleware_home` directory with a managed server, the system does not create the `oms_dms` directory and you must copy ADML files manually to the administration server's `Middleware_home` directory.

To copy metric rules files:

1. Start an OSM WebLogic managed server.
2. Go to the `domain_home/oms_dms` directory.
3. Do one of the following:
 - As a UNIX or Linux user with write permission to the ADML directory, run the following script:

```
copyAdmlFiles.sh
```
 - As a Windows user with write permission to the ADML directory, run the following script:

```
copyAdmlFiles.bat
```

This script copies the ADML files `domain-oracle_comms_osm-11.0.xml` and `server-oracle_comms_osm-11.0.xml` to the `Middleware_home/oracle_common/modules/oracle.dms_12.1.3/adml` directory.

For a graphical representation of the metrics data, you can use the Oracle Communications Application Management Pack interface for Oracle Enterprise Manager Cloud Control 12c. For more information about installing and configuring Application Management Pack, see *Oracle Application Management Pack for Oracle Communications System Administrator's Guide*. For more information about Enterprise Manager, see *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

Note: If you are using Internet Explorer 11 as the web browser to access Oracle Enterprise Manager Cloud Control 12.1.0.4, you must update Oracle Enterprise Manager Cloud Control 12.1.0.4 with the following patch:

Patch 20465665: MERGE REQUEST ON TOP OF 11.1.1.7.1 FOR BUGS 18680326 14739854 19933990

Download the patch from the My Oracle Support Web site at:

<https://support.oracle.com>

Instructions for applying the patch are provided in the patch Readme file.

For more information about accessing the DMS interface to view metrics tables, as well as using Application Management Pack to graphically view metrics data, see the topic about metrics data in *OSM System Administrator's Guide*.

Relocating ADML Files Without Restarting the Server

Whether the files are copied automatically by the OSM server or manually, DMS locates the new ADML files when you restart the WebLogic servers. You can also have DMS locate the ADML files immediately, without restarting the servers.

To have DMS locate new ADML files without restarting the servers:

1. Do one of the following:
 - If you are a UNIX or Linux user, run the following script:

```
Middleware_home/oracle_common/common/bin/wlst.sh
```

- If you are a Windows user, run the following script:

```
Middleware_home/oracle_common/common/bin/wlst.cmd
```

Note: You cannot use the `wlst.sh` or `wlst.cmd` scripts in the `WebLogic_home/common/bin` directory because these scripts do not have the Oracle JRF extensions enabled.

2. At the command prompts, run the following command:

```
connect('user', 'password', 't3://hostname:port')
```

where *user* is the user name of the WebLogic administrator, *password* is the password of the WebLogic administrator, *hostname* is the name of the administration server and *port* is the administration server port number. For more information about using WLST over a secure connection, see the security section of *OSM System Administrator's Guide*.

3. Load the metric rules files by running the following command:

```
reloadMetricRules()
```

The system loads the metric rules files in the ADML directory. This command shows the metric rules of all the managed servers and the administration server. If one of the OSM ADML files is missing from the reported files list for a server, ensure that the *Middleware_home* directory for that server has the ADML files correctly deployed.

4. Open the **setDomainEnv.sh** script from the *domain_home/bin* directory of the administration server.
5. Add the following string to the JAVA_OPTIONS property:

```
-Dweblogic.management.disableManagedServerNotifications=true
```

Registering Oracle HTTP Server Instance

To view metrics data using Application Management Pack, you must have Oracle HTTP Server configured and running in OSM. For more information, see *Setting up an Oracle HTTP Server for OSM Cluster Load Balancing* [Doc ID 1618630.1] knowledge article on the My Oracle Support Web site at:

<https://support.oracle.com>

You must also register the Oracle HTTP Server instance in OSM.

To register the Oracle HTTP Server instance:

1. Start an OSM WebLogic administration server.
2. Go to the **bin** directory of the Oracle HTTP Server instance, for example, *OHS_Instance_HOME/bin*.
3. Run the following command:

```
opmnctl registerinstance -adminHost hostname -adminPort port
```

where *hostname* is the name of the OSM WebLogic administration host machine and *port* is the port of the OSM WebLogic administration server.

The Oracle HTTP Server instance is registered in the OSM server.

Queue Configuration Post Installation Tasks

The following sections provide instructions for configuring OSM and solution queues after installing OSM.

Creating the Queue for the Account Manager

If you are going to use the Account Manager feature, you must use design Studio to create an additional SAF agent in WebLogic Server. For instructions on how to create the queue, see the information about creating an Accounts SAF agent in Oracle Communications Design Studio Modeling OSM Processes Help.

Configuring Distributed Queues for an OSM Solution

In addition to the distributed queues that OSM creates during installation, you may need to create and configure your own custom distributed queues to support your particular OSM solution.

Use the following high-level steps to create and configure a distributed queue and its members:

- Create the member queues, one per managed server pinned to each JMS server.
- Create the distributed queue with equally-weighted member queues and target the distributed queue to the cluster.
- Confirm that the distributed queue is accessible and visible to all managed servers in the cluster.

To create the member queues:

1. In the WebLogic Administration Console, expand **Services, Messaging**, and then select **JMS Modules**.
2. On the Summary of JMS Modules page, select **oms_jms_module**.

Note: You must use the predefined JMS system module to allow the connection factory to deliver messages to the correct managed server. Do not create a new JMS system module.

3. On the Configuration page, above the Summary of Resources table, click **New**.
4. On the Create a New JMS System Module Resource page, select **Queue** and click **Next**.
5. On the JMS Destination Properties page, enter the name and JNDI name of the member queue, and then click **Next**.
6. Select the subdeployment you want to assign to the queue.
The number of subdeployments should equal the number of JMS servers, and hence managed servers configured in the cluster.
7. Upon selection of a subdeployment, the queue is automatically assigned to the correct JMS server.
8. Click **Finish**. The newly created member queue is displayed in the resources list.
9. Repeat steps 2-8 to create a queue for each managed server in the cluster.

For information about using JMS queues, see *OSM System Administrator's Guide*.

To create the distributed queue:

1. On the Configuration page, above the Summary of Resources table, click **New**.
2. On the Create a New JMS System Module Resource page, select **Distributed Queue** and click **Next**.
3. On the JMS Distributed Destination Properties page, do the following:
 - a. Enter the name and JNDI name of the distributed queue.
 - b. Ensure the Load Balancing Policy is set to Round-Robin.
 - c. Deselect **Allocate Members Uniformly**.
4. Click **Next**.
5. From the Members Available list, select the newly created queues and move them to the Chosen list.
6. Click **Finish**. The distributed queue is displayed in the resources list.

To confirm that the distributed queue is visible to each server in the cluster:

1. Navigate to the Summary of Servers page and select a managed server.
2. On the Configuration page, click the **View JNDI Tree** link.
3. Verify that the distributed queue is visible to the managed server.
4. Repeat steps 1-3 for each managed server in the cluster.

OSM Integration with External Systems

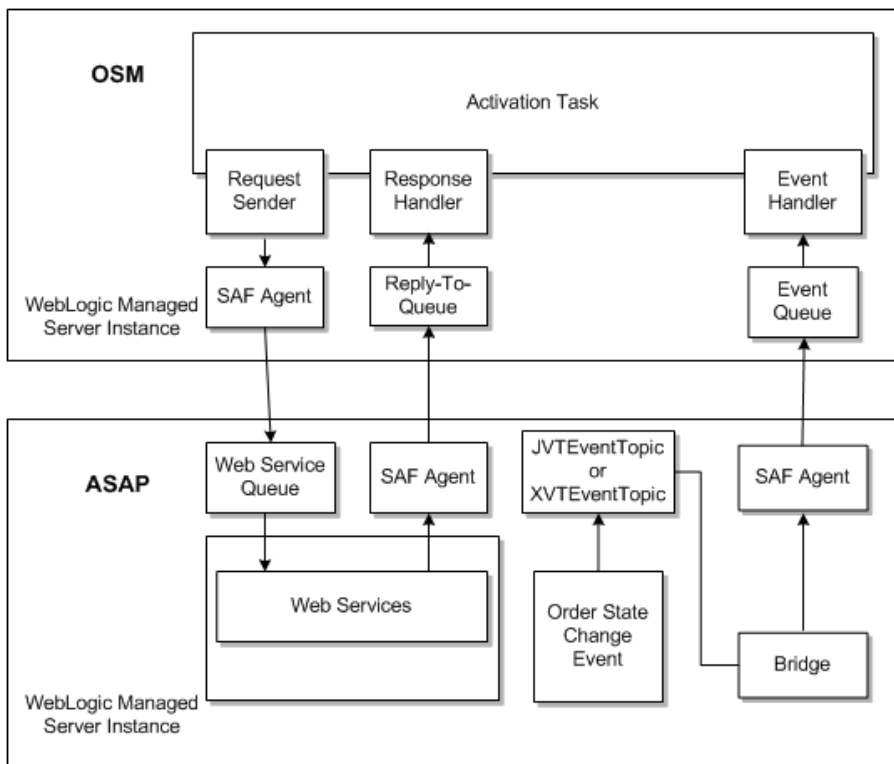
The following sections describe OSM integration tasks between OSM, Oracle Communications ASAP, and Oracle Communications Unified Inventory Management (UIM). These integration tasks are also applicable for OSM integration with other remote applications.

Integrating OSM and ASAP or IP Service Activator Using SAF Agent and JMS Bridging

To ensure reliable communication Oracle recommends that you create a Store-and-Forward (SAF) agent and JMS bridge between the Oracle Communications ASAP WebLogic server or Oracle Communications IP Service Activator WebLogic server and the OSM WebLogic server.

Figure 8–1 illustrates an example SAF and JMS bridge configuration between the Web Service interface on ASAP and a Web Service client on OSM. An example SAF and JMS bridge configuration between the Web Service interface on IP Service Activator and a Web Service client on OSM would appear the same.

Figure 8–1 SAF Agent and JMS Bridge Configuration Between OSM and ASAP



In this example, an OSM SAF agent sends requests to the ASAP request queue, and ASAP returns responses through the ASAP SAF agent to the OSM reply-to queue. In

addition, ASAP sends work order state changes from the JSRP XVTEventTopic through a JMS bridge with a SAF agent to the OSM event queue.

For detailed instructions for creating SAF and JMS bridges between ASAP and OSM, see *Configuring WebLogic Resources for OSM Integration With ASAP And UIM On Different Domains (Doc ID 1431235.1)* knowledge article on the My Oracle Support Web site at:

<https://support.oracle.com>

This article is also applicable to IP Service Activator or to any other remote application that uses a WebLogic JMS server to send and receive Web Service or JMS messages.

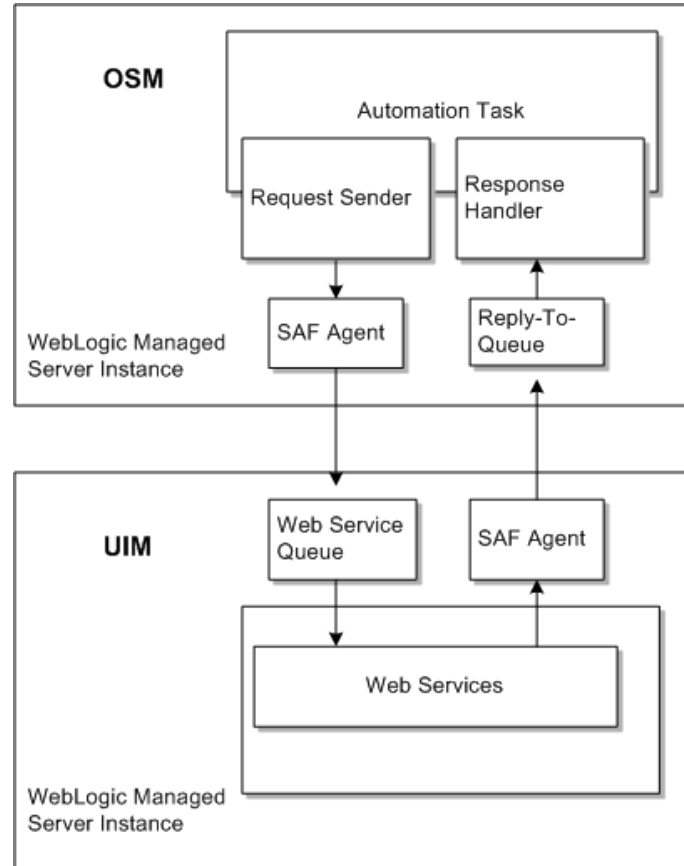
Note: When using the above instructions with any remote application other than ASAP, remember to change any reference to ASAP to the remote application for which you are creating bridges. For example, change ASAP to IPSA.

Integrating OSM and UIM Using SAF Agent

Oracle recommends that you create a SAF agent between the UIM WebLogic server and the OSM WebLogic server. Oracle recommends this SAF agent for the Web Service interfaces to ensure reliable communication.

Figure 8–2 illustrates an example SAF configuration between the Web Service interface on UIM and a Web Service client on OSM.

Figure 8–2 SAF Agent Configuration Between OSM and UIM



In this example, an OSM SAF agent sends requests to the UIM request queue, and UIM returns responses through the UIM SAF agent to the OSM reply-to queue.

For detailed instructions for creating SAF agents between UIM and OSM, see *Configuring WebLogic Resources for OSM Integration With ASAP And UIM On Different Domains (Doc ID 1431235.1)* knowledge article on the My Oracle Support Web site at:

<https://support.oracle.com>

This article is applicable to any remote application that uses a WebLogic JMS server to send and receive Web Service messages.

Deploying Custom Plug-Ins When Running on Managed Server

If OSM is running on a WebLogic managed server, the `behaviorBuild.properties` file must be configured to specify the URL of the administration server (for example, `http://hostname:port`).

From the system prompt, execute the command `ant deploy`.

In the WebLogic Administration Console, perform the following steps:

1. Undeploy the custom plug-in from the administration server.
2. Deploy the custom plug-in to the managed server.
3. Target the custom plug-in to the managed server.

Changing the WebLogic Server of Oracle RAC Database Size

The following sections describe how to change the number of managed servers in a cluster or the Oracle RAC database size.

Connecting Oracle RAC with JDBC Multi Data Source

During installation, the OSM installer prompts for the database parameters of the Oracle RAC instances and automatically creates the appropriate configuration in a JDBC multi data source. If you decide to manually configure your JDBC data source, you must understand the following discussion.

At the application layer, OSM maintains WebLogic Server order affinity. That is, all processing of an order is performed exclusively by one WebLogic Server instance, to minimize serialization. The OSM application cannot ensure all database operations for a particular order maintained by a WebLogic Server instance are directed to the same Oracle RAC instance. Thus, the approach to preserve Database Server order affinity is to have each WebLogic Server instance connect to only one Oracle RAC instance at any instant.

OSM uses a multi data source consisting of two data sources, each of which connects to an Oracle RAC database instance. Using the failover algorithm, the first data source is the primary data source and the other data source is the secondary data source. Under normal operation, only the primary data source is connected and used. When the primary data source fails, the multi data source chooses the next available data source as the primary data source.

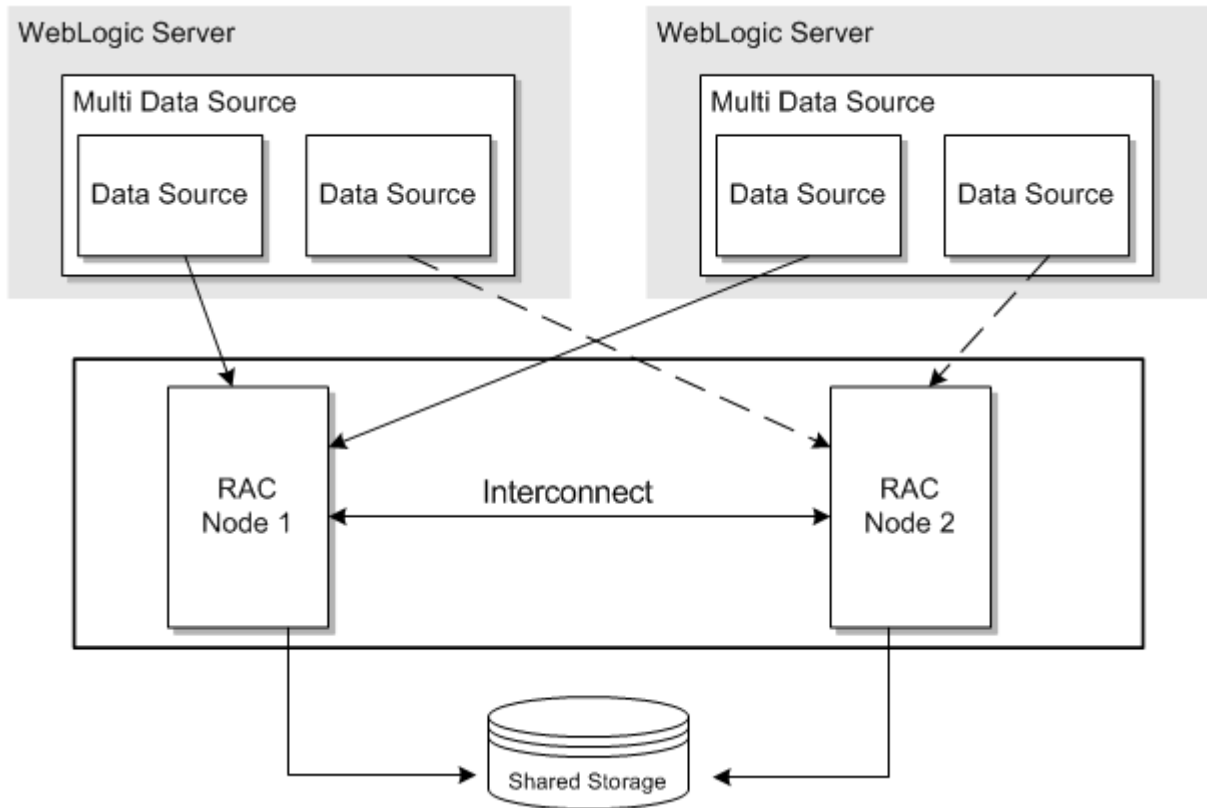
The failover algorithm is used in both active-passive and active-active topologies. However, the configuration of the data source members within the multi data source is different:

- In active-passive Oracle RAC, all instances in the WebLogic Server cluster are configured to the PREFERRED Oracle RAC database instance as the primary data

source, and to the AVAILABLE Oracle RAC database instance as the secondary. Upon database failure, all WebLogic Server instances transition from the PREFERRED Oracle RAC database instance to the AVAILABLE Oracle RAC database instance.

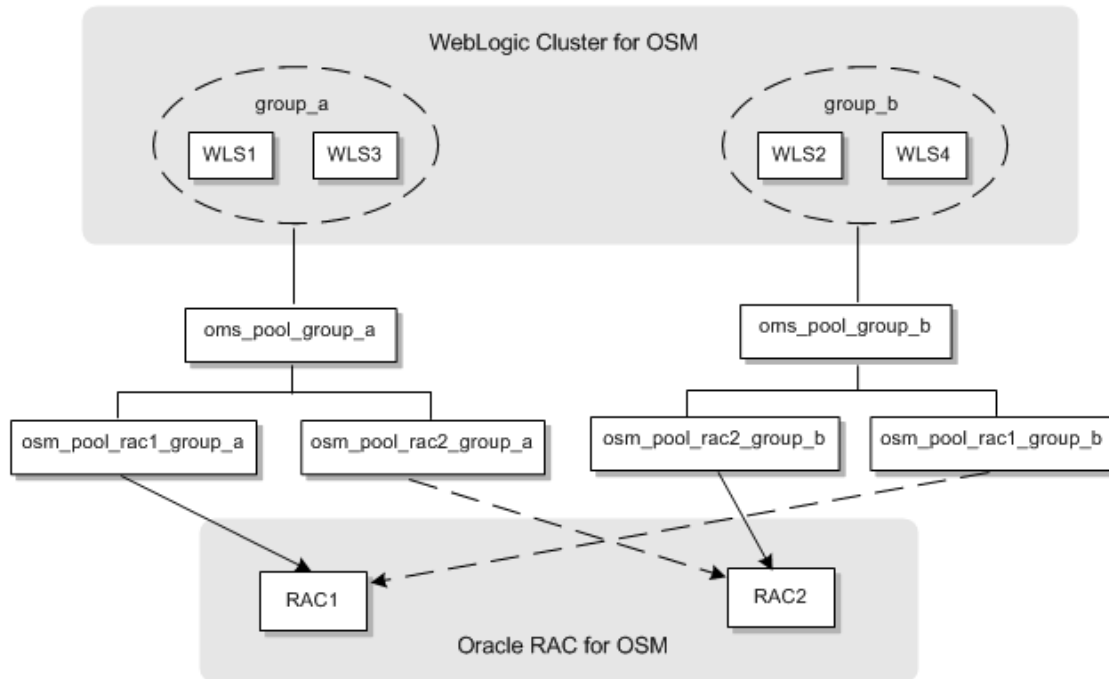
Figure 8–3 illustrates this configuration.

Figure 8–3 Data Source Configuration for Oracle RAC Active-Passive



- In active-active Oracle RAC, WebLogic Server instances are partitioned. Half of the WebLogic Server instances are configured to one Oracle RAC database instance as the first data source and to the other Oracle RAC database instance as the second data source. The other half in the WebLogic Server cluster are configured with the sequence of the Oracle RAC database instances swapped. As a result, if one of the Oracle RAC database instances fails, half the WebLogic Server instances failover to the remaining Oracle RAC database instance, which is already handling the database operations of half of the WebLogic Server cluster.

Figure 8–4 illustrates this configuration.

Figure 8–4 Data Source Configuration for Oracle RAC Active-Active

In the active-active Oracle RAC configuration, the use of the failover algorithm (as opposed to a load-balancing algorithm) may appear counter-intuitive. However, keep in mind that load balancing in an active-active Oracle RAC configuration is not managed at the multi data source layer, but rather by partitioning the instances in the WebLogic Server cluster. There is no dynamic load balancing between WebLogic instances and database instances.

The relationship of a WebLogic instance and database instance in an active-active Oracle RAC configuration is many-to-one. That is, more than one WebLogic instance may choose the same database instance as its primary database instance, but a WebLogic instance cannot choose more than one database instance as its primary database instance. When you add a new database instance, you can either reassign an existing WebLogic instance to it, or create a new WebLogic instance.

WebLogic Server instances must be partitioned appropriately to load-balance with active-active Oracle RAC. The recommended approach is to have an even number of physical application servers with the same hardware dimensioning and weight. You should monitor the performance of your WebLogic and database instances to ensure they are not overloaded or under utilized. You can add more WebLogic instances to a database instance that is not fully utilized, or reassign a WebLogic instance to another database instance that is overloaded.

When a WebLogic Server cluster resizes, the ownership of an order is reassigned. The cache transfer of records from one database instance to another has a temporary impact on performance.

Adding Oracle RAC Instances

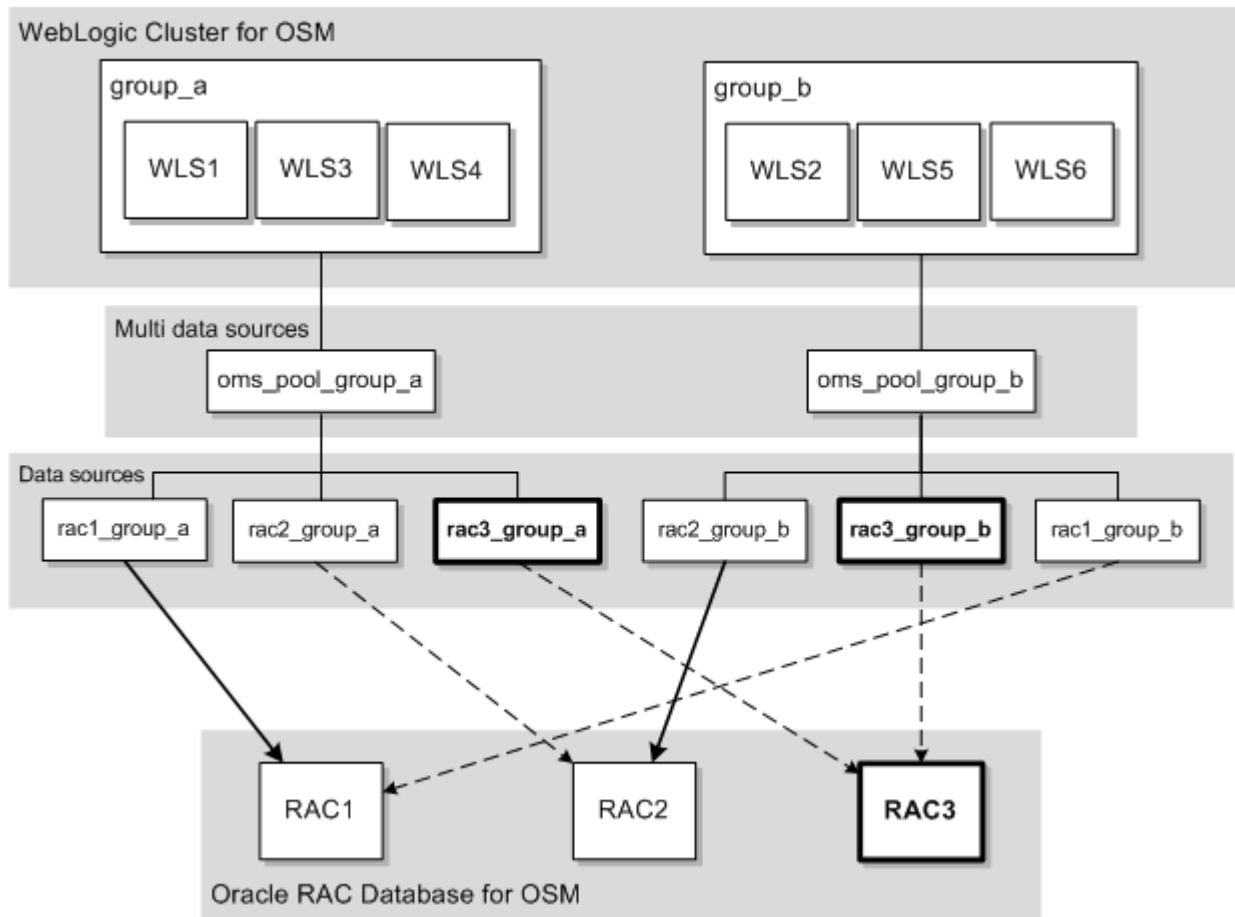
You can add a Oracle RAC instance to your environment in the following roles:

- As an additional passive backup instance in an active-passive environment.

- As a passive backup instance in an active-active environment. The new instance connects to the existing WebLogic partitions through new secondary data sources connected to the existing multi data sources.

Figure 8–5 shows an example of adding a third Oracle RAC instance as a backup in an active-active environment. The figure shows the new Oracle RAC instance and data sources in bold. Note that no WebLogic partition uses RAC3 as a primary instance.

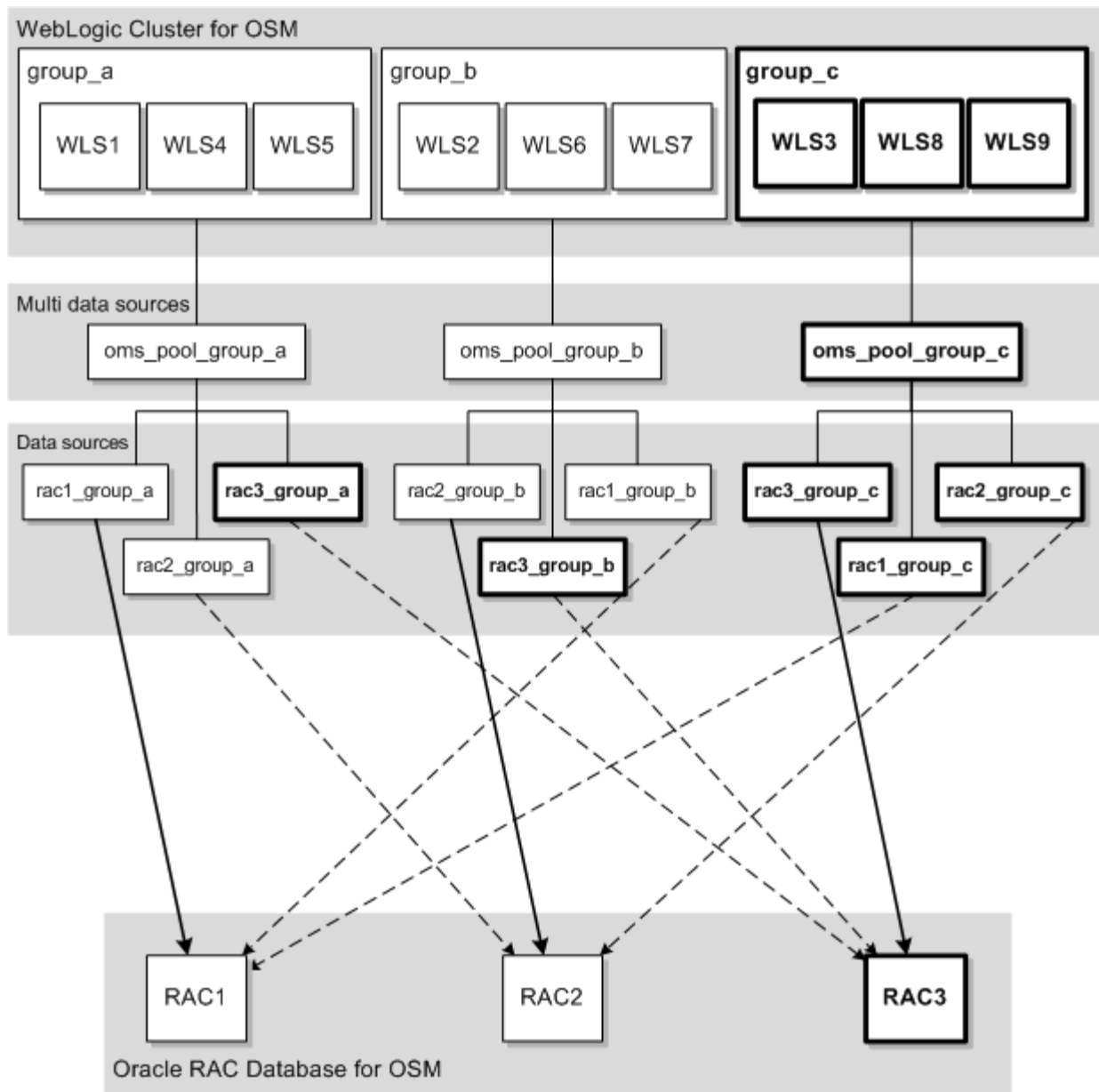
Figure 8–5 Data Sources for a Third Backup Oracle RAC Instance in an Active-Active Environment



- As an active instance in an active-active environment. Choose this option for higher availability. The new instance connects to:
 - A new WebLogic group through a new primary data source configured in a new multi data source.
 - The existing WebLogic groups through new secondary data sources configured in existing multi data sources.

Figure 8–6 shows an example of adding a third Oracle RAC instance as an active member of an active-active environment. The figure shows the new elements in bold. Note that each Oracle RAC instance serves as a primary instance for a new WebLogic group.

Figure 8–6 Data Sources for a Third Active Oracle RAC Instance in an Active-Active Environment



See the following for more information:

- For grouping and adding new managed servers, see the WebLogic Server documentation and ["Adding a New Managed Server to a Clustered Environment"](#).
- For adding a new Oracle RAC instance and partitioning the OSM database schema, see the Oracle Database documentation and *OSM System Administrator's Guide*.
- For adding new data sources and multi data sources, see ["Manually Configuring Additional Data Sources for an Oracle RAC Instance"](#).

Manually Configuring Additional Data Sources for an Oracle RAC Instance

OSM supports high availability in the database layer through configuration of Oracle Real Application Clusters (Oracle RAC) for either:

- Failover, also known as warm standby or active-passive Oracle RAC.
- Load balancing, or active-active Oracle RAC.

Each WebLogic Server instance in the OSM cluster interacts with Oracle RAC through a WebLogic multi data source configured for failover with multiple data sources, one for each Oracle RAC instance. This setup is used for both active-passive and active-active configurations. In an active-active configuration, load balancing is achieved by evenly distributing the clustered server nodes into groups in an alternating fashion.

During installation, the OSM installer automatically creates the appropriate data source configuration for the first Oracle RAC instance. You can let it automatically configure data sources for additional RAC instances, or you can choose to manually configure additional data sources after installation.

If you choose to manually configure additional data sources after installation, the Installer automatically creates the following:

- Two data sources: **osm_pool_rac1_group_a** and **osm_pool_rac1_group_b**.
- Two multi data sources: **oms_pool_group_a** and **oms_pool_group_b**

You must configure additional data sources as described in ["Manually Creating and Configuring Data Sources"](#). The number of additional data sources you configure depends on the number of Oracle RAC instances and your environment's configuration type.

For a second Oracle RAC instance:

- In an active-passive configuration, create one new data source.
- In an active-active configuration, create two new data sources.

For additional Oracle RAC instances beyond the second:

- In an active-passive configuration, the new Oracle RAC instance is an additional backup instance. Create one new data source to connect the existing multi data sources to the new Oracle RAC instance.
- In an active-active configuration, the new Oracle RAC instance can be one of the following:
 - A passive backup instance. Create new data sources connecting each existing multi data source to the new Oracle RAC instance. See [Figure 8–6, "Data Sources for a Third Active Oracle RAC Instance in an Active-Active Environment"](#) for a detailed example.
 - An active instance. Create a new multi data source and $2n-1$ new data sources, where n is the total number of Oracle RAC instances. Of the new data sources, n connect the new multi data source to the Oracle RAC instances, and $n-1$ connect the existing multi data sources to the new Oracle RAC instance.

For example, if you are adding a third Oracle RAC instance, you would create five new data sources: three to connect the new multi data source to each Oracle RAC instance, and two to connect the existing multi data sources to the new Oracle RAC instance.

See [Figure 8–6, "Data Sources for a Third Active Oracle RAC Instance in an Active-Active Environment"](#) for a detailed example.

Manually Creating and Configuring Data Sources

To create and configure additional data sources for an Oracle RAC instance:

1. Log in to the WebLogic Administration Server Console.
2. In the Domain Structure tree, expand **Services, JDBC**, then select **Data Sources**.
3. On the Summary of JDBC Data Sources page, click **New**.
4. On the JDBC Data Sources Properties page, do the following:
 - Enter a name for the JDBC data source.
 - If you have an active-passive configuration, name the data source **osm_pool_n** where *n* is the number of the new Oracle RAC instance.
For example, if you are adding a third Oracle RAC instance, name the new data source **osm_pool_3**.
 - If you have an active-active configuration, name the data source **osm_pool_racn_group_x**, where *n* and *x* represent the Oracle RAC instance and WebLogic group that the data source connects.
For example, if you are adding a third Oracle RAC instance, one of the new data sources will be called **osm_pool_rac3_group_c**. It connects to the third Oracle RAC instance and the WebLogic group called **group_c**.
 - Enter a unique JNDI name for the data source in either configuration. For example, **oracle/communications/osm/internal/jdbc/pool_3**.
 - Select **Oracle** as the database type.
 - Click **Next**.
5. Select one of the following non-XA thin drivers and click **Next**:
 - If your Oracle RAC database is configured with a remote listener (the default), select ***Oracle's Driver (Thin) for RAC Service-Instance connections; Versions: 10 and later**.
 - If your Oracle RAC database is configured with local listeners, select ***Oracle's Driver (Thin) for Instance connections; Versions: 9.0.1 and later**.
6. On the Transaction Options page, do the following:
 - a. Ensure the default option **Supports Global Transactions** is selected.
 - b. Select the **Logging Last Resource** option.
 - c. Click **Next**.
7. On the Connection Properties page, specify the service name, database name, host, and port of the additional Oracle RAC instance based on one of the following scenarios:
 - If your Oracle RAC database is configured with a **remote listener** and server-side load balancing (the default):
 - a. Specify the same the host, port, and service name as those specified for the existing data sources.
 - b. Specify the unique instance name of the new Oracle RAC instance. The instance name is required in order to override server-side load balancing. See "[Listener Considerations for Oracle RAC](#)" for a full discussion of listener functionality.

For example, if an existing data source URL is:

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP) (HOST=host1.oracle.com) (PORT=1521))) (CONNECT_
```

```
DATA=(SERVICE_NAME=orcl)(INSTANCE_NAME=orcl1))
```

The new data source URL will specify the same host, port, and service name, and a unique instance name, as follows:

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=host1.oracle.com)(PORT=1521)))(CONNECT_
DATA=(SERVICE_NAME=orcl)(INSTANCE_NAME=orcl2))
```

- If your Oracle RAC database is configured with **local listeners** only:
 - a. Specify either a different host or port than the host or the port of the existing data sources.
 - b. Specify either the same service name or a unique instance name, depending on which the existing data sources specify. If the existing data sources specify both, the new data source must as well.

For example, if the existing data source URL is:

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=host1.oracle.com)(PORT=1521)))(CONNECT_
DATA=(INSTANCE_NAME=orcl1))
```

The new data source URL will specify a different host, and only specify the instance name, as follows:

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=host2.oracle.com)(PORT=1521)))(CONNECT_
DATA=(INSTANCE_NAME=orcl2))
```

- Enter the OSM database schema user name and password, and then confirm the password.
 - Click **Next**.
8. On the Test Database Connection page, do one of the following:
- Review the connection parameters and click **Test Configuration**.
WebLogic attempts to create a connection from the administration server to the database. Results are displayed at the top of the page. If the test is unsuccessful, you should correct any configuration errors and retry the test.
Click **Next**.
 - If the JDBC driver you selected is not installed on the administration server, click **Next** to skip this step.
9. On the Select Targets page, do one of the following:
- If you have an active-passive configuration, target the new data source to the entire cluster.
 - If you have an active-active configuration, target the data source to one group in the cluster.
- For example, in [Figure 8–6, "Data Sources for a Third Active Oracle RAC Instance in an Active-Active Environment"](#), the new data sources ending in **group_a** are targeted to the **group_a** servers, the new data sources ending in **group_b** are targeted to the **group_b** servers, and the new data sources ending in **group_c** are targeted to the **group_c** servers.
10. Click **Finish**.

Your configuration is saved and the data source is deployed to the cluster.

11. Configure the connection properties for the new data source. See "[Configuring Connection Pool Properties](#)".
12. Repeat the previous steps for each required new data source.
13. Add the new data sources to multi data sources. See "[Adding Data Sources to Multi Data Sources](#)".

Configuring Connection Pool Properties

In addition to the properties you defined in the previous section, you must configure the data source's connection pool properties.

To configure the connection pool properties, do the following:

1. Select the data source and navigate to the Connection Pool tab.
2. In the **Properties** list, enter `oracle.net.CONNECT_TIMEOUT=10000`.
3. In the **Initial Capacity** field, enter `0`.
4. Click **Advanced** options.
5. Select the **Test Connections on Reserve** check box.
6. In the **Test Frequency** field, enter `300`.
7. In the **Test Table Name** field, enter `SQL SELECT 1 FROM DUAL`.
8. In the **Seconds to Trust an Idle Pool Connection**, enter `10`.
9. In the **Shrink Frequency** field, enter `900`.
10. Save your changes.

Adding Data Sources to Multi Data Sources

You can make all data source and multi data source changes in a single edit session. You do not have to activate your changes between steps.

For any number of new Oracle RAC instances, add the new data sources to the existing multi data sources as described in "[Adding Data Sources to an Existing Multi Data Source](#)". For Oracle RAC instances beyond the second instance, you must also create a new multi data source, and add some of the new data sources to it, as described in "[Creating a New Multi Data Source](#)".

Note: Oracle recommends that you shut down all managed servers before changing the order of the data sources as described in the procedure below because the order affects the name of the Oracle Coherence cluster when OSM starts.

Adding Data Sources to an Existing Multi Data Source

To add new data sources to an existing multi data source:

1. In the Domain Structure tree, expand **Services**, then select **Data Sources**.
2. On the Summary of Data Sources page, click a multi data source name.
3. Click the **Configuration Data Sources** tab, and do one of the following:
 - For an active-passive configuration, move the data source that you want to include in the multi data source to the **Chosen** list.

- For an active-active configuration, add the data sources to the multi data sources in an rotating order so that no data source appears in the same rank twice.

For example, if you have three multi data sources, the data sources must appear in the order shown in [Table 8–1](#).

Table 8–1 Example Data Source Order

Multi Data Source	Data Source List
oms_pool_group_a	<ul style="list-style-type: none"> ■ osm_pool_rac1_group_a ■ osm_pool_rac3_group_a ■ osm_pool_rac2_group_a
oms_pool_group_b	<ul style="list-style-type: none"> ■ osm_pool_rac2_group_b ■ osm_pool_rac1_group_b ■ osm_pool_rac3_group_b
oms_pool_group_c	<ul style="list-style-type: none"> ■ osm_pool_rac3_group_c ■ osm_pool_rac2_group_c ■ osm_pool_rac1_group_c

See "[Adding Oracle RAC Instances](#)" for an illustration of how these data sources and multi data sources connect to Oracle RAC instances and WebLogic partitions.

4. Save your changes.
5. Repeat the previous steps for each multi data source.

Creating a New Multi Data Source

To create a new multi data source and add the new data sources to it:

1. In the Domain Structure tree, expand **Services**, then select **Data Sources**.
2. On the Summary of Data Sources page, click **New** and select **Multi Data Source**.
3. On the Configure the Multi Data Source page, enter the following information:
 - **Name:** Enter **oms_pool_group_x** where *x* is the next letter in a sequence.
For example, if your existing multi data sources are **oms_pool_group_a** and **oms_pool_group_b**, name the new multi data source **oms_pool_group_c**.
 - **JNDI Name:** Enter the JNDI path to where this JDBC data source will be bound.
 - **Algorithm Type:** Select **Failover**.
4. On the Select Targets page, do one of the following:
 - If you have an active-passive configuration, target the new multi data source to the entire WebLogic cluster.
 - If you have an active-active configuration, target the multi data source to the same group in the WebLogic cluster that you targeted most of your new data sources to (typically a newly-added WebLogic server group).

For example, in [Figure 8–6, "Data Sources for a Third Active Oracle RAC Instance in an Active-Active Environment"](#), the new multi data source **oms_**

`pool_group_c` is targeted to the same WebLogic server group as the new data sources `rac3_group_c`, `rac1_group_c`, and `rac2_group_c`.

5. On the Select Data Source Type page, select the **Non-XA Driver** option.
6. On the Add Data Sources page, add the data sources in an order that alternates with that of the existing multi data sources. See [Table 8-1](#) for an example with three multi data sources.
7. Click **Finish**.

Adding a New Managed Server to a Clustered Environment

To add a new managed server to a clustered environment:

1. Ensure that the managed servers and the cluster are created. Ensure that the managed servers have been assigned to the cluster, and that OSM is installed on the cluster.
2. Create a new managed server and do the following:
 - a. If a proxy is used in the cluster configuration, add the new managed server's IP address and port number to the proxy server's configuration. For example, if you use a WebLogic HTTP proxy, update the **WebLogicCluster** parameter in the `domain_home/apps/OracleProxy4_proxyserver_proxy/WEB-INF/web.xml` file (where `proxyserver` is the proxy server name) and redeploy the proxy for the change to take effect.
 - b. If the cluster address of the cluster is set, update it with the new managed server's IP address and port number.
3. If you are adding a new managed server to an Oracle Real Application Cluster (Oracle RAC) active-active deployment, consider the following:

Load balancing is achieved by dividing WebLogic managed servers into groups that interact through a multi data source with the same primary and failover Oracle RAC instances, but in reverse order. You must decide to which group the new managed server should belong based on which Oracle RAC instance you want to be the primary one for that server (the others will be used for failover). You then add the managed server to the targets of the multi data source and the regular data sources that correspond to that group; for example, `osm_pool_group_a`, `osm_pool_rac1_group_a`, and `osm_pool_rac2_group_a`. For load balancing purposes, it is recommended that you distribute managed servers evenly between the groups (see [Figure 8-4, "Data Source Configuration for Oracle RAC Active-Active"](#)).
4. Based on the persistent store you selected when you first installed OSM (for more information, see ["Performing an Interactive Installation of OSM"](#)), do one of the following:
 - a. If you use the default persistent store (not recommended), skip this step.
 - b. If you use custom file stores, create a new file store for the new server. For more information, see ["Creating and Configuring Persistent File Stores"](#).
 - c. If you use JDBC stores, create a new JDBC store and associate it with the data source targeted to the new server. If you do not use Oracle RAC, this is the **CP-oms_pool** data source. If you use Oracle RAC, choose the multi data source targeted to the new server.

Note: *MS2* in the following steps indicates the name of the managed server.

5. Create a JMS server with the following settings:

- Name = `oms_jms_server_MS2`

Note: The name of the JMS server must always be set to `oms_jms_server_ManagedServerName` where *ManagedServerName* is the exact name of the managed server.

- Target = *MS2*
- PersistentStore = `oms_jms_store_MS2`
(required for custom file stores but not for the default persistent store or the JDBC store)

6. Start the new managed server.

7. Open the `domain_home/config/config.xml` file.

8. In the section for the new server, before `</server>`, add the following:

```
<web-service>
<messaging-queue-mdb-run-as-principal-name>oms-internal</messaging-queue-mdb-run-as-principal-name>
</web-service>
```

9. Save and close the file.

10. Create a subdeployment under the JMS module `oms_jms_module` with the following settings:

- Name = `oms_jms_server_MS2`
- Target = `oms_jms_server_MS2`

11. Create a JMS template queues under the JMS module `oms_jms_module`

- Name = `osmJmsNonMigratableTemplate_managed_server`
- Destination Key = `OsmDescendingPriorityDestinationKey`
- Quota = `oms_ws_cluster_correlates.Quota`
- JNDIName = `oracle/communications/ordermanagement/WebServiceClusterCorrelateQueue_MS2`

12. Create the following queues under the JMS module `oms_jms_module`:

- Queue
 - Name = `oms_behavior_queue_MS2`
 - SubDeploymentName = `oms_jms_server_MS2`
 - Quota = `oms_behavior_queue.Quota`
 - JNDIName = `mslv/oms/oms1/internal/jms/behaviors_MS2`
- Queue

- Name = oms_events_MS2
- SubDeploymentName = oms_jms_server_MS2
- Quota = oms_events.Quota
- JNDIName = mslv/oms/oms1/internal/jms/events_MS2
- Queue
 - Name = OrchestrationDependenciesQueue_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = OrchestrationDependenciesQueue.Quota
 - JNDIName = oracle/communications/ordermanagement/OrchestrationDependenciesQueue_MS2

- Queue

Note: If you are using JSM service migration, you must configure the oms_cartridge_deploy_MS2 queue as described in "[Configuring a New Managed Server that uses JMS Service Migration](#)".

For all those not using JSM service migration, use the queue configuration described here.

- Name = oms_cartridge_deploy_MS2
- SubDeploymentName = oms_jms_server_MS2
- Quota = oms_cartridge_deploy.Quota
- Local JNDIName = mslv/provisioning/internal/ejb/deployCartridgeQueue

Note: For this queue, you must provide a local JNDI name rather than a global JNDI name.

If you use the WebLogic Server Administration Console to create the queue, do not enter a value in the **JNDI Name** field while creating the queue. Instead, after you have created the queue, enter the local JNDI name in the **Local JNDI Name** field under the **Advanced** section on the **Settings for oms_cartridge_deploy_MS2** screen.

- Queue
 - Name = oms_order_updates_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_order_updates.Quota
 - JNDIName = mslv/provisioning/internal/ejb/orderupdates_MS2
- Queue
 - Name = oms_ws_requests_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_ws_requests.Quota

- JNDIName = oracle/communications/ordermanagement/WebServiceQueue_MS2
 - Queue
 - Name = oms_ws_cluster_requests_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_ws_cluster_requests.Quota
 - JNDIName = oracle/communications/ordermanagement/WebServiceClusterRequestQueue_MS2
 - Queue
 - Name = oms_ws_cluster_responses_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_ws_cluster_responses.Quota
 - JNDIName = oracle/communications/ordermanagement/WebServiceClusterResponseQueue_MS2
 - Queue
 - Name = oms_ws_cluster_correlates_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_ws_cluster_correlates.Quota
 - JNDIName = oracle/communications/ordermanagement/WebServiceClusterCorrelateQueue_MS2
13. Set the JMSPriority destination key for the **oms_ws_requests_MS2** queue as follows:
- a. In the WebLogic Server Administration Console, in the Domain Structure tree, expand Services, then expand Messaging, and select **JMS Modules**.
 - b. From the JMS Modules table, select **oms_jms_module**.
 - c. From the Summary of Resources table, select **oms_ws_requests_MS2**.
 - d. In the Destination Keys section, move DestinationKey-JMSPriority to the Chosen list.
 - e. Save the destination key settings.
14. Create the following topics under the JMS module **oms_jms_module**:
- Topic
 - Name = oms_order_events_MS2
 - SubDeploymentName = oms_jms_server_MS2
 - Quota = oms_order_events.Quota
 - JNDIName = mslv/provisioning/external/orderevents_MS2
 - Topic
 - Name = oms_signal_topic_MS2

- SubDeploymentName = oms_jms_server_MS2
- Quota = oms_signal_topic.Quota
- JNDIName = mslv/oms/oms1/internal/jms/InternalSignalTopic_MS2

15. Add the following member queues and topics to the following distributed queues:

- Add member queue oms_behavior_queue_MS2 to distributed queue oms_distributed_behavior_queue
- Add member queue oms_events_MS2 to distributed queue oms_distributed_events_queue
- Add member queue OrchestrationDependenciesQueue_MS2 to distributed queue oms_distributed_orchestration_dependencies_queue
- Add member queue oms_order_events_MS2 to distributed topic oms_distributed_order_events_queue
- Add member queue oms_order_updates_MS2 to distributed queue oms_distributed_order_updates_queue
- Add member queue oms_ws_requests_MS2 to distributed queue oms_distributed_ws_requests_queue
- Add member queue oms_ws_cluster_requests_MS2 to distributed queue oms_distributed_cluster_ws_requests_proxy_queue
- Add member queue oms_ws_cluster_responses_MS2 to distributed queue oms_distributed_cluster_ws_response_proxy_queue
- Add member queue oms_ws_cluster_correlates_MS2 to distributed queue oms_distributed_cluster_ws_correlates_queue
- Add member topic oms_signal_topic_MS2 to distributed topic oms_distributed_signal_topic

16. If an Order-to-Activate cartridge is already deployed, run **ant task config_All**.

17. Add the new managed server well-known address IP address and port number to the Coherence configuration file.

Configuring a New Managed Server that uses JMS Service Migration

When adding a new managed server, if you are using JMS service migration, you must perform the following procedure when creating the oms_cartridge_deploy_managed_server queue (where *managed_server* is the name of the managed server for which the queue belongs):

1. Create a JMS server with the following settings:
 - Name = osmJmsNonMigratableServer_managed_server
 - Target = MS2
2. Create a subdeployment with the following settings under the JMS module **oms_jms_module**:
 - Name = osmJmsNonMigratableServer_managed_server
 - Target = The JMS server you created in step 1
3. Create a JMS template queues under the JMS module **oms_jms_module**.
 - Name = osmJmsNonMigratableTemplate_managed_server
 - Destination Key = OsmDescendingPriorityDestinationKey

4. Create a queue with the following settings under the JMS module **oms_jms_module**:
 - Name = oms_cartridge_deploy_MS2
 - Template = The template you created in step 3
 - SubDeploymentName = The JMS server you created in step 2
 - Local JNDIName = mslv/provisioning/internal/ejb/deployCartridgeQueue

Note: For this queue, you must provide a local JNDI name rather than a global JNDI name.

If you use the WebLogic Server Administration Console to create the queue, do not enter a value in the **JNDI Name** field while creating the queue. Instead, after you have created the queue, enter the local JNDI name in the **Local JNDI Name** field under the **Advanced** section on the **Settings for oms_cartridge_deploy_MS2** screen.

Removing a Managed Server from a Clustered Environment

When you remove a managed server from a clustered environment, you must first delete the related queues, then remove the managed server using the WebLogic Administration Console. See ["Preparing to Remove a Managed Server from a Clustered Environment"](#) and ["Removing a Managed Server from a WebLogic Cluster"](#) for more information.

Preparing to Remove a Managed Server from a Clustered Environment

Before you can remove an OSM WebLogic server from a cluster, you must remove membership of the following queues from the distributed queues listed in [Table 8–2](#), and then delete the queues:

- oms_behavior_queue_ManagedServer
- oms_events_ManagedServer
- oms_order_updates_ManagedServer
- oms_ws_cluster_correlates_ManagedServer
- oms_ws_cluster_requests_ManagedServer
- oms_ws_cluster_responses_ManagedServer
- oms_ws_requests_ManagedServer
- OrchestrationDependenciesQueue_ManagedServer
- oms_cartridge_deploy_ManagedServer

Table 8–2 Distributed Queues to Remove Membership

Queue Name
oms_distributed_behavior_queue
oms_distributed_cluster_ws_correlates_queue
oms_distributed_cluster_ws_requests_proxy_queue
oms_distributed_cluster_ws_response_proxy_queue
oms_distributed_events_queue

Table 8–2 (Cont.) Distributed Queues to Remove Membership

Queue Name
oms_distributed_orchestration_dependencies_queue
oms_distributed_order_updates_queue
oms_distributed_ws_requests_queue

If you have installed an Order-to-Activate cartridge, remove the membership of the following queues from the Order-to-Activate distributed queues listed in [Table 8–3](#), and then delete the queues:

- OSM_FalloutQueue_ManagedServer
- OSM_PIPFalloutQueue_ManagedServer
- OSM_ORPFalloutQueue_ManagedServer
- OSM_InBoundMessageRecoveryQueue_ManagedServer
- OSM_WebServiceFindTroubleTicketCFResponseQueue_ManagedServer
- OSM_WebServiceFalloutCFResponseQueue_ManagedServer
- AIA_CreateCustomerQueue_ManagedServer
- AIA_CreateCustomerResponseQueue_ManagedServer
- AIA_CreateProvisioningOrderQueue_ManagedServer
- AIA_CreateProvisioningOrderResponseQueue_ManagedServer
- AIA_CreateBillingOrderQueue_ManagedServer
- AIA_CreateBillingOrderResponseQueue_ManagedServer
- AIA_UpdateFulfillmentOrderQueue_ManagedServer
- AIA_UpdateSalesOrderQueue_ManagedServer
- AIA_CreateTroubleTicketRequestQueue_ManagedServer
- AIA_CreateTroubleTicketResponseQueue_ManagedServer
- AIA_UpdateTroubleTicketRequestQueue_ManagedServer
- OSM_OrderActivityQueue_ManagedServer
- OSM_WebServiceFalloutLFResponseQueue_ManagedServer
- AIA_CreateErrorFaultQueue_ManagedServer
- OSM_WebServiceResponseQueue_ManagedServer
- OSM_ServiceProvisioningUpdateQueue_ManagedServer
- OSM_LFAbortOrderPropagationRespQueue_ManagedServer
- OSM_WebServiceRetryResponseQueue_ManagedServer

Table 8–3 Order-to-Activate Queues to Delete

Queue Name
Distributed_FalloutQueue
Distributed_OSM_PIPFalloutQueue
Distributed_OSM_ORPFalloutQueue

Table 8–3 (Cont.) Order-to-Activate Queues to Delete

Queue Name
Distributed_OSM_InBoundMessageRecoveryQueue
Distributed_OSM_WebServiceFindTroubleTicketCFResponseQueue
Distributed_OSM_WebServiceFalloutCFResponseQueue
Distributed_AIA_CreateCustomerQueue
Distributed_AIA_CreateCustomerResponseQueue
Distributed_AIA_CreateProvisioningOrderQueue
Distributed_AIA_CreateProvisioningOrderResponseQueue
Distributed_AIA_CreateBillingOrderQueue
Distributed_AIA_CreateBillingOrderResponseQueue
Distributed_AIA_UpdateFulfillmentOrderQueue
Distributed_AIA_UpdateSalesOrderQueue
Distributed_AIA_CreateTroubleTicketRequestQueue
Distributed_AIA_CreateTroubleTicketResponseQueue
Distributed_AIA_UpdateTroubleTicketRequestQueue
Distributed_OSM_OrderActivityQueue
Distributed_OSM_WebServiceFalloutLFResponseQueue
Distributed_AIA_UpdateFulfillmentOrderQueue
Distributed_AIA_CreateErrorFaultQueue
Distributed_OSM_WebServiceResponseQueue
Distributed_OSM_ServiceProvisioningUpdateQueue
Distributed_OSM_LFAbortOrderPropagationRespQueue
Distributed_OSM_WebServiceRetryResponseQueue

Removing a Managed Server from a WebLogic Cluster

To remove an OSM managed server from a WebLogic cluster:

1. Shut down the Oracle database server or servers used by your OSM instance.
2. Log in to the WebLogic Administration Console.
The WebLogic Administration Console is displayed.
3. Click **Environment**.
4. Click **Servers**.
The Summary of Servers screen is displayed.
5. Click **Control**.
6. Select all managed servers. Do not select the administration server (followed by "(admin)" in the list).

Note: Note which OSM managed server you want to remove.

7. Click **Shutdown**.

8. Select **Force Shutdown Now**.
The State changes from RUNNING to SHUTDOWN.
9. Click **Services**.
10. Click **JMS Modules**.
The JMS Modules screen is displayed.
11. Click **oms_jms_module**.
The Settings for oms_jms_module screen is displayed.
12. For every OSM or Order-to-Activate distributed queue, do the following:
 - a. Click the *distributed_queue*, where *distributed_queue* is the name of the OSM distributed queue.
The Settings for *distributed_queue* screen is displayed.
 - b. Click **Members**.
The Distributed Queue Members screen is displayed.
 - c. Select the *queue_managed_server*, where *queue* is the OSM or Order-to-Activate queue and *managed_server* is the managed server you want to remove.
 - d. Click **Delete**.
13. Delete every *queue_managed_server* or *topic_managed_server*, where *queue* and *topic* are the names of the OSM queues and topics and *managed_server* is the managed server you want to remove.
14. If the managed server you are removing is configured with JMS service migration, remove the osmJmsNonMigratableTemplate_*managed_server* template associated to the managed server you want to delete.
15. Click **Subdeployments**.
The Subdeployments screen is displayed.
16. Select the oms_jms_server_*ManagedServer* you want to delete.
If the managed server you are removing is configured with JMS service migration, also select the osmJmsNonMigratableServer_*managed_server* subdeployment associated to the managed server you want to delete.

Note: You cannot delete a managed server subdeployment until there are no resources associated with it. If any resources still appear, either delete the resource if it is a queue, or remove the managed server from the member list if it is a distributed queue.

17. Click **Delete**.
18. Click **Services**.
19. Click **JMS Servers**.
The Summary of JMS Servers screen is displayed.
20. Select the oms_jms_server_*ManagedServer* you want to delete.
If the managed server you are removing is configured with JMS service migration, also select the osmJmsNonMigratableServer_*managed_server* JMS server associated to the managed server you want to delete.

21. Click **Delete**.
22. Click **Environment**.
23. Click **Servers**.

The Summary of Servers screen is displayed.
24. Select the managed server you want to delete.
25. Click **Delete**.
26. Click **Environment**.
27. Click **Clusters**.

The Summary of Clusters screen is displayed.
28. Click the name of the cluster that the managed server you deleted was associated with.
29. In the **Clusters Address** field, remove the IP address and port number for the managed server you deleted.
30. In the **Number of Servers In Cluster Address** field, reduce the number by one.
31. Click **Save**.
32. If a proxy is used in the cluster configuration, delete the managed server's IP address and port number from the proxy server's configuration. For example, if you use a WebLogic HTTP proxy, update the **WebLogicCluster** parameter in the *domain_home/apps/OracleProxy4_proxyserver_proxy/WEB-INF/web.xml* file (where *proxyserver* is the proxy server name) and redeploy the proxy.
33. Save and close the file.
34. Pack and redeploy the **oms.ear** file as described in *OSM Developer's Guide*.

Troubleshooting OSM Installation Problems

This chapter describes some of the issues you may encounter during the Oracle Communications Order and Service Management (OSM) installation process, and their solutions.

Coherence Configuration Error: ORA-00001: unique constraint

The following error can occur in the OSM WebLogic server console when creating an order:

```
com.mslv.oms.handler.InternalErrorException: ORA-00001: unique constraint  
ORDERMGMT4701.XPKOM_ORDER_FLOW_COORDINATOR) violated
```

This error occurs because incorrect or missing Coherence settings cause the nodes in the cluster to be unaware of each other. The servers are unaware that they need to generate order IDs that take the other servers into consideration. This problem does not occur if the same server gets all of the createOrder requests. The problem occurs when any other server gets a request and uses the wrong formula to generate the order ID.

For more information about Coherence, see "[Configuring Oracle Coherence for an OSM Cluster](#)".

Coherence Configuration Error: [STUCK] ExecuteThread

The following thread error can occur in the OSM WebLogic server console when running an order:

```
[STUCK] ExecuteThread: '2' for queue: 'weblogic.kernel.Default (self-tuning)'  
waiting for lock  
java.util.concurrent.locks.ReentrantReadWriteLock$FairSync@5d7fc269 WAITING
```

The osm-invocation and osm-distributed thread-count values are set too low. See "[Configuring and Monitoring Coherence Threads](#)" for information about increasing these settings.

Error About T3 After Initial OSM Startup

The first time you start the OSM server after installation, you may see an exception indicating **T3 file attachment not found**.

If this occurs, restart the server.

Node Manager Does Not Create IP Address for Whole Server Migration

When you start up a managed server that is configured for whole server migration, the managed server fails to start because node manager does not create the floating IP address for the managed server.

If this occurs, ensure that you have selected **Automatic Server Migration Enabled** when you configured the managed server. Node manager does not allocate IP addresses to managed server unless this value is selected. See "[Configure Managed Servers for Whole Server Migration](#)" for information about setting this value.

Database Connection Problems During Installation

If you receive database connection errors when clicking **Connect** on the Database Server Connection Information dialog box, click **Retry**. This sometimes fixes the problem.

This issue is related to latency in the database connection. Acceptable network latency should be between 0.2 and 0.4 msec. Anything higher than 1 msec can substantially reduce OSM performance.

To verify network latency, do the following:

1. Log in to the machine running the OSM server.
2. Run the following command:

```
#ping -s osm_database
```

where *osm_database* is the host name or IP address of the machine running the OSM database server.

The system responds with lines similar to the following:

```
PING osm_database: 56 data bytes  
64 bytes from osm_database: icmp_seq=0. time=0.389 ms  
64 bytes from osm_database: icmp_seq=1. time=0.357 ms
```

A value for time of less than **0.4** indicates acceptable network latency. A value greater than **1.0** indicates excessive network latency.

Note: Solaris uses the `-s` option. Linux and AIX do not require this option.

DataDictionary Expansion Level

If you are having issues deploying cartridges, the cause may be related to the DataDictionary expansion level. In Oracle Communications Design Studio, under Windows preferences, increase the DataDictionary expansion level to 10. In some cases, you may need to increase the level to more than 10.

JMS Server Connection Problems

After installation, when you restart the server, you may receive an error message from the JMS server connecting to the database. Many retries of the operation occur.

First, check the database connectivity as the database listener or database instance might be down. As a last resort, you may have to re-create the JMS server resource (not recommended) or re-run the OSM installation.

Problems When Running Multiple WebLogic Domains on One Host

If you are running multiple WebLogic domains on one host and you see errors such as Web clients failing to load, JSP errors, or errors indicating that JSP pages can't be recompiled, you may not have set umask values properly to protect files in one WebLogic instance from other WebLogic instances.

JDBC Errors When First Order Submitted

If you receive JDBC errors when the first order is submitted to OSM, you may need to turn on JDBC logging. Refer to the Oracle WebLogic Server documentation.

Unable to Bring Up Managed Server After Database Failure

OSM JDBC data sources support global transactions through the logging last resource (LLR) WebLogic optimization. LLR transaction records must be available to resolve in-doubt transactions during recovery, which runs automatically at server startup. WebLogic does not start if the LLR table is unreachable. OSM also fails to start if the Oracle database is unreachable. In addition, if the database is Oracle RAC, both database nodes specified by the data source URLs must be reachable. When Weblogic starts, failure of a database node is handled gracefully (processing fails over to the other node).

Slow Query Performance in OSM Web Clients

If you have many cartridges deployed in OSM and have other hardware issues that may be impacting performance, the query performance of OSM Web clients might be very slow.

To avoid slow query performance in OSM Web clients, you can try setting `cursor_sharing=FORCE` as follows:

Caution: Using the `cursor_sharing=FORCE` setting must be done with caution and is not recommended for all OSM installations (only those installations with specific hardware issues and that have a low number of OSM instances).

1. Change `cursor_sharing=FORCE`

Log into SQL*Plus as a user with ALTER SYSTEM privileges and run:

```
alter system set cursor_sharing=FORCE scope=both;
```

2. Restart OSM.
3. Log in to the OSM Web client.
Expect performance to be slow the first time.
4. For the Task Web client, refresh the Worklist a few times.
Response time should be much better.
5. Log out of the OSM Web client and log in again.
6. Check that the query operation runs faster.

Delayed JMS Messages

Clock synchronization issues may cause JMS request and response messages to remain in a queue in a delayed state.

When a message is sent, it is stamped with the time on the sender's machine. When the message arrives at the JMS destination, if the recipient's machine has a clock that is running several minutes slower, the timestamp is displayed as a future time and the WebLogic server decides to delay the message until the future time arrives.

To prevent this problem, use network time protocol (NTP) servers to synchronize clocks across all machines in a cluster.

The short term work around for this issue is to manually move the message to another JMS server on a machine with a clock that is synchronized.

To monitor JMS messages in the OSM WebLogic server console:

1. Log in to the OSM WebLogic server.
The WebLogic Administration Console is displayed.
2. Click **Services**.
3. Select **Messaging**.
4. Select **JMSModules**.
5. Select the JMS module associated with the delayed message.
6. Select the queue associated with the delayed message.
7. Click the **Monitoring** tab.
8. Select a destination to find the delayed message.

Note: If the message is not in the first destination, check the second destination.

9. Select **Show messages**.
10. Select the message in the delayed state.
11. Click **Move**.

Error Message For Events From a JMS Topic in a Cluster

The following message can occur when attempting to process an event from a JMS topic:

```
<Message-Driven EJB: YourCartridgeName_1.0.0.0_YourPluginName_
orderCompleteEventMDB's transaction was rolled back. The transaction details are:
....
```

OSM does not support JMS topics within an OSM clustered environment. For more information about OSM queue configuration, see "[OSM Integration with External Systems](#)".

JMS Message Delivery Failure

If OSM drops and does not process JMS messages, make sure that the messages are not using uniform distributed queue (UDQ) format. OSM supports only weighted

distributed queues. For more information about OSM queue configuration, see "[OSM Integration with External Systems](#)".

OSM and RCU Installers Are Slow to Run Database Tablespace Query

It can take an unusually long time for the OSM Installer and RCU Installer to run a database tablespace query. Purging the Oracle Database recycle bin ensures that the installers can run the database tablespace query more quickly.

To purge the Oracle Database recycle bin system wide:

1. Log in to SQL*Plus as sysdba.
2. Enter the following command:

```
purge dba_recyclebin;
```

The recycle bin is purged system wide.

To purge the Oracle Database recycle bin for a single user:

1. Log in to SQL*Plus as the OSM installer database user.
2. Enter the following command:

```
purge recyclebin;
```

The recycle bin for the database user is purged.

OSM Installer Issues for UNIX or Linux

If you are re-using the installation directory or the operating system temporary directory, you might have a problem running the installer on a UNIX or Linux system. To resolve this, you need to start two sessions: a session for WebLogic Server, and separate a session for running OSM Installer.

To start a UNIX or Linux session for WebLogic Server:

1. Ensure the OSM WebLogic Server has the following Java Virtual Machine (JVM) setting:

```
-Djava.io.tmpdir=./tmp
```

Note: If OSM WebLogic Server is installed in a cluster environment, create a `tmp_servername` directory in the WebLogic Server domain directory, and use the following setting for each server in the cluster:

```
-Djava.io.tmpdir=./tmp_servername
```

where `servername` is the name of each server in the cluster. For example, to install OSM on `oms_cluster`, which consists of `oms_server1` and `oms_server2`, start `oms_server1` by using `-Djava.io.tmpdir=./tmp_oms_server1`, and start `oms_server2` by using `-Djava.io.tmpdir=./tmp_oms_server2`.

To start a UNIX or Linux session for running OSM Installer:

1. Create a new directory, and then create a temporary directory within that new directory. For example:

```
/home/osm_user/new_osm_install
```

`/home/osm_user/new_osm_install/tmp`

2. Download the OSM software media pack for your operating system from the Oracle software delivery Web site, located at:
<https://edelivery.oracle.com/>
and save it to the directory that you created. For example, `/home/osm_user/new_osm_install`.
3. Follow steps 4 and 6 of the procedure to install OSM, located in the "[Installing OSM](#)" topic.
4. In the temporary directory that contains the installation executable file, for example, `/home/osm_user/new_osm_install`, run the OSM Installer by doing one of the following:
 - On Oracle Linux and Red Hat Enterprise Linux, run the following command:

```
InstallLinux.bin -is:tempdir ./tmp
```
 - On Oracle Solaris, run the following command:

```
InstallSparc.bin -is:tempdir ./tmp
```
 - On IBM AIX, run the following command:

```
InstallAix.bin -is:tempdir ./tmp
```
 - On HP-UX Itanium, run the following command:

```
InstallHpuxItanium.bin -is:tempdir ./tmp
```
 - On Windows, navigate to the directory containing the installation executables and double-click `Install.exe`.
5. Continue with step 8 of the procedure to install OSM, located in the "[Installing OSM](#)" topic.

Command for unpack.jar Fails with a Write Error

If you run the `unpack.jar` command and you receive a write error, you must provide a target application tag (`-app_dir`) while running the command.

For example:

```
./unpack.sh -template=/scratch/oracle/Middleware/user_projects/domains/osmprak_72251to730_upgddomain_final8may.jar -domain=/scratch/oracle/Middleware/user_projects/domains/osmprak_72251to730_upgddomain -app_dir=/scratch/oracle/Middleware/user_projects/applications/osmprak_72251to730_upgddomain
```

JBoss Cache Timeouts

Long full garbage collections can cause JBoss timeout errors to appear in the log files.

Verifying the OSM Installation

This chapter describes how to verify that Oracle Communications Order and Service Management (OSM) is installed correctly.

Checking the State of All Installed Components

You can verify that OSM is installed by checking the state of all installed components in the OSM WebLogic server Administrator console.

To check the state of all installed components:

1. Log in to the Oracle WebLogic Server console.
2. In the left pane of the console, expand the **Environment** node and select **Servers**.
3. In the right pane of the console, click the a managed server on which OSM is installed.
4. In the tabs, select **Deployments** and expand **oms** to verify that all EJBs and modules have been deployed.
5. Verify that both **oms** and **cartridge_management_ws** applications are **active**.
6. Repeat 2 steps 5 to for all other managed servers in the cluster.

Verifying the OSM Clients

You can verify that OSM is installed by logging into the Order Management web client and the Task web client using the OSM administrator user account. The OSM WebLogic server instance must be running before attempting these procedures.

Some functions and screens provided by these clients are not accessible until you have created and deployed a valid OSM cartridge that includes a role configured with permissions to use these functions and screens. After doing this, you must then assign the role to a workgroup using the OSM Order Management web client. For more information, see *OSM Order Management Web Client User's Guide*.

You can use the product cartridges that come with the OSM installer and you can also use the following sample OSM cartridges included with Oracle Communications Design Studio:

- Provisioning Broadband and Order Change Demo contained in the **bb_ocrm_demo** cartridge file.
- Provisioning View Framework Demo contained in the **view_framework_demo** cartridge file.

For more information about installing these sample cartridges, configuring roles, setting permissions, and deploying cartridges, see the Design Studio Help.

To log in to the Task web client:

1. Access the following URL in your web browser:

`http://host:port/OrderManagement`

Where *host* is the machine where OSM is installed, and *port* is the server's HTTP port number.

If the server has been set up for secure connection, enter `https` in the URL. Typically, the System Administrator would have the login information.

2. In the **User Name** field, enter the OSM administrator user name you selected when you installed OSM.
3. In the **Password** field, enter the OSM administrator password you selected when you installed OSM.
4. Click **Login**.

Note: The New Order, Worklist, and Query tabs are not accessible for the OSM administrator. The OSM administrator user can also access the Reporting, Notification, and Options tabs.

To log in to the Order Management web client:

1. Access the following URL in your web browser:

`http://host:port/OrderManagement/orchestration`

Where *host* is the machine where OSM is installed, and *port* is the server's HTTP port number.

If the server has been set up for secure connection, enter `HTTPS` in the URL. Typically, the System Administrator would have the login information.

2. In the **User Name** field, enter the OSM administrator user name you selected when you installed OSM.
3. In the **Password** field, enter the OSM administrator password you selected when you installed OSM.
4. Click **Login**.

Note: You can log into the Order Management web client, but the administrator user cannot use any functions.

Configuring and Verifying HTTPS Connectivity for OSM Client Browsers

To configure and verify HTTPS connectivity for OSM client browsers:

1. Ensure that you have completed the steps described in "[Preparing WebLogic Server for an OSM Cluster Installation](#)."
2. Access one of the following URLs in your web browser:

`https://host:sslport/OrderManagement`

`https://host:sslport/OrderManagement/orchestration`

where *host* is the machine in which OSM is installed and *sslport* is the server's HTTPS port number. *host* and *sslport* can also be the host name and SSL secure port of a hardware or software load balancer, for example, if you have set up and configured the Oracle HTTP Server software load balancer.

3. Click **Continue to this website (not recommended)**.
4. Click **Certificate Error**.
5. Click **View Certificates**.
6. Select the root certificate authority.
7. Click **Install Certificate**.
8. Click **Next**.
9. Select **Place all certificates in the following store**.
10. Choose **Trusted Root Certification Authorities**.
11. Click **OK**.
12. Click **Yes**.
13. Select the intermediate certificate authority.
14. Click **Install Certificate**.
15. Import the intermediate certificate into **Intermediate Certification Authorities**.
16. Click **OK**.
17. Click **Yes**.
18. Close the web browser.
19. Open the web browser. No certificate errors should appear.

Configuring OSM to Evaluate System Configuration Compliance

The OSM installation includes an OSM compliance tool. Running this tool evaluates your system's compliance against established rules to ensure that the system is optimally configured for the environment.

This section includes the post-installation tasks required for OSM to interact with the compliance tool.

OSM provides a set of python (*.py) scripts that extend the WebLogic Scripting Tool (WLST) command vocabulary, which allows you to use WLST to run the compliance tool. For more information about WLST, see Oracle WebLogic Scripting Tool documentation. For information about using WLST over a secure connection, see the *OSM System Administrator's Guide*.

Manually Installing Compliance Files

The compliance tool relies on WLST extensions in the *WebLogic_home/common/wlst* directory. When you start the OSM server for the first time, the WLST extension files are automatically installed in the correct directory. If this directory is not accessible to the OSM server, the files need to be installed manually, using the procedure in this section.

To manually install compliance files:

1. Start an OSM WebLogic managed server.
2. Go to the `domain_home/osm_compliance/scripts` directory.
3. Do one of the following:

- As a UNIX or Linux user with write permission to the WLST directory, run the following script:

```
copyComplianceWLSTScripts.sh
```

- As a Windows user with write permission to the WLST directory, run the following script:

```
copyComplianceWLSTScripts.bat
```

The following WLST extension files are copied to the `WebLogic_home/common/wlst` directory: **compliance.py**, **evaluate.py**, and **snapshot.py**.

Configuring Compliance for an OSM Cluster

You can run the compliance tool on a single instance of OSM or in a clustered environment. If you are running OSM in a clustered environment, you must configure coherence remote management, which allows you to specify one node as the MBean server that manages all other nodes.

You configure coherence remote management by adding and setting system properties for OSM managed servers after you start the Java virtual machine.

To configure coherence remote management:

1. Log on to the WebLogic Server Administration Console.
2. Click **Lock & Edit**.
3. In the **Domain Structure** tree, expand **Environment** and then click **Servers**.

The Summary of Servers page is displayed.

4. Click the name of the WebLogic server where you want to designate as the MBean server that manages all other nodes.

The configuration parameters for the server are displayed on a tabbed page.

5. Click the **Server Start** tab.
6. In the **Arguments** field, enter the following:

```
-Dtangosol.coherence.management.remote=true  
-Dtangosol.coherence.management=all
```

7. Click **Save**.
 8. In the **Domain Structure** tree, expand **Environment** and then click **Servers**.
- The Summary of Servers page is displayed.
9. Click the name of a WebLogic server where you want to designate as the MBean clients of the MBean server.

The configuration parameters for the server are displayed on a tabbed page.

10. Click the **Server Start** tab.
11. In the **Arguments** field, enter the following:

```
-Dtangosol.coherence.management.remote=true
```

```
-Dtangosol.coherence.management=none
```

12. Repeat steps 8 and 11 for all other managed servers in your system.
13. Restart the managed servers.

Evaluating System Configuration Compliance

The OSM compliance tool captures a snapshot of your system's configuration and evaluates this configuration against established rules, which are based on best practices and guidelines. Using these rules, the compliance tool analyzes the system and produces an evaluation result that allows you to verify that your system is optimally configured for your environment.

Several default compliance tool parameters are specified in the **oms-config.xml** file. Use these parameters to change the directory path where the system stores the following: the compliance snapshot output, the evaluation results, the snapshot files that will be evaluated, and the evaluation rules. For more information, see *OSM System Administrator's Guide*.

The compliance tool is based on JMX technology and captures the configuration snapshot from target environments, such as JMX MBeans for the WebLogic domain, OSM system and database parameters, and coherence cluster for OSM.

For more information about the rules that are provided and adding new rules, see the compliance tool documentation, provided in the SDK at the following location:

```
OSM_home/SDK/Compliance/doc/index.html
```

Running the Compliance Tool

Run the compliance tool using WebLogic Scripting Tool (WLST) scripts. For information about the post-installation tasks required for OSM to interact with the compliance tool, see the post-installation section of *OSM Installation Guide*. For more information about WLST, see WebLogic Scripting Tool documentation.

Note: If you are running the compliance tool in a cluster, there are additional factors to consider. For more information, see "[Cluster Considerations](#)".

To run the compliance tool:

1. Enter WLST interactive mode and connect to an OSM managed server.
2. Do one of the following:
 - If you want to create the snapshot then evaluate it do the following:
 - a. Run the following command, which creates a snapshot of the system configuration:

```
osmSnapshot ("snapshot_directory")
```

where *snapshot_directory* is the directory in which you want to put the snapshot of the system configuration. If you leave this blank, the system puts the snapshot in the default directory specified by the **oms-config.xml** file.

- b. Run the following command, which verifies configuration compliance by evaluating the snapshot:

```
osmEvaluate("evaluate_directory")
```

where *evaluate_directory* is the directory in which you want to put the evaluation of the snapshot against the compliance rules. If you leave this blank, the system puts the evaluation in the default directory specified by the **oms-config.xml** file.

- If you want to take a snapshot and immediately evaluate the snapshot do the following:

- a. Run the following command, which creates the compliance results file:

```
osmCompliance("compliance_directory")
```

where *compliance_directory* is the directory in which you want to put the compliance results. If you leave this blank, the system puts the compliance results in the default directory specified by the **oms-config.xml** file.

Cluster Considerations

You can run the compliance tool in a clustered environment. Keep in mind that the `osmSnapshot` command collects the following types of configuration:

- **common:** The same on every managed server.
- **coherence:** Available only on the managed server that has the coherence MBean server.
- **server:** Specific to the managed server that is collecting the snapshot.

It is typical to run the compliance tool on the managed server that has the coherence MBean server because doing so will evaluate the broadest set of configuration (common, coherence, and a server). To fully check compliance, you must also run the tool on each of the other managed servers.

Evaluating Compliance Results

The compliance tool saves the evaluation results in the directory specified in the WLST command or in the **oms-config.xml** parameter. The evaluation results are saved in two formats: HTML and XML.

Note: The names of the evaluation result files are in the following formats: *yyyymmdd-hhmmss.xml* and *yyyymmdd-hhmmss.html*.

The evaluation results report displays information about the software versions in your environment, and then lists the results. These results are divided into the following tables:

- **Non-Compliant Rules:** The rules with which your environment is not compliant.
- **Compliant Rules:** The rules with which your environment is compliant.

Table 10–1 lists the columns in the HTML evaluation results file and provides a description for the information contained in each column.

Table 10–1 Compliance Tool Evaluation Results File: HTML

Column Name	Description
Index	Specifies rule index in the table.
Rule Name	Displays the name of the compliance rule.

Table 10–1 (Cont.) Compliance Tool Evaluation Results File: HTML

Column Name	Description
Severity	Defines the severity of this rule. Possible values are: <ul style="list-style-type: none"> ▪ Error: Must fix. Your system might be unstable until you correct the problem. ▪ Warning: Should fix. Your system will perform better if you correct the problem. ▪ Information: May or may not apply to your system. Evaluate and correct as needed.
Description	Specifies a general description of the rule.
Message	If the rule passes, it displays the compliant message. If the rule fails, it displays a non-compliant message and a list of non-compliant objects.
Rationale	Displays the rationale behind a compliance rule.
Reference	Specifies a link to a document that describes the compliance rule in more detail.
Keywords	Displays keywords related to targeted configurations.

Table 10–2 lists the elements in the XML evaluation results file and provides a description for the information stored in each element.

Table 10–2 Compliance Tool Evaluation Results File: XML

Column Name	Description
compliantResult	Contains the evaluation result of a compliance rule. Each compliant result element stores evaluation the result for one rule.
compliantMessage	Appears if a compliance rule passes. The message is not displayed when the rule fails. This message is copied directly from the rule file.
description	Specifies a general description of the rule.
keywordlist	Displays keywords related to targeted configurations.
nonCompliantMessage	Appears if a compliance rule fails. The message is not displayed when the rule passes. This message is copied directly from the rule file.
nonCompliantObjects	Contains a list of objects that failed the compliance rule. Non-compliant objects are not displayed when the rule passes.
nonCompliantObject	Contains an object that failed the compliance rule.
rationale	Displays the rationale behind a compliance rule.
referenceUrl	Specifies the link to a document that describes the compliance rule in more detail.
ruleName	Displays the name of the compliance rule.

Table 10–2 (Cont.) Compliance Tool Evaluation Results File: XML

Column Name	Description
severity	Defines the severity of this rule. Possible values are: <ul style="list-style-type: none"> ▪ Error: Must fix. Your system might be unstable until you correct the problem. ▪ Warning: Should fix. Your system will perform better if you correct the problem. ▪ Information: May or may not apply to your system. Evaluate and correct as needed.

OSM Pre-Production Testing and Tuning

This chapter describes how to run performance tests and tune Oracle Communications Order and Service Management (OSM) before going into production.

OSM Performance Testing and Tuning Overview

Performance testing and tuning is an iterative process with cycles of testing, tuning, analyzing, and retesting. Although many factors impact OSM performance, you can classify them into the following categories:

- **Hardware:** OSM performance is bounded by the limitations of the hardware on which it runs such as when maximum CPU, memory, or other resources are reached. For example, through the performance testing process, you may discover that you need more hardware for another database instance or for additional WebLogic Server managed servers.
- **Software:** Achieving optimal OSM performance depends on proper configuration and tuning of these OSM components and technologies included in the OSM architecture:
 - The operating systems
 - The Oracle GRID infrastructure and associated disk groups and disks
 - The Oracle Real Application Cluster (Oracle RAC) database
 - The Oracle WebLogic Server cluster
 - Java
 - The Java message service
 - Oracle Coherence
 - Shared storage
 - Oracle Communications Design Studio
- **Solution:** OSM cartridges provide the metadata instructions that the OSM server needs to fulfill orders according to business requirements. The level of complexity defined in OSM cartridges impacts order processing performance. For example, the number of tasks in a process or the number of order line items in an incoming order, and the complexity of the incoming order can affect order throughput. To improve solution-related performance, you may need to redesign the solution in Design Studio and redeploy it.

The main goal of performance testing is to determine how many automation threads and how large an order cache are required in a managed server to handle a peak order rate that is sustainable. Although CPU can sometimes cause performance issues,

memory is typically the first resource to reach its maximum capacity. You can determine this peak sustainable order rate by monitoring the memory usage of the WebLogic Server during a performance test.

The process for determining this sustainable peak order rate includes the following steps:

1. Install and configure the performance test environment. This includes the hardware, software, and the OSM solution components.
2. Prepare the WebLogic Server connection pool, maximum constraints for work managers, and the JBoss and Coherence cache size and timeout values by setting these values to very high settings. Setting these values high enables you to find the point at which the memory of the managed server begins to be overloaded.
3. Find the sustainable peak order rate by monitoring the WebLogic Server's Java heap using JConsole. The sustainable peak order rate is determined by ensuring that the live data size (LDS) remains stable at 50 % of the old generation tenured heap.
4. When you have determined the sustainable peak order rate, you can review the WebLogic Server log files to determine the number of automation threads that had been in use, the number of orders in the JBoss and Coherence cache, and the average duration these orders required before completing.
5. Configure the WebLogic Server connection pool, maximum constraints for work managers, and the JBoss and Coherence cache size and timeouts values by setting these values to the those you determined during performance testing. Performing this step ensures that WebLogic Server managed servers in your WebLogic Server cluster do not run out of memory.
6. Use the sustainable peak order rate to determine how many managed servers you require in your WebLogic Server cluster.

Guidelines for the Performance Test Environments

You determined the initial sizing of your production environment hardware when you planned the physical architecture of your system, as described in "[Planning the Physical Architecture](#)". In this chapter, you will run performance tests to determine if your initial sizing is adequate.

Ideally, the hardware sizing for the performance test environment should be comparable to that of the production environment. For example, if the test environment is less than half of the capacity of the production environment, then you cannot adequately test the performance capability of the solution. In addition, the technology stack and the solution architecture should resemble the production environment as closely as possible. For example, the Oracle Grid infrastructure, the Oracle RAC setup, the WebLogic Server setup, and the shared storage used should be similar to that used in the production environment.

When the performance test environment is smaller than the production environment, a conservative approach must be taken to extrapolate the results, considering that the results in production may be substantially different than what is being observed in the test environment. For example, you can test a smaller number of managed servers in the test cluster environment as long as the managed servers have the same resources as an equivalent production managed server (for example, memory, CPU). If you plan to deploy multiple managed servers per machine in production, a you should use a similar deployment for testing (for example, smaller number of machines but comparable deployment and resource usage for each machine).

You should not assume a simple, linear extrapolation based on hardware. Often, usage and data contention bottlenecks do not manifest themselves until the system is large enough. Conversely, an undersized system may magnify issues that otherwise would not exist: for instance, when using an Oracle RAC database with a slow interconnect or slow storage retrieval. For example, you must know the number of managed servers you have in your cluster to properly size the coherence invocation service threads. If your coherence threads are not properly sized for your environment, you may experience costly issues in a fully sized production environment. For more information about configuring coherence threads, see "[Configuring and Monitoring Coherence Threads](#)".

The performance test environment may also serve as a preproduction environment for tasks such as validating upgrade plans or new cartridges. Oracle recommends that you keep the performance test environment available both prior to the initial deployment and throughout the lifespan of the OSM solution, so that performance testing can be conducted on any new enhancements, fixes, and workarounds, and any other changes introduced to the implementation.

When you are planning the performance test environment, create a test plan that includes the following high-level information:

- Versions of the following software: OSM, WebLogic Server, Coherence, JDK, Oracle Database, Design Studio, and the OSM Design Studio plug-ins
- The patches applied
- Operating system, version, and configuration
- Solution and deployment architecture
- Latest cartridges
- WebLogic Server configuration files (all files in *WLS_domain/config* folder), JVM heap size, the **osm-coherence-cache-config.xml**, the OSM **oms-config.xml** file
- Cluster size
- OSM database configuration: memory size, tablespaces and redo log sizes, layout, and so on. Also, for example, whether you plan to use Oracle RAC and partitioning and, if so, the number of orders per partition.

About Configuring the Environment for Performance Testing

The performance testing process involves determining the sustainable order rate that each managed server in the OSM WebLogic cluster can handle. The sustainable order rate is typically 80% of the maximum order rate that each managed server can handle beyond which the managed server becomes overloaded. This creates a buffer that ensures that large spikes in customer orders do not create problems.

This chapter provides instructions for configuring and tuning work managers, work manager constraints, and JBoss and Coherence caches such that in the initial environment setup, the constraints and caches are set very high. Having these settings high enables you to overload the managed server's CPU and memory so that you can determine the sustainable order rate for each managed server. After determining the sustainable order rate, you can then configure the work manager constraints and caches to ensure that the managed server in the cluster can never process more orders than it can handle.

About Work Managers, Work Manager Constraints, and the JDBC Connection Pool

OSM uses work managers to prioritize and control work. You can tune work managers using work manager constraints, which is an effective way to prevent overloading the managed servers in the OSM WebLogic Server cluster. The work manager constraints limit the number of threads available to OSM work managers.

The OSM installer creates only one maximum thread constraint shared by all OSM work managers. While this performs well in a development environment, this configuration is not the best approach in a production environment. For example, in a production environment under high load, this configuration can cause all available threads to alternate between the automation work manager (`osmAutomationWorkManager`) and the JMS Web Service work manager (`osmWsJmsWorkManager`), impacting core order processing capabilities.

To better control the flow of orders, Oracle recommends that you create the following additional thread constraints:

- **`osmJmsApiMaxThreadConstraint`** for the **`osmWsJmsWorkManager`** work manager. The `osmJmsApiMaxThreadConstraint` should be 12.5% of the total number of threads when you initially begin the tuning process.
- **`osmHttpApiMaxThreadConstraint`** for the **`osmWsHttpWorkManager`** and **`osmXmlWorkManager`** work manager. The `osmHttpApiMaxThreadConstraint` should be 12.5% of the total number of threads when you initially begin the tuning process.
- **`osmGuiMaxThreadConstraint`** for the **`osmTaskClientWorkManager`**, **`osmOmClientWorkManager`** work managers. The `osmGuiMaxThreadConstraint` should be 25% of the total number of threads when you initially begin the tuning process.
- **`osmAutomationMaxThreadConstraint`** for the **`osmAutomationWorkManager`** work manager. The `osmAutomationMaxThreadConstraint` should be 50% of the total number of threads when you initially begin the tuning process.

After you have completed the tuning process, you will set these constraints to values that enable maximum performance while ensuring that the server does not get overloaded or encounter alternating thread issues.

You must also ensure that every OSM thread always has access to a database connection. Oracle recommends that you set the maximum number of work manager threads to 80% of the database connection pool. One approach to this configuration is to first determine the total number of threads needed by adding all the maximum work manager constraints together, and then set the database connection pool to 125% of this number.

About the JBoss and Coherence Order Cache

OSM uses JBoss and Coherence order caches that determine how many orders can stay in active memory and for how long before being removed from the cache. Tuning the JBoss and Coherence order caches also prevents the managed servers in the OSM WebLogic Server cluster from being overloaded.

Synchronizing Time Across Servers

It is important that you synchronize the date and time across all machines that are involved in testing, including client test drivers. In production environments, Oracle recommends that you do this using Network Time Protocol (NTP) rather than manual synchronization. Synchronization is important in capturing accurate run-time statistics.

Determining Database Size

The size of the database (amount of memory, number of CPUs, and storage capacity) has an impact on performance. Oracle recommends that you run tests using the same size database that is planned for the production environment. You can do this by seeding the database with data, migrating data, or running a representative set of sample orders. Initial testing against an empty database only highlight the most serious problems. With an empty schema, database performance problems that relate to gathering optimizer statistics that are inaccurate will not become apparent until after the OSM system enters production.

This chapter provides instructions for populating the database with orders, warming up the system, and running database optimizer statistics so that the performance test generates accurate results.

Note: Oracle recommends that you back up the OSM schema before running performance testing. After testing, you can restore the schema so that you do not need to purge orders that were generated during the testing. Keep in mind that exporting and importing the OSM schema can be time-consuming.

Alternatively, you can drop the all partitions and rebuild the seed data. This method can be faster than backing up and restoring the schema.

Setting Up Emulators

If the entire system is not available for testing, you can set up emulators to simulate external requests and responses. For example, if you need to test OSM performance before the billing or inventory system is ready, you can use emulators.

If you are using the Order-to-Activate cartridges, OSM provides an Oracle Application Integration Architecture (Oracle AIA) Emulator, which you can use to emulate order responses. If possible, run emulators on separate hardware from the OSM server so they do not consume OSM resources during performance testing. For more information about setting up and using Oracle AIA emulators, see *OSM Cartridge Guide for Oracle Application Integration Architecture*.

Setting Up a Test Client for Load Generation

You can use a test client to submit the orders for performance testing. The test client can be a custom application or any third-party tool, such as JMeter, LoadUI, or SoapUI. The examples used in this chapter are from a SoapUI project.

Keep the following in mind when setting up a test client:

- Ensure the test client does not impact OSM hardware resources. It is best to run test clients on different hardware from the hardware where OSM is deployed.
- Ensure the number of test client threads is configurable and supported in the test client machine. This is essential for load and scalability testing because the number of concurrent users that the system can support is based on the number of test client threads. If high loading is required, you might need to use multiple test client machines to generate a sufficiently high load.
- Ensure the test client can provide vital statistics on performance data, such as average, maximum, standard deviation, and 90th percentile performance numbers.
- Ensure the test client can complete long running tests with a steady load.

Example Managed Server Configuration

This section describes an example managed server configuration to illustrate how to run a performance test on an OSM instance as described in ["Example Performance Tests on OSM Managed Servers"](#).

The example is based on the following:

- Each machine has 64 threads and processors.
- Each machine has 128 GB of physical memory.
- Each machine runs two managed servers.
- Each managed server is configured with 32 GB of memory.

To configure the managed servers, do the following:

1. For each managed server, set 24 hardware threads for garbage collection by using the **-XX:ParallelGCThreads** managed server startup argument.

See ["Configuring Managed Server Startup Parameters"](#) for more information about setting startup parameters.

Note: Even though you could allocate half of the 64 hardware threads for garbage collection, this would create too many tenured heap partitions which increases the risk of fragmentation.

2. For each managed server, configure the database connection pool with four times the number of available hardware threads. This very large connection pool removes any limitations on the number of threads that managed server can use during the performance test. This enables the performance test to determine the actual overload point for the managed servers.

In the sample environment, given that there are two managed servers on one machine that has 64 threads, the connection pool for each managed server could start at $4 \times 64 \text{ threads} / 2 \text{ managed servers} = 128 \text{ connections}$ for each managed server.

Note: Ideally, each managed server would have its own dedicated machine. In which case, there would be $4 \times 64 \text{ threads} / 1 \text{ managed server} = 256 \text{ connections}$ for the managed server.

To set the maximum capacity of the connection pool, do the following:

- a. Log in to the WebLogic Server Administration Console.
- b. Click **Lock & Edit**.
- c. In **Domain Structure**, select **Services**, then **Data Sources**.

The Summary of JDBC Data Sources screen is displayed.

- d. For each OSM JDBC data source
- e. Select an OSM JDBC data source. The OSM JDBC data source syntax is:

```
osm_pool_sid_group_y
```

where *sid* is the system identifier (SID) of the Oracle RAC database instance and *y* is the group letter for the managed server.

- The Configuration tab is displayed
- f. Click the **Connection Pools** tab.
 - g. In the **Maximum Capacity** field, enter **128**.
 - h. Click **Save**.
 - i. Repeat steps c to h for all other OSM JDB data sources.
 - j. Click **Activate Changes**.
3. Create the new maximum thread constraints and set the thread constraints them to a large value for initial performance testing. These maximum constraints are calculated based on 80% of the database connection pool, which is $128 \times 0.80 = 102$:
- **osmJmsApiMaxThreadConstraint** for the **osmWsJmsWorkManager** work manager. In this example, the constraint should be $102 \times 0.125 = 12.75$
 - **osmHttpApiMaxThreadConstraint** for the **osmWsHttpWorkManager** and **osmXmlWorkManager** work managers. In this example, the constraint should be $102 \times 0.125 = 12.75$
 - **osmGuiMaxThreadConstraint** for the **osmTaskClientWorkManager** and **osmOmClientWorkManager** work managers. In this example, the constraint should be $102 \times 0.25 = 25$.
 - **osmAutomationMaxThreadConstraint** for the **osmAutomationWorkManager** work manager. In this example, the constraint should be $102 \times 0.5 = 51$.

To create these constraints, do the following:

- a. In the Administration Console, click **Lock & Edit**.
- b. In **Domain Structure**, select **Environment**, then **Work Managers**.
The Summary of Work Managers screen is displayed.
- c. Click **New**.
- d. Select **Maximum Threads Constraint**.
- e. Click **Next**.
- f. In the **Name** field, enter the name of the constraint.
- g. In the **Count** field, enter the initial constraint value for performance testing.
- h. Click **Next**.
- i. Select *cluster_name*, then **All servers in the cluster** (where *cluster_name* is the name of the OSM WebLogic Server cluster).
- j. Click **Finish**.
- k. Repeat steps b to j for all remaining constraints.
- l. In **Domain Structure**, select **Environment**, then **Work Managers**.
The Summary of Work Managers screen is displayed.
- m. Select a work manager.
The **Configuration** tab is displayed.
- n. From the **Maximum Threads Constraints** list, select the new corresponding work manager maximum constraint.
- o. Click **Save**.

Guidelines for Performance Testing and Tuning

This section provides general guidelines and example procedures for conducting performance tests on OSM. The sample procedures use SoapUI and JConsole. The method involves testing and tuning the OSM system until you determine the sustainable order rate for each managed server in the OSM WebLogic Server cluster and for the Oracle RAC database instances.

Your performance goals, including the expected results for each test run, are typically based on business objectives.

In working toward achieving the optimum performance for your OSM system, keep the following high-level goals in mind:

- Maximizing the rate by which orders are processed by the system (order throughput)
- Minimizing the time it takes for each order to complete

The performance testing and tuning examples provided in this section illustrate how you can find the correct balance between these considerations, which often affect one another. For example, when you achieve maximum throughput, orders might not have the fastest completion time. Sometimes you must configure OSM to respond faster but at the expense of order throughput.

The example performance test also addresses the technical safety boundaries for the system, such as a hardware resource utility (for example, heap size), and the ability to process a certain number of orders and manual users at the same time. The example performance test also addresses secondary technical goals that ensure the system can continue running under stress, such as handling a large burst of orders, outages of other systems, or failover and recovery of OSM hardware.

Note: Even if you cannot define specific performance requirements, it is valuable to conduct performance testing in order to get benchmark numbers that you can compare with future releases of the solution.

General Guidelines for Running Tests and Analyzing Test Performance

To analyze the results of the test runs, do the following during testing:

- Gather operating system information for OSM application machines.
- Gather Automatic Workload Repository (AWR) snapshots for Oracle RAC, ADDM, and (Active Session History) ASH reports from the database for the exact duration of the test.
- Monitor information for WebLogic Server CPU, heap, and threads using tools like VisualVM or JConsole.
- Gather garbage collection logs and server logs.
- Gather multiple thread dumps regularly, especially during issues.
- Gather heap dumps, if necessary.
- Monitor WebLogic server activities, such as JMS queues, JDBC connections, execute thread pool, and so on, using WLST.
- Monitor network and storage for less latency and consistent throughput based on the documented service times for the hardware.

Example Performance Tests on OSM Managed Servers

When you have created a production ready OSM solution and have deployed it in a test environment as described in "[Guidelines for the Performance Test Environments](#)", you can run the performance tests described in this section. The performance testing process includes the following steps:

1. Determine how long your orders last and set the order volatility level on the OSM schema.
2. Begin a performance test to warm up the production system to achieve the following:
 - Enable the OSM server to compile all Java classes involved in processing orders.
 - Enable incremental statistics gathering on low, medium, and high volatility order and gather statistics at appropriate times.
 - Determine the appropriate size of the JBoss and Coherence order cache and the order cache inactivity timeouts.
3. Run the performance test.
4. Gather data.
5. Analyze data.
6. Tune the work manager constraints and the maximum connection pool capacity.
7. Tune the JBoss and Coherence maximum order cache.
8. Tune the redo log file size.

In addition to the steps described in this chapter, you must also tune other components such as the database, the operating system, the network, the storage, and so on.

Setting the Order Volatility Level

Before you warm up your system, you can specify whether you have low, medium, or high volatility orders for a specific group of database tables. Order with high volatility last for only a few second. Orders with low volatility can last for hours or even days. Orders that are a mix of high or low volatility can be classified as medium volatility. You need to specify the order volatility level for these tables because the volatility level is dependent on the solution. For more information about statistics, see *OSM System Administrator's Guide*.

Log in to the OSM ordermgmt schema and run the following commands to set the order volatility level:

```
execute om_db_stats_pkg.set_table_volatility('OM_ORDER_FLOW',om_const_pkg.v_volatility_volatility_level);
execute om_db_stats_pkg.set_table_volatility('OM_AUTOMATION_CTX',om_const_pkg.v_volatility_volatility_level);
execute om_db_stats_pkg.set_table_volatility('OM_AUTOMATION_CORRELATION',om_const_pkg.v_volatility_volatility_level);
execute om_db_stats_pkg.set_table_volatility('OM_ORDER_POS_INPUT',om_const_pkg.v_volatility_volatility_level);
execute om_db_stats_pkg.set_table_volatility('OM_UNDO_BRANCH_ROOT',om_const_pkg.v_volatility_volatility_level);
execute om_db_stats_pkg.set_table_volatility('OM_ORCH_DEPENDENCY_PENDING',om_const_pkg.v_volatility_volatility_level);
```

where *volatility_level* is low, medium, or high.

Warming Up the OSM System

Before an OSM performance test, you must start and run the WebLogic servers and the database so that all Java classes compile and the cache of the database populates with data. Typically, running the system for 5 to 10 minutes at 30 percent of its maximum order intake is sufficient, at which point the WebLogic server CPU usage and database input/output have stabilized.

After the initial warm-up period, you must run orders again at a higher rate to gather database statistics about low, medium, and high volatility tables. Do not gather statistics unless you have properly warmed up the system or the statistics will not be representative.

While you are running the orders, you must also set various JBoss and Coherence order cache values in preparation for the performance test.

For example, to run a warm up session with SoapUI, do the following:

1. Download and install SoapUI.
2. Create a SoapUI project.
3. Within the project, create a test suite.
4. Create a test step for `CreateOrderBySpecification` using a single order.
5. Open the order.
6. Click on the address bar and select **Add new endpoint**.

The Add new endpoint screen is displayed.

7. Enter the following:

```
http://hostname:port/OrderManagement/wsapi
```

where *hostname* is the managed server host name or IP address and *port* is the port number of the managed server.

8. Submit the order to verify connectivity with the OSM managed server.
9. Create a load test with the representative set of orders.
10. Open the load test.
11. In the **Limit** field enter a number. For example 600. This value in seconds causes the load test to run for 10 minutes which is a sufficient amount of the initial warm up time to enable the Java classes to compile.
12. In the **Threads** field, enter 4.
13. In the **Delay** field, enter a number. For example 15000. This value represents a 15000 millisecond delay interval (2.5 seconds) in which SoapUI submits the orders. The higher the value, the longer the delay, and the fewer orders are submitted. The lower the value, the shorter the delay, and more orders are submitted.
14. Open a terminal and run the following command:

```
ps -ef | grep managed_server
```

where *managed_server* is the name of the managed server you are tuning. The output specifies the current user name running the managed server and the first set of numbers specifies the process ID (PID) number of the managed server.

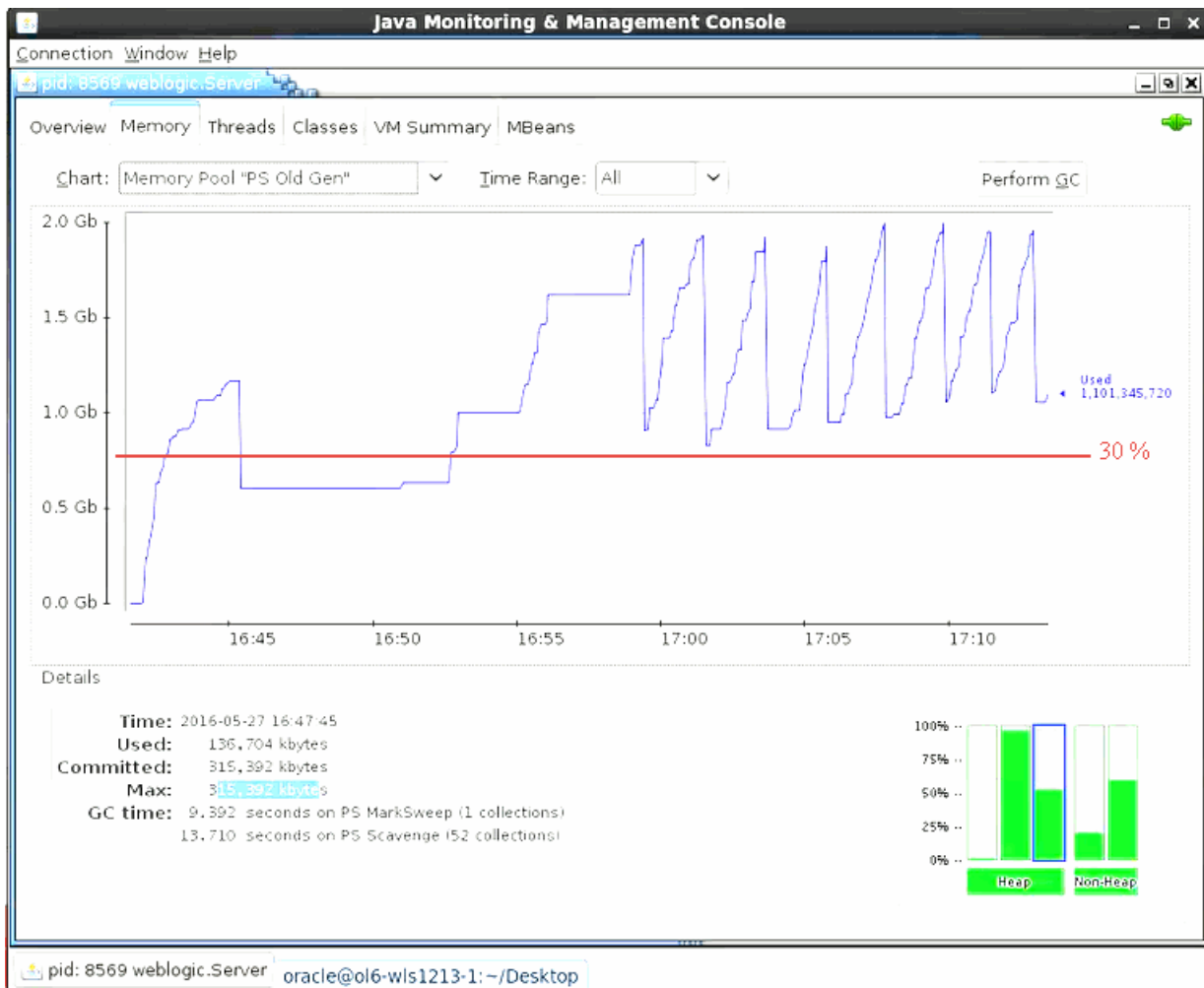
15. Run `java_home/bin/jconsole` (where *java_home* is the JDK root directory) to run the JConsole application for monitoring

The New Connection screen is displayed.

16. Select the PID that corresponds to the one from the results in step 14.
17. Click **Connect**.
18. Click **Insecure**.
19. Click the **Memory** tab.
20. From the **Chart** list, select **Memory Pool "PS Old Gen"**.
21. Monitor the life data size (LDS) which is the number of live objects that remain after a garbage collection. Ensure that the LDS is no more than 30% of the maximum old generation during the warm up process. If the order rate causes the LDS to increase above 30%, then the managed server is processing too many orders. Increase the **Delay** field amount on the SoapUI Load Test screen until you see the live objects after garbage collection return to 30%.

For example, [Figure 11-1](#) shows a small 2.5 GB managed server running with more than 30% live objects after garbage collection.

Figure 11-1 JConsole LDS Size Above 30%



22. After the initial performance test to compile the Java classes completes, set the **Limit** value to a higher number. For example **1800** for a 30 minute performance test for gathering database statistics.

Note: The duration you set depends on the OSM system being tested. Some systems may require longer than 30 minutes.

23. Start the performance test for gathering low volatility statistics and determining order cache eviction time.
24. Log in to the order management schema.
25. Enable incremental statistics on low volatility orders.

```
execute om_db_stats_pkg.set_table_prefs_incremental(a_incremental => true,a_volatility => om_const_pkg.v_volatility_low);
```

26. After the performance test has completed, gather statistics on the low volatility orders. Because the database is no longer processing orders, you can use all available threads (default behavior) to gather statistics.

```
execute om_db_stats_pkg.gather_order_stats(a_force => true,a_volatility => om_const_pkg.v_volatility_low);
```

27. Use the OSM Task web client and verify the average time it takes for orders to complete.

To verify the average time it take for order to complete, do the following:

- a. Log in to the OSM Task web client.
 - b. Click **Reporting**.
 - c. Click **Completed Order Statistics**.
 - d. In the **From** field, enter the starting time and date for the current performance test.
 - e. In the **To** field, enter the current time and date for the performance test.
 - f. Click **Find**.
 - g. Compare the average time it take for orders to complete from the **Avg Time** column with the longest time it take for orders to complete from the **Highest Time** column. You can use these values to determine how long orders should stay in the cache before being evicted. For example, if orders, on average, take three minutes to complete and it took five minutes for the longest, then a four minute cache eviction timeout for inactivity would be reasonable. Or, if most orders take 30 minutes to complete and the longest took 50 minutes to complete, then a forty minute timeout for inactivity would be sufficient. The inactivity timeout should capture 80% of your order volume.
28. Using a text editor, open the *domain_home/oms-config.xml* file.
29. Add the following text to the bottom of the file before the final `</oms-configuration>` tag to configure the JBoss cache:

```
<oms-parameter>
  <oms-parameter-name>ClosedOrderCacheMaxEntries</oms-parameter-name>
  <oms-parameter-value>60</oms-parameter-value>
</oms-parameter>
<oms-parameter>
```

```
<oms-parameter-name>ClosedOrderCacheTimeout</oms-parameter-name>
<oms-parameter-value>60</oms-parameter-value>
</oms-parameter>
<oms-parameter>
  <oms-parameter-name>OrderCacheMaxEntries</oms-parameter-name>
  <oms-parameter-value>order_max</oms-parameter-value>
</oms-parameter>
<oms-parameter>
  <oms-parameter-name>OrderCacheInactivityTimeout</oms-parameter-name>
  <oms-parameter-value>inactivity_timeout</oms-parameter-value>
</oms-parameter>
```

where

- *order_max* is the maximum number of orders that can be in the managed server's JBoss cache. Set this value to a high number, such as 2000 for the purposes of performance tuning procedure. You will change this number to a lower setting after completing the performance tuning procedure.
- *inactivity_timeout* is the value you determined in step 27 in seconds. This timeout evicts an order from the JBoss cache.

30. Save and close the file.

31. Using a text editor, open the `osm-coherence-cache-config.xml` file. See ["Configuring and Monitoring Coherence Threads"](#) for more information about locating and externalizing the `osm-coherence-cache-config.xml` file.

32. Search on `osm-local-large-object-expiry`:

```
<scheme-name>osm-local-large-object-expiry</scheme-name>
  <eviction-policy>LRU</eviction-policy>
  <high-units>order_max</high-units>
  <low-units>0</low-units>
  <unit-calculator>FIXED</unit-calculator>
  <expiry-delay>inactivity_timeout</expiry-delay>
  <flush-delay>1000ms</flush-delay>
</local-scheme>
```

where

- *order_max* is the maximum number of orders that can be in the managed server's Coherence cache. Set this value to a high number, such as 2000 for the purposes of performance tuning procedure. You will change this number to a lower setting after completing the performance tuning procedure.
- *inactivity_timeout* is the value you determined in step 27 in seconds. This timeout evicts an order from the Coherence cache.

33. Save and close the file.

34. Restart all servers.

35. In the SoapUI load test screen, change the **Delay** field to a smaller number, such as 12000 which is two seconds, and run a second 30 minute load test.

36. Start the performance test for gathering medium and high volatility statistics.

37. Monitor the life LDS and ensure that the LDS is no more than 50% of the maximum old generation. If the order rate causes the LDS to increase above 50%, increase the **Delay** field amount on the SoapUI Load Test screen.

38. Log in to the order management schema.

39. Enable incremental statistics on medium and high volatility orders.

```
execute om_db_stats_pkg.set_table_prefs_incremental(a_incremental => true,a_
volatility => om_const_pkg.v_volatility_medium);
execute om_db_stats_pkg.set_table_prefs_incremental(a_incremental => true,a_
volatility => om_const_pkg.v_volatility_high);
```

40. During the performance test, gather statistics on the medium and high volatility orders. The following statements also reduce the number of threads used for gathering statistics to two so that order processing does not suffer a performance impact.

```
execute DBMS_STATS.SET_SCHEMA_PREFS(user, 'DEGREE', 2);
execute om_db_stats_pkg.gather_order_stats(a_force => true,a_volatility => om_
const_pkg.v_volatility_high);
execute DBMS_STATS.SET_SCHEMA_PREFS(user, 'DEGREE', 'DBMS_STATS.AUTO_DEGREE');

execute DBMS_STATS.SET_SCHEMA_PREFS(user, 'DEGREE', 2);
execute om_db_stats_pkg.gather_order_stats(a_force => true,a_volatility => om_
const_pkg.v_volatility_medium);
execute DBMS_STATS.SET_SCHEMA_PREFS(user, 'DEGREE', 'DBMS_STATS.AUTO_DEGREE');
```

Note: If this is the first time you run this performance test with optimizer statistics gathered, some sql execution plans may not be optimal. The database compares execution plans during the overnight maintenance window and accepts the better plans at that time. You may want to repeat the test the following day to see if there is a performance improvement. In addition, the you may want your DBA to review which execution plans the database selected during the maintenance window because they may not always be the most optimal.

Determining the Sustainable Order Rate for a Managed Server

The following procedure should be done after completing warm up procedures.

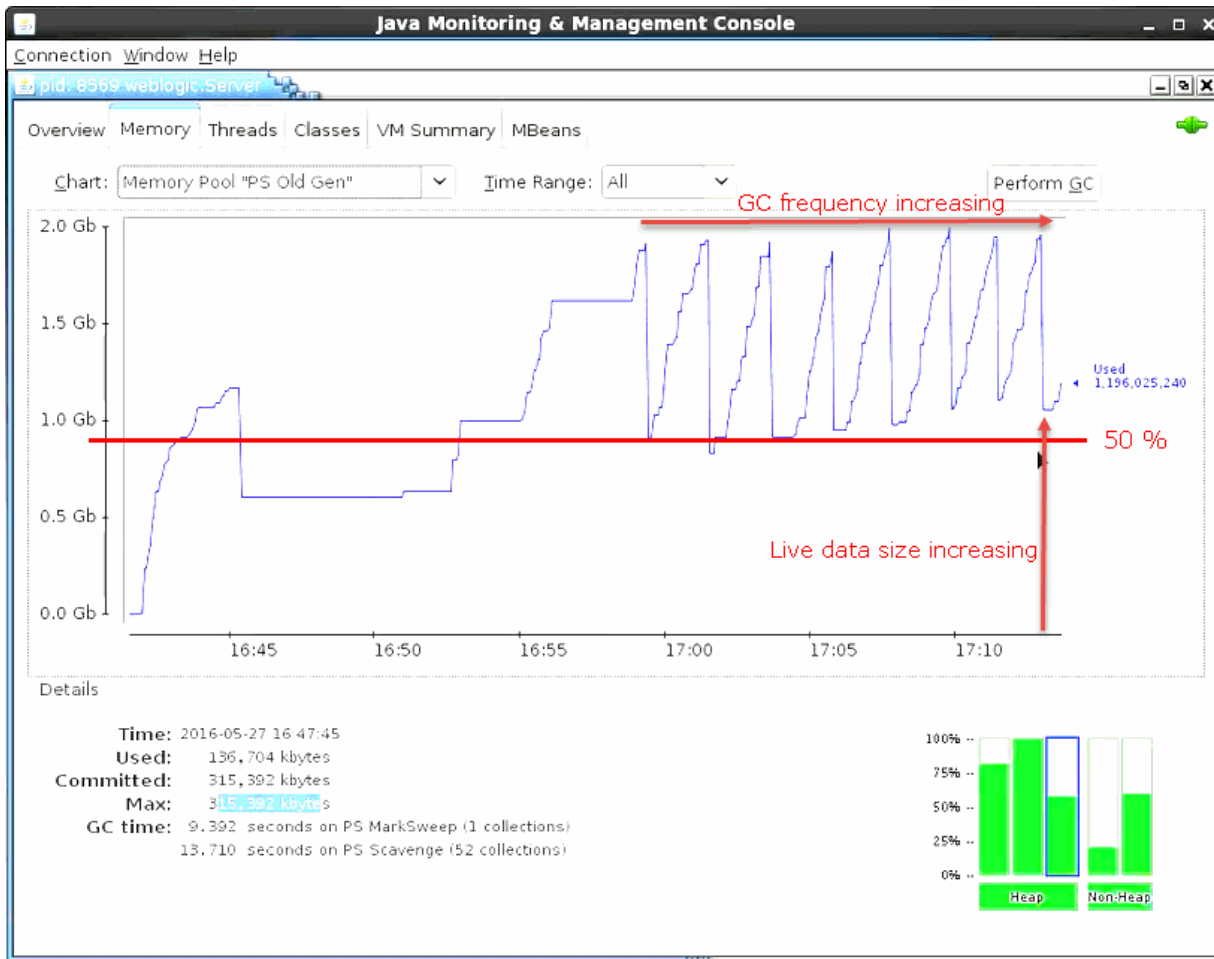
1. Log on to the Oracle database as sys or the equivalent (traditional database or the pluggable database) and create an Oracle database automatic workload repository (AWR) snapshot.
2. Open the SoapUI load test.
3. In the **Limit** field enter a number. For example **3600**. This value is in seconds and causes the load test to run for 60 minutes, which is sufficient for the performance test although in some cases a longer period is required.
4. In the **Threads** field, enter **4**.
5. In the **Delay** field, enter a number. For example **15000**. This value represents a 15000 millisecond delay interval (2.5 seconds) between order submissions. The higher the value, the longer delay, and the less orders are submitted. The lower the value, the shorter the delay, and more orders are submitted.
6. Start the performance test.
7. As you are running the performance test, run JConsole.
8. Monitor the LDS and ensure that the level is stable at around 50% of the maximum old generation. If the order injection rate causes the LDS to increase above 50% for an extended time and if the LDS continues to increase so that garbage collection

becomes more and more frequent, then decrease the number of orders you submit by increasing the **Delay** field amount on the SoapUI Load Test screen. For example, you might move from a 2.5 second delay to a 3 second delay.

Figure 11–2 shows garbage collection with a steadily increasing frequency and LDS size. If the order injection rate were to remain at the current level, the managed server would eventually crash.

The inverse scenario is also possible where the LDS size is lower than 50% and the frequency of garbage collection is much longer. In this case, you must increase the order injection rate by decreasing the Delay field amount on the SoapUI Load Test screen.

Figure 11–2 JConsole Garbage Collection Frequency and LDS Size



Note: The frequency of garbage collection and the size of the LDS for a 32 GB managed server is much larger than is depicted in [Figure 11-2](#). The maximum old generation in a 32 GB managed server is 17 GB and the target LDS is 50% of the old generation which is 8.5 GB. Depending on the size and complexity of your orders, garbage collection may take a long time to occur. For example, garbage collection may only occur once every half hour. If very long garbage collection intervals are occurring, then increase the length of the performance test to two or even three hours to get an accurate garbage collection sampling. See step 3 to increase the length of the performance test.

9. When the LDS level has stabilized during the performance test, verify the number of automation threads being used to support the current number of orders that the managed server is processing. This value will be used to set the work manager maximum thread constraint for automations.

To verify the number of automation threads in use and set the automation work manager maximum constraint, do the following:

- a. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.
- b. In the **Domain Structure** tree, expand **Environment** and then click **Servers**.
The Summary of Servers page is displayed.
- c. Click the name of the WebLogic server that you are tuning.
The configuration parameters for the server are displayed on a tabbed page.
- d. Click the **Monitoring** tab.
- e. Click the **Threads** subtab.
- f. Above the Self-Tuning Thread Pool Threads table, click **Customize this table**.
- g. In the **Filter by Column** list, select **Work Manager**.
- h. In the **Criteria** field, enter **osmAutomationWorkManager**.
- i. Click **Apply**.
- j. Refresh the screen every minute over 30 minutes to determine the highest number of active `osmAutomationWorkManager` threads you see after a refresh during that time.

[Figure 11-3](#) shows the beginning of a table that lists 60 active automation threads.

Note: It is possible that there may be no active threads after refreshing. This does not indicate a problem unless the result occurs consistently.

Figure 11–3 Automation Threads

Customize this table

Self-Tuning Thread Pool Threads (Filtered - More Columns and Entries exist)

Showing 1 to 60 of 60 Previous | Next

Name	Current Request	User	Work Manager
[ACTIVE] ExecuteThread: '16' for queue: 'weblogic.kernel.Default (self-tuning)'	Workmanager: osmAutomationWorkManager, Version: 0, Scheduled=false, Started=true, Started time: 52 ms	oms-automation	osmAutomationWorkManager
[ACTIVE] ExecuteThread: '17' for queue: 'weblogic.kernel.Default (self-tuning)'	Workmanager: osmAutomationWorkManager, Version: 0, Scheduled=false, Started=true, Started time: 52 ms	oms-automation	osmAutomationWorkManager

10. Determine the maximum number of orders that can be in the JBoss and Coherence cache:

- a. Open a terminal on the machine running the manager server that you are tuning.
- b. In a text editor, open `domain_home/servers/managed_server/logs/managed_server.out` (where *managed server* is the name of the managed server you are tuning).
- c. Search the log file for cache information using the **# Orders Information** text. Search through all instances and find the highest instance of the **Orchestration Cache** or the **Order Cache** value (whichever is greater of the two, although they are typically identical).

This example, after searching through 30 cache information instances, the following cache information instance shows the highest set of cache values:

```
Cache                % Full # Orders Information
-----
Closed Order Cache   12%   6/50
Historical Order Cache 8%   80/1000
Orchestration Cache  40%  400/1000
Order Cache          40%  401/1000
Redo Order Cache     0%   0/1000
```

You would select the Order Cache number in this example because it is higher than the Orchestration Cache number.

11. After you finish the test, log on to the Oracle database again and create a second AWR snapshot.
12. Generate a report using both AWR snapshots.
13. Ask a database administrator (DBA) to analyze the AWR report to determine whether the database is performing as expected. DBAs are trained to detect database performance issues such as an undersized database or suboptimal sql statement execution plans.

Tuning Work Manager Constraints and the Maximum Connection Pool Capacity

To set work manager constraints and the maximum connection pool capacity for OSM JDBC data sources, do the following:

1. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.

2. In the **Domain Structure** tree, expand **Environment** and then click **Work Managers**.

The Summary of Work Managers page is displayed.

3. Click **Lock & Edit**.

4. Select the **osmAutomationMaxThreadConstraint**.

The Configuration tab appears.

5. In the **Count** field, enter the number of automation threads you observed in step 9 of the "[Determining the Sustainable Order Rate for a Managed Server](#)" procedure.

The example in [Figure 11-3](#) of step 9 showed 60 automations active.

6. Click **Save**.

7. In the **Domain Structure** tree, expand **Environment** and then click **Work Managers**.

The Summary of Work Managers page is displayed.

8. Select the **osmGuiMaxThreadConstraint**.

The Configuration tab appears.

9. In the **Count** field, enter a number. This value is typically half of the **osmAutomationMaxThreadConstraint** count although if you have a solution that makes extensive use of manual tasks, you may need to raise this value.

For example, if the **osmAutomationMaxThreadConstraint** was 60 then the **osmGuiMaxThreadConstraint** would be 30. However, if the OSM client users begin to experience long delays before they can gain access to an OSM client session, then you may want to raise this value. You should include OSM client users in your performance test to make sure that the ratio of threads allocated to **osmGuiMaxThreadConstraint** and **osmAutomationMaxThreadConstraint** is properly balanced.

10. Click **Save**.

11. In the **Domain Structure** tree, expand **Environment** and then click **Work Managers**.

The Summary of Work Managers page is displayed.

12. Select the **osmJmsApiMaxThreadConstraint**.

The Configuration tab appears.

13. In the **Count** field, enter a number. A typical starting value is between 4 to 6 which is sufficient in most cases. If the overall health of the managed server and the database are good, but the Web Service JMS queue is accumulating messages, then this value could be increased. Increase the value incrementally, and run additional performance tests to ensure that the overall health of the managed server and database continues to be good.

14. Click **Save**.

15. In the **Domain Structure** tree, expand **Environment** and then click **Work Managers**.

The Summary of Work Managers page is displayed.

16. Select the **osmHttpApiMaxThreadConstraint**.

The Configuration tab appears.

17. In the **Count** field, enter a number. A typical starting value is between 4 to 6 which is sufficient in most cases. If the overall health of the managed server and the database are good then this value could be increased. Increase the value incrementally, and run additional performance tests to ensure that the overall health of the managed server and database continues to be good.
18. Click **Save**.
19. Add all the maximum constraints you have configured and divide the total by 0.80 (80%) to determine the maximum connection pool size. For example, if the you had the following constraint values:
 - `osmAutomationMaxThreadConstraint = 60`
 - `osmGuiMaxThreadConstraint = 30`
 - `osmJmsApiMaxThreadConstraint = 5`
 - `osmHttpApiMaxThreadConstraint = 5`
 which results in $100 / 0.80$ which equals $= 125$ maximum connection pool size.
20. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.
21. In **Domain Structure**, select **Services**, then **Data Sources**.
The Summary of JDBC Data Sources screen is displayed.
22. Select an OSM JDBC data source. The OSM JDBC data source are as follows:
`osm_pool_sid_group_y`
where *sid* is the Oracle RAC database instance system identifier and *y* is the group letter.
The Configuration tab is displayed
23. Click the **Connection Pools** tab.
24. In the **Maximum Capacity** field, enter the value you calculated in step 19.
25. Click **Save**.
26. Repeat steps 21 to 25 for all other OSM JDBC connections.
27. Click **Activate Changes**.

Tuning the JBoss and Coherence Maximum Order Cache

To set the maximum number of orders in the JBoss and Coherence cache for managed servers, do the following:

1. Using a text editor, open the `domain_home/oms-config.xml` file.
2. Change the JBoss OrderCacheMaxEntries value:

```
<oms-parameter>
  <oms-parameter-name>OrderCacheMaxEntries</oms-parameter-name>
  <oms-parameter-value>order_max</oms-parameter-value>
</oms-parameter>
```

where `order_max` is the maximum number of orders that can be in the managed server's JBoss cache. Set this value to the number orders in the cache that you observed in step 10 of the "[Determining the Sustainable Order Rate for a Managed Server](#)" procedure.

3. Save and close the file.
4. Using a text editor, open the `osm-coherence-cache-config.xml` file. See "[Configuring and Monitoring Coherence Threads](#)" for more information about locating and externalizing the `osm-coherence-cache-config.xml` file.
5. Search on `osm-local-large-object-expiry`:

```
<scheme-name>osm-local-large-object-expiry</scheme-name>
  <eviction-policy>LRU</eviction-policy>
  <high-units>order_max</high-units>
```

where `order_max` is the maximum number of orders that can be in the managed server's Coherence cache. Set this value to the number orders in the cache that you observed in step 10 of the "[Determining the Sustainable Order Rate for a Managed Server](#)" procedure.

6. Save and close the file.

Sizing the Redo Log Files

Using the AWR log files generated in the "[Determining the Sustainable Order Rate for a Managed Server](#)" section, check the log switches (derived) statistics. Log switching should occur at a frequency no less than 20 minutes apart. If the frequency of log switching is less than 20 minutes apart, then the redo log files are undersized. Increase the log file size, or number of redo log groups, or both.

Checkpoint frequency is affected by several factors, including log file size and the `FAST_START_MTTR_TARGET` initialization parameter. If you set this parameter to limit the instance recovery time, Oracle Database automatically tries to checkpoint as frequently as necessary. The optimal size can be obtained by querying the `OPTIMAL_LOGFILE_SIZE` column from the `V$INSTANCE_RECOVERY` view. If `FAST_START_MTTR_TARGET` is not set, `OPTIMAL_LOGFILE_SIZE` is not set either.

For more information see http://docs.oracle.com/cd/E11882_01/server.112/e41573/build_db.htm#PFGRF94147.

If the above change does not reduce checkpoint frequency, renice the LGWR to run at higher priority or run LGWR in the RT class by adding LGWR to the parameter: `_high_priority_processes='VKTM|LGWR'`. Only change `_high_priority_processes` in consultation with database support. For example, more processes may need to be added, such as PMON. And if the database is RAC, LMS should be added to this parameter. Test this change thoroughly.

Finally, if all other methods fail to reduce checkpoint frequency, set the `_log_parallelism_max` hidden parameter after consultation with database support.

Additional Performance Testing Options

The following sections provide additional performance testing options.

Performance Related Features for Large Orders

In some cases, you might want to model large orders for OSM. A large order typically contains a sizeable payload with more than a hundred order items, and where each order item may contain many data elements. OSM provides the following features that can help you manage these large orders:

- Order automation concurrency control (OACC) is a policy driven OSM function that you can use to limit the number of concurrent automations plug-in instances

that OSM can process at one time. For large orders, this ability can significantly reduce contention caused by an excessive number of automation plug-ins processing at the same time. High levels of automation plug-in contention can create performance issues because of the number of message retries and timeouts on the JMS queues. You can specify a policy using the `AutomationConcurrencyModels` parameter in the `oms-config.xml` file (see *OSM System Administrator's Guide*) or you can include an OACC policy in solution cartridge. See *OSM Developer's Guide* for information about creating OACC policies.

- Use the `oracle.communications.ordermanagement.table-layout.size` and the `oracle.communications.ordermanagement.table-layout.fetch-size` `oms-config.xml` parameter to create a threshold that limit the number of order rows that OSM can retrieve at one time from the database when using **Data** tab in the Order Management web client. See *OSM System Administrator's Guide* for more information.
- Use the `oracle.communications.ordermanagement.table-layout.threshold` `oms-config.xml` parameter to specify a threshold that automatically applies the style behavior table layout if a multi-instance node exceeds the threshold when using **Data** tab in the Order Management web client. See *OSM System Administrator's Guide* for more information.
- Ensure that the `show_all_data_history_logs_for_orderdetails` is set to false to reduce the number of logs that OSM generates. See *OSM System Administrator's Guide* for more information.

Distribution of High-Activity Orders

High-activity orders have a large number of processes, sub-processes, and tasks that must be run concurrently. Because the workload for a high-activity order can be significantly higher than for a typical order, OSM may redistribute a high-activity order to another active server instance proportionate to the managed server weights within the cluster. This redistribution based on weight ensures that one managed server does not get an unfair share of high-activity orders because of round robin-load balancing and ensures that high-activity orders are properly distributed among members in the cluster.

Note: A high-activity order is not exempt from order affinity: when OSM redistributes the order, it transfers the entire order and order ownership to another managed server. This redistribution does not mean that the order is being processed and owned by more than one managed server. See "[About Order Affinity and Ownership in an OSM WebLogic Cluster](#)" for more information.

High activity order processing is enabled by default. To tune or disable the high-activity order routing mode in OSM, you must configure a set of related parameters in the `oms-config.xml` file. See *OSM System Administrator's Guide* for a detailed reference of available parameters.

Measuring Order Throughput

Based on the order complexity guidelines specified in "[Overview of Planning Your OSM Production Installation](#)", you can calculate order throughput per second (TPS) using the following formula:

(throughput in task transitions per second) / (average number of tasks per order)

Throughput can then be calculated hourly, by multiplying by 3600 seconds per hour; or daily, by multiplying by 3600 seconds per hour plus the number of operating hours per day.

To determine a TPS value:

1. Log onto a database.
2. Enter the following statements:

```
alter session set nls_date_format = 'dd-mon-yyyy hh24:mi:ss';

select
    count(*),
    min(timestamp_in),
    max(timestamp_in),
    24*3600*(max(timestamp_in)-min(timestamp_in)) duration,
    to_char ((count(*)/(24*3600*(max(timestamp_in)-min(timestamp_in)))),
    '9999.999') tasks_per_sec
from om_hist$order_header
where hist_order_state_id = 4 and task_type in ('A','M','C') and
timestamp_in between 'dd-mon-yyyy hh24:mi:ss' and 'dd-mon-yyyy hh24:mi:ss';
```

where

- *dd* is the day.
- *mon* is the first three letters of the month.
- *yyyy* is the year.
- *hh24* is the number of hours in the 24 hour format.
- *mi* is the number of minutes.
- *ss* is the number of second.

Using the OM_ORDER_NODE_ANCESTRY Table

OM_ORDER_NODE_ANCESTRY is a table that stores the hierarchy of order group nodes. The table improves the efficiency and response time of worklist and order search queries, mainly for cartridges that have multi-instance subprocesses and a large number of flexible headers. For more information about parallel processes and multi-instance subprocesses, see the topic about understanding parallel process flows in *OSM Concepts*.

The downside of enabling the OM_ORDER_NODE_ANCESTRY table is increased CPU usage for order creation and updates, increased order creation response time, and most importantly increased disk usage. Specifically, OM_ORDER_NODE_ANCESTRY is one of the largest tables in OSM. It is often responsible for more than 20% of the space, depending on the depth of order templates, especially for large orders, such as O2A. Therefore, this table is disabled by default.

An Oracle database package called OM_ORDER_NODE_ANCESTRY_PKG contains the stored procedures that allow you enable and disable the OM_ORDER_NODE_ANCESTRY table.

Note: If you deploy cartridges with multi-instance subprocesses and are considering running OSM with the OM_ORDER_NODE_ANCESTRY table disabled, you must evaluate factors such as the ancestry depth in the master order template and the number of flexible headers, which could impact performance in the UI worklist and search results.

Table 11-1 shows the performance implications of running different cartridges in OSM with the OM_ORDER_NODE_ANCESTRY table enabled or disabled.

Table 11-1 Performance Implications of the OM_ORDER_NODE_ANCESTRY Table

OSM Solution	OM_ORDER_NODE_ANCESTRY Table Status	Performance Implications
Cartridges that do not require multi-instance subprocesses	Disabled	Positive impact: <ul style="list-style-type: none"> ■ Saves CPU time ■ Reduces order creation time ■ Improves throughput ■ Reduces OSM schema disk storage
Cartridges that require multi-instance subprocesses	Enabled	Positive impact: <ul style="list-style-type: none"> ■ Improves response time when users retrieve worklist tasks and search orders Negative impact: <ul style="list-style-type: none"> ■ Increases CPU time ■ Increases order creation time ■ Degrades throughput ■ Increases OSM schema disk storage In this case, consider compressing the ancestry table. For more information about Oracle advanced compression, see Oracle Technology Network. Note that compression has the following negative impact: <ul style="list-style-type: none"> ■ Further increases order creation time ■ Increases SQL database CPU per execution (INSERTs)
Cartridges that require multi-instance subprocesses	Disabled	Positive impact: <ul style="list-style-type: none"> ■ Saves CPU time ■ Reduces order creation time ■ Improves throughput ■ Reduces OSM schema disk storage Negative impact: <ul style="list-style-type: none"> ■ Increases the response time when users retrieve worklist tasks and search orders In this case, Oracle recommends: <ul style="list-style-type: none"> ■ Avoiding deep order template node hierarchies ■ Eliminating unnecessary flexible headers

Enabling the OM_ORDER_NODE_ANCESTRY Table

When the OM_ORDER_NODE_ANCESTRY table is enabled, OSM populates the OM_ORDER_NODE_ANCESTRY table with data and uses queries on this table to support UI worklist and order searches. Running OSM in this mode is effective for new order id blocks. A new block is allocated when the current partition where new orders are created (known as the active partition) is exhausted.

Order ids are stored in the OM_ORDER_ID_BLOCK table. In this table, a column called ANCESTRY_POPULATED_UP_TO indicates the last order id in the block of order ids that has data in the OM_ORDER_NODE_ANCESTRY table.

An active order id block can be split logically, as in the following example:

- An order id block contains order ids from 0 to 100000. The order id block is NOT split yet and all order ids in this block contain ancestry data.
- An order id block is split. Orders ids between order id 0 and 2000 have ancestry data. Orders between order id 2001 and 100000 do not have ancestry data.

A block of order ids is **active** if it is the latest block for the current database instance (DBINSTANCE). The previous blocks for the database instance are **inactive** blocks.

When users retrieve worklist tasks or search for orders, OSM uses the data in order id blocks to determine if queries are run against the OM_ORDER_NODE_ANCESTRY table (old queries) or the OM_ORDER_INSTANCE table (new queries).

Note: Ancestry data is used only if the cartridge includes multi-instance tasks (pivot nodes).

You might need to switch several times between running OSM with the OM_ORDER_NODE_ANCESTRY table enabled and disabled. The following example scenarios illustrate circumstances that might necessitate switching between the two modes.

Scenario 1: Introducing multi-instance subprocess entities (enable, disable, enable)

1. You have upgraded OSM to a later version that includes this functionality. OSM continues to run with the OM_ORDER_NODE_ANCESTRY table enabled.
2. Because of large volumes of orders, you determine that OSM cartridges do not use multi-instance subprocesses and decide to disable the OM_ORDER_NODE_ANCESTRY table.
3. Some time later, you introduce multi-instance sub-process entities (for example, OSM needs to run a sub-process for each of the multiple addresses a customer has) by redeploying existing, or deploying new, cartridges.
4. You then determine that the worklist demonstrates performance degradation and decide to re-enable the OM_ORDER_NODE_ANCESTRY table.

Scenario 2: Eliminating multi-instance subprocess entities (disable, enable, disable)

1. You install the latest release of OSM, which includes this functionality. The OM_ORDER_NODE_ANCESTRY table is disabled.
2. You deploy a cartridge that uses multi-instance subprocesses, and leave the table disabled because performance test results are satisfactory.
3. You then determine that the worklist demonstrates performance degradation and decide to enable the OM_ORDER_NODE_ANCESTRY table.

4. Some time later, you redeploy updated cartridges so that all multi-instance subprocesses are eliminated. You then disable the OM_ORDER_NODE_ANCESTRY table.

You can run this procedure when OSM is online or offline.

To enable the OM_ORDER_NODE_ANCESTRY table:

1. Log in to SQL*Plus as the OSM core schema user.
2. Run the following command:

```
begin
    om_order_node_ancestry_pkg.enable_ancestry_table;
end;
```

Disabling the OM_ORDER_NODE_ANCESTRY Table

Running OSM with the OM_ORDER_NODE_ANCESTRY table disabled is suitable if you are deploying cartridges that do not include multi-instance subprocesses. When you run OSM with the table disabled, the OM_ORDER_NODE_ANCESTRY table is not populated and hierarchical queries (for cartridges with multi-instance subprocesses) that are run using UI worklist or search functionality return ancestry data from the OM_ORDER_INSTANCE table.

You must disable the OM_ORDER_NODE_ANCESTRY table when OSM is offline because the procedure uses the last order id to split the block of order ids into two parts: populated and non-populated. For example, if the current order id is 100 and the last order id in the active block is 10000:

- [1...100...10000] is logically split into:
 - [1...100]: order ids with populated ancestry
 - [101...10000]: order ids with non-populated ancestry

To disable the OM_ORDER_NODE_ANCESTRY table:

1. Log in to SQL*Plus as the OSM core schema user.
2. Take the OSM server offline. For more information about stopping OSM, see *OSM System Administrator's Guide*.
3. Run the following command:

```
begin
    om_order_node_ancestry_pkg.disable_ancestry_table;
end;
```

Note: You can run the disable OM_ORDER_NODE_ANCESTRY table procedure only once on a single block of ids because the current block of ids can be split only once.

Upgrading to OSM 7.3.1

This chapter describes how to upgrade Oracle Communications Order and Service Management (OSM) to version 7.3.1.

About OSM Upgrades

Upgrading OSM consists of the following process:

- Planning the upgrade
- Implementing and testing the upgrade on a development system
- Preparing to upgrade a production system
- Implementing and testing the upgrade on the production system

The upgrade process includes these tasks:

- Gather a list of components installed in your current OSM system
- Document the configuration selections made when installing your current OSM system
- Upgrade the platform (if applicable)
- Upgrade the Oracle WebLogic Server core software (if applicable)
- Upgrade or create a new WebLogic domain (if applicable)
- Update the WebLogic domain
- Upgrade the Oracle Database (if applicable)
- Upgrade the OSM software

The post upgrade process includes these tasks:

- Upgrade the development environment, including Oracle Communications Design Studio, Ant, GraphViz, OSM SDK, and OSM Tools
- Upgrade and redeploy cartridges to the OSM 7.3.1 server

For current version and patch information, see "[OSM System Requirements](#)."

Note: If you are upgrading from OSM 7.3.0 to OSM 7.3.1, you do not need to upgrade the database or WebLogic Server, as the versions are the same.

Supported Upgrade Paths

You can upgrade to OSM 7.3.1 from any OSM 7.x release.

Note: If you are upgrading OSM using a patch from My Oracle Support, you must read the patch Readme text and the contents of this chapter. In some cases the patch Readme may provide specific instructions that supersede those instructions included in this chapter.

Note: If you upgrade to Order and Service Management 7.x from a prior version of OSM and your cartridges were developed with OSM Administrator tool, Oracle recommends that you migrate your cartridges into Oracle Communications Design Studio. Use Design Studio as the tool to design and deploy OSM 7.x cartridges. The recommended migration procedure, common migration issues, and issue resolutions are documented in release 7.3.2 *Design Studio Order and Service Management Cartridge Migration Guide*, which is available in the Oracle Help Center:

<http://docs.oracle.com/en/industries/communications/design-studio/index.html>

About Backing Up Your Data

Before upgrading OSM, make a backup of your data files and the database. For general OSM backup and restore information, see *OSM System Administrator's Guide*. All of the backup information in that document is relevant to performing a backup prior to an upgrade.

OSM does not recreate or overwrite any existing WebLogic resources (including OSM users, groups and queues) except for the resources that were removed prior to upgrade (such as **oms.ear** and **cartridge_management_ws.ear**), which are upgraded if the existing version is lower than the version to which you are upgrading.

About Upgrading Oracle Database

The procedures in this section should be performed only by a qualified database administrator.

If you are upgrading from OSM 7.3 to 7.3.1, you do not need to upgrade the database. If you are performing an upgrade that requires a database version upgrade as well, you first upgrade the database and then upgrade OSM. In this case, the normal backup and restore procedures as discussed in *OSM System Administrator's Guide* still apply. It is recommended to back up the database both before and after upgrading it.

About OSM Customizations

Any customizations to views, tables, triggers, or other entities stored in the OSM database schema must be reapplied after OSM is upgraded.

Any custom reports on the OSM database schema must be reapplied or rewritten if schema changes are made to the newer database.

About Creating a New Localization JAR File

If you have localized data in a pre-7.3 OSM database schema, a new set of OSM 7.3 localization files must be created and reapplied after OSM is upgraded. You cannot reuse the **omsmodel_110.jar** file from a previous release.

For details about how to recreate the **omsmodel_110n.jar** file, refer to *OSM Developer's Guide*. Reapply localization data from the previous versions of the JAR file to the newer JAR file.

About Installer Disk Space

The amount of disk space required when upgrading is often higher than the 600 MB recommended for a new installation, and depends on the amount of disk space that is being used by the existing system. Oracle recommends that you test the upgrade in a non-production environment to determine the space required for your database.

To reduce the amount of disk space when upgrading, make sure to purge orphan data and unnecessary orders, and drop unnecessary partitions, in order to use as little data as possible. For information about purging data and dropping partitions, see the topic about managing the OSM database schema in *OSM System Administrator's Guide*.

About Execute Queues and Work Managers

Prior to OSM 7.2.4, the system prioritized work using execute queues. Execute queues have been replaced by work managers, which can be created and configured using WebLogic Server console. Running the installer removes the old execute queues and creates default work managers.

If you have custom execute queues running on your system, Oracle recommends that you remove them and create an equivalent work manager. For more information about creating and configuring work managers, see *OSM System Administrator's Guide*. For information about using work managers to optimize scheduled work, see *Oracle Fusion Middleware Configuring Server Environments for Oracle WebLogic Server*.

Preparing for an OSM Upgrade

The following sections describe how to prepare the OSM environment for an OSM upgrade.

Preparing the Environment

To prepare the OSM environment:

1. Ensure that all transactions are committed and (if you are upgrading from a pre-7.2 version of OSM) all JMS messages are consumed.
2. Stop all of the processes running against OSM (including the XML Import/Export application, XMLAPI agents and others). For more information about how to stop OSM, see *OSM System Administrator's Guide*.
3. Stop the WebLogic Server.
4. Back up the OSM database.

Caution: The OSM installer stops the OSM schema upgrade if it encounters any issues. This can render the schema unusable. The OSM installer cannot rectify this problem on its own.

5. Do the following:
 - If you are creating a new WebLogic domain, back up the existing WebLogic server domain directory, custom SDK files, and scripts to a directory outside of your OSM installation.
 - If you are upgrading the existing OSM 7.2 WebLogic domain, archive the *MW_home* directory including all subdirectories. Archive the *WLS_home* directory as well if it is not located in the *MW_home* directory.
6. Start the WebLogic server.
7. Stop the OSM WebLogic application component **oms.ear** using the WebLogic console, and then delete the **oms.ear** file.
8. If you are upgrading from a version of OSM higher than 7.0, delete the **oms.ear** and any automation plug-in **.ear** files from WebLogic using the Administration Console. Also, manually delete these files from their respective directories located under *domain_home/servers/admin_server/upload/* where *admin_server* is the name of the administration server for the domain. Do not delete *cartridge_management_ws.ear* either from the deployments in the Administration Console or from the file system.
9. If you are upgrading a development system that uses the Order-to-Activate cartridges and the Activation Integration Architecture emulators, remove the emulator **.ear** files from WebLogic using the console. Also, manually delete these files from under *domain_home/servers/admin_server/upload/* where *admin_server* is the name of the administration server for the domain. You will have to re-deploy the emulator after the upgrade process is complete.
10. Stop the WebLogic Server.

Upgrading or Creating the WebLogic Domain

The following sections describe the steps to prepare the WebLogic domain for an OSM upgrade. You can:

- Skip this step. This is supported for OSM 7.3 to OSM 7.3.1.
- Upgrade the existing WebLogic domain. This option is supported for OSM 7.2.2 or OSM 7.2.4 to OSM 7.3.1.
- Create a new WebLogic domain.

If you are upgrading an OSM release earlier than 7.2.2, you must create a new WebLogic domain for 12c.

Before you upgrade or create the WebLogic Server domain see *Oracle Fusion Middleware Upgrade Guide for Oracle WebLogic Server 12c (12.1.3)* and review the steps to:

- Upgrade custom security providers
- Upgrade Node Managers
- Upgrade WebLogic Domain
- Upgrade WebLogic Domain (remote managed servers)

Upgrading the OSM 7.2.2 or OSM 7.2.4 WebLogic Domain to Fusion Middleware 12.1.3

The high-level steps for upgrading an OSM 7.2.2 or 7.2.4 WebLogic Domain to Oracle Fusion Middleware 12.1.3 are the following:

Note: For more detailed instructions, follow the procedure that matches the upgrade for your domain in *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.

1. Install the recommended JDK and required third-party software. For more information, see "[OSM System Requirements](#)."
2. Download and Install WebLogic Server Software and ADF 12.1.3. For more information, see "[Installing and Configuring the WebLogic Server Cluster](#)."
3. Prepare the security store. The following steps use a basic OSM domain as an example:

- a. Download the RCU version 11g from Oracle support as patch 16471709.
- b. Run RCU version 11g to create only the OPSS schema (assuming the domain has only OPSS information to be upgraded).
- c. Create a Data Source Instance pointing to the OPSS schema.

The JNDI name of the JDBC data source entered in the procedure will be used in the next step.

- d. Re-associate the file-based security store to a database-based security store by using the WLST command `reassociateSecurityStore`.

Run the WLST command by using the `wlst.cmd` (for Windows) or `wlst.sh` (for UNIX and Linux) command in the `MW_home/oracle_common/common/bin` directory. For example:

```
reassociateSecurityStore(domain=BEA, servertype=DB_ORACLE,
jpsroot=cn=jpsroot, datasourcename=jdbc/OpssDataSource)
```

where `BEA` is your domain name, and `jdbc/OpssDataSource` is the JNDI name of the JDBC data source that you created in step c.

Note: Ensure you have followed the steps in "[Preparing the Environment](#)" and that you have stopped and deleted the `oms.ear` file. Deleting the `oms.ear` file prevents the previous oms application from running in the new upgraded domain.

- e. Stop all WebLogic servers and processes.

For more information, see *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.

4. Upgrade the security store by doing the following:
 - a. Go to the `MW_home(12c)/oracle_common/upgrade/bin` directory and run Oracle Fusion Middleware Upgrade Assistant by using the following command:

```
ua.sh/cmd
```
 - b. Select **Schemas**.
 - c. In the Available Components page, make sure you select Oracle Platform Security Services in order to upgrade the OPSS schema.

For more information, see *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.

5. Use RCU version 12c to create the remaining (not including OPSS) database schemas that will be used by the domain. For more information, see "[Creating Database Schemas Using RCU](#)."
6. After the schemas are upgraded, reconfigure the domain by doing the following:
 - a. Go to the `MW_home(12c)/oracle_common/upgrade/bin` directory and run the Reconfiguration Wizard by using the following command:

```
reconfig.sh/cmd
```
 - b. In the Advanced Configuration step, select **Deployments and Services**.

Note: In the Deployments Targeting Screen, ensure all (required) libs and applications are targeted to the OSM cluster but changes are not required for other servers. In the Service Targeting Screen, besides the OSM data-source to OSM cluster/server, ensure that all non-OSM data sources that are used by the domain are deployed into the Administration server, OSM cluster/server and proxy server.

For more information, see *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.

7. Upgrade component configurations by doing the following: For more information, see *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.
 - a. Go to the `MW_home(12c)/oracle_common/upgrade/bin` directory and run Oracle Fusion Middleware Upgrade Assistant by using the following command:

```
ua.sh/cmd
```
 - b. Select **WebLogic Component Configurations**.
 - c. After the Upgrade Assistant successfully completes the WebLogic component configurations operation, start the servers and verify in WebLogic Console that all the relevant servers, applications, and libraries are upgraded to 12c. For information about packing and unpacking the upgraded domain to distribute to other machines in a clustered environment, see "[Replicating the Domain on Other Machines](#)."

For more information, see *Oracle Fusion Middleware Upgrading to the Oracle Fusion Middleware Infrastructure*.

Note: After the domain upgrade finishes, and before you install OSM 7.3.1, you must use WebLogic Console to go to JMS Connection Factories (for example, `oms_connection_factory`) to ensure that the **Default Targeting Enabled** check box is not selected. If it is selected, de-select it and then re-start the servers, if necessary.

Creating a New 12.1.3 WebLogic Domain

To create a new WebLogic 12.1.3 domain with ADF 12.1.3:

Note: You must create a new WebLogic 12.1.3 domain with ADF 12.1.3 if you are upgrading from OSM 7.0.x. Review the existing hardware and ensure it is supported by OSM 7.3.1, otherwise you must upgrade to supported hardware. For more information, see ["General Hardware Sizing and Configuration Recommendations."](#)

1. Install the recommended JDK version. See ["Software Requirements"](#) for details on the recommended version.
2. Install Oracle Fusion Middleware Infrastructure 12.1.3 which includes Oracle WebLogic Server 12.1.3 and ADF 12.1.3. See ["Software Requirements."](#)
3. Apply any required Oracle WebLogic Server and ADF patches. See ["Software Requirements"](#) for details.
4. Create a new 12.1.3 domain. Use the same domain name as the existing domain. When creating the new 12.1.3 domain, Oracle recommends that you select **Oracle Enterprise Manager** template, in order to view and manage OSM logs. Also, you must select **Oracle JRF**. This is required for OSM as it makes use of ADF. See ["Installing and Configuring the WebLogic Server Cluster."](#)

Note: When you select the **Oracle JRF** template, the template for **WebLogic Coherence Cluster Extension** is also selected. Do not deselect the coherence cluster extension template option.

Re-create user accounts and settings. You must recreate all the users and other settings that you had configured in your old domain in your new 12.1.3 domain. Note that password requirements may have changed with the newer version of Oracle WebLogic. If you are upgrading a system that uses the Order-to-Activate cartridges, users and settings to support the cartridges will have to be recreated. See ["Updating Order-to-Activate Cartridges."](#)

If your previous domain was in a clustered WebLogic Server environment re-create the same environment. See ["Installing and Configuring the WebLogic Server Cluster"](#) for information about installing OSM in a clustered environment in this guide.

Updating the WebLogic Domain

The following section describes WebLogic domain updates that may be required.

Updating JMS Security Policy Settings

Starting with OSM 7.0.1, JMS Queues or Topics that are part of the JMS system module (**oms_jms_module**) have a security policy. No action is required for applications built using the OSM SDK, but modifications are required to external (non-OSM) applications that communicate with OSM using JMS.

An application that communicates with OSM using JMS already has **ejb-jar.xml** and **weblogic-ejb.jar.xml** files in the code. Before these applications are used with OSM 7.0.1 or later, the following additions must be made.

In the **ejb-jar.xml** file, add a `<security-identity>` for each EJB. In the example below the EJB is a message-driven bean.

```
<message-driven>
  ...
```

```

    <security-identity>
      <run-as>
        <role-name>test-role</role-name>
      </run-as>
    </security-identity>
  </message-driven>

```

In the **ejb-jar.xml** file, include the `<security-role>` as a part of the `<assembly-descriptor>`:

```

<assembly-descriptor>
  <security-role>
    <description/>
    <role-name>test-role</role-name>
  </security-role>
  ...
</assembly-descriptor>

```

In the **weblogic-ejb.jar.xml** file map the `<security-role>` to the oms-automation user to allow EJBs to access the JMS resources:

```

<weblogic-ejb-jar>
  ...
  <security-role-assignment>
    <role-name>test-role</role-name>
    <principal-name>oms-automation</principal-name>
  </security-role-assignment>
  <run-as-role-assignment>
    <role-name>test-role</role-name>
    <run-as-principal-name>oms-automation</run-as-principal-name>
  </run-as-role-assignment>
</weblogic-ejb-jar>

```

Upgrading the Database

If you are currently running on an 11gR1 database, export the OSM data, upgrade the database to 12c (12.1.3) and import the OSM data. See "[Software Requirements](#)" for version details and information on required patches.

Refer to the Oracle Database documentation for information about upgrading Oracle Database Server from version 11gR1 to 11gR2 and how to migrate data.

Updating Coherence Properties for Managed Servers

The coherence cluster property for non-OSM managed servers might all be set to the same default value, which creates a conflict in the environment.

If you are upgrading OSM in a non-clustered environment, you must update coherence properties from the default, after you upgrade the domain and before you run the installer.

To update coherence properties in a non-clustered environment:

1. Log in to the WebLogic Server Administration Console.
2. In the Domain Structure tree, expand **Environment**, and then click **Servers**.
The Summary of Servers window is displayed.
3. Click **Lock & Edit**.
4. Do one or both of the following:

- On the Coherence tab for each non-OSM managed server, set the **Coherence Cluster** property to **None**.
 - On the Coherence tab for the OSM managed server, set the **Coherence Cluster Unicast Listen Port** property to a unique port.
5. Click **Save**.
 6. Click **Release Configuration**.

Upgrading the SDK Library Names

The OSM 7.3.1 installation includes changes to the names of some of the SDK library JAR files. If you have a custom implementation that has SDK library references in the classpath, you need to change these references so that they use the new JAR file names.

[Table 12–1](#) lists the old file names that you need to replace with the new file names in classpath references.

Table 12–1 SDK Third-Party Library JAR File Names

Old File Name	New File Name
commons-codec-1.9.jar	commons-codec.jar
commons-collections4-4.0.jar	commons-collections4.jar
commons-io-2.4.jar	commons-io.jar
commons-lang-3.3.1.jar or commons-lang3-3.3.2.jar	commons-lang3.jar
commons-logging-1.1.1.jar	commons-logging.jar
commons-net-3.3.jar	commons-net.jar
commons-pool2-2.2.jar	commons-pool2.jar
commons-vfs2-2.0.jar	commons-vfs2.jar
httpclient-4.1.2.jar or httpclient-4.3.5.jar	httpclient.jar
httpcore-4.3.2.jar	httpcore.jar
jaxen-1.1.3.jar or jaxen-1.1.6.jar	jaxen.jar
ojdbc6.jar	ojdbc7.jar
resolver.jar	xml-resolver.jar
saxon9-dom.jar or saxon-license.lic	saxon-ee-java-osm-license.jar
saxon9-xpath.jar saxon9.jar saxon9ee.jar	saxon-ee-java.jar
text-table-formatter-1.1.1.jar	texttablefmt.jar
xschema.jar	[no longer needed as a separate library, now part of xmlparserv2.jar]

Upgrading OSM to 7.3.1

This procedure describes how to upgrade OSM to version 7.3.1.

Caution: Before upgrading, refer to "[About OSM Upgrades](#)" for important preparation steps.

Upgrading the Database Schema for OSM Versions 7.2.2.0 through 7.2.2.3 Only

If you are upgrading to OSM 7.3.1 from OSM version 7.2.2.0 through OSM version 7.2.2.3, there is an extra procedure you have to follow. You need to update the database schema to the one for OSM 7.2.2.3.5 before performing the full upgrade. If you are upgrading from any other version of OSM, you do not need to follow this procedure.

Note: Make sure that you read the patch Readme text for any additional instructions that either augment or supersede the information provided in this section.

To upgrade the database schema for OSM versions 7.2.2.0 through 7.2.2.3:

1. Ensure the Weblogic Server domain is not running.
2. Download the OSM 7.2.2.3.5 patch from Oracle support. The patch number is **18422521**.
3. Extract the installer from the patch file.
4. Run the installer. See "[Installing OSM](#)" for more information about running the installer.
5. Choose **Custom Installation** for the Setup Type when prompted.
6. When prompted to select the components to install, select only the **Database Schema** component.
Selecting this option will cause the installer to migrate the database schema.
7. When prompted to enter database information, enter the information for your current OSM database.
8. When prompted to enter the database credentials, enter the user name and password for the current OSM core schema user and rule engine user.
9. In the Database Schema Found window, select **Upgrade**.
10. Continue with the installation of the database schema until the process is finished.
11. Perform the regular OSM upgrade to version 7.3.1. See "[Performing the OSM Upgrade](#)" for more information.

Recovering from a Database Upgrade Failure

If an error occurs while the installer is upgrading the database schema, you can fix the error and rerun the installer. The installer then resumes the upgrade from the point of failure, which means you do not have to roll back the entire upgrade and start from the beginning.

For the procedure for upgrading OSM, see "[Performing the OSM Upgrade](#)."

When you run the installer, the installer generates and then stores an upgrade plan. When you re-run the installer after a failure, this plan is executed one action at a time. In general, each migration script and SQL statement that modifies the schema is a separate action and database transaction.

The following are the high-level steps in the process of recovering from a database upgrade failure. For information about handling an OSM database schema installation failure, see "[Handling an OSM Database Schema Installation Failure](#)."

1. [Finding the Issue that Caused the Failure](#)
2. [Fixing the Issue that Caused the Failure](#)
3. [Restarting the Upgrade from the Point of Failure](#)

Finding the Issue that Caused the Failure

When the installer fails during an installation or upgrade, you receive an error message. Before you continue with the installation or upgrade, you must find and resolve the issue that caused the failure. There are several places where you can look to find information about the issue.

The **database installation plan action spreadsheet** is a file that contains a summary of all the installation actions that are part of this OSM database schema installation or upgrade. The actions are listed in the order that they are performed. The spreadsheet includes actions that have not yet been completed. To find the action that caused the failure, go to the `OSM_home/Database/osm-db-installer-core/install/om_$(install$plan_actions.csv)` file and review the **status** column. The failed action is the first action with a status that is **FAILED**. The **error_message** column of that row contains the reason for the failure.

The **database installation log file** gives a more detailed description of all the installation actions that have been run for this installation. The issue that caused the failure is located in the `OSM_home/Database/osm-db-installer-core/install/dbInstaller.log` file. The failed action is typically at the bottom, that is, the last action that was performed.

There are also the following database tables that contain information about the database installation:

- **om_\$(install\$plan_actions**: Contains the same information as the database plan action spreadsheet. Compare this table to the spreadsheet in cases of a database connection failure.
- **om_\$(install\$plan**: Contains a summary of the installation and any upgrades that have been performed on this OSM database schema.

Fixing the Issue that Caused the Failure

Use the information in the log or error messages to fix the issue before you restart the upgrade process. For information about troubleshooting log or error messages, see *OSM System Administrator's Guide*.

Restarting the Upgrade from the Point of Failure

In most cases, restarting the upgrade consists of pointing the installer to the schema that was partially upgraded, and then rerunning the installer.

Keep the following in mind when preparing to restart an upgrade:

- Most migration actions are a single transaction, which is rolled back in the event of failure. However, some migration actions involve multiple transactions. In this case, it is possible that some changes were committed.
- Most migration actions are repeatable, which means that they can safely be re-run even if they were committed. However, if a failed action is not repeatable and it committed some changes, either reverse all the changes that were committed and set the status to **FAILED**, or complete the remaining changes and set the status to **COMPLETE**.

To restart the upgrade after a failure:

1. Determine which action failed and why by using the information in ["Fixing the Issue that Caused the Failure."](#)
2. If the status for the failed action is **STARTED**, check the database to see whether the action is finished or still in progress.
3. If the failed action is still in progress, either end the session or wait for the action to finish (roll back).

Note: The transaction might not finish immediately after the connection is lost, depending on how fast the database detects that the connection is lost and how long it takes to roll back.

4. Fix the issue that caused the failure.

Note: If the failure is caused by a software issue, contact Oracle Support. With the help of Oracle Support, determine whether the failed action modified the schema and whether you need to undo any of those changes.

If you decide to undo any changes, leave the action status set to **FAILED** or set it to **NOT STARTED**. When you retry the upgrade, the installer starts from this action. If you manually complete the action, set its status to **COMPLETE**, so that the installer starts with the next action. Do not leave the status set to **STARTED** because the next attempt to upgrade will not be successful.

5. Restart the upgrade by running the installer.

The installer restarts the upgrade from the point of failure.

Performing the OSM Upgrade

To upgrade OSM:

1. If you are using an existing WebLogic domain (for example, because you are upgrading from OSM 7.3.0), rename the **oms-config.xml** file from the old installation. This file is located in the server startup directory, which is usually the home directory for the domain.
2. Start the WebLogic server in the new or upgraded WebLogic 12.1.3 domain. If this is a clustered environment, start the administration, managed, and proxy servers.
3. Verify that any WebLogic patches you installed are displayed in the WebLogic log.
4. Log in to SQL*PLUS as sysdba and run the following:


```
grant create any context to sys as sysdba with admin option
```

5. Run the installer for OSM 7.3.1.

Note: If you are upgrading from OSM 7.0.x, part of the SDK (the automation module) is not upgraded if installing to the original 7.0.x OSM directory. Specify a new directory to ensure complete installation of the new OSM SDK.

Note: The OSM installer automatically migrates the OSM schema as part of the installation process if the Database Schema component is selected.

6. On the **Component Selection** screen, select the same components as were installed in your previous OSM installation. Ensure that the **Database Schema** is selected.
7. On the Database Credential Information screen:
 - Enter the username and password for the previous OSM schema.
 - Enter the username and password for the previous OSM rule engine schema.
8. On the Database Analysis screen, click **Upgrade**.
9. If your OSM application requires localization, you will be prompted during the upgrade (at the Database Schema Localization Information screen) to specify the path to your localized file.
10. On the WebLogic Configuration - Configuration Type screen, select **Connect to a running WebLogic server**.
11. On the WebLogic Server Connection Information screen, enter the WebLogic server connection information.

If the installer detects an existing database configuration in the domain, and the database connection information is different from that supplied during the installation, the Database Configuration Comparison screen is displayed.

This screen provides a comparison of database configuration differences in either a single-database setup, or an Oracle Real Application Clusters (Oracle RAC) database setup, depending on your environment.

If the database configuration for your previous OSM installation included a single-instance database, the pre-existing data source is a generic data source.

If the database configuration for your previous OSM installation included an Oracle RAC database configuration, the pre-existing data source is a multi data source containing two generic data sources.

See "[Connecting Oracle RAC with JDBC Multi Data Source](#)" for a discussion on how OSM supports Oracle RAC through the use of WebLogic multi data sources.

12. If the domain is a new 12.1.3 domain, the Database Configuration Comparison screen will be skipped.

On the Database Configuration Comparison screen, do one of the following:

- Select **Replace the existing JDBC data source configuration with the new connection information** and click **Next**. If you are upgrading from a

non-Oracle-RAC database to an Oracle RAC environment, you must select this option.

Caution: The installation does not migrate any data to the new data source (including persisted JMS messages). All configuration parameters will be reset to their defaults. Therefore, any customizations will be lost. Ensure you have a backup of your previous installation before proceeding.

- Select **Leave the existing JDBC data source configuration intact** and click **Next**. This is the default option. The installer continues at step 20.
- Click the **Back** button repeatedly to return to the Database Connection Information screen and change your settings.

If the current installation uses an Oracle RAC database connection, the Oracle Real Application Clusters (RAC) Configuration screen is displayed. Otherwise, installation continues at step 19. You can configure Oracle RAC for failover or load balancing. Load balancing options are available only under the following circumstances:

- If this is a multi-node cluster deployment.
- If schema partitioning is selected.

13. Do one of the following:

- Configure Oracle RAC by selecting one of the following options:
 - **Configure WebLogic JDBC data sources to use additional RAC Database instances now.**

The installer preconfigures the database connections in WebLogic.

- **Configure WebLogic JDBC data sources manually after installation completes.**

You can add more Oracle RAC database instances manually after upgrading. See "[Manually Configuring Additional Data Sources for an Oracle RAC Instance](#)" for configuration details.

- **Deselect Use Oracle RAC.**

The installer configures a single data source for the Oracle RAC instance previously specified, but does not create a multi data source. OSM will not use Oracle RAC for load balancing or failover.

Note: If you decide in the future to implement Oracle RAC for load balancing or failover, you must run the installer again and select one of the other options described here. You cannot manually add and configure the Oracle RAC database instance.

14. Do one of the following:

- If you chose to configure WebLogic JDBC data sources manually after installation or not to use Oracle RAC, click **Next** and go to step 19.
- If you chose to use additional Oracle RAC Database instances now, continue selecting options on this screen as described in step 15.

15. Do the following:

a. Under RAC operation mode, select one of the following options:

– **Load Balancing (Active Active) - Order and Service Management WebLogic Cluster Installations**

The Installer groups the WebLogic Server instances according to the number of Oracle RAC database instances. Each group is configured to a separate Oracle RAC database as the primary data source, and the remaining Oracle RAC database instances as secondary data sources. See "[Connecting Oracle RAC with JDBC Multi Data Source](#)" for more information.

This option is available only if OSM is deployed to a WebLogic cluster.

– **Failover (Active Passive)**

The installer configures a multi data source and multiple data sources. The first data source connects to the primary database instance previously specified, and the subsequent data sources connect to other database instances to be specified. This option preconfigures the database connections in WebLogic for warm standby. See "[Connecting Oracle RAC with JDBC Multi Data Source](#)" and "[Creating the Oracle Database for OSM](#)" for more information.

b. Under Listener Configuration, select one of the following options:

– **Remote Listener (Database Server-side load balancing)**– **Local Listeners**

See "[Listener Considerations for Oracle RAC](#)" for a discussion on listener functionality.

c. Click Next.

16. If you did not previously specify the SID of the primary Oracle RAC instance, the installer displays an error message and takes you to the Database Connection Information screen to enter the SID (the host, port, and service name are protected). After entering the SID, installation resumes at the next step.

17. Do one of the following:

■ If you selected the remote listener option:

a. In the **SCAN Address** field, you can modify the SCAN address if required.

b. In the **SCAN Port** field, you can modify the SCAN port if required.

c. Add a new row and specify the same Service Name as you did for the primary instance and a unique SID for each additional Oracle RAC instance. For a container database, use the PDB service name and the CDB SID.

d. If you did not specify the SID of the primary Oracle RAC instance earlier in the upgrade, do so now in the first row. For a container database, use the CDB SID.

■ If you selected the local listeners option, add a new row for each additional Oracle RAC instance and specify:

a. The host and port: Each row must use a different combination of host and port. For example, if you use the same host, you must use a different port.

26. If a new WebLogic domain was created, copy the contents of the **Attachments** folder from the old WebLogic domain to the newly created WebLogic 12.1.3 domain. Ensure that the file permissions allow the OSM application to read and write the files copied to the new domain.
27. Shutdown and restart the WebLogic 12.1.3 server.
28. Refer to *Design Studio Installation Guide* for any required upgrade actions for Design Studio.
29. Upgrade your cartridges. See "[Upgrading Pre-7.3.1 Cartridges to OSM 7.3.1.](#)"

When the upgrade is complete, instruct your OSM web client users to clear their browser's temporary cache files. Refer to the web browser's documentation for information about how to do this.

Important: Users who do not clear their cache may experience unexpected errors while using the upgraded OSM web client because the web browser may still be using the previous versions of certain OSM web client files.

XQuery Model Changes

The latest version of Saxon has a stricter approach to type checking. There are changes to how Saxon converts arguments and returns types to and from Java functions, so some XQuery functions that were written for earlier versions of Saxon might not work correctly.

Using `java.util.Map` as an Argument or Return Type

XPath 2.0 introduced `Map` as an internal data type. If a variable of type `java.util.Map` is not explicitly typed, Saxon casts the variable to the native XPath `Map` type. The solution is to explicitly bind any `java.util.Map` variables to the Java namespace. For example,

Before:

```
declare namespace
osm="http://xmlns.oracle.com/communications/ordermanagement/model";
declare namespace ns1="http://www.metasolv.com/OMS/OrderModel/2002/06/25";

declare namespace mapUtil = "java:java.util.Map";

declare variable $mvmap external;

declare variable $mvkey as xs:string* external;

<model:modelVariable name="{/ns1:model/ns1:cartridge/@namespace}"
namespace="SystemDefinedNamespace"
xmlns:model="http://xmlns.oracle.com/communications/ordermanagement/model">
  <model:description>model variable</model:description>
  {
    for $i in ($mvkey)
      let $r := mapUtil:get($mvmap,$i)
      return
        <model:entry name="{ $i}" >
          <model:value>{$r}</model:value>
        </model:entry>
  }
</model:modelVariable>
```

After:

```
declare namespace
osm="http://xmlns.oracle.com/communications/ordermanagement/model";
declare namespace ns1="http://www.metasolv.com/OMS/OrderModel/2002/06/25";

declare namespace jt="http://saxon.sf.net/java-type";
declare namespace mapUtil = "java:java.util.Map";
declare variable $mvmap as jt:java.util.Map external;

declare variable $mvkey as xs:string* external;

<model:modelVariable name="{/ns1:model/ns1:cartridge/@namespace}"
namespace="SystemDefinedNamespace"
xmlns:model="http://xmlns.oracle.com/communications/ordermanagement/model">
  <model:description>model variable</model:description>
  {
    for $i in ($mvkey)
      let $r := mapUtil:get($mvmap,$i)
      return
        <model:entry name="{ $i}" >
          <model:value>{$r}</model:value>
        </model:entry>
  }
</model:modelVariable>
```

Using java.util.Collection as a Return Type

If a Java function returns a collection or array, Saxon converts this to an XPath sequence. The return object can no longer be passed to a `java.util.Iterator`. The latest version of Saxon makes it easier to deal with collections. Instead of using a Java iterator, you can use the XPath sequence. For example,

Before:

```
declare function local:getAttachedProvOrderEBM() as element()*
{
  let $names := context:getAllAttachmentFileNames($context)
  return
    if (fn:exists($names)) then
      (
        let$name := iterator:next(collection:iterator($names))
        return
          if (fn:exists($name)) then
            (
              saxon:parse(saxon:base64Binary-to-string(saxon:octets-to-
            )
          )
            else ()
        )
      )
    else ()
};
```

After:

```
declare function local:getAttachedProvOrderEBM() as element()*
{
  let $names := context:getAllAttachmentFileNames($context)
  return
    if (fn:exists($names)) then
      (
```

```

let$name := [1]($names)
return
  if (fn:exists($name)) then
    (
      saxon:parse(saxon:base64Binary-to-string(saxon:octets-to-
    )
    else ()
  )
else ()
};

```

Invoking Overloaded Methods of Same Number of Arguments with Ambiguous Types

There are extensive changes to how overloaded methods are chosen. In most cases, these changes are transparent. But in the case of overloaded methods with the same number of arguments, if the supplied argument has an ambiguous type, Saxon is unable to resolve the method to invoke, for example, Invoking `java.lang.String.valueOf()` with a `byte[]`. The solution in these cases is to cast the argument to a proper Java type. For example,

Before:

```

saxon:parse(xs:string(javaString:valueOf(context:getAttachment($context,
xs:string($name))))/provord:ProcessProvisioningOrderEBM

```

After:

```

saxon:parse(xs:string(javaString:valueOf(context:getAttachmentAsString($context,
xs:string($name))))/provord:ProcessProvisioningOrderEBM

```

Handling Null Values from Java Functions

If a Java method returns null, the XPath value is an empty sequence. If the XQuery script does not correctly handle empty sequences, an XPath exception is thrown. You must ensure in the XQuery that invocations of Java functions that can return null are properly handled to check for empty sequences.

Converting OSM Data Source Configurations

During an OSM upgrade, you have the option to replace an existing data source configuration with another data source configuration based on the new database connection information you provide. The most typical scenario is to upgrade from a non-Oracle-RAC database configuration to an Oracle RAC database configuration.

To implement a data source configuration change, the installer removes the existing configuration and sets up a new one (either a single generic data source for a non-Oracle-RAC configuration, or a multi data source and two generic data sources for an Oracle RAC configuration).

If you already have an existing data source/Oracle RAC configuration, you can convert from one type of configuration to another using the installer. This section describes three conversion scenarios.

Oracle RAC Active-Passive to Active-Active

To perform an active-passive to active-active conversion, you must run the installer twice. This type of conversion is allowed only if the schema is partitioned. Perform the following steps:

1. Shut down all managed servers in the OSM cluster.

2. Run the installer to downgrade from an Oracle RAC active-passive configuration to a non-Oracle-RAC configuration. Only the screens that are relevant to the conversion are listed here.
 - a. On the Component Selection screen, select **Server** and click **Next**.
 - b. On the Database Configuration Comparison screen, select **Replace the existing JDBC data source configuration with the new connection information** and click **Next**.
 - c. On the Oracle Real Application Clusters (Oracle RAC) screen, select **Do not use Oracle RAC** and click **Next**.
3. Run the installer to upgrade from a non-Oracle-RAC configuration to an Oracle RAC active-active configuration.
 - a. On the Component Selection screen, select **Server** and click **Next**.
 - b. On the Database Configuration Comparison screen, select **Replace the existing JDBC data source configuration with the new connection information** and click **Next**.
 - c. On the Oracle Real Application Clusters (Oracle RAC) screen, select **Configure an additional Oracle RAC instance for load-balancing using the installer** and click **Next**.
4. Start the managed servers.

After the conversion, any in-flight orders will be picked up by OSM in the new environment and processed. If there are no in-flight orders, you can submit a new order for testing purposes. You can also check that the data sources have been assigned to the WebLogic Server instances correctly and that the JMS JDBC store, if configured, is using the correct multi data source.

Oracle RAC Active-Active to Active-Passive

To perform an active-active to active-passive conversion, you must run the installer twice. Perform the following steps:

1. Shut down all managed servers in the OSM cluster.
2. Run the installer to downgrade from an Oracle RAC active-active configuration to a non-Oracle-RAC configuration. Only the screens that are relevant to the conversion are listed here.
 - a. On the Component Selection screen, select **Server** and click **Next**.
 - b. On the Database Configuration Comparison screen, select **Replace the existing JDBC data source configuration with the new connection information** and click **Next**.
 - c. On the Oracle Real Application Clusters (Oracle RAC) screen, select **Do not use Oracle RAC** and click **Next**.
3. Run the installer to upgrade from a non-Oracle-RAC configuration to an Oracle RAC active-passive configuration.
 - a. On the Component Selection screen, select **Server** and click **Next**.
 - b. On the Database Configuration Comparison screen, select **Replace the existing JDBC data source configuration with the new connection information** and click **Next**.

- c. On the Oracle Real Application Clusters (Oracle RAC) screen, select **Configure an additional (secondary) Oracle RAC instance for failover using the installer** and click **Next**.
4. Start the managed servers.

After the conversion, any in-flight orders will be picked up by OSM in the new environment and processed. If there are no in-flight orders, you can submit a new order for testing purposes. You can also check that the data sources have been assigned to the WebLogic Server instances correctly and that the JMS JDBC store, if configured, is using the correct multi data source.

Oracle RAC Active-Active to Active-Active

This conversion is most likely to happen in a development or testing environment where new or different Oracle RAC database instances are being introduced. The installer does not support this type of conversion. Instead, you perform the reconfiguration manually by logging in to the WebLogic Administration Console and changing the URLs of the data sources to point to the new Oracle RAC instances.

Additional Configuration for JMS Service Migration

For upgrading OSM instances in a clustered environment that make use of JMS service migration, you must perform the following procedure:

1. Log in to the WebLogic Server Administration Console.
The Administration Console is displayed.
2. From the Domain Structure, click **Services**, then **Messaging**, then **JMS Modules**.
The Summary of JMS Modules screen is displayed.
3. Click **oms_jms_modules**.
The Settings for oms_jms_module screen is displayed.
4. For each instance of the **oms_cartridge_deploy_managed_server** queue (where *managed_server* is one of the managed servers in the cluster) do the following:
 - a. Click **oms_cartridge_deploy_managed_server**.
The Settings for **oms_cartridge_deploy_managed_server** screen is displayed.
 - b. Click the **Configuration** tab then the **General** subtab.
 - c. From the **Templates** list, select **None**.
 - d. Click **Save**.
 - e. Click the **Subdeployment** tab.
 - f. From the Subdeployment list, select the **omsJmsNonMigratableServer_managed_server** that corresponds to the same managed server that appears in the **oms_cartridge_deploy_managed_server** queue name.
For example, oms_cartridge_deploy_OSMServer1 should use the osmJmsNonMigratableServer_OSMServer1 subdeployment.
 - g. Click **Save**.
 - h. Click the **Configuration** tab then the **General** subtab.
 - i. From the Template list, select **omsJmsNonMigratableTemplate_managed_server**. that corresponds to the same managed server that appears in the **oms_cartridge_deploy_managed_server** queue name.

For example, `oms_cartridge_deploy_OSMServer1` should use the `omsJmsNonMigratableTemplate_OSMServer1` template.

- j. Click **Save**.
- k. Restart the managed server that the `oms_cartridge_deploy_managed_server` queue is associated with.
5. After you restart each managed server, log in to the OSM Order Management web client.
6. Click **Refresh Cache**.
The **Confirm Metadata Refresh** dialog box appears.
7. Click **Yes**.

Configuring Attachment Location for Whole Server Migration

As of OSM 7.3.0, attachments are stored in the OSM database instead of the T3 file stores. However, if there are unprocessed orders that contain attachments from before the upgrade, those attachments continue to use the T3 file stores until the orders complete. You may need to move the location of this T3 file store to support whole server migration.

To configure the T3 file path:

1. Configure a shared directory accessible to each machine in the cluster. For example, you can use the same directory that you configured in "[Configure Managed Servers for Whole Server Migration](#)" or create a new directory in the same path.

For example:

```
/mnt/shares/oracle/cluster/attachments/
```

2. Log in to the WebLogic Server Administration Console.
The WebLogic Administration Console is displayed.
3. Click **Lock & Edit**.
4. In **Domain Structure**, select **Services**, then **File T3**.
The Summary of File (T3) Services appears.
5. Click **Oms_Remote_file_system**.
6. Click the **Configuration** Tab.
7. In the Path field, replace **Attachments** with a link to the shared directory.
8. Click **Save**.
9. Click the **Targets** tab.
10. Select the cluster name.
11. Select **All servers in the cluster**.
12. Click **Save**.
13. Click **Activate Changes**.

Upgrading the Development and Administration Environment

OSM supports a development and administration environment that includes the following software components that may require an upgrade:

- **Design Studio:** The currently supported versions of the Design Studio core and plug-ins may be different than those certified with your source OSM release. There may also be additional plug-ins that were not available with your OSM source release. See *Design Studio Compatibility Matrix* for Design Studio for Order and Service Management compatibility information.
- **Ant:** Apache Ant is a Java tool that is required by the OSM XML Import Export application (XMLIE) and the OSM cartridge management tool (CMT) used for deploying custom task assignment algorithms. You may need to upgrade the Ant version to use these applications. See "[Software Requirements](#)" for version details.
- **GraphViz:** GraphViz is a graphic visualization used with XMLIE to convert an OSM metadata XML document into an HTML presentation. See "[Software Requirements](#)" for version details.
- **OSM SDK Tools and Samples:** You can install new versions of the OSM SDK tools and samples using the OSM installer. See "[Upgrading OSM to 7.3.1](#)" for more information about running the OSM installer.

Upgrading Pre-7.3.1 Cartridges to OSM 7.3.1

After you have upgraded your OSM system to version 7.3.1, perform the following procedure to enable your pre-OSM 7.3.1 cartridges to run in the newly upgraded environment.

Cartridge Upgrade Prerequisites

Before you upgrade cartridges, ensure the following prerequisites are met:

- OSM is upgraded to 7.3.1 using the OSM installer.
- Design Studio is upgraded to the required version. See "[Upgrading the Development and Administration Environment](#)."
- The OSM 7.3.1 SDK component is installed using the OSM installer.
- The Oracle WebLogic Server domain for OSM 7.3.1 is running.
- Old existing domain configurations, such as JMS queues, users, groups, and emulators have been recreated in the new domain.
- Automation plug-in .ear files are deleted from WebLogic using the console.
- All cartridges are backed up.

Cartridge Upgrade Procedure

To upgrade your pre-7.3.1 cartridges to OSM 7.3.1:

1. Set global default Java preferences.

In Design Studio, from the **Window** menu, select **Preferences**. Then expand **Java** and do the following:

- a. Select **Installed JREs** and check the box next to the Java 7 JRE you are using.

Note: If your cartridge has pending or completed orders that you do not want to purge, do not undeploy the cartridge, but deploy the new version with `PURGE_CARTRIDGE_BEFORE_DEPLOY` set to **false**.

- Set `ENTITY_CONFLICT_ACTION_ON_DEPLOY` to **replace** to replace the old entities with the new (this is the default); set it to **ignore** to add the new entities and retain the old; or set it to **abort** to stop the process. This variable applies only if `PURGE_CARTRIDGE_BEFORE_DEPLOY` is set to **false**.
- Set `PURGE_ORDER_ON_UNDEPLOY` to **true** to purge all existing orders associated with the cartridge, or set it to **false** if you do not want the system to undeploy the cartridge if it has pending orders. If both `PURGE_ORDER_ON_UNDEPLOY` and `FAST_CARTRIDGE_UNDEPLOY` are set to **true**, the operation uses the forced fast undeploy option, which quits open orders; neither the cartridge nor the associated orders are purged. If `PURGE_ORDER_ON_UNDEPLOY` is set to true and `FAST_CARTRIDGE_UNDEPLOY` is set to false, the operation uses the forced undeploy option, which purges the cartridge and associated orders.

Caution: Undeploying a cartridge purges all existing orders for that cartridge.

5. In Design Studio, in the **customAutomation** folder of your cartridge workspace, replace **automationMap.xsd** with the latest version from the `OSM_home/SDK/Automation/automationdeploy_bin` folder. Refer to the discussion about defining OSM preferences in the Design Studio Modeling OSM Processes Help for more information about how to define general preferences for the new OSM version.
6. If there are **no pending** Order-to-Activate orders in your OSM instance, change the target version and cartridge versions to be compatible with OSM 7.3.1. If there are pending Order-to-Activate orders in your OSM instance, skip this step.

For each cartridge in your workspace, in the Project editor Properties tab set the target version to 7.3.1 and update the version number if your cartridge is not using five-digit version numbers. See "[Updating Cartridges to a Five-Digit Version](#)."

7. Clean and build all cartridges.

In this step, it is expected that builds will fail. Go to the Problems view and run the quick fix for the following errors:

- "The automationBuild.xml file in cartridge ... is not the right version for this Design Studio ...".

After fixing the problem, a new **automationBuild.xml** file is created in the `src` directory of the cartridge.

- "Order Model Error - Order Template Node/ControlData/... is not defined...".

After fixing the problem, Design Studio upgrades the OracleComms_OSM_CommonDataDictionary model project to the current version for 7.3.1 and applies the `calculatedStartDate` data structure from the OSM common data dictionary to the following entities:

- Order Specifications in the **Order Template** tab

- Order Components in the **Order Template** tab (if the Order Component contains control data)
- Create Task in the **Task Data** tab (if the Creation Task contains control data)
- "Order Model Error - Order Template Node/ControlData/Functions/.../duration is not defined...".
After fixing the problem, Design Studio applies the duration data structure from the OSM common data dictionary to the following entities:
 - Order Specifications in the **Order Template** tab
 - Order Components in the **Order Template** tab (if the Order Component contains control data)
 - Create Task in the **Task Data** tab (if the Creation Task contains control data)

This step will automatically update the OracleComms_OSM_CommonDataDictionary, as mentioned previously in this step. You can also update the OracleComms_OSM_CommonDataDictionary manually. See ["Updating the Common Data Dictionary Manually"](#) for more information.

8. Some cartridges may fail to build if they contain Java classes which implement interfaces that have changed in OSM 7.3.1.

To fix this error, open the failed Java files in Design Studio, right-click the error marker, and run the quick fix "add unimplemented methods".

9. If the same Java class exists in different cartridges (for example, if both cartridge A and B define a Java class `com.mycompany.cartridges.log.LogActivity`), then this class must be the same in both cartridges.
10. Clean and build all cartridges in the workspace again.
11. Redeploy all cartridges to the OSM 7.3.1 run-time environment.

Upgrade Impacts on Cartridges from Previous Releases to OSM 7.3.1

This section provides information on upgrade impacts to cartridges from previous releases of OSM to version 7.3.1.

Updating the Common Data Dictionary Manually

If you follow the procedures in ["Upgrading Pre-7.3.1 Cartridges to OSM 7.3.1,"](#) it should not be necessary to update the OracleComms_OSM_CommonDataDictionary manually.

Many releases of OSM, including OSM 7.3.1, contain additions that have been made to the OracleComms_OSM_CommonDataDictionary. In 7.3.1, for example, there are updates to the data dictionary in support of the Assets and Accounts features.

Oracle recommends that you update the data dictionary whenever you upgrade Design Studio. However, if you do not plan to use the new OSM features, it is not mandatory to update it.

All changes made to the common data dictionary are additive and fully backward-compatible. If you decide not to update the data dictionary at the time you update your cartridges, and later you make any changes to your solution that require the updated common data dictionary, you can also update the common data

dictionary using the Quick Fix option on the problem marker that informs you that a needed data element is not defined. If you prefer, you can update it using the manual procedure in this section.

To update the common data dictionary manually:

1. In Design Studio, from the **Project** menu, deselect **Build Automatically**.
2. In the Studio Projects view, right-click on the **OracleComms_OSM_CommonDataDictionary** project and select **Delete**.
3. In the confirmation dialog box, select **Also delete contents...** and click **Yes**.
4. Create the common data dictionary in your workspace. See "[Creating the Common Data Dictionary Project in Your Workspace](#)" for instructions.
5. Clean and build all cartridges in the workspace.
6. If desired, from the **Project** menu, select **Build Automatically**.

Modeling Order Components to Use Calculated Start Dates

Starting with OSM 7.2.2, you can model order components to use a calculated start date calculated by OSM. OSM derives the start date while balancing order item durations and dependencies and the order component requested delivery date.

This functionality depends on two data structures existing in the OSM common data dictionary: `calculatedStartDate` and `duration`.

See "[Upgrading OSM to 7.3.1](#)" for more information adding these data structures to the OSM common data dictionary.

After migrating a cartridge to version 7.3.1, you must set the cartridge target version to OSM version 7.3.1. If you set the target version to OSM version 7.2 or earlier, OSM does not calculate start dates for order components. Instead, order components begin processing as soon as possible, based on dependencies.

See *OSM Modeling Guide* for guidelines about modeling order components to use calculated start dates.

Turning On Inheritance of Keys and Significance for Existing Cartridges

Starting with OSM 7.2, significance and keys are included in the information extended from a base order. The significance of an inherited data element within the order template is now inherited from the OSM entity that contributed it. For example, a data element an order component contributes to the **ControlData** structure defined on the order now inherits the significance value that is defined on the order component.

Providing this inheritance within the order template is recommended for new cartridge development. You have the option to turn this functionality on for existing cartridges.

Design Studio will detect conflicts such as incorrect significance behavior after you turn the functionality on, and raise problem markers. To resolve conflicts you must examine order data elements and align their significance values to adhere to inheritance rules (as described below). You must resolve problem markers before you can deploy your cartridges.

The order template inheritance functionality may impact cartridges that were developed in earlier releases of Design Studio as follows:

- Unintended inheritance

A data element now inherits its significance value from its order contributor; for example, from a base order, an order component, or an order item specification. If you intended for a data element marked **Inherited** in significance to inherit its significance value from its data schema, you need to set this manually.

To ensure the inheritance uses the significance value you intended, check all data elements and explicitly mark them as significant or not according to your design requirements.

- Inheritance discrepancies due to multiple order template contributors

In the case of multiple inheritance where a data element is inherited on the order template from multiple entities, the inherited data element must have the same significance value as is set for the OSM entity from which it is inherited. For example, the **ControlData/Functions** data structure can be inherited on the order template from these OSM entities: an extended order, an order component, and an order item. If the **ControlData/Functions** data structure is set with a different significance value in any of the contributing OSM entities (on the **Order Template** tab of those entities), Design Studio creates a problem marker. You cannot build and deploy the cartridge until the marker is resolved.

Note: Design Studio creates problem markers only if the order contributors have different values and the order has the significance set to **Inherited**.

To resolve problem markers, examine the relevant data elements and align the significance so that it is consistent across all order contributors. You can set the same significance value on all Order Component Specification editor **Order Template** tabs for all order components contributing to the order, or you can override the significance value of that data structure on the order by using the Order editor.

After you resolve design discrepancies that may exist, use OSM preferences to turn on order template inheritance of keys and significance.

To turn on order template inheritance of keys and significance for existing cartridges:

Tip: Disallow this functionality *temporarily* to minimize the immediate upgrade impact on your cartridges, and allow it later for optimal development convenience.

1. In Design Studio, from the **Window** menu, select **Preferences**, then select **Oracle Design Studio**, and then select **Order and Service Management Preferences**.
2. In the **Order Template Inheritance** field, do the following:
 - To allow significance defined on an order template data element to be inherited from child orders and other order contributors, select **Inherit significance from order contributors**.
 - To allow keys defined on an order to be inherited from child orders and from other order contributors, select **Inherit keys from order contributors**.

Design Studio sets the order template inheritance preferences you specify as a global preference.

3. Click **OK**.

Design Studio saves your order template inheritance preferences and closes the Preferences dialog box.

4. Clean and build the cartridges.
5. Resolve any problem markers that may result from order template inheritance discrepancies in your cartridges.

Creating the Common Data Dictionary Project in Your Workspace

In releases of Design Studio prior to 7.2, you were required to manually model order component control data. Starting with release 7.2, Design Studio automatically creates control data structures for order components if you create the **OracleComms_OSM_CommonDataDictionary** model project in your workspace.

The common data dictionary project can co-exist with existing cartridge projects and will automatically generate order component control data for new order components you create after creating the model project in your existing workspace. In this case, Design Studio updates the order component control data structure you have defined in the data schema of your existing base project. However, Design Studio does not replace the reference of **ControlData** in the order templates to use the model project schema instead of your existing project schema.

Design Studio will prompt you to create the **OracleComms_OSM_CommonDataDictionary** cartridge the first time you create or open an entity related to orchestration in a workspace using Design Studio 7.2 or later where the common data dictionary is not present.

If in the past you have seen this prompt and selected **Do not show this prompt in the future**, you must re-enable the prompt in order to create the common data dictionary.

To create the common data dictionary in your workspace:

1. If you have previously disabled the prompt:
 - a. From the **Window** menu, select **Preferences**.
The Preferences dialog box is displayed.
 - b. In the Preferences navigation tree, expand **Oracle Design Studio**, and then expand **Order and Service Management Preferences**.
 - c. Select **Orchestration Preferences**.
 - d. In the Common Data Dictionary area, select the **Prompt To Create Orchestration Data Dictionary** check box.
 - e. Click **OK**.
Design Studio saves the preference and closes the Orchestration Preferences dialog box.
2. Open or create an orchestration entity, for example, an order item specification or an order component specification.
You are prompted to confirm importing the common data dictionary.
3. Click **OK**.
The **OracleComms_OSM_CommonDataDictionary** model project is created in your workspace.

See Design Studio Help for information on how the **OracleComms_OSM_CommonDataDictionary** model project creates control data.

Updating Cartridges to a Five-Digit Version

Starting with OSM 7.2, cartridges use five digits to specify their version. If you choose to change the target version of your cartridges, you must update the version format.

To update cartridges to use a five-digit version number:

1. In the Project editor Properties tab for each cartridge, change the value of **Target Version** from the current value (7.0.3 or earlier) to **7.3.1**.
2. Update the cartridge versions to 1.0.0.0.0 in the XML catalogs.
 - a. Open the Package Explorer view.
 - b. For each cartridge, open the **catalog.xml** file located in *CartridgeName/xmlCatalogs/core*.
 - c. Select the **Source** tab.
 - d. Each rewritePrefix attribute in the file includes the version 1.0.0. Change this version to 1.0.0.0.0.
3. Set up the event views for the orders in the cartridge.
4. Exit and restart Eclipse. If prompted to save any entities, select **Yes**.
5. When Eclipse is restarted, the Studio Project Upgrade window is displayed with a list of cartridges that should be upgraded. Click **Finish** to upgrade the cartridges. This can take several minutes. When the upgrade is finished, you are presented with the option to view the upgrade logs if you wish.
6. Build all of the cartridges. Some cartridge builds will fail with the following error listed in the Problems pane:

Order and Service Management Cartridge Error - The automationBuild.xml file in cartridge *CartridgeName* is not the right version for this DS OSM plugin release. Right click on problem marker for the Quick Fix.

For each cartridge that fails to build with this error:

- a. Right-click on the error in the Problems pane and select **Quick Fix** from the menu.
- b. Click **Finish** in the Quick Fix window and then click **OK** to confirm.
- c. Rebuild the project.

Specifying Task Views for Order-Related Automation

Starting with OSM 7.2, you can use the Automation View field to specify the query view that the automation plug-in uses for Order, Event and Jeopardy notifications. One default query task is available per role. You can add roles and configure default query tasks in the Order editor Permissions tab. In addition to triggering automation plug-ins, order data changed event notifications can trigger one other type of notification. See the discussion on Defining Event Notifications in *OSM Developer's Guide*.

This does not apply to Automation Tasks because data available to the automation plug-in is explicitly defined as a Task View.

Configuring Order Lifecycle Policy Transition Error Messages

Starting with OSM 7.2 you can configure the error messages and severity levels logged when an Order Lifecycle Policy condition fails instead of the full XQuery code being

logged. For more information see the discussion on the Order Lifecycle Policy Transition Conditions tab in the Design Studio Modeling OSM Processes Help.

When cartridges are migrated, each Order Lifecycle Policy condition is set with the default level of ERROR. The first 1000 characters of the condition expression are the initial error message. After migration, you should re-configure the error message and level and the condition name in Design Studio.

Modeling Data Entries Above the 1000-Character Limit

Starting with Design Studio 3.1.4 (compatible with OSM versions up to 7.0.3), Design Studio generates an error message to prevent creation of data entries above 1000 characters. In previous versions of Design Studio, you could create unbounded data dictionary entries (up to 9999 characters) in OSM cartridges and deploy the cartridges to OSM servers (up to OSM release 7.0.3). These OSM cartridge data entries were persisted in the OSM database as metadata that OSM used for creating run-time entities associated with orders.

However, the OSM database has always had a data entry limit of 1000 characters. Cartridges deployed with unbounded data entries using Design Studio 3.1.3 to an OSM 7.0.3 server would generate no errors, but at run time, if an order was submitted with a data entry of more than 1000 characters, the order processing would fail. This failure was caused by the OSM database data entry limit which does not normally support unbounded lengths greater than 1000 characters.

Following is an example of the Design Studio error messages generated in this situation:

```
Data Dictionary Model Error - Max length of the Data Element Bandwidth backing the Order Template node/adsl_service_details/bandwidth exceeds 1000.
```

You must resolve this error before you can deploy the OSM cartridge.

If there is a requirement for data entries that contain more than 1000 characters, OSM provides other ways to achieve this goal including:

- Modeling data dictionary entries as XML type so that the data entry can contain XML documents.
- Adding order remarks
- Adding attachments to order remarks

See *OSM Developer's Guide* for more information about these alternatives.

Note: Although OSM provides powerful orchestration and order provisioning engines, OSM is not a data warehouse and management system and should not be used as an intermediary between upstream and downstream systems.

Updating Order-to-Activate Cartridges

The Order-to-Activate cartridges are pre-built Oracle Communications Order and Service Management (OSM) cartridges that support the Oracle Order-to-Activate business process to be used with the Oracle Communications Order to Cash Integration Pack for Oracle Communications Order and Service Management (Order to Cash Integration Pack for OSM). For more information about this product, see *OSM Cartridge Guide for Oracle Application Integration Architecture*.

This chapter describes how to update earlier versions of OSM Order-to-Activate cartridges to run on OSM 7.3.1. It also contains information about how to configure Oracle WebLogic Server resources for the cartridges in your WebLogic Server domain for OSM 7.3.1, and how to deploy the updated cartridges.

System Requirements

Before updating the Order-to-Activate cartridges, ensure the following:

- OSM is upgraded to 7.3.1.
- Oracle Communications Design Studio is upgraded to version 7.3.2 and your workspace is configured according to the instructions for Design Studio 7.3.2.

The instructions in this chapter assume you are using a new (empty) Design Studio 7.3.2 workspace for OSM.

- The Oracle WebLogic Server domain for OSM 7.3.1 is running.
- Existing user-created domain configurations, such as JMS queues, users, groups, and emulators are the same as before the OSM upgrade. (Do not re-create the system-generated users: `osm`, `osmoe`, `osmde`, `osmfallout`, `osmlf`, `osmoelf`, `osmlfaop`, and `uim`.)

Preparing to Update the Order-to-Activate 7.0.3, 7.2.0, 2.0.1, 2.1.0, and 2.1.0.2 Cartridges

Before updating Order-to-Activate cartridges, do the following:

- Ensure compatibility between Order-to-Activate cartridges, OSM, and Oracle AIA. See "[Ensuring Order-to-Activate Cartridge Compatibility](#)."
- Back up your existing cartridges.
- If updating Order-to-Activate 7.0.3 cartridges, update the `oms-config.xml` file. See "[Updating the oms-config.xml File When Updating Order-to-Activate 7.0.3 Cartridges](#)."

- Ensure that you have the latest patch for your version of the cartridges. See "[Getting the Latest Patch for Your Version of the Cartridges.](#)"
- Start the Oracle WebLogic Server domain for OSM 7.3.1.
- Set Design Studio preferences. See "[Setting Design Studio Preferences.](#)"
- Download the migration package. See "[Downloading the Migration Package.](#)"
- Import the Migration Package Cartridge. See "[Importing the Migration Package Cartridge.](#)"

Ensuring Order-to-Activate Cartridge Compatibility

To install or upgrade the Order-to-Activate cartridges, you must ensure compatibility between the following:

- OSM software version and Order-to-Activate cartridge version
OSM is compatible with all cartridges developed in a previous release, including Order-to-Activate cartridges. So, any OSM version is compatible with the same version or an earlier version of the Order-to-Activate cartridges.
- OSM Order-to-Activate cartridge version and Oracle Application Integration Architecture (Oracle AIA) Order to Cash Integration Pack for OSM version

For details about Order-to-Activate cartridge compatibility, see knowledge article 1388662.1, **OSM - Order to Activate O2A - AIA Compatibility Matrix** on the Oracle support website:

<https://support.oracle.com>

Note: If you want to use Order-to-Activate 7.2.0.x cartridges with OSM 7.3.1, you must ensure that your Order-to-Activate cartridges have been upgraded to the 7.2.0.2 patch or higher.

Getting the Latest Patch for Your Version of the Cartridges

It is important to get the latest patch for the version of the cartridge you are updating. For the 7.0.3 and 7.2 versions of the cartridges, you can find the latest patch on Oracle support inside the latest OSM patch for the appropriate version. For the 2.0.1 and later versions of the cartridges, the latest patch is on Oracle support as a separate release for Oracle AIA cartridges under the OSM product. Patches contain a complete installation of the cartridges and do not require an existing installation to be present. It is important to use the latest patch regardless of whether you have modified the Order-to-Activate solution.

Updating the oms-config.xml File When Updating Order-to-Activate 7.0.3 Cartridges

To use Order-to-Activate 7.0.3 cartridges with OSM 7.3.1, you must add a parameter to the **oms-config.xml** file.

To update the **oms-config.xml** file for Order-to-Activate 7.0.3 cartridges:

1. Back up and edit the **oms-config.xml** file. For detailed instructions about working with the **oms-config.xml** file, see the chapter about configuring OSM using the **oms-config.xml** file in *OSM System Administrator's Guide*.
2. Add the following near the end of the file, immediately before the close of the **oms-configuration** element:

```

<oms-parameter>
  <oms-parameter-name>
    oracle.communications.ordermanagement.resource.FullScopeAccess
  </oms-parameter-name>
  <oms-parameter-value>*</oms-parameter-value>
</oms-parameter>

```

3. Repackage and redeploy the **oms.ear** file unless you are using an external **oms-config.xml** file. See the chapter about configuring OSM using the **oms-config.xml** file in *OSM System Administrator's Guide* for more information.

Setting Design Studio Preferences

To set Design Studio preferences:

1. Verify that Design Studio is running.
2. From the **Window** menu, select **Preferences**.
The Preferences dialog box is displayed.
3. In the Preferences navigation tree, expand **Oracle Design Studio**.
4. Select **Order and Service Management Preferences**.
The Order and Service Management Preferences page includes the Deploy Properties pane in which you can provide home directories for various tools.
5. In the **WebLogic Home** field, enter or browse to the directory in which the WebLogic Server is installed, for example, C:\Program Files\Oracle Middleware\wlserver.
6. In the **Java SDK Home** field, enter or browse to the directory in which you have installed the JDK for the version of Java that matches the version of Java on your OSM server, for example, C:\Program Files\WebLogic\jdk170_xx.
7. In the **OSM SDK Home** field, enter or browse to the directory in which you have installed the OSM SDK, for example, C:\Program Files\Oracle Communications\OSM7\SDK.
8. Select **Inherit significance from order contributors** and **Inherit keys from order contributors**.
9. Expand **Order and Service Management Preferences** and select **Application Integration Architecture (AIA) Preferences**.
10. In the **Oracle Middleware Home** field, enter the directory in which you have installed Oracle Middleware products, for example, C:\Program Files\Oracle Middleware.
11. Under **Java**, select **Installed JREs**.
12. If the Java directory that you entered for **Java SDK Home** in step 6 is not displayed, add it and ensure that it is selected.
13. Click **OK**.
14. From the **Project** menu, deselect **Build Automatically**.

Downloading the Migration Package

The Migration package is included with the OSM 7.3.1 software download, and does not need to be downloaded separately. Your existing OSM software download should include the following file:

OracleComms_OSM_O2A_CartridgesMigration.zip

This is the migration package.

Importing the Migration Package Cartridge

To import the migration package cartridge:

1. Verify that Design Studio is running.
2. From the **Studio** menu, select **Show Design Perspective**.
3. From the **Window** menu, select **Show View**, and then select **Package Explorer**.
4. From the **Window** menu, select **Show View**, and then select **Other**.

The Show View window is displayed.

5. Expand **Ant** and click **Ant** from below it. Click **OK**.

The Ant view opens.

6. From the **File** menu, select **Import Studio Project**.

The Import Projects dialog box is displayed.

7. Select **Select archive file** and click **Browse**.

8. Browse to the directory where you extracted the OSM 7.3.1 software and select **OracleComms_OSM_O2A_CartridgesMigration.zip**.

9. Click **Open**.

OSM.O2A.Cartridges.Migration is displayed and selected in the **Projects** field.

10. Click **Finish**.

The **OSM.O2A.Cartridges.Migration** project is imported.

The **OSM.O2A.Cartridges.Migration** project contains the following directories, which you can see in the Package Explorer view:

- **7.0.3**: This directory contains the resources required for migrating Order-to-Activate 7.0.3 cartridges to run on OSM 7.3.1.
- **7.2.0**: This directory contains the resources required for migrating Order-to-Activate 7.2.0 cartridges to run on OSM 7.3.1.
- **2.0.1**: This directory contains the resources required for migrating Order-to-Activate 2.0.1 cartridges to run on OSM 7.3.1.
- **2.1.0**: This directory contains the resources required for migrating Order-to-Activate 2.1.0 cartridges to run on OSM 7.3.1.
- **2.1.0.2.0**: This directory contains the resources required for migrating Order-to-Activate 2.1.0 cartridges to run on OSM 7.3.1.
- **config**: This directory contains configuration scripts to create users and JMS resources and scripts to build the Oracle AIA emulators and deploy them to the OSM 7.3.1 server. The scripts in this directory are used for all 7.0.x migrations. Migrations for 7.2.0 and 2.0.1 use the config_All targets from the **SolutionConfig.xml** files instead of the files in this directory.

Updating the Order-to-Activate Cartridges

There are four distinct scenarios for updating the Order-to-Activate cartridges, depending on your needs. Each scenario has its own process, outlined below.

- To update Order-to-Activate 7.2.0 or 2.0.1 cartridges, see the following sections:
 - [Updating Unmodified or Modified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges to Run on OSM 7.3.1](#)
- To update the standard, unmodified Order-to-Activate 7.0.3 cartridges as released by Oracle, if there are no pending orders for the cartridges, see the following sections:
 - [Updating Unmodified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1](#)
 - [Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates](#)
 - [Deploying the Updated Order-to-Activate Cartridges](#)
- To update a solution that was based on the Order-to-Activate 7.0.3 cartridges provided by Oracle, but which has since had cartridges added to it, removed from it, or modified in it, or for which there are pending orders, see the following sections:
 - [Updating Modified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1](#)
 - [Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates](#)
 - [Deploying the Updated Order-to-Activate Cartridges](#)

Note: Some XQuery functions that were written for earlier versions of Saxon might not work correctly. For more information, see "[XQuery Model Changes](#)."

Updating Unmodified or Modified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges to Run on OSM 7.3.1

The following procedure updates Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 cartridges so that they can run on OSM 7.3.1. Use this procedure both to update the standard, unmodified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 cartridges and to update a solution that is based on modified versions of the Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 cartridges. This procedure makes no functional changes to the contents of the cartridges.

Importing the Installation Cartridge for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2

To import the installation cartridge for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2:

1. Ensure that you have the following software installed on your Windows system:
 - The supported version of WebLogic Server and ADF. See "[Software Requirements](#)" for more information.
 - OSM Administrator Software Development Kit (SDK) components
 - Java JDK: Use the version of Java that matches the one being used by the OSM server. See "[Software Requirements](#)" for more information.
 - Eclipse with Design Studio plug-ins

Note: The Order-to-Activate cartridges require the following Design Studio plug-ins:

- Design Studio Platform
- Design Studio for Order and Service Management
- Design Studio for Order and Service Management Orchestration
- Design Studio for Order and Service Management Integration
- Design Studio for Order and Service Management Orchestration Application Integration Architecture (AIA)

See *Design Studio Installation Guide* for information about installing Design Studio plug-ins and how to confirm which plug-ins are installed.

2. If you do not already have it available, locate or download the appropriate version of the unmodified cartridges.
 - You should always make sure that you use the latest patch of the cartridges, if one is available. See "[Getting the Latest Patch for Your Version of the Cartridges](#)" for more information.
 - If you are downloading the latest version from the Oracle software delivery website, select **Oracle Communications Order and Service Management Cartridge for Provisioning Fulfillment** and select your platform.
 - If you have already downloaded the Order-to-Activate cartridges, locate the **OracleComms_OSM_O2A_CartridgesInstaller_byyyymmdd.zip** file.
3. Unzip the **OracleComms_OSM_O2A_CartridgesInstaller_byyyymmdd.zip** file.
The **OSM.PIP** directory containing the **OracleComms_OSM_O2A_Install.zip** file is created.
4. Verify that Design Studio is running.
5. From the **File** menu, select **Import Studio Project**.
The Import Projects dialog box is displayed.
6. Select **Select archive file** and click **Browse**.
7. Browse to the **OSM.PIP** folder and select **OracleComms_OSM_O2A_Install.zip**.
8. Click **Open**.
The **OracleComms_OSM_O2A_Install** project is displayed and selected in the **Projects** field.
9. Click **Finish**.
The **OracleComms_OSM_O2A_Install** project is imported.

Importing Unmodified OSM Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges

If you are updating unmodified Order-to-Activate cartridges, follow this procedure.

To import the OSM Order-to-Activate cartridges:

1. Open the Ant view.
2. Right-click in the Ant view and select **Add Buildfiles**.

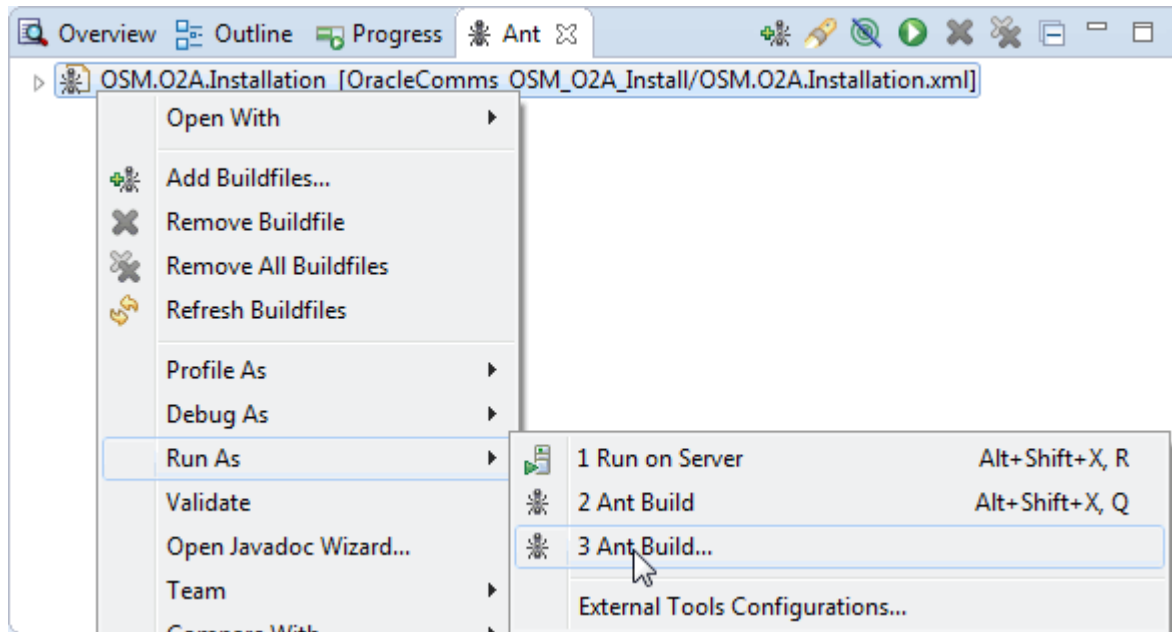
The Buildfile Selection dialog box is displayed.

3. Expand **OracleComms_OSM_O2A_Install** and select **OSM.O2A.Installation.xml**.
4. Click **OK**.

The **OSM.O2A.Installation** item is displayed in the Ant view.

5. Right-click **OSM.O2A.Installation** and select **Run As**.
6. Select **Ant Build...** (not **Ant Build**), as shown in [Figure 13–1](#).

Figure 13–1 Run As Menu



The Edit Configuration dialog box is displayed.

7. Click the **Build** tab and deselect **Build before launch**.
8. Click the **Properties** tab and deselect **Use global properties as specified in the Ant runtime preferences**.
9. Click the **JRE** tab and select **Run in the same JRE as the Workspace**.
10. Click **Close** and click **Yes**.
11. In the Ant view, expand **OSM.O2A.Installation** and double-click **import_solution**.
12. In the first **Ant Input Request** window, do one of the following:
 - To import cartridges for the Complex solution topology, enter **c** and click **OK**.
 - To import the cartridges for the Typical solution topology, enter **t** and click **OK**.
 - To import the cartridges for the Simple solution topology, enter **s** and click **OK**.
13. In the second **Ant Input Request** window, do one of the following:
 - To deploy both central order management and service order management to the same OSM instance, enter **s** and click **OK**.

- To deploy central order management and service order management to different OSM instances, enter **m** and click **OK**.

The cartridges appropriate for the settings you selected are imported into the workspace. This may take a few minutes.

Importing Modified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges

If you are updating modified Order-to-Activate cartridges, follow this procedure.

To import the modified OSM Order-to-Activate cartridges:

1. Import the latest patch of the Order-to-Activate cartridges for your version into your Design Studio workspace for OSM 7.3.1.

For example, if you have been working with Order-to-Activate version 7.2.0.6, import the cartridges for the latest patch of 7.2.0 (for example, 7.2.0.10).

For more information about how to do this see "[Importing Unmodified OSM Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges](#)."
2. Import any custom cartridges that you created into the workspace.
3. If you have modified any sample Order-to-Activate cartridges (which are unsealed), such as composite cartridges, check the README file for the latest patch, which tells you what cartridges have been changed by the patch. Then do one of the following:
 - If the cartridges you modified have not been updated by the patch, import your modified versions of the cartridges.
 - If the cartridges you modified have been updated by the patch, you must re-create your modifications in the versions of the cartridges from the latest patch.
4. In general, you should not unseal and modify cartridges that are sealed. If you have done this, check the README file for the latest patch, which tells you what cartridges have been changed by the patch. Then do one of the following:
 - If the cartridges you modified have not been updated by the patch, import your modified versions of the cartridges.
 - If the cartridges you modified have been updated by the patch, you must re-create your modifications in the versions of the cartridges from the latest patch.

Migrating the Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 Cartridges

To migrate the modified or unmodified Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2 cartridges:

1. Right-click in the Ant view and select **Add Buildfiles**.

The Buildfile Selection dialog box is displayed.
2. Expand the **OSM.O2A.Cartridges.Migration** cartridge and expand the **7.2.0, 2.0.1, 2.1.0, or 2.1.0.2.0** directory, depending on your version of the cartridges. Click the **migration.xml** file and click **OK**.

The appropriate file, **OSM.O2A.Cartridges.7.2.0_to_7.3.1_Migration**, **OSM.O2A.Cartridges.2.0.1_to_7.3.1_Migration**, **OSM.O2A.Cartridges.2.1.0_to_7.3.1_Migration**, or **OSM.O2A.Cartridges.2.1.0.2.0_to_7.3.1_Migration** is displayed in the Ant view.
3. Configure the buildfile for the file you have added:

- a. In the Ant view, right-click the name of the file and select **Run As**.
 - b. Select **Ant Build...** (not **Ant Build**), as shown in [Figure 13–1](#).
The Edit Configuration dialog box is displayed.
 - c. Click the **Build** tab and deselect **Build before launch**.
 - d. Click the **Properties** tab and deselect **Use global properties as specified in the Ant runtime preferences**.
 - e. Click the **JRE** tab and select **Run in the same JRE as the Workspace**.
 - f. Click **Close** and click **Yes**.
4. In the Ant View, expand the file you added (**OSM.O2A.Cartridges.7.2.0_to_7.3.1_Migration**, **OSM.O2A.Cartridges.2.0.1_to_7.3.1_Migration**, **OSM.O2A.Cartridges.2.1.0_to_7.3.1_Migration**, or **OSM.O2A.Cartridges.2.1.0.2.0_to_7.3.1_Migration**) and double-click **migrate**.
 5. Exit and restart Eclipse.
If prompted to save any entities, select **Yes**.
When Eclipse is restarted, the Studio Project Upgrade window is displayed, with a list of cartridges that should be upgraded.
 6. Click **Finish**.
The cartridges will be updated. This can take several minutes. When the upgrade is finished, you are presented with the option to view the upgrade logs.
 7. Build all of the cartridges.
See the Design Studio Help for information about how to build cartridges.
 8. Configure the WebLogic Server resources for your environment.
See "[Configuring WebLogic Server Resources for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2](#)" for more information.

Configuring WebLogic Server Resources for Order-to-Activate 7.2.0, 2.0.1, 2.1.0, or 2.1.0.2

The process in this section configures the metadata for the composite cartridges in addition to configuring the WebLogic Server resources.

To configure the WebLogic Server resources for Order-to-activate 2.0.1, 2.1.0, or 2.1.0.2, see *OSM Cartridge Guide for Oracle Application Integration Architecture* for the version of the cartridges you are updating. In the chapter titled "Performing an Interactive Installation of the Order-to-Activate Components" (version 2.1.0 or 2.1.0.2) or "Installing the Order-to-Activate Components" (version 2.0.1), and perform the procedure in the "Configuring WebLogic Server Resources" section.

This documentation is available from the Oracle Help Center website:

<http://docs.oracle.com>

To configure the WebLogic Server resources for Order-to-Activate 7.2.0:

1. Open the Ant view.
2. Find the one row in [Table 13–1](#) that matches your situation. For each cartridge listed in the corresponding "SolutionConfig.xml Files to Add" column of the table:
 - a. Right-click in the Ant view and select **Add Buildfiles**.
The Buildfile Selection dialog box is displayed.

- b. Expand the cartridge listed in the table and click on the **SolutionConfig.xml** file.
- c. Click **OK**.

Table 13–1 SolutionConfig.xml Files to Use in Different Situations

Topology	Configuration	SolutionConfig.xml Files to Add
Simple	Central order management and service order management are on the same OSM instance	OracleComms_OSM_O2A_COMSOM_SimpleSolution
Simple	Central order management and service order management are on different OSM instances	OracleComms_OSM_O2A_COM_SimpleSolution OracleComms_OSM_O2A_SOM_Solution
Typical	Central order management and service order management are on the same OSM instance	OracleComms_OSM_O2A_COMSOM_TypicalSolution
Typical	Central order management and service order management are on different OSM instances	OracleComms_OSM_O2A_COM_TypicalSolution OracleComms_OSM_O2A_SOM_Solution

The items are displayed in the Ant view. Each **SolutionConfig.xml** file is listed as the name of the cartridge it was added from. For example, if you added the **SolutionConfig.xml** file from **OracleComms_OSM_O2A_COMSOM_SimpleSolution**, it is listed as **OracleComms_OSM_O2A_COMSOM_SimpleSolution** in the Ant view.

3. For each **SolutionConfig.xml** file you have added, configure the buildfile:
 - a. In the Ant view, right-click the name of the cartridge for the **SolutionConfig.xml** file and select **Run As**.
 - b. Select **Ant Build...** (not **Ant Build**).
The Edit Configuration dialog box is displayed.
 - c. Click the **Build** tab and deselect **Build before launch**.
 - d. Click the **Properties** tab and deselect **Use global properties as specified in the Ant runtime preferences**.
 - e. Click the **JRE** tab and select **Run in the same JRE as the Workspace**.
 - f. Click **Close** and click **Yes**.
 - g. Right-click the name of the cartridge for the **SolutionConfig.xml** file and select **Run As** again.
 - h. Select **Ant Build...** (not **Ant Build**).
The Edit Configuration dialog box is displayed.

Note: It is necessary to close and reopen the Edit Configuration dialog box because after you have deselected the **Use global properties...** check box, Eclipse prevents you from changing any of these properties until you close and re-open the Edit Configuration dialog box.

- i. Click the **Properties** tab and set the appropriate values according to [Table 13–2](#).

Table 13–2 Values for Ant Edit Configuration Properties Tab

Property Name	Description	Notes
aia.emulator.serverName	<p>Name of the cluster or server within WebLogic Server to which you want to deploy the emulators. Set this to one of the following:</p> <ul style="list-style-type: none"> ■ If OSM is installed to a cluster, set this value to the name of the cluster. ■ If OSM is installed to the administration server, set this to the name of the administration server. ■ If OSM is installed to a single managed server, set this value to the managed server name. <p>If both central order management and service order management are in the same OSM server instance, set this to the name of the cluster or server for the single OSM instance.</p> <p>If central order management and service order management are in different OSM server instances, set this to the name of the cluster or server for central order management in the central order management buildfile and to the name of the cluster or server for service order management in the service order management buildfile.</p>	Set this property in all files if you are installing the Oracle AIA emulators.
cf.adminServerListenAddress	Host name of the system where the WebLogic Server for central order management is running. If you are in a clustered environment, set this to the server where the Administration server is located.	Set this if the name of the cartridge associated with the buildfile contains COM or COMSOM .
cf.adminServerListenPort	Port on which the WebLogic Server for central order management is listening. If you are in a clustered environment, set this to the port on which the Administration server is listening.	Set this if the name of the cartridge associated with the buildfile contains COM or COMSOM .
cf.clusterName	Name of the cluster for central order management, exactly as it is shown in the WebLogic Server console.	Set this if the name of the cartridge associated with the buildfile contains COM or COMSOM and you are in a clustered WebLogic environment.
cf.userName	Name of a user with administrative privileges on the WebLogic Server for listening on cf.adminServerListenAddress and cf.adminServerListenPort.	Set this if the name of the cartridge associated with the buildfile contains COM or COMSOM .
lf.adminServerListenAddress	Host name of the system where the WebLogic Server for service order management is running. If you are in a clustered environment, set this to the server where the Administration server is located.	Set this if the name of the cartridge associated with the buildfile contains SOM .

Table 13–2 (Cont.) Values for Ant Edit Configuration Properties Tab

Property Name	Description	Notes
If.adminServerListenPort	Port on which the WebLogic Server for service order management is listening. If you are in a clustered environment, set this to the port on which the Administration server is listening.	Set this if the name of the cartridge associated with the buildfile contains SOM .
If.clusterName	Name of the cluster for service order management, exactly as it is shown in the WebLogic Server console.	Set this if the name of the cartridge associated with the buildfile contains SOM and you are in a clustered WebLogic environment.
If.userName	Name of a user with administrative privileges on the WebLogic Server listening on If.adminServerListenAddress and If.adminServerListenPort.	Set this if the name of the cartridge associated with the buildfile contains SOM .

- j. Click **Close** and click **Yes**.
4. For *each* **SolutionConfig.xml** file you have added, do the following:
 - a. In the Ant view, expand the cartridge name and double-click **config_All**.
 - b. The first Ant Input Request window requests the WebLogic administrator user password. Enter the password for the user you entered in **cf.userName** or **If.userName** (whichever value you configured for the buildfile you are running). Click **OK**.
 - c. In the second Ant Input Request window, enter **y** to use the same password for all of the users being created or enter **n** to use a different password for each user. Click **OK**.
 - d. Enter the passwords requested for the Order-to-Activate users by the Ant Input Request windows:

Note: Ensure that the passwords you enter meet the security requirements of your WebLogic Server domain. By default, the WebLogic server requires passwords of at least eight characters, with at least one numeric or special character. However, the requirements for your domain may be different.

If you entered **y** in the previous step, enter the common password for the Order-to-Activate users and click **OK**.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **COM**, you are prompted for passwords for the following users: **COM user** (osm), **COM Order Event user** (osmoe), **COM Data Change Event user** (osmde), and **COM Fallout user** (osmfallout). Click **OK** after each entry.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **SOM**, you are prompted for passwords for the following users: **SOM user** (osmlf), **SOM Order Event user** (osmoelf), and **SOM Order Abort user** (osmlfaop). Click **OK** after each entry.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **COMSOM**, you are prompted for passwords for the following users: **COM user** (osm), **COM Order Event user** (osmoe), **COM**

Data Change Event user (osmde), **COM Fallout user** (osmfallout), **SOM user** (osmlf), **SOM Order Event user** (osmoelf), and **SOM Order Abort user** (osmlfaop). Click **OK** after each entry.

After you have entered the passwords and clicked **OK**, the system creates the users in the WebLogic domain. This may take a few minutes.

Note: Although **config_All** has now created users in the WebLogic Server domain, it is still possible to cancel the script at a later point and rerun it. If **config_All** finds the users already present in the domain, it will skip adding them again and continue with the rest of the configuration process.

- e. In the next Ant Input Request window, enter **s** if you are using a standalone WebLogic Server environment or enter **c** if you are using a clustered environment. Click **OK**.

- f. In the next Ant Input Request window, enter **d** (for development environment) if you do not intend to connect to Oracle AIA or enter **p** (for production environment) if you intend to connect to Oracle AIA. Click **OK**.

If you selected **d**, the queues for a development environment will be created. This may take several minutes. If you selected **p**, the queues will be created after the next step.

- g. Do one of the following:

If you selected to have a development environment, in the next Ant Input Request window, enter **d** to deploy the Oracle AIA emulators or enter **n** to skip deploying the Oracle AIA emulators.

If you selected to have a production environment, in the next Ant Input Request window, enter **s** and click **OK**. This will install a Store-and-Forward (SAF) service for communications with Oracle AIA. Do not choose **b** in this window, because it is not supported.

- h. If you selected to have a production environment, entered **s** to install a SAF service, and the name of the cartridge associated with the buildfile contains **COMSOM** or **COM**:

Enter the Oracle AIA server user name that OSM central order management should use to connect to Oracle AIA in the next window, and click **OK**.

Then, enter the password for that user in the next window, and click **OK**.

Then, enter the host name and port (in the format *hostname:port*) that central order management should use for connecting to Oracle AIA in the next window. If the Oracle AIA server is on a WebLogic Cluster, enter all the host names and ports, separated by commas, for example:

```
yourhost1.com:8001,yourhost1.com:8002,yourhost2.com:7030
```

Click **OK**.

Finally, if OSM is not deployed in a clustered WebLogic Server environment, enter the name of the WebLogic server where central order management is running, and click **OK**.

- i. If you selected to have a production environment, entered **s** to install a SAF service, and the name of the cartridge associated with the buildfile contains **SOM**:

Enter the Oracle AIA server user name that OSM service order management should use to connect to Oracle AIA in the next window, and click **OK**.

Then, enter the password for that user in the next window, and click **OK**.

Then, enter the host name and port (in the format *hostname:port*) that service order management should use for connecting to Oracle AIA in the next window. If the Oracle AIA server is on a WebLogic Cluster, enter all the host names and ports, separated by commas, for example:

```
yourhost1.com:8001,yourhost1.com:8002,yourhost2.com:7030
```

Click **OK**.

Finally, if OSM is not deployed in a clustered WebLogic Server environment, enter the name of the WebLogic server where service order management is running, and click **OK**.

- j. Click **OK**. The system configures the rest of the WebLogic resources. This may take a few minutes.
5. When the installer is finished, shut down any affected WebLogic domains and restart them.
6. Exit and restart Eclipse.

Note: If you have made a mistake setting the Design Studio preferences and it causes this procedure to fail, this will be displayed in the Console view in Design Studio. First, correct the preferences using the instructions in "[Setting Design Studio Preferences](#)." Next, go to the **Properties** tab of the Edit Configuration dialog box, select **Use global properties as specified in the Ant runtime preferences** to update the values, and then deselect **Use global properties as specified in the Ant runtime preferences** again. Then, select **Clean** from the **Project** menu and clean and build the OracleComms_OSM_O2A_Install project. Exit and restart Design Studio, and then begin the procedure for configuring the WebLogic Server resources again.

Updating Unmodified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1

This section provides instructions for updating the unmodified Order-to-Activate 7.0.3 cartridges to run on OSM 7.3.1. You cannot use this procedure if there are pending orders for the cartridges on your OSM server, because the version number format changed between OSM 7.0.3 and OSM 7.3.1.

Note: At some point in the following process, the Import OSM Common Data Dictionary window will probably be displayed. Ensure that **Show this dialog in the future** is selected, and click **Cancel**.

To update your unmodified Order-to-Activate 7.0.3 cartridges to run on OSM 7.3.1:

1. Get the latest patch of the Order-to-Activate 7.0.3 cartridges. See "[Getting the Latest Patch for Your Version of the Cartridges](#)" for more information about getting the correct version.
2. Unzip the patch file.
3. Unzip the **OSM.PIP_Installer_byyyyymmdd.zip** file.

The OSM.PIP directory is created containing the **OracleCgbuOsmAIAInstallation.zip** and **OracleCgbuOsmAIAPIPCartridges.zip** files used later in this procedure.

4. Verify that Design Studio is running.
5. Import the installation cartridge for the Order-to-Activate 7.0.3 cartridges into your workspace:
 - a. From the **File** menu, select **Import Studio Project**.
The Import Projects dialog box is displayed.
 - b. Select **Select archive file** and click **Browse**.
 - c. Browse to the **OSM.PIP** folder for Order-to-Activate 7.0.3 cartridges and select **OracleCgbuOsmAIAInstallation.zip**.
 - d. Click **Open**.
The **OracleCgbuOsmAIAInstallation** project is displayed and selected in the **Projects** field.
 - e. Click **Finish**.
The **OracleCgbuOsmAIAInstallation** project is imported.
6. Import the remaining cartridges for Order-to-Activate 7.0.3 for your desired topology:
 - a. From the **File** menu, select **Import Studio Project**.
The Import Projects dialog box is displayed.
 - b. Select **Select archive file** and click **Browse**.
 - c. Browse to the **OSM.PIP** folder for Order-to-Activate 7.0.3 cartridges and select **OracleCgbuOsmAIAPIPCartridges.zip**.
 - d. In the **Projects** field, ensure that only the appropriate projects are selected:
For the Typical topology, deselect the following projects if they are present:
DoublePlayProductSpecificationDanube
OracleCgbuDoublePlayProductSpecNileTddcn
OracleCgbuOsmAIAInstallation
SimpleSalesOrderFulfillment
For the Simple topology, deselect the following projects if they are present:
DoublePlayProductSpecificationNile
OracleCgbuDoublePlayProductSpecNileTddcn
OracleCgbuOsmAIAInstallation
TypicalSalesOrderFulfillment
 - e. Click **Finish**.
The projects are imported. After the import is complete, the Upgrade Studio Projects window is displayed.
 - f. Click **Finish**.
7. From the **Studio** menu, select **Show Design Perspective**.
8. Set your cartridge management variables.

For each cartridge in your workspace, click the Project editor **Cartridge Management Variables** tab and set the following variables as needed:

- **PURGE_CARTRIDGE_BEFORE_DEPLOY**: Enter **true** to undeploy the previous version of a cartridge before deploying the new version, or enter **false** to update the cartridge with the changes for the new version.

Note: If your cartridge has pending or completed orders that you do not want to purge, do not undeploy the cartridge, but deploy the new version with **PURGE_CARTRIDGE_BEFORE_DEPLOY** set to **false**.

- **ENTITY_CONFLICT_ACTION_ON_DEPLOY**: Enter **replace** to replace the old entities with the new (default); enter **ignore** to add the new entities and retain the old; or enter **abort** to stop the process if conflicts are encountered. This variable only applies if **PURGE_CARTRIDGE_BEFORE_DEPLOY** is set to **false**.
- **PURGE_ORDER_ON_UNDEPLOY**: Enter **true** to purge all existing orders associated with the cartridge, or enter **false** if you do not want the system to undeploy the cartridge if it has pending orders.

Caution: Undeploying a cartridge purges all existing orders for that cartridge.

9. Right-click in the Ant view and select **Add Buildfiles**.

The Buildfile Selection dialog box is displayed.

10. Expand the **OSM.O2A.Cartridges.Migration** cartridge and expand the **7.0.3** directory. Click the **migration.xml** file and click **OK**.

The **OSM.O2A.Cartridges.7.0.3_to_7.3.1_Migration** file is displayed in the Ant view.

11. Configure the buildfile for the file you have added:

- a. In the Ant view, right-click the name of the file and select **Run As**.
- b. Select **Ant Build...** (not **Ant Build**), as shown in [Figure 13-1](#).
The Edit Configuration dialog box is displayed.
- c. Click the **Build** tab and deselect **Build before launch**.
- d. Click the **Properties** tab and deselect **Use global properties as specified in the Ant runtime preferences**.
- e. Click the **JRE** tab and select **Run in the same JRE as the Workspace**.
- f. Click **Close** and click **Yes**.

12. In the Ant View, expand the **OSM.O2A.Cartridges.7.0.3_to_7.3.1_Migration** file and double-click **migrate**.

13. Exit and restart Eclipse.

If prompted to save any entities, select **Yes**.

When Eclipse is restarted, the Studio Project Upgrade window is displayed, with a list of cartridges that should be upgraded.

14. Click Finish.

The cartridges will be updated. This can take several minutes. When the upgrade is finished, you are presented with the option to view the upgrade logs.

15. Build all of the cartridges.

See the Design Studio Help for information about how to build cartridges. Some cartridge builds will fail with the following error listed in the Problems pane:

Order and Service Management Cartridge Error - The automationBuild.xml file in cartridge *CartridgeName* is not the right version for this DS OSM plugin release. Right click on problem marker for the Quick Fix.

For each cartridge that fails to build with this error:

- a. Right-click on the error in the Problems pane and select **Quick Fix**.

The Quick Fix window is displayed.

- b. Click **Finish** and then click **OK**.
- c. Build the project again.

16. Configure the WebLogic Server resources for your environment.

See "[Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates](#)" for more information.

Updating Modified Order-to-Activate 7.0.3 Cartridges to Run on OSM 7.3.1

Order-to-Activate 7.0.3 cartridges are native to OSM 7.0.3. This procedure updates the cartridges so that they can run on OSM 7.3.1. Use this procedure if you want to update a solution that is based on modified versions of the Order-to-Activate 7.0.3 cartridges, or if you have pending orders in your OSM server. This procedure makes no functional changes to the contents of the cartridges.

Note: At some point in the following process, the Import OSM Common Data Dictionary window will probably be displayed. Ensure that **Show this dialog in the future** is selected, and click **Cancel**.

To update your modified Order-to-Activate 7.0.3 cartridges to run on OSM 7.3.1:

1. Get the latest patch of the Order-to-Activate 7.0.3 cartridges. See "[Getting the Latest Patch for Your Version of the Cartridges](#)" for more information about getting the correct version.
2. Find all XQuery files that have changed and compare them with original files to find the changes, and then apply those changes manually to files in the **OSM.O2A.Cartridges.Migration\7.0.3** folder. The following files will have changed:

```
OracleCgbuProvisioningFallout\resources\CreateErrorFault.xqy
CommunicationsProvisioningOrderFulfillmentPIP\resources\LFCheckCreationOrderFailure.xqy
CommunicationsSalesOrderFulfillmentPIP\resources\orderstate\OrderFailedStateHandler.xquery
OracleCgbuCommonDataDictionaryPIP\resources\TargetSystemManagementModule.xquery
```

3. In the `OracleCgbuOsmAIAInstallation/src/oracle/communications/ordermanagement`

/util/transform folder, find the **XQueryTransformer.java** file, compare it with the **XQueryTransformer.java** file that is in the OSM.O2A.Cartridges.Migration/7.0.3/OracleCgbuOsmAIAInstallation/src/oracle/communications/ordermanagement/util/transform folder, and manually apply the changes.

4. Update the broadband service cartridge to target version 7.0.3.
5. Unzip the patch file.
6. Unzip the **OSM.PIP_Installer_byyyymmdd.zip** file.
The OSM.PIP directory is created containing the **OracleCgbuOsmAIAInstallation.zip** and **OracleCgbuOsmAIAPIPCartridges.zip** files used later in this procedure.
7. Verify that Design Studio is running.
8. Import the installation cartridge for the Order-to-Activate 7.0.3 cartridges into your workspace:
 - a. From the **File** menu, select **Import Studio Project**.
The Import Projects dialog box is displayed.
 - b. Select **Select archive file** and click **Browse**.
 - c. Browse to the **OSM.PIP** folder for Order-to-Activate 7.0.3 cartridges and select **OracleCgbuOsmAIAInstallation.zip**.
 - d. Click **Open**.
The **OracleCgbuOsmAIAInstallation** project is displayed and selected in the **Projects** field.
 - e. Click **Finish**.
The **OracleCgbuOsmAIAInstallation** project is imported.
9. Import the remaining cartridges for Order-to-Activate 7.0.3 for your desired topology:
 - a. From the **File** menu, select **Import Studio Project**.
The Import Projects dialog box is displayed.
 - b. Select **Select archive file** and click **Browse**.
 - c. Browse to the **OSM.PIP** folder for Order-to-Activate 7.0.3 cartridges and select **OracleCgbuOsmAIAPIPCartridges.zip**.
 - d. In the **Projects** field, ensure that only the appropriate projects are selected:
For the Typical topology, deselect the following projects if they are present:
DoublePlayProductSpecificationDanube
OracleCgbuDoublePlayProductSpecNileTdDcn
OracleCgbuOsmAIAInstallation
SimpleSalesOrderFulfillment
For the Simple topology, deselect the following projects if they are present:
DoublePlayProductSpecificationNile
OracleCgbuDoublePlayProductSpecNileTdDcn
OracleCgbuOsmAIAInstallation

TypicalSalesOrderFulfillment

- e. Click **Finish**.

The projects are imported. After the import is complete, the Upgrade Studio Projects window is displayed.

- f. Click **Finish**.

10. Manually import any custom cartridges that you created into your Design Studio workspace.
11. Consult the README file supplied with the latest patch of the Order-to-Activate cartridges to see what cartridges have been updated by the patch, and for each cartridge that you have modified in your solution, do one of the following:
 - If the cartridge you modified has not been updated by the patch, manually import your version of the cartridge into your workspace.
 - If the cartridge you modified has been updated by the patch, manually reapply your changes to the cartridge supplied by the patch.
12. From the **Studio** menu, select **Show Design Perspective**.
13. Set your cartridge management variables.

For each cartridge in your workspace, click the Project editor **Cartridge Management Variables** tab and set the following variables as needed:

- **PURGE_CARTRIDGE_BEFORE_DEPLOY**: Enter **true** to undeploy the previous version of a cartridge before deploying the new version, or enter **false** to update the cartridge with the changes for the new version.

Note: If your cartridge has pending or completed orders that you do not want to purge, do not undeploy the cartridge, but deploy the new version with **PURGE_CARTRIDGE_BEFORE_DEPLOY** set to **false**.

- **ENTITY_CONFLICT_ACTION_ON_DEPLOY**: Enter **replace** to replace the old entities with the new (default); enter **ignore** to add the new entities and retain the old; or enter **abort** to stop the process if conflicts are encountered. This variable only applies if **PURGE_CARTRIDGE_BEFORE_DEPLOY** is set to **false**.
- **PURGE_ORDER_ON_UNDEPLOY**: Enter **true** to purge all existing orders associated with the cartridge, or enter **false** if you do not want the system to undeploy the cartridge if it has pending orders.

Caution: Undeploying a cartridge purges all existing orders for that cartridge.

14. Update the library names in the **OSM.AIAEmulatorsBuild.xml** file:
 - a. Outside Design Studio, navigate to the **OracleCgbuOsmAIAInstallation** directory in your workspace.
 - b. Open the **OSM.AIAEmulatorsBuild.xml** file in a text editor or an XML editor.
 - c. Change all occurrences of the following JAR files from the old name to the new name:

Old .jar File Name	New .jar File Name
commons-codec-1.9.jar	commons-codec.jar
commons-collections-3.2.jar	commons-collections-4.jar
commons-io-2.4.jar	commons-io.jar
commons-lang-2.1.jar	commons-lang3.jar
commons-logging-1.1.jar	commons-logging.jar
commons-net-3.3.jar	commons-net.jar
commons-pool2-2.2.jar	commons-pool2.jar
commons-vfs2-2.0.jar	commons-vfs2.jar
httpclient-4.1.2.jar	httpclient.jar
httpcore-4.3.2.jar	httpcore.jar
jaxen-1.1.3.jar	jaxen.jar
ojdbc6.jar	ojdbc7.jar
oracle.jps_11.1.1	oracle.jps_12.1.3
resolver.jar	xml-resolver.jar
saxon9.jar saxon9-xpath.jar saxon9ee.jar	saxon-ee-java.jar
saxon-license.lic	saxon-ee-java-osm-license.jar
text-table-formatter-1.1.1.jar	texttablefmt.jar
\${aia.jdev.lib.dir}/javax.jms_1.1.1.jar	\${aia.jdev.lib.dir}/../oracle_common/modules/javax.jms_1.1.4.jar

There are several instances of each value in the file.

- d. Change all occurrences of **fileset dir="{aia.jdev.lib.dir}"** to **fileset dir="{aia.jdev.lib.dir}/../oracle_common/modules "**.
 - e. Remove any occurrences of Saxon JAR file references, except references to **saxon9ee.jar**.
 - f. Change all occurrences of **include name="saxon-license.lic"/** file to **include name="saxon-ee-java.jar"/** file.
 - g. Package the **saxon-license.lic** file.
 - h. Save the file under the project **OracleCgbuOsmAIAInstallation/...**, and close the file.
 - i. Update the **Manifest.mf** file under the **OracleCgbuOsmAIAInstallation/...** folder with the latest .jar files, that is, **saxon9.jar** to **saxon-ee-java.jar**, **commons-lang-2.1.jar** to **commons-lang3.jar**, and so on.
15. Return to Design Studio and update the Java build path by doing the following for each row in [Table 13-3](#):
- a. In the Studio Projects view, right-click the cartridge listed in the Cartridge Name column and select **Properties**.
 - b. Select **Java Build Path** in the left pane of the Properties window, and click the **Libraries** tab.

- c. Select the library in the Old Value column and click **Edit**.
- d. Change the value to match the value in the New Value column and click **OK**.

Table 13–3 Java Build Path Updates

Cartridge Name	Old Value	New Value
BroadbandServicesProvisioning	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p>	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/ javax.jms_1.1.4.jar</p>
CommunicationsProvisioningOrderFulfillmentPIP	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/ javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>

Table 13–3 (Cont.) Java Build Path Updates

Cartridge Name	Old Value	New Value
CommunicationsSalesOrderFulfillmentPIP	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>
OracleCgbuCommonDataDictionaryPIP	<p>OSM_ home/Automation/automationdeploy_bin/commons-io-1.4.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-xpath.jar</p> <p>MW_home/modules/javax.ejb_3.0.1.jar</p>	<p>OSM_ home/Automation/automationdeploy_bin/commons-io.jar</p> <p>MW_home/oracle_common/modules/javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p> <p>MW_home/oracle_common/modules/javax.ejb_3.3.0.jar</p>

Table 13–3 (Cont.) Java Build Path Updates

Cartridge Name	Old Value	New Value
OracleCgbuCommunicationsORPFalloutPIP	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>
OracleCgbuOsmAIAInstallation	<p>OSM_ home/Automation/automationdeploy_bin/commons-collections-3.2.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_bin/commons-collections4-4.0.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>
OracleCgbuOsmAIAInstallation	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang-2.1.jar</p>	<p>OSM_ home/Automation/automationdeploy_bin/commons-lang3.jar</p>
OracleCgbuOsmAIAInstallation	<p>MW_ home/jdeveloper/modules/oracle.jps_11.1.1/jps-api.jar</p>	<p>MW_home/oracle_common/modules/oracle.jps_12.1.3/jps-api.jar</p>

Table 13–3 (Cont.) Java Build Path Updates

Cartridge Name	Old Value	New Value
OracleCgbuProvisioning Fallout	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/ javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>
OracleCgbuSIFalloutPIP	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-dom.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon9-xpath.jar</p>	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/ javax.jms_1.1.4.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/saxon-ee-java.jar</p> <p>Remove saxon9-dom.jar from classpath</p> <p>Remove saxon9-xpath.jar from classpath</p>
VoIPServiceProvisioning	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang-2.1.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging-1.1.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/wlclient.jar</p> <p>MW_home/wlserver_ 10.3/server/lib/weblogic.jar</p> <p>MW_home/modules/javax.jms_1.1.1.jar</p>	<p>OSM_ home/Automation/automationdeploy_ bin/commons-lang3.jar</p> <p>OSM_ home/Automation/automationdeploy_ bin/commons-logging.jar</p> <p>MW_ home/wlserver/server/lib/wlclient.jar</p> <p>MW_ home/wlserver/server/lib/weblogic.jar</p> <p>MW_home/oracle_common/modules/ javax.jms_1.1.4.jar</p>

16. Exit and restart Eclipse.

If prompted to save any entities, select **Yes**.

When Eclipse is restarted, the Studio Project Upgrade window is displayed with a list of cartridges that should be upgraded.

17. Click **Finish** to upgrade the cartridges.

This can take several minutes. When the upgrade is finished, you are presented with the option to view the upgrade logs.

18. If there are no pending Order-to-Activate orders in your OSM instance, change the target version and cartridge versions to be compatible with OSM 7.3.1. If there are pending Order-to-Activate orders in your OSM instance, you must skip this step. For each cartridge in your workspace:

a. In the Project editor **Properties** tab for the cartridge, change the value of **Target Version** from **7.0.3** to **7.3.1**.

b. Open the Package Explorer view.

c. Open the *CartridgeName/xmlCatalogs/core/catalog.xml* file.

d. Click the **Source** tab.

e. Each rewritePrefix attribute in the file includes the string **1.0.0**. Change this value to **1.0.0.0**.

19. In the Package Explorer view, replace the **OracleCgbuCommonDataDictionaryPIP/resources/osm-pip-utility.jar** file with the **OSM.O2A.Cartridges.Migration/7.0.3/OracleCgbuCommonDataDictionaryPIP/resources/osm-pip-utility.jar** file.

This will replace the Order-to-Activate 7.0.3 version of the utility library with the 7.3.1 version from the migration package.

20. Set up the event views for the orders in the solution by doing the following for each row in [Table 13–4](#):

a. Expand the cartridge listed in the Cartridge column in [Table 13–4](#) and open the order editor for the order in the Order column.

b. Click the **Events** tab for the order editor.

c. In the **Milestone** list, select the value in the Milestone column.

d. In the **Automation** list, select the value in the Automation column.

e. Click **Select** and, in the resulting window, select the value in the View column.

Table 13–4 Milestone Automation Event Notification View Updates

Cartridge	Order	Milestone	Automation	View
CommunicationsProvisioningOrderFulfillmentPIP	CommunicationsProvisioningOrder	completion	ProvisionOrderCompleteEventHandler	CommunicationsProvisioningOrderQueryTask
CommunicationsProvisioningOrderFulfillmentPIP	CommunicationsProvisioningOrder	creation	LFCheckCreationOrderFailureBean	CommunicationsProvisioningOrderQueryTask
BroadbandServicesProvisioning	BroadbandServicesProvisioningOrder	completion	BroadbandServiceOrderCompleteEventHandlerBean	BroadbandServicesProvisioningOrderQueryTask

Table 13–4 (Cont.) Milestone Automation Event Notification View Updates

Cartridge	Order	Milestone	Automation	View
VoIPServiceProvisioning	VoIPServiceProvisioningOrder	completion	VoIPServiceOrderCompleteEventHandlerBean	VoIPServiceProvisioningOrderQueryTask
CommunicationsSalesOrderFulfillmentPIP	CommunicationsSalesOrder	completion	SalesOrderCompleteEventHandlerBean	FalloutNotificationTask
CommunicationsSalesOrderFulfillmentPIP	CommunicationsSalesOrder	stateChange	OrderStateChangeHandler	FalloutNotificationTask

21. Set up the event views for the orders in the solution by doing the following for each row in [Table 13–5](#):
 - a. Expand the cartridge listed in the Cartridge column in [Table 13–5](#) and open the order editor for the order in the Order column.
 - b. Click the **Notifications** tab for the order editor and in the event list on the left, select the value in the Event column.
 - c. Click the **Automation** subtab.
 - d. In the **Automation** list, select the value in the Automation column.
 - e. Click **Select** and, in the resulting window, select the value in the View column.

Table 13–5 Event Notification View Updates

Cartridge	Order	Event	Automation	View
CommunicationsProvisioningOrderFulfillmentPIP	CommunicationsProvisioningOrder	SendFault2AIAEH	SendFault2AIAEH	CommunicationsProvisioningOrderQueryTask
CommunicationsSalesOrderFulfillmentPIP	CommunicationsSalesOrder	CreateOrderFalloutNotification	CreateOrderFalloutNotification	FalloutNotificationTask
CommunicationsSalesOrderFulfillmentPIP	CommunicationsSalesOrder	CloseFalloutTroubleTicket	CloseFalloutTroubleTicket	FalloutNotificationTask
CommunicationsSalesOrderFulfillmentPIP	CommunicationsSalesOrder	NotifyCRMofOrderFalloutStatus	NotifyCRMofOrderFalloutStatusBean	FalloutNotificationTask

22. Modify the `InitiateBillingSITask` automated task:
 - a. Expand the `CommunicationsSalesOrderFulfillmentPIP` cartridge, expand **Automated Tasks**, and then expand **TASK**.
 - b. Open the `InitiateBillingSITask` task and click the **Automation** tab.
 - c. Click **Add**.
The Add Automation window is displayed.
 - d. In the **Name** field, enter `InitiateBillingResponseBean`.
 - e. Select **XQuery Automator** from the **Automation Type** drop-down list, select the **External Event Receiver** option, and then click **OK**.
 - f. In the **Automation** list, select the automation you just created, and click **Properties**.

- g. On the **Details** tab in the Properties pane, change the value for **EJB Name** to **InitiateBillingSITask.InitiateBillingResponseBean** and change the value for **Run As** to **oms-automation**.
 - h. Click the **External Event Receiver** tab in the Properties pane, change the value of **JNDI Name** to **%{O2A_INBOUND_CREATE_BILLING_RESPONSE_QUEUE_JNDI}**, and remove the value from the **Message Property Selector** field.
 - i. Click the **XQuery** tab in the Properties pane, ensure the **Bundle In** option is selected, set the value for **XQuery** to **AIAEBMResponse.xqy**, and deselect **Update Order**.
23. Modify the ProvisionOrderSITask automated task:
- a. Expand the CommunicationsSalesOrderFulfillmentPIP cartridge, expand **Automated Tasks**, and then expand **TASK**.
 - b. Open the **ProvisionOrderSITask** task and click the **Automation** tab.
 - c. Click **Add**.
The Add Automation window is displayed.
 - d. In the **Name** field, enter **ProvisioningResponseBean**.
 - e. Select **XQuery Automator** from the **Automation Type** drop-down list, select the **External Event Receiver** option, and then click **OK**.
 - f. In the **Automation** list, select the automation you just created, and click **Properties**.
 - g. On the **Details** tab in the Properties pane, change the value for **EJB Name** to **ProvisionOrderSITask.ProvisioningResponseBean** and change the value for **Run As** to **oms-automation**.
 - h. Click the **External Event Receiver** tab in the Properties pane, change the value of **JNDI Name** to **%{O2A_INBOUND_CREATE_PROV_RESPONSE_QUEUE_JNDI}**, and change the value of **Message Property Selector** to **CGBUPIPCFFALLOUT IS NULL**.
 - i. Click the **Correlation** tab in the Properties pane, select **XML Body** in the **Correlation** drop-down list, and enter the following into the **XML Body** field:

```
(*[local-name()='ProcessFulfillmentOrderUpdateEBM']/*[local-name()='DataArea']/*[local-name()='ProcessFulfillmentOrderUpdate']/*[local-name()='Identification']/*[local-name()='BusinessComponentID']) |
(*[local-name()='ProcessFulfillmentOrderUpdateEBM']/*[local-name()='EBMHeader']/*[local-name()='Sender']/*[local-name()='ObjectCrossReference']/*[local-name()='SenderObjectIdentification']/*[local-name()='BusinessComponentID']) |
(*[local-name()='OrderFalloutNotification']/*[local-name()='OrderID']/*[local-name()='AlternateObjectKey']/*[local-name()='ID' and @schemeID='CFS_ORDER_KEY'])
```
 - j. Click the **XQuery** tab in the Properties pane, ensure the **Bundle In** option is selected, set the value for **XQuery** to **AIAEBMResponse.xqy**, and deselect **Update Order**.
24. Modify the SyncCustomerSITask automated task:
- a. Expand the CommunicationsSalesOrderFulfillmentPIP cartridge, expand **Automated Tasks**, and then expand **TASK**.
 - b. Open the **SyncCustomerSITask** task and click the **Automation** tab.

- c. In the list, select **SyncCustomerResponseBean**, and then click **Properties**.
 - d. On the **Details** tab in the Properties pane, change the value for **EJB Name** to **SyncCustomerSITask.SyncCustomerResponseBean**.
25. Modify the **CommunicationsServicesProvisioningOrderSIEnterPointSITask** automated task:
- a. Expand the **CommunicationsProvisioningOrderFulfillmentPIP** cartridge, expand **Automated Tasks**, and then expand **TASK**.
 - b. Open the **CommunicationsServicesProvisioningOrderSIEnterPointSITask** task and click the **Automation** tab.
 - c. Click **Add**.
The Add Automation window is displayed.
 - d. Enter **CommunicationsServicesProvisioningOrderUpdateUndoBean** in the **Name** field.
 - e. Select **XQuery Automator** from the **Automation Type** drop-down list, select the **External Event Receiver** option, and then click **OK**.
 - f. In the **Automation** list, select the automation you just created, and click **Properties**.
 - g. On the **Details** tab in the Properties pane, change the value for **EJB Name** to **CommunicationsServicesProvisioningOrderSIEnterPointSITask.CommunicationsServicesProvisioningOrderUpdateUndoBean** and change the value for **Run As** to **oms-automation**.
 - h. Click the **External Event Receiver** tab in the Properties pane, change the value of **JNDI Name** to **%{O2A_INTERNAL_SERVICE_PROVISIONING_UPDATE_QUEUE_JNDI}**, and remove the value from the **Message Property Selector** field.
 - i. Click the **Correlation** tab in the Properties pane, ensure the **Correlation** field is set to **Message Property**, and enter **OMSOrderID** into the **Message Property** field.
 - j. Click the **XQuery** tab in the Properties pane, ensure the **Bundle In** option is selected, set the value for **XQuery** to **CommunicationsServicesProvisioningOrderUpdate.xqy**, and deselect **Update Order**.
26. If you updated the target version for your cartridges to **7.3.1** in step 18 (that is, if you have no pending Order-to-Activate orders in your OSM instance), modify the **CommunicationsSalesOrderLine** order item specification. If you did not update the Target Version for your cartridges to **7.3.1** in step 18, you must skip this step.
- a. Expand the **CommunicationsSalesOrderFulfillmentPIP** cartridge, expand **Order Item Specifications**, and then expand **LINE**.
 - b. Open the **OpenCommunicationsSalesOrderLine** order item specification and click the **Order Item Dependencies** tab.
 - c. In the **Order Item Dependencies** list, select **interOrderDependency**.
 - d. In the **XQuery** subtab on the right, there is a namespace declaration for **osmc**. In that declaration, the text **1.0.0** is present. Change that text to **1.0.0.0.0**.
27. Exit and restart Eclipse.
- If prompted to save any entities, select **Yes**.

28. Build all of the cartridges.

See the Design Studio Help for information about how to build cartridges. Some cartridge builds will fail with the following error listed in the Problems pane:

Order and Service Management Cartridge Error - The automationBuild.xml file in cartridge *CartridgeName* is not the right version for this DS OSM plugin release. Right click on problem marker for the Quick Fix.

For each cartridge that fails to build with this error:

- a. Right-click on the error in the Problems pane and select **Quick Fix**.

The Quick Fix window is displayed.

- b. Click **Finish** and then click **OK**.
- c. Rebuild the project.

29. Configure the WebLogic Server resources for your environment.

See "[Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates](#)" for more information.

Configuring WebLogic Server Resources for 7.0.3 Cartridge Updates

The following section provides the procedure for configuring WebLogic Server resources. It must be performed for 7.0.3 cartridge updates.

Setting Up the Configuration File for Connecting to Oracle AIA

If you are going to connect to an instance of Oracle AIA (instead of using the Oracle AIA emulators), you need to configure a file. The file you configure will depend on whether OSM is running on a WebLogic Server cluster or a WebLogic Server standalone server.

Setting Up the Configuration File for OSM on WebLogic Cluster

To set up the configuration file if OSM is running on a WebLogic Server cluster:

1. Outside Design Studio, in the directory for your Design Studio workspace, browse to the **OracleCgbuOsmAIAInstallation/config-scripts/saf-cluster/** directory.
2. Edit the **config-cluster-saf.properties** file.
3. Change the values for the parameters in [Table 13-6](#):

Table 13-6 Parameters to Edit in the config-cluster-saf.properties File

Parameter	Description
adminServerListenAddress	Host name of the system where the WebLogic Server for central order management is running.
adminServerListenPort	Port on which the WebLogic Server for central order management is listening.
adminServerName	Name of the WebLogic server listening on adminServerListenAddress and adminServerListenPort.
userName	Name of a user with administrative privileges on the WebLogic server listening on adminServerListenAddress and adminServerListenPort.
passWord	Password of the user defined in the userName parameter.

Table 13–6 (Cont.) Parameters to Edit in the config-cluster-saf.properties File

Parameter	Description
saf_FileStoreDir	A directory on the system defined in the adminServerListenAddress parameter. If the value starts with a forward slash, it indicates an absolute path on the system. If the value does not begin with a forward slash, it indicates a path inside the domain directory for the server. This directory will be created if it does not exist.
fmwRemoteServerListenAddress	Host name of the system where the WebLogic Server for Oracle AIA is running. If Oracle AIA is running in a clustered WebLogic Server environment, enter values for all of the servers, in the format <i>managed_server_name.hostname:port</i> separated by commas, for example: firstMS.yourhost.com:8001,secondMS.yourhost.com:8002
fmwRemoteServerUserName	Name of the user that OSM should use to connect to Oracle AIA.
fmwRemoteServerPassWord	Password of the user defined in the fmwRemoteServerUserName parameter.

4. Save and exit the file.

Setting Up the Configuration File for OSM on Standalone WebLogic Server

To set up the configuration file if OSM is running on a WebLogic Server standalone server:

1. Outside Design Studio, in the directory for your Design Studio workspace, browse to the **OracleCgbuOsmAIAInstallation/config-scripts/saf-standalone** directory.
2. Edit the **config-standalone-saf.properties** file.
3. Change the values for the parameters in [Table 13–7](#):

Table 13–7 Parameters to Edit in the config-standalone-saf.properties File

Parameter	Description
adminServerListenAddress	Host name of the system where the WebLogic server for central order management is running.
adminServerListenPort	Port on which the WebLogic server for central order management is listening.
adminServerName	Name of the WebLogic server listening on adminServerListenAddress and adminServerListenPort.
userName	Name of a user with administrative privileges on the WebLogic server listening on adminServerListenAddress and adminServerListenPort.
passWord	Password of the user defined in the userName parameter.
saf_FileStoreDir	A directory on the system defined in the adminServerListenAddress parameter. If the value starts with a forward slash, it indicates an absolute path on the system. If the value does not begin with a forward slash, it indicates a path inside the domain directory for the server. This directory will be created if it does not exist.
fmwRemoteServerListenAddress	Host name of the system where the WebLogic Server for Oracle AIA is running.

Table 13–7 (Cont.) Parameters to Edit in the config-standalone-saf.properties File

Parameter	Description
fmwRemoteServerListenPort	Port on which the WebLogic Server for Oracle AIA is listening.
fmwRemoteServerUserName	Name of the user that OSM should use to connect to Oracle AIA.
fmwRemoteServerPassWord	Password of the user defined in the fmwRemoteServerUserName parameter.

4. Save and exit the file.

Running the config_All Target

To configure the WebLogic Server resources:

1. Verify that Design Studio is running.
2. From the **Window** menu, select **Show View**, and then select **Other**.
The Show View window is displayed.
3. Expand **Ant** and select **Ant** from below it. Click **OK**.
The Ant view opens.
4. Right-click in the Ant view and select **Add Buildfiles**.
The Buildfile Selection dialog box is displayed.
5. Expand the **OSM.O2A.Cartridges.Migration** cartridge and expand the **config** directory. Add the files listed below and click **OK**.
 - If central order management and service order management are in the same OSM instance, add **config_COMSOM.xml**.
 - If central order management and service order management are in different OSM instances, add **config_COM.xml** and **config_SOM.xml**.

The files are displayed in the Ant view. Each file is listed as with **config** replaced by **OracleComms_OSM_O2A_CartridgeMigration**. For example, if you added the **config_COMSOM.xml** file, it is listed as **OracleComms_OSM_O2A_CartridgeMigration_COMSOM.xml** in the Ant view.

6. For each file you have added, configure the buildfile:
 - a. In the Ant view, right-click the name of the file and select **Run As**.
 - b. Select **Ant Build...** (not **Ant Build**), as shown in [Figure 13–1](#).
The Edit Configuration dialog box is displayed.
 - c. Click the **Build** tab and deselect **Build before launch**.
 - d. Click the **Properties** tab and deselect **Use global properties as specified in the Ant runtime preferences**.
 - e. Click the **JRE** tab and select **Run in the same JRE as the Workspace**.
 - f. Click **Close** and click **Yes**.
 - g. Right-click the name of the file and select **Run As** again.
 - h. Select **Ant Build...** (not **Ant Build**).
The Edit Configuration dialog box is displayed.

Note: After you have deselected the **Use global properties...** check box, Eclipse prevents you from changing any of these properties until you close and reopen the Edit Configuration dialog box.

- i. Click the **Properties** tab and set the appropriate values listed in [Table 13–8](#).

Table 13–8 Values for Ant Edit Configuration Properties Tab

Property Name	Description	Notes
aia.emulator.serverName	<p>Name of the cluster or server within WebLogic Server to which you want to deploy the emulators. Set this to one of the following:</p> <ul style="list-style-type: none"> ■ If OSM is installed to a cluster, set this value to the name of the cluster. ■ If OSM is installed to the administration server, set this to the name of the administration server. ■ If OSM is installed to a single managed server, set this value to the managed server name. <p>If both central order management and service order management are in the same OSM server instance, set this to the name of the cluster or server for the single OSM instance.</p> <p>If central order management and service order management are in different OSM server instances, set this to the name of the cluster or server for central order management in the central order management buildfile and to the name of the cluster or server for service order management in the service order management buildfile.</p>	Set this property in all files if you are installing the Oracle AIA emulators.
cf.adminServerListenAddress	Host name of the system where the WebLogic server for central order management is running. If you are in a clustered environment, set this to the server where the Administration server is located.	Set this if the buildfile has COM or COMSOM in the name.
cf.adminServerListenPort	Port on which the WebLogic server for central order management is listening. If you are in a clustered environment, set this to the port on which the Administration server is listening.	Set this if the buildfile has COM or COMSOM in the name.
cf.clusterName	Name of the cluster for central order management, exactly as it is shown in the WebLogic Server console.	Set this if the buildfile has COM or COMSOM in the name and you are in a clustered WebLogic Server environment.
cf.userName	Name of a user with administrative privileges on the WebLogic Server for listening on cf.adminServerListenAddress and cf.adminServerListenPort.	Set this if the buildfile has COM or COMSOM in the name.

Table 13–8 (Cont.) Values for Ant Edit Configuration Properties Tab

Property Name	Description	Notes
If.adminServerListenAddress	Host name of the system where the WebLogic Server for service order management is running. If you are in a clustered environment, set this to the server where the Administration server is located.	Set this if the name of the buildfile has SOM in the name.
If.adminServerListenPort	Port on which the WebLogic Server for service order management is listening. If you are in a clustered environment, set this to the port on which the Administration server is listening.	Set this if the buildfile has SOM in the name.
If.clusterName	Name of the cluster for service order management, exactly as it is shown in the WebLogic Server console.	Set this if the buildfile has SOM in the name and you are in a clustered WebLogic Server environment.
If.userName	Name of a user with administrative privileges on the WebLogic Server listening on If.adminServerListenAddress and If.adminServerListenPort.	Set this if the buildfile has SOM in the name.

- j. Click **Close** and click **Yes**.
7. For *each* file you have added, do the following:
 - a. In the Ant view, expand the cartridge name and double-click **config_All**.
 - b. The first Ant Input Request window requests the WebLogic Server administrator user password. Enter the password for the user you entered in **cf.userName** or **If.userName** (whichever value you configured for the buildfile you are running). Click **OK**.
 - c. In the second Ant Input Request window, enter **y** to use the same password for all of the users being created or enter **n** to use a different password for each user. Click **OK**.
 - d. Enter the passwords requested for the Order-to-Activate users by the **Ant Input Request** windows:

Note: Ensure that the passwords you enter meet the security requirements of your WebLogic Server domain. By default, WebLogic Server requires passwords of at least eight characters, with at least one numeric or special character. However, the requirements for your domain may be different.

If you entered **y** in the previous step, enter the common password for the Order-to-Activate users and click **OK**.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **COM**, you are prompted for passwords for the following users: **COM user** (osm), **COM Order Event user** (osmoe), **COM Data Change Event user** (osmde), and **COM Fallout user** (osmfallout). Click **OK** after each entry.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **SOM**, you are prompted for passwords for the

following users: **SOM user** (osmlf), **SOM Order Event user** (osmoelf), and **SOM Order Abort user** (osmlfaop). Click **OK** after each entry.

If you entered **n** in the previous step and the name of the cartridge associated with the buildfile contains **COMSOM**, you are prompted for passwords for the following users: **COM user** (osm), **COM Order Event user** (osmoe), **COM Data Change Event user** (osmde), **COM Fallout user** (osmfallout), **SOM user** (osmlf), **SOM Order Event user** (osmoelf), and **SOM Order Abort user** (osmlfaop). Click **OK** after each entry.

After you have entered the passwords and clicked **OK**, the system creates the users in the WebLogic Server domain. This may take a few minutes.

Note: Although **config_All** has now created users in the WebLogic Server domain, it is still possible to cancel the script at a later point and rerun it. If the **config_All** finds the users already present in the domain, it will skip adding them again and continue with the rest of the configuration process.

e. In the next Ant Input Request window, enter **s** if you are using a standalone WebLogic Server environment or enter **c** if you are using a clustered environment. Click **OK**.

f. In the next Ant Input Request window, enter **d** (for development environment) if you do not intend to connect to Oracle AIA or enter **p** (for production environment) if you intend to connect to Oracle AIA. Click **OK**.

If you selected **d**, the queues for a development environment will be created. This may take several minutes. If you selected **p**, the queues will be created after the next step.

g. If you selected to have a development environment, in the next Ant Input Request window, enter **d** to deploy the Oracle AIA emulators or enter **n** to skip deploying the Oracle AIA emulators.

h. If you selected to have a production environment, in the next Ant Input Request window, enter **b** to install a JMS bridge to Oracle AIA or enter **s** to install a Store-and-Forward (SAF) service for communications with Oracle AIA.

Note: If you are connecting to Oracle AIA version 11.1 or later, select **s** in this step. JMS bridges are not supported for communication to Oracle AIA 11.1 or later.

i. Click **OK**.

The system configures the rest of the WebLogic resources. This may take a few minutes.

8. When the installer is finished, shut down any affected WebLogic domains and restart them.

9. Exit and restart Eclipse.

Note: If you have made a mistake setting the Design Studio preferences and it causes this procedure to fail, this will be displayed in the Console view in Design Studio. First, correct the preferences using the instructions in "[Setting Design Studio Preferences](#)." Next, go to the **Properties** tab of the Edit Configuration dialog box, select **Use global properties as specified in the Ant runtime preferences** to update the values, and then deselect **Use global properties as specified in the Ant runtime preferences** again. Then, select **Clean** from the **Project** menu and clean and build the OracleComms_OSM_O2A_Install project. Exit and restart Design Studio, and then begin the procedure for configuring the WebLogic Server resources again.

Deploying the Updated Order-to-Activate Cartridges

The following section provides the procedure for deploying the updated Order-to-Activate cartridges. It must be performed for 7.0.3, 7.2.0, 2.0.1, and 2.1.0 cartridge updates.

Before deploying the Order-to-Activate cartridges:

- Ensure that all of the cartridges have been built successfully. These steps are included in the individual procedures for updating the Order-to-Activate cartridges.
- Configure the WebLogic Server resources.

To deploy the updated Order-to-Activate cartridges:

1. Verify that Design Studio is running.
2. Create a new Studio Environment project and a new Studio environment.

Note: See the Design Studio Help for details on creating a Studio Environment project and a Studio environment.

If you are installing central order management and service order management on different OSM servers, you need two environment entities: one pointing to the central order management cluster or standalone server and the other pointing to the service order management cluster or standalone server.

3. Open the Environment perspective.
4. Select the Design Studio environment in which the cartridges are to be deployed.
The Cartridge Management pane is displayed, displaying a list of available cartridges.
5. Select all of the cartridges you wish to deploy and click **Deploy**.

Uninstalling OSM

This chapter provides information about uninstalling the Oracle Communications Order and Service Management (OSM) product.

The OSM Uninstaller removes only the OSM program files. It does not remove the database schemas or the OSM application from the WebLogic server.

To completely remove OSM, you must perform the following steps:

1. Back up all customized configuration files.
2. Remove the OSM application from the WebLogic server. See "[OSM Uninstall: Additional Tasks](#)" for minimal instructions, and see the Oracle WebLogic Server documentation for more information.

Note: Because the OSM installation scripts do not update the operating system's registry settings, you do not need to perform any manual clean-up operations on the registry.

3. Remove the OSM database schemas. See Oracle Database documentation for more information.
4. Uninstall OSM components by running the OSM Uninstaller. See "[Uninstalling OSM Components](#)." If uninstalling using silent uninstall, see "[Performing a Silent Uninstall](#)."
5. Remove the directory where OSM is installed.

Uninstalling OSM Components

The OSM Uninstaller removes the OSM program files. It does not uninstall any database or WebLogic domain information. This includes elements created by the OSM Installer. These must be uninstalled manually.

Note: To run the OSM Uninstaller using the procedure in this section, you must have the Info-ZIP project utility installed. If it is not already installed on your system, you can download it from the following location:

<http://sourceforge.net/projects/infozip/>

If you do not install the Info-ZIP project utility, you must modify the OSM uninstall script to use a different unzip utility.

Always run the Uninstaller to remove the OSM program files. If you simply delete the program files without running the Uninstaller, you may receive errors in future OSM installations.

Note: The uninstallation operation does not have any dependency on the WebLogic server and the Oracle Database. You do not have to keep the servers in Running mode to uninstall OSM.

To uninstall the OSM program files:

1. Go to the installation directory folder, *OSM_home/_uninst*.
2. Do one of the following:
 - On Oracle Linux or Red Hat Enterprise Linux, Solaris, IBM AIX, or Hewlett-Packard HP-UX Itanium, execute the command:

```
OSMUninstall.sh
```
 - On Microsoft Windows, execute the command:

```
OSMUninstall.bat
```

Or, from the **Start** menu, select **Programs**, then **Oracle Communications**, then select **Order and Service Management Uninstaller**.
3. In the Uninstaller's welcome dialog box, click **Next**.
The Product Uninstallation dialog box is displayed.
4. Do one of the following:
 - To remove all of the OSM files, click **Next**, which opens the confirmation dialog box.
 - To remove specific components, deselect the components you want to leave installed and click **Next**, which opens the confirmation dialog box.
5. Click **Next**, which starts the uninstallation process.
The uninstaller removes the OSM program files from the workstation.
6. Do one of the following:
 - Click **Yes** to remove an existing file.
 - Click **Yes to All** to remove all existing files.
 - Click **No** to keep an existing file.
 - Click **No to All** to keep all existing files.
7. Click **Finish**.

OSM Uninstall: Additional Tasks

In addition to running the OSM software uninstall procedure, you need to perform additional tasks to completely remove the OSM software and related software elements.

You should perform an environment-specific analysis on each OSM system to create a customized list of uninstallation tasks. For example, you may want to remove customizations that you added after OSM was installed. These customizations might

be part of a clustered environment or a multiproduct installation. You may also need to remove additional dependent WebLogic resources, such as messaging bridges, JMS Queues, automation plug-ins, and user accounts.

The specific steps for uninstalling all related elements will vary based on your particular environment.

The following procedure specifies the additional uninstallation tasks for a minimal OSM installation in a single server environment:

1. Close the OSM applications running in the system, including:
 - Oracle Communications Design Studio
 - XML Import/Export application
 - XML API agents
2. Stop the OSM WebLogic applications.
3. Log in to the WebLogic Administration console.
4. Click **Deployments**, and stop the OSM application **oms**, the cartridge management web services application **cartridge_management_ws**, and the shared Java EE library **comms-platform-webapp**.

Note: Do not stop **cartridge_management_ws** and **comms-platform-webapp** in a suite or multiproduct environment because other applications may be dependent on them.

5. Click the OSM application **oms**, then select the **Configuration** tab, then the **Workload** tab, and delete all of the application-scoped work managers.
6. Navigate to **Services**, then **Messaging**, then **JMS Modules**, and delete **oms_jms_module**.
7. Navigate to **Services**, then **Messaging**, then **JMS Servers**, and delete **oms_jms_server**.
8. Navigate to **Services**, then **JDBC**, then **Data Sources**, and delete **oms_pool**.
9. Navigate to **Services**, then **File T3**, and delete **oms_remote_file_system**.
10. Navigate to **Security Realms**, then **myrealm**, then **Users and Groups**, then **Users** and delete the following OSM users:
 - **oms-automation**
 - **oms-internal**
 - **deployAdmin**
 - **admin**

Note: **admin** is the default OSM Administrator user and **deployAdmin** is the default Design Studio administrator user. If you specified different names during the OSM installation, remove the custom users.

11. Navigate to **Security Realms**, then **myrealm**, then **Users and Groups**, then **Groups**, and delete the following OSM user groups if present:

- **Cartridge_Management_WebService**

Note: Do not delete **Cartridge_Management_WebService** in a suite or multiproduct environment because other applications may be dependent on it.

- **OMS_cache_manager**
- **OMS_client**
- **OMS_log_manager**
- **OMS_user_assigner**
- **OMS_workgroup_manager**
- **OMS_ws_api**
- **OMS_ws_diag**
- **OMS_xml_api**
- **OSM_automation**
- **osmRestApiGroup**
- **osmEntityClientGroup**

12. Click **Deployments**, and delete the OSM application **oms**, the cartridge management web services application **cartridge_management_ws**, and the shared Java EE library **comms-platform-webapp**.

Note: Do not delete **cartridge_management_ws** and **comms-platform-webapp** in a suite or multiproduct environment because other applications may be dependent on them.

13. Delete the folder generated by the OSM WebLogic server during its installation.
14. Close the WebLogic server.
15. Navigate to the **Domain** directory, and delete the **Attachments** folder.

Performing a Silent Uninstall

Before you run a silent uninstall, you must configure the `installOptions.txt` file to reflect which OSM features you want to uninstall. You can use the sample file located in the `OSM_home/SDK/Samples/installation` directory and modify it accordingly.

Each feature in the `installOptions.txt` file has a selection state of either **true** or **false** to control whether that feature is to be uninstalled. The following sample shows the values for the Database Schema feature.

```
#####
#
# "Database Schema" Feature
#
# The selection state of the "Database Schema" feature. Legal values are:
#
# true - Indicates that the feature is selected for installation
# false - Indicates that the feature is not selected for installation
```

```

#
# For example, to select "Database Schema" for installation, use
#
#   -P featureds.active=true
#
### -P featureds.active=<value>

#####
#
#   true - Indicates that the feature is selected for uninstallation
#   false - Indicates that the feature is not selected for uninstallation
#
### -P featureds.activeForUninstall=<value>

#####

```

To run a silent uninstall:

1. Navigate to the directory where the installation executables are placed.
2. Do one of the following:
 - On Linux, execute the command:

```
OSMUninstallLinux.bin -silent -options installOptions.txt
```
 - On Solaris, execute the command:

```
OSMUninstallSparc.bin -silent -options installOptions.txt
```
 - On AIX, execute the command:

```
OSMUninstallAix.bin -silent -options installOptions.txt
```
 - On Windows, execute the command:

```
OSMUninstall.exe -silent -options installOptions.txt
```
 - On HP-UX Itanium, execute the command:

```
OSMUninstallHpuxItanium.bin -silent -options installOptions.txt
```

Production Checklist

This appendix provides a check list of tasks that must be accomplished before going into production.

About Using the Production Checklist

Use the OSM checklist to verify that operational best-practices and key procedures exist before to going into production or performing a major release upgrade. These operational best-practices include success factors such as performance, configuration, purging, and database statistics management.

Ensure that implementation project teams review this material well ahead of going into production to ensure that project plans incorporate the required activities.

Ensure that implementation project teams provide an explicit response to this checklist to Oracle. The production checklist can help Oracle clarify key success factors and risks so that Oracle can provide faster emergency responses in case of problems.

The implementation project should share additional information (for example, performance test results) with Oracle to provide better overall context on the deployment. Oracle maintains all such information confidentially according to the Oracle Information Protection Policy. Shared information can be deleted upon request.

Provide the checklist response and any additional information by opening an OSM service request with a title such as "Production Checklist" at least one month prior to going into production. Oracle may request clarifications through the service request, which can then be closed.

Checking for a Current OSM Patch Before Going Into Production

Going into production using a recent OSM patch ensures that the OSM solution is not susceptible to known issues encountered by other customers, which may or may not manifest themselves in pre-production tests. It also facilitates resolution of any new issues that may be encountered, which are normally resolved on recent patches.

For OSM releases in Premier Support with active customers, Oracle continue to release patch sets (for example, 7.3.0.1.0, or 7.3.0.2.0) at a regular interval. The patch set interval depends on the level of customer activity for a given release. For example, the patch set interval may be every six months. The majority of bugs are fixed in patch sets and often include important operational enhancements (for example, improved purging performance).

In addition, Oracle releases interim patches (for example, 7.3.0.1.2) to address specific problems that are blocking specific customers. These interim patches are released on a code branch for the given patch set. All interim patches are cumulative (a superset) of

prior interim patches for that branch. Changes released in an interim patch are forwarded-ported into the next upcoming patch set.

Oracle normally releases interim patches for the last two patch sets of a given release.

The implementation project teams should plan to go into production or upgrade on a recent patch of the latest patch set (preferred) or the prior patch set (also acceptable). For example, if 7.3.0.1.0 was the last patch set issued, going into production on 7.3.0.1.5 (a recent patch of that patch set) would be the preferred option. Alternatively, it would also be acceptable to go into production on 7.3.0.0.14, a recent patch of 7.3.0.0.0 (the prior patch set).

In general, if the implementation project takes more than six months, Oracle recommends that the implementation project teams plan to upgrade to a recent patch on the same release prior to going into production. Oracle can provide advanced notice of planned patch sets to assist in this planning. For example, if a project started three months ago using OSM 7.3.0.0.9 (on the prior patch set) and the implementation project teams plan to go into production in the next three months, Oracle would recommend that the teams check with Oracle when a 7.3.0.1.0 patch set may be released. The implementation project teams should plan to upgrade prior to going into production, avoiding going into production on an older patch set.

Checklist:

- ❑ The production system launch or upgrade should take place on a recent interim patch for the latest patch set (preferred) or the previous patch set.
- ❑ If implementation project teams have a long-running project (more than six months), plan to upgrade to a patch of the most recent patch set prior to going into production or upgrading.

Useful information to share: What is the five digit OSM patch level targeted for going into production or upgrading?

Checking for Deployment Architecture

Understanding the OSM deployment architecture is important in troubleshooting configuration-related production issue. Diagrams depicting deployment architecture information are helpful.

Checklist:

- ❑ Optimize storage I/O to sustain both order processing and order (row-based) purging. For more information, see "[RAID Recommendations for the Database](#)".
- ❑ Consider using fast solid state drives (SSD) disks for critical DB files (for example, REDO logs). For more information, see "[RAID Recommendations for the Database](#)".
- ❑ Validate that shared Weblogic Server persistent store storage I/O is sufficient for the order processing throughput. For high-volume deployments fast SSD are recommended. For more information, see "[Network Latency and NFS Configuration for WebLogic Server Shared Storage](#)".
- ❑ Application logs (including WebLogic Server and OSM) are written to a local file-system.

Useful information to share:

- At a high-level, what are the external systems that OSM interacts with?

- How many application servers are deployed? What are their hardware specifications?
- Is Oracle RAC used and if so what RAC configuration is used (for example, Active/Active)?
- How many database servers are deployed and what are their hardware specifications?
- Are virtual machines used, if so which product and version?
- Are multiple instances of OSM (for example, COM, SOM) deployed?
- What are the version numbers for key other software (Oracle Application Integration Architecture (Oracle AIA), OSM Order-to-Activate cartridges, WebLogic Server, operating system, database, virtual machine)?
- What RAID storage configuration is used (for example RAID 10, RAID 5)?
- What type of storage is used for the shared Weblogic Persistent Store?
- What security provider configuration (for example, internal or external LDAP directory) does OSM use?

Checking the OSM Production System Configuration

Optimal performance and system behavior under load or faults depend heavily on proper configuration of OSM, the database, and WebLogic Server. The compliance tool identifies configuration problems that may cause production issues. Run the compliance tool before doing performance tests to avoid costly delays. For more information about running the compliance tool, see "[Verifying the OSM Installation](#)".

Checklist:

- The compliance tool was run on the OSM production system.
- All configuration compliance issues of severity "Error" and "Warning" have been corrected or reviewed and determined to be acceptable.
- The size of log files and their rollover is correctly configured for app server and database components according to the amount of disk space available.
- Do a manual review of all configuration files to identify any typos or inconsistent configurations (for example, between managed server startup parameters, and so on).
- Ensure that all recommended patches have been installed. For more information, see "[Software Requirements](#)".

Useful information to share: Rerun the compliance tool when all corrections have been made and share the report with Oracle. Add an explanation for any "Error" or "Warning" that are ignored.

Checking for Performance Expectations

Ensure that you validate that the OSM solution performs at the full expected target order volume prior to going into production. For more information about running performance tests on the OSM solution, see "[OSM Pre-Production Testing and Tuning](#)".

Gathering this information ahead of time may save precious investigation time to resolve a production issue.

Checklist:

- ❑ Performance tests have confirmed that the OSM production system can sustain the full expected maximum hourly order volume rate. These tests should observe the following:
 - Ensure that representative mix of order types and size is used in the test workload.
 - Ensure that the average size of the order (line item count for orchestration orders) is aligned with expected production order workload.
 - Ensure that the test order mix includes a sufficient number of revision orders and larger orders, if applicable.
 - Ensure that the production system has a sufficient amount of memory to handle the expected number of cartridge versions deployed.
 - Ensure that for long-running orders, a sufficient number of in-progress orders are already loaded in the system to simulate the maximum workload of the system.
 - Validate that sufficient capacity remains to sustain peak volume if any one machine of the production system were to fail, or to deal with unexpected order volume peaks (for example, +20%).
- ❑ Performance tests have confirmed that the production system can process the maximum expected order size.
- ❑ Performance tests have confirmed that the OSM production system can process any expected large bulk operations.
- ❑ Longevity performance tests (for example, 24 hours) have been performed without errors on the OSM production system. Longevity performance tests must validate the following:
 - The workload is distributed uniformly across the cluster.
 - JMS messages do not accumulate.
 - Java Garbage collection is operating properly. Oracle recommends that you perform a regular analysis of garbage collection logs (for example, with GCViewer) to detect changes in your memory usage patterns. In particular, frequently check the live data size (LDS), which is the amount of memory used in tenured heap after a full garbage collection cycle. A healthy LDS should be at 50% or less when using the Parallel Old garbage collection algorithm. Garbage collection logs should be captured for a period long enough for at least one full garbage collection to occur (when using parallel old garbage collection). In addition, memory problems often present themselves as periods of high CPU utilization where the system appears to become unresponsive. Cluster instability is another frequent symptom.
 - Database locks are not occurring.
 - Weblogic thread locks are not occurring.
- ❑ The I/O capacity of the database storage sub-system and of the shared Weblogic Server persistent store has been validated.

Useful information to share:

- What are the average and maximum OSM order creation volume targets per day and during the busy hour?
- If orders coming into OSM (for example, COM) generate additional orders (for example, SOM), what is the expected generated order volume for each?

- What is the expected line item count for average size orders and the expected line item count for large size orders? Indicate the approximate percentage of large orders.
- Indicate the approximate percentage of expected revision orders, if applicable.
- Indicate the average order duration time (number of days to complete an order).
- Indicate the average number of cartridge types and versions planned to be deployed on the production system.
- Describe any bulk operations that may occur during the day including the number of orders submitted and at what time they will be executed.
- Indicate whether Oracle has previously provided hardware sizing recommendations for the deployment.
- Share a summary of performance test results that specifies how the production system (for example, the application servers, the database, and the storage) responds (for example, the CPU, memory, and I/O) during the target peak load with the target number of cartridge versions deployed. This provides a baseline for comparison when investigating any future performance-related issue.

Checking for a Migration Strategy and Production Schedule

Many OSM projects require a migration phase. Some options include an in-place upgrade of an existing OSM database, or setting up a new parallel instance of OSM and cutting over all orders to the new instance at one time or progressively (for example, blocks of subscribers).

Checklist:

- If an in-place OSM database upgrade is planned.
 - Ensure that completed partitions and orders have been purged to reduce the amount of data to be upgraded.
 - Ensure that the procedure has been tested with a full production database and includes a back-out strategy.
- The schedule for migration, going into production, and key post production activities is defined and Oracle Support is notified.

Useful information to share:

- What is the planned migration procedure, including the back-out procedure?
- What is the schedule for going into production and post going into production activities?

Checking for Database Management Procedures

Determining partition size and deciding on a purging policy are key to ensure that storage capacity is reclaimed in a timely fashion and system performance maintained. For more information, see the discussion about managing the OSM schema in *OSM System Administrator's Guide*.

Checklist:

- Oracle recommends that OSM uses a partitioned database schema to benefit from the ability to purge partitions and from other partition maintenance procedures.

- ❑ Ensure that the average expected daily and weekly storage consumption rate has been measured.
- ❑ Ensure that a procedure exists for regularly creating empty partitions before they are needed. This procedure should align with the expected rate at which the partitions are consumed. This procedure is typically performed after completed partitions are purged.
- ❑ Ensure that you have defined a purging strategy: partition based purging, row based purging, or a hybrid of both. For more information, see *OSM System Administrator's Guide*.
- ❑ Ensure that there is a schedule for backing up the system and collecting statistics and that these activities are included in any performance tests that include purging (for example, during longevity tests).
- ❑ If you are using partition based purging, do the following:
 - Ensure that partition size and purge frequency are defined and documented. The purge frequency should provide sufficient time for most orders (for example, 98%) to complete in partitions to be purged while factoring in the retention period. This ensures that storage capacity is reclaimed in a timely and predictable fashion.
 - Ensure that performance tests are run with `purge_partitions`, or `drop_empty_partitions`, or both to ensure that the database, storage and OSM are tuned for maximum purging performance.
 - If you have inter-order dependencies you may need to use special purge criteria for which you should conduct tests and ensure that subsequent order processing of dependent orders works as expected.
 - Ensure that a backup is taken before running the partition purge in case an error occurs during the purge.
 - Ensure that optimizer statistics are gathered after running a partition purge so that the updated statistics take into account the consolidated partitions.
 - Ensure that the database administrator is trained to recover from common purging problems identified in the discussion about troubleshooting and error handling in *OSM System Administrator's Guide*.
- ❑ If you are using row based purging, do the following:
 - Ensure that purge frequency is defined and documented. The daily or weekly purge frequency is primarily a function of the amount of CPU and I/O available throughout the day and week. You must run performance tests to determine whether you have sufficient CPU and I/O to meet the expected daily and weekly order volume.
 - Ensure that partition size is large enough that space freed up in a partition can be reused by new orders in the same partition. Generally partition size should be able to accommodate at least two months worth of order data.
 - Plan a schedule for when row based purging will happen on a daily and weekly basis and at what parallelism this purging will use. If you have high order processing volume, you would use less parallel processing. If you have less order processing volume, you can use more parallel processing.
- ❑ Ensures that the maximum expected number of OSM partitions multiplied by the number of sub-partitions (for example, 32) never exceeds 4800. This is the practical database server scalability limits on number of partitions.

- ❑ Ensure that sufficient storage capacity is available to persist all in-progress orders, pre-created empty partitions including a margin of safety in case of delays in purging completed partitions.
- ❑ If the OSM solution includes additional database tables, ensure that you have database management strategies that include purging (if applicable) and backup.
- ❑ Ensure that operational procedures exist for purging and dropping partitions, for undeploying unneeded cartridge versions, and for creating empty partitions to receive new orders for the upcoming production period (for example, the next month).

Useful information to share:

- What is the partition size (number of orders), number of Oracle RAC nodes, and number of subpartitions configured?
- If using partition based purging, what is the expected number of days (starting from first order creation) required for a partition to complete most (for example, ~98%) of its orders to be ready for purging?
- If using row based purging, what is the row based purging schedule and purge rate (purged orders per minute).
- How long do you plan to retain orders (order retention policy) after orders have completed?
- How frequently do you plan to add and drop partitions?
- Are you planning to use `purge_partitions`, to retain a small percentage of orders still not completed, or to `drop_empty_partitions`, having completed (or aborted) all orders?

Checking for Database Optimizer Statistics Schedule

Because OSM performance depends on optimal database performance, you must properly gather database optimizer statistics on a daily basis. For more information about database optimizer statistics, see *OSM System Administrator's Guide*.

Checklist:

- ❑ Ensure that the daily and weekly OSM production schedule is defined, including expected peak order processing hours and the time when OSM batch operations occur.
- ❑ Ensure that a job is scheduled to gather database statistics for highly volatile OSM order tables during expected daily high-volume periods. Incremental statistics are disabled for these tables.
- ❑ Ensure that a strategy is defined for handling low to medium volatility OSM order tables according to your scenario and that the tables are included in the daily statistics gathering job if applicable.
- ❑ Enable incremental statistics for other OSM order tables and sufficient low-volume time exists in the day for the database to gather statistics for these tables automatically. Ensure that you confirm when this normally occurs.
- ❑ If batch OSM operations do not naturally occur before database statistics are automatically gathered daily, you may need to schedule a job to gather statistics explicitly.
- ❑ Ensure that a backup and disaster recovery strategy is in place for this OSM deployment.

Useful information to share:

- What is the daily OSM production schedule (peaks, batch operations, backups, and database statistics gathering)?
- What are the key elements of the OSM database statistics gathering procedure?

Checking for Outage and Order Failure Plans

It must be possible to stop incoming orders, to be queued in an upstream system (for example, Oracle AIA), for a planned OSM outage or an unplanned incident.

Ensure that a strategy exists to identify and correct order-related failures.

- ❑ Ensure that operational procedures exist for stopping the creation of new orders in OSM and for dealing with systems that may be sending responses to OSM.
- ❑ Ensure that procedures exist for introducing queued orders into OSM in a gradual way (see OSM Warm-up Procedures in 1919049.1) when needed (for example, after major changes to the system).
- ❑ Ensure that a strategy, procedures, and tools exist to manage orders in fallout, including orders that may be stuck. This includes procedures for dealing with JMS messages that go into fallout queues and that may need to be resubmitted into processing queues.

Checking for Change Control Management Plans

As for any mission-critical software, when OSM is in service you must make changes to the environment (for example, configuration changes or cartridge deployments) in a controlled manner. You must ensure the existence of detailed steps for the introduction of any changes.

Provide the following:

- Document and test a specific backup strategy so that if anything that was planned fails, a reversal of the changes can be performed to bring the system back to its previous state. This would potentially need to happen at the database level, at the solution level, at the cartridges level, or even at the core OSM application level.
- Document of potentially involved and affected systems.
- Document those that implemented the changes (including prerequisites), their roles and how to contact them during the time period the changes are scheduled for.
- Document the approximate duration for every step.
- Document prerequisite steps to be performed on OSM and external systems with outcomes and responsibilities, for example:
 - Taking a snapshot or backup of various other systems in case rollback is required.
 - Stopping the upstream flow of orders into OSM.
 - Waiting until the OSM inbound queues are drained and all orders are started.
 - Stopping the various managed servers.
 - And so on.
- Document the step-by-step plan for what is to be done on OSM and external systems with outcomes and responsibilities.

- Document the steps that need to be performed after the change with outcomes and responsibilities.
- Document validation steps to ensure that the changes are active and working as expected.
- Document any hardware, operating system, database, application server, and OSM changes.

In the event of a serious production issue, Oracle support may request change control documentation to understand whether any recent changes may have contributed to a production issue. The availability of this information can greatly shorten the resolution of an issue. It's also important to retain the ability to test the system under volume after going into production, which requires a separate pre-production environment.

Checklist:

- ❑ Ensure that a change control management strategy exists that defines how changes are tracked, applied one at a time (or in small groups), validated, approved, and monitored after implementation (in case of problems).
- ❑ Ensure that an initial baseline of configuration is captured and change control documentation exists.
- ❑ Ensure that procedures exist (and are tested) for introducing solution cartridge changes. The procedure should include how to version cartridge changes, a regression test strategy and plan, and the ability to validate in-progress order compatibility if un-versioned cartridge changes are planned (see 1612273.1)
- ❑ Ensure that procedures exist for applying patches (OSM, WebLogic Server, and database), including a test strategy.
- ❑ Ensure that procedures exist for gathering database statistics after major changes.
- ❑ Ensure that a pre-production environment exists to test future changes and investigate product issues (including performance issues) that may occur.

Useful information to share: Describe the pre-production environment and how it compares (for example, processing capacity) to the production environment. Is it sufficient to validate performance volume related issues or changes?

Checking for Performance Monitoring Procedures

It is important to monitor the OSM workload and key system metrics to quickly detect any changes in workload or performance characteristics. Oracle support may request performance monitoring information to investigate any performance-related issue that may arise in production.

- ❑ Ensure that a method exists for capturing and tracking the daily and hourly volume of OSM orders created and completed and the volume of tasks executed.
- ❑ Ensure that a method exists for capturing and tracking the creation and completion of large orders (if applicable).
- ❑ Capture and track key system performance metrics such as application server and database server CPU utilization, memory consumption, and storage I/O and capacity.

Upgrading OSM to an Oracle RAC Environment

This appendix describes how to upgrade an existing Oracle Communications Order and Service Management (OSM) system that uses a single-instance database to an environment that uses Oracle Real Application Clusters (Oracle RAC). You can perform the upgrade using one of two methods:

- Upgrade OSM after converting the database to Oracle RAC
- Upgrade OSM to Oracle RAC using Data Pump Import Export

Upgrading OSM After Converting the Database to Oracle RAC

Using this method, you convert your single-instance database to an Oracle RAC database first, and then run the OSM installer to upgrade the OSM database schema and configure the WebLogic Server resources.

See *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for database conversion instructions.

See "[Performing the OSM Upgrade](#)" for detailed installation steps.

Upgrading OSM to Oracle RAC Using Data Pump Import and Export

If it is not feasible to upgrade the database instance due to circumstances in your environment, such as the presence of other applications on the instance, you can export the data from the existing database instance and import it into the new version. The recommended method for doing this is Oracle Data Pump Import and Export. After the data is imported, you can run the OSM installer.

Upgrade Overview

To upgrade OSM to Oracle RAC using Oracle Data Pump, perform the following general steps:

1. Shut down the OSM Server. See "[Shutting Down the OSM Server](#)."
2. Turn off the OSM Notification Engine. See "[Turning Off the Notification Engine](#)."
3. Export and then import the data from the database using Oracle Data Pump. See "[Exporting and Importing the Database Data](#)."

Note: Step 3 should be performed by a Database Administrator. Steps 2 and 5 may need to be performed by someone with database administration experience.

4. Run the OSM installer to upgrade the OSM database schema and configure the WebLogic Server resources. See "[Performing the OSM Upgrade](#)" for detailed installation steps.
5. Restart the Notification Engine. See "[Restarting the Notification Engine](#)."
6. Restart the OSM Server. See "[Restarting the OSM Server](#)."

Shutting Down the OSM Server

Stop OSM according to the instructions in *OSM System Administrator's Guide*.

Turning Off the Notification Engine

Prior to migration, make sure the database is not processing any jobs. You do this by manually turning off the Notification Engine.

1. Log in to SQL*Plus as the primary OSM schema user (not the Rule Engine user).
2. Enter the following commands into SQL*Plus:

```
update om_parameter
  set value = 'N'
  where mnemonic = 'run_jobs';
update om_parameter
  set value = '86400'
  where mnemonic = 'job_monitor_interval';
commit;
```

The database will stop running new jobs.

3. Enter the following commands into SQL*Plus:

```
begin
  for i in (select job from user_jobs) loop
    dbms_job.broken(i.job, TRUE);
    dbms_job.remove(i.job);
  end loop;
  commit;
end;
```

The database will halt any jobs that are currently running.

4. Enter the following command into SQL*Plus:

```
select * from user_jobs;
```

This should return no jobs running. If there are still any jobs running, consult a DBA.

Exporting and Importing the Database Data

Export the data from the non-Oracle-RAC database and import it to the Oracle RAC database. The recommended method for exporting and importing the data from the database is to use the Oracle Data Pump Import and Export utility.

For information about how to use Oracle Data Pump, see the Oracle Database documentation. Following are a few considerations for OSM:

- It is best to export and import in schema mode (the default).
- Ensure that you export and import both the OSM Primary Schema and the OSM Rule Engine Schema.

- By default, Data Pump Import creates the schema users and performs the necessary grants. It is a good idea to use the default, and if you do, you must ensure that users with the same names do not already exist in the new database instance.

Running the OSM Installer

See ["Performing the OSM Upgrade"](#) for detailed installation steps.

Restarting the Notification Engine

After you have migrated the OSM database to the new environment, you can restart the Notification Engine.

1. Log in to SQL*Plus as the primary OSM schema user (not the Rule Engine user).
2. Enter the following command into SQL*Plus:

```
select * from user_jobs;
```

If this command returns two running jobs, you do not have to restart the Notification Engine manually: go to ["Restarting the OSM Server."](#)

3. Enter the following commands into SQL*Plus:

```
update om_parameter
  set value = 'Y'
  where mnemonic = 'run_jobs';
update om_parameter
  set value = '600'
  where mnemonic = 'job_monitor_interval';
commit;
```

The database will start running new jobs.

4. Enter the following commands into SQL*Plus:

```
begin
  om_job_pkg.resubmit_jobs(om_const_pkg.v_rule_task_type, 1, 10, 0, 0, 0, 0);
end;
```

The database will start the appropriate jobs.

Restarting the OSM Server

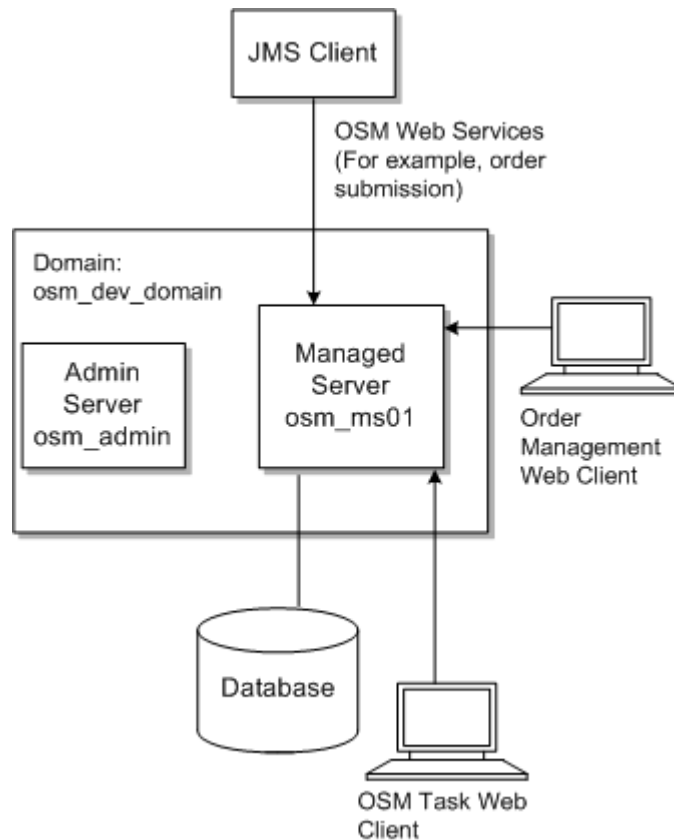
Start OSM according to the instructions in *OSM System Administrator's Guide*.

OSM Development System Guidelines and Best Practices

This appendix provides guidelines and best practices for the various technologies and components that make an Oracle Communications Order and Service Management (OSM) development system.

OSM Development Planning Overview

[Figure C-1](#) shows a development system topology with one administration server, one managed server at the application server layer. The database layer contains a non-partitioned database. This OSM system can be deployed on a single Windows or Linux machine or VM.

Figure C-1 OSM Development System Topology

Installing OSM Components on a Windows System

The OSM Server is not supported on Windows systems for production environments. The OSM server can be installed on a Windows system for development, demonstration, and non-performance test systems.

If you plan to use Oracle Communications Design Studio on the Windows system, you should also install the SDK Tools component on the Windows system. If you plan to generate reports using the command line utility of the OSM Reporting Interface, you must install the SDK Tool component.

Hardware Requirements for Development Systems

A small development installation can be installed on a system meeting the following minimum requirements:

- Two GB RAM
- One dual-core processor
- 10 GB of disk space

The numbers provided are guidelines only. Actual disk and memory usage will vary based on the number of users, amount of data, and transaction volume.

For a small, low-volume installation, you can co-locate components such as the Oracle Database and WebLogic Server on the same computer. In this case, the minimum RAM required is four GB.

Preparing the Database

The following sections provide information about installing and configuring the Oracle database.

Oracle Database Kernel Configuration

If Oracle Database is installed on the same server as OSM, you must ensure that the appropriate kernel configuration for the database is present.

Downloading and Installing the Oracle Database

For information about installing Oracle Database, see the Oracle Database installation documentation.

You can install OSM with Oracle Database Release 12c pluggable databases (PDB) within a multitenant container database (CDB) or within a non-container database.

In order to set all of the options in the database, you may not want to create a database during the database software installation. It may be more convenient to run the Oracle Database Configuration Assistant (DBCA) after installing the database software. See *Oracle Database 2 Day DBA* for more information about creating a database with DBCA.

Database Configuration Considerations for Development Instances

Use local listeners. With this option, each Oracle RAC instance is configured to register only with its listener in the same physical server.

The initial extent size for partitioned tables is set to 8MB. If you have many sub-partitions, a large amount of space can be allocated. For example, a table with 64 sub-partitions will be allocated with an initial space requirement of 512MB. Although this is not an issue for production environments, it can become an issue in development or testing environments with limited storage capacity.

To minimize the database space consumed by OSM:

- Set the **deferred_segment_creation** initialization parameter to **True** (the default value.)
- Install OSM with no partitions, or a small number of partitions (for example, 4.)
- Use a tablespace with uniform extent allocation and a small extent size, such as 64KB.

Database Parameters

If you have many (for example, more than ten) instances of OSM accessing the same database instance, reduce the value of the **job_queue_processes** parameter to a value between 100 and 500.

Tablespaces

For non-production environments, one permanent tablespace is sufficient for the OSM data, and OSM can use the default temporary tablespace for the database instance.

Preparing WebLogic Server

The following sections provide information about installing and configuring the WebLogic Server.

Installing WebLogic Server Software

The software for WebLogic Server and Application Development Framework (ADF) is included in the OSM software media pack. You download the OSM software media pack from the Oracle software delivery website:

<https://edelivery.oracle.com/>

You install WebLogic Server on all machines that will participate in your domain. The installation directories must be the same on all machines. For complete installation instructions and general information about installing and configuring WebLogic Server, see the WebLogic Server documentation.

Note: See [Table 2-1, "OSM Required Software"](#) for WebLogic Server version and patch information. Ensure that you use the WebLogic Server documentation specific to the required WebLogic Server version.

WebLogic Server Software Installation Overview

To install WebLogic Server:

1. Ensure that you have installed the version of Java and the Java Development Kit (JDK) that is supported by OSM, not the version included with WebLogic Server (see [Table 2-1, "OSM Required Software"](#) for more information). If you are using a 64-bit operating system, Oracle recommends using a 64-bit JDK with the OSM WebLogic server instance to increase performance.
2. Set environment variables for the version of Java that is supported by OSM, not the version included with WebLogic Server. Do the following:
 - Set `JAVA_HOME` to the location of the supported Java version.
 - On a UNIX system, add `$JAVA_HOME/bin` to the `PATH` variable.
 - On a Windows system, add `%JAVA_HOME%/bin` to the `PATH` variable.
3. Install the WebLogic Server software as described in *Oracle Fusion Middleware Installing and Configuring Oracle WebLogic Server and Coherence*. When prompted for the installation type, select **Complete**.
4. Download and install any necessary patches from Oracle support. Follow the instructions in the `README.txt` file that is included with the patch.
5. Create database schemas. See "[Creating Database Schemas Using RCU](#)".
6. Create a WebLogic Server domain.
7. Configure the WebLogic Server domain.

Creating Database Schemas Using RCU

After you install the WebLogic Server software, create schemas in the database. You create the schemas using the Repository Creation Utility (RCU), which is included in the WebLogic Server installation.

The schemas are required for creating the WebLogic Server domain with the JRF template. Each schema can be used by only one domain. If you create a new domain, you must also create new schemas.

Before creating the schemas, ensure that you have your database connection string, port, administrator credentials, and service name ready.

To create database schemas using RCU:

1. Go to the *Middleware_home/oracle_common/bin/* directory.
2. Run RCU using one of the following commands:
 - On UNIX:
`./rcu`
 - On Windows:
`rcu.bat`

The Repository Creation Utility Welcome screen appears.

3. Click **Next**.

The Create Repository screen is displayed.

4. Select **Create Repository**, and then click **Next**.

The Database Connection Details screen is displayed.

5. Enter database details in the fields provided (for example, Database Type, Host Name, Port, and so on), and then click **Next**. Use the Hostname of one of the RAC instances. Do not use the SCAN IP address.

The installer checks the prerequisites. After the prerequisite checks are completed, click **OK**, and then click **Next**.

The Components screen is displayed.

6. Select the **Create a New Prefix** option, and enter a new prefix for the schema that will be used for the WebLogic domain.

7. In the table, expand the **AS Common Schemas** component, and select the following components:

- Oracle Platform Security Services (*prefix_OPSS*)
- Audit Services (*prefix_IAU*)
- Audit Services Append (*prefix_IAU_APPEND*)
- Audit Services Viewer (*prefix_IAU_VIEWER*)
- Common Infrastructure Services (*prefix_STB*)

where *prefix* is the prefix name you entered at step 6.

8. On the Schema Passwords screen, select the **Use the same password for all schemas** option. Enter and confirm a password to use for the schemas, and then click **Next**.

The Map Tablespaces screen is displayed. You can click the **Manage Tablespaces** button when you want to change existing tablespaces. For this procedure, click **Next**. A Repository Creation notification is displayed. Click **OK**. Tablespaces are created, and the progress is displayed in a pop-up notification. When the operation is completed, click **OK**.

The Summary screen is displayed.

9. Click **Create**.

Note: RCU may take several minutes to create the schemas. If creating the schemas takes an unusual amount of time, Oracle recommends that you purge the database recycle bin to ensure that RCU schemas are created more quickly the next time. For more information, see "[OSM and RCU Installers Are Slow to Run Database Tablespace Query](#)".

Creating the WebLogic Server Domain

To create the WebLogic Server domain for OSM:

1. Create a domain as described in *Oracle Fusion Middleware Creating WebLogic Domains Using the Configuration Wizard*, and make the following selections:
 - On the Templates screen:
 - Select the **Oracle JRF** and **WebLogic Coherence Cluster Extension** templates.
 - Select the **Oracle Enterprise Manager** template if you want to use Oracle Enterprise Manager Fusion Middleware Control to view and manage OSM logs.
 - The **Basic WebLogic Server Domain** template is selected by default and you cannot deselect it.
 - On the Domain Mode and JDK screen, select or browse to the version of the Java Development Kit (JDK) that is supported by OSM (see [Table 2-1](#), "[OSM Required Software](#)" for more information).
 - On the Database Configuration Type screen, configure the schemas that the system requires, which you created in "[Creating Database Schemas Using RCU](#)". Enter the data, including the schema owner that you created, and then click **Get RCU Configuration**. Click **Next**.
 - On the Component Datasources screen, verify that the component schemas are configured and then click **Next**.
 - On the Advanced Configuration screen, do one of the following:
 - To create an administration server without any managed servers, select only **Administration Server**.

This configuration is appropriate for most development and test environments. However, because performance testing and staging environments should use the same server configuration as the production environment, a different configuration may be more appropriate.
 - To create an administration server with a single managed server select at least **Administration Server**, **Managed Servers**, **Clusters and Coherence**, and **Deployments and Services**.

This configuration is appropriate for production environments that are not highly available. Having the administration traffic on the administration server and the application traffic on the managed server ensures that critical administration operations (such as starting and stopping servers, changing a server's configuration, and deploying applications) do not compete with high-volume application traffic on the same network connection.

- To create an administration server with multiple managed servers, select at least **Administration Server, Managed Servers, Clusters and Coherence**, and **Deployments and Services**.

This configuration, also called a cluster, is appropriate for all environments that need high availability. If you are using Oracle RAC, you must configure the same number or more of managed servers in the cluster as there are Oracle RAC node instances. For example, if you have two Oracle RAC nodes, you must have at least two managed servers.

See "[Installing and Configuring the WebLogic Server Cluster](#)" for detailed instructions about creating a WebLogic Server cluster.

- If you are creating an administration server with a single managed server, do the following:
 - On the Managed Servers screen, add one managed server.
 - On the Deployments Target screen, target all the deployments to the managed server. The targets you select must have ADF installed.
- If you are creating a domain on Oracle Solaris and you plan to choose JMS File Store (as opposed to JMS JDBC Store) for JMS message persistence during the OSM installation:
 - On the Advanced Configuration screen, select JMS File Store.
 - On the JMS File Stores screen (appears at the end of the domain creation, just before the Configuration Summary screen), ensure that the JMS persistent stores are located on a UFS file system.

Locating the persistent store on a ZFS file system can impact the JMS messaging subsystem's performance. By default, the JMS file store is located in the domain directory, so Oracle recommends that the domain directory be located on a UFS file system. If your business needs require that the WebLogic Server domain be located on a ZFS file system, you should modify the domain configuration to locate the file store on a UFS file system. See the WebLogic Server documentation for more information about this configuration.

Increasing the Memory Settings for WebLogic Servers

OSM requires more memory than the amount configured for the WebLogic server by default. The values provided in the following procedure are appropriate for most development environments, but the memory available in your environment may vary.

To increase the memory settings for non-clustered WebLogic servers on UNIX and Linux:

1. Back up the `domain_home/bin/setDomainEnv.sh` file by saving a copy with a different name.
2. Open the `domain_home/bin/setDomainEnv.sh` file in a text editor.
3. Search for the following:

```
USER_MEM_ARGS="
```

4. Do one of the following:
 - If you find the search text, change the value of the variable so that the following options are set to the following options or larger:

```
-Xms4g -Xmx4g -Xmn2g -XX:PermSize=128m -XX:MaxPermSize=128m
```

- If do not find the search text, do the following:
 - a. Search for the following line:


```
# IF USER_MEM_ARGS the environment variable is set, use it to override
ALL MEM_ARGS values
```
 - b. Above the line that you searched for, add the USER_MEM_ARGS environment variable as follows:


```
USER_MEM_ARGS="-Dweblogic.wsee.useRequestHost=true -Xms4g -Xmx4g -Xmn2g
-XX:MaxPermSize=128m -XX:PermSize=128m"

# IF USER_MEM_ARGS the environment variable is set, use it to override
ALL MEM_ARGS values
...
```

5. Save and close the file.

To increase the memory settings for non-clustered WebLogic servers on Windows:

1. Back up the *domain_home\bin\setDomainEnv.cmd* file by saving a copy with a different name.
2. Open the *domain_home\bin\setDomainEnv.cmd* file in a text editor.
3. Search for the line that begins with the following:

```
set USER_MEM_ARGS
```

4. Do one of the following:

Note: The following values are suitable if your system has more than 4 GB of memory and you are running Windows 7 with the 64-bit Java 7 Development Kit. Otherwise, smaller values are more appropriate.

- If you find the search text, change the value of the variable so that the following options are set to the following options or larger:


```
-Xms4g -Xmx4g -Xmn2g -XX:PermSize=128m -XX:MaxPermSize=128m
```
- If you do not find the search text, do the following:
 - a. Search for the following:


```
@REM IF USER_MEM_ARGS the environment variable is set, use it to
override ALL MEM_ARGS values
```
 - b. Above the line that you searched for, add the USER_MEM_ARGS environment variable as follows:


```
set USER_MEM_ARGS=-Dweblogic.wsee.useRequestHost=true -Xms4g -Xmx4g
-Xmn2g -XX:MaxPermSize=128m -XX:PermSize=128m

@REM IF USER_MEM_ARGS the environment variable is set, use it to
override ALL MEM_ARGS values
...
```

5. Save and close the file.

Configuring the WebLogic Server Domain

The following tasks can be performed either before or after installing OSM, but Oracle recommends performing them before installing OSM.

Configuring WebLogic Server for 64-Bit Java on Solaris

Because 64-bit Java on Solaris also includes a 32-bit JVM, you need to change some settings for WebLogic Server to make use of the 64-bit JVM.

To configure WebLogic Server for 64-bit Java on Solaris:

1. Back up the `WebLogic_home/common/bin/commEnv.sh` file by saving a copy with a different name.
2. Open the `WebLogic_home/common/bin/commEnv.sh` file in a text editor.
3. Search for the following line:

```
JAVA_USE_64BIT=false
```

4. Change **false** to **true**:

```
JAVA_USE_64BIT=true
```

5. Search for the following line:

```
SUN_ARCH_DATA_MODEL="32"
```

6. Change **32** to **64**:

```
SUN_ARCH_DATA_MODEL="64"
```

7. Save and close the file.

Preventing Connection Timeout when Using a Remote Database

To prevent a connection timeout when your database and server are in separate locations, or when deploying large cartridges, do the following before deploying cartridges:

1. Increase the value of the Stuck Thread Max time parameter as follows:
 - a. Log in to the WebLogic Server Administration Console.
 - b. In the **Domain Structure** tree, expand **Environment** and then click **Servers**.
The Summary of Servers page is displayed.
 - c. Click the name of the WebLogic server where you want to deploy the cartridges.
The configuration parameters for the server are displayed on a tabbed page.
 - d. Click the **Tuning** tab, and modify the value of the **Stuck Thread Max Time** parameter to 1200 in seconds or greater.
 - e. Click **Save**.
2. Increase the value of the Timeout Seconds Java Transaction API parameter as follows:
 - a. In the **Domain Structure** tree of the WebLogic Server Administration Console, click the name the WebLogic server domain.
The configuration parameters for the domain are displayed on a tabbed page.

lockout while the failover occurs and are then served by the other database instance after the instance has started.

Setting Up the Database and Clusterware for Cold Standby

A typical cold standby configuration consists of Oracle Clusterware and two Oracle single-instance databases running on separate physical servers with shared disk storage. In this configuration, when node A fails, the database, listener, and ASM instance automatically fail over to node B.

The following procedure describes how to set up Oracle Database and Clusterware to provide cold failover for a single-instance, non-cluster, Oracle database.

1. Install Oracle Clusterware on two physical machines.
 - For Linux, see *Oracle Grid Infrastructure Installation Guide for Linux*.
 - For Oracle Solaris, see *Oracle Grid Infrastructure Installation Guide for Solaris Operating System*.
 - For AIX, see *Oracle Grid Infrastructure Installation Guide for AIX*.
2. Install a clustered ASM (Automatic Storage Management) *home* and instance.

Note: Oracle recommends the use of ASM to optimize storage performance and usage, and to tolerate storage failures. You may need to use other storage systems, such as Oracle Automatic Cluster File System (ACFS), or storage on raw devices. For more information, see the respective product documentation.

3. Create an ASM disk group on shared storage which is accessible to both nodes A and B.
4. Install a software-only version of Oracle Database into a new Oracle home on both nodes.
5. Use the database configuration assistant (DBCA) to create a single-instance database on node A, sharing data files stored on the ASM disk group created in step 3.
6. Create a new virtual IP address on node A.
7. Implement the scripts provided in the Oracle white paper *Using Oracle Clusterware to Protect A Single Instance Oracle Database*. The scripts must be run on both nodes to protect the single-instance database, virtual IP address, and listener.
8. Start the database, listener, and ASM instance on node A using Oracle Clusterware.
9. Start the ASM instance on node B.

You have now configured your database instances for cold cluster failover. Once you have installed OSM, you can configure a WebLogic instance to automatically restart when the database fails. See "[Configuring WebLogic for Cold Cluster Failover](#)" for more information.

Configuring WebLogic for Cold Cluster Failover

This section describes how to configure a WebLogic instance to restart automatically when a database configured for cold cluster failover fails. For each server in the cluster, navigate to the **Health Monitoring** tab and set the following parameters:

- **Auto Kill if Failed** - Select this parameter to enable Node Manager to automatically kill the server if its health state is failed.
- **Auto Restart** - Select this parameter to enable Node Manager to automatically restart the failed server.
- **Restart Delay Seconds** - Set this value to the number of seconds Node Manager should wait before attempting to restart the server. The value should allow ample time for the database failover to complete, for example, 300 seconds.

You may also want to consider increasing the **JMS Redelivery Limit** and possibly the **JMS Redelivery Delay Override** parameters to ensure that the JMS message redelivery limit is not exceeded during database failover. If the redelivery limit for a JMS message is exceeded, the message is normally delivered to a fallout queue and the symptom is a stuck order. See *OSM System Administrator's Guide* for more information about JMS redelivery configuration settings.

Oracle RAC Active-Passive

OSM supports Oracle RAC in active-passive configuration. Oracle recommends using an active-active configuration for maximum availability.

In active-passive Oracle RAC, an active instance handles requests and a passive instance is on standby. When the active instance fails, an agent shuts down the active instance completely, brings up the passive instance, and application services can successfully resume processing. As a result, the active-passive roles are now switched.

Cold Cluster Failover

Cold cluster failover consists of Oracle Clusterware and two or more Oracle single-instance databases running on separate physical servers sharing disk storage. Oracle Clusterware monitors the primary active database instance and provides the capability of failover to a cold standby database in case of failure, thus ensuring high availability. Clients on the network experience a period of lockout while the failover occurs and are then served by the other database instance after the instance has started.

JMS Service Migration

If whole server migration is not possible, JMS service migration is an alternative.

JMS services are singleton services and, therefore, are not active on all server instances in a cluster. Instead, they are pinned to a single server in the cluster to preserve data consistency. To ensure that singleton JMS services do not introduce a single point of failure for dependent applications in the cluster, WebLogic Server can be configured to automatically or manually migrate them to any server instance in the migratable target list.

Migratable JMS-related services cannot use the default persistent store, so you must configure a custom store and target it to the same migratable target as the JMS server. The custom store must either be accessible from all candidate server members in the migratable target or migrated to a backup server target by pre-migration/post-migration scripts. JMS service and JTA must be migrated together.

For more information, see the chapter on service migration in *Oracle Fusion Middleware Using Clusters for Oracle WebLogic Server*.

Silent Installation `install_cfg.xml` Parameters

This appendix lists and describes silent installation `install_cfg.xml` parameters for Oracle Communications Order and Service Management (OSM).

WebLogic Parameters

Table D-1 lists the WebLogic parameters for a silent installation of OSM.

Table D-1 *WebLogic Parameters for OSM Silent Installation*

Parameter Name	Description
Configure-BEA-WebLogic	Set to Yes to configure the WebLogic domain or No not to configure the domain.
JBoss-lib-dir	Directory in which the JBoss Java libraries are located.
BEA-WebLogic-Host	WebLogic host name or IP Address.
BEA-WebLogic-Port	WebLogic administration server port number.
WebLogic-System-User	OSM WebLogic domain administrator user name.
WebLogic-System-Password	OSM WebLogic domain administrator password.
OSM-WLS-Server-Name	In a clustered environment, the OSM WebLogic cluster name. In a non-clustered environment, the administration server name.
OSM-WLS-Server-Port	In a clustered environment, the port number of any one managed server in the cluster. Do not use the proxy port. In a non-clustered environment, the port number of the administration server.
Oracle-Server-Host	Host name of the database instance. Use this parameter for a non-Oracle-RAC database.
Oracle-Server-Port	Port number on which the database is listening. Use this parameter for a non-Oracle-RAC database.
Oracle-SID	Oracle SID of a non-Oracle-RAC database instance.
schema_username	OSM database schema owner name.
schema_password	OSM database schema owner password.
Connection-Pool-Initial-Capacity	Initial capacity for Connection Pool.
Connection-Pool-Maximum-Capacity	Maximum capacity for Connection Pool.

Table D-1 (Cont.) WebLogic Parameters for OSM Silent Installation

Parameter Name	Description
Connection-Pool-Capacity-Increment	Number of connections added when the connection pool maintained by the WebLogic server is exhausted.
OSM-Administrator-User	OSM Administrator user name.
OSM-Administrator-Password	OSM Administrator password.
Studio-Admin-User	The Oracle Communications Design Studio administrator user. Default is deployAdmin .
Studio-Admin-Password	The Design Studio administrator user password.
OSM-Internal-Password	The Core OSM user (oms-internal) password
OSM-Automation-Password	The OSM automation user (oms-automation) password
Switch-Database	Set to Yes to alter the existing OSM data source configuration or to create the OSM data source configuration if none exists. Set to No to leave the existing database configuration unaltered. Note: In production mode you must set this parameter to No because you cannot alter the existing OSM data source configuration.
RAC-Database	Set to Yes to configure an Oracle RAC database or No not to configure an Oracle RAC database.
JMS-Store-Type	Type of JMS store to be used by the OSM server. Values are File , JDBC , or NoChange . Default is File .
BEA-WebLogic-SSL-Port	Set only if SSL is used, the WebLogic Administration Server's SSL port number.
Use-SSL-Connection	Set to Yes to use an SSL connection to the WebLogic Administration Server or No not to use an SSL connection.
SSL-Key-Store	Set only if SSL is used, location of the key store file.
Oracle-Service-Name	Name of the service used for a non-Oracle-RAC database instance.
OSM-Database-Timezone-Offset	OSM database timezone offset. (The non-Daylight-Saving-Time offset of the database timezone from GMT in seconds.)
RAC-Type	Type of Oracle RAC database configuration. Values are ActiveActive or ActivePassive (default). Applies only if RAC-Database is set to Yes .
RAC-Listener	Set only to configure an Oracle RAC database. Values are Remote or Local .
Database-Server-Host-N	Host name of an Oracle RAC database instance. Only use this parameter when configuring an Oracle RAC database, where <i>N</i> is the number of the Oracle RAC database instance. When the value of RAC-Listener is Remote , the value of this parameter must be the same for all instances. When the value of RAC-Listener is Local , the value of either this parameter or Database-Server-Port-N must be different for all instances.

Table D–1 (Cont.) WebLogic Parameters for OSM Silent Installation

Parameter Name	Description
Database-Server-Port- <i>N</i>	<p>Port number on which the an Oracle RAC database is listening. Only use this parameter when configuring an Oracle RAC database, where <i>N</i> is the number of the Oracle RAC database instance.</p> <p>When the value of RAC-Listener is Remote, the value of this parameter must be the same for all instances.</p> <p>When the value of RAC-Listener is Local, the value of either this parameter or Database-Server-Host-<i>N</i> must be different for all instances.</p>
Database-Server-SID- <i>N</i>	<p>System identifier of the an Oracle RAC database instance. Only use this parameter when configuring an Oracle RAC database, where <i>N</i> is the number of the Oracle RAC database instance.</p> <p>When the value of RAC-Listener is Remote, this parameter must be specified. The value must be unique for all instances.</p> <p>When the value of RAC-Listener is Local, either this parameter or Oracle-Service-Name-<i>N</i> must be specified. Specify the same parameter for all instances.</p>
Oracle-Service-Name- <i>N</i>	<p>Name of the service used for an Oracle RAC database instance. Only use this parameter when configuring an Oracle RAC database, where <i>N</i> is the number of the Oracle RAC database instance.</p> <p>When the value of RAC-Listener is Remote, this parameter must be specified. The value must be the same for all instances.</p> <p>When the value of RAC-Listener is Local, either this parameter or Database-Server-SID-<i>N</i> must be specified. Specify the same parameter for all instances.</p>
JTA-Timeout-Value	<p>Number of seconds that an active transaction is allowed to be in the first phase of a two-phase commit transaction before being rolled back. Oracle recommends setting this to at least 300.</p>
Create-Coherence-Config	<p>Set to true if you want the Installer to create a coherence cluster. Set to false if you do not want the Installer to create a coherence cluster.</p>
Coherence-Cluster-Name	<p>Name of the coherence cluster.</p>
Coherence-Cluster-Unicast-Port	<p>Unicast port number of the coherence cluster.</p>
Number-Coherence-Well-Known-Addresses	<p>Number of coherence cluster Well Known Address (WKA) members.</p>
Well-Known-Address-Listen-Addresses- <i>n</i>	<p>The WKA member's server address, where <i>n</i> is the ordinal of the WKA member.</p>
Well-Known-Address-Listen-Port- <i>n</i>	<p>The WKA member's port number, where <i>n</i> is the ordinal of the WKA member.</p> <p>Set this value to the same value as the coherence cluster's unicast port.</p>

Table D-1 (Cont.) WebLogic Parameters for OSM Silent Installation

Parameter Name	Description
Configure-Job-Orders	Determines whether the Job Orders product cartridge is deployed by the installer. Note: This parameter is not applicable for silent installation. To manually deploy product cartridges, see <i>OSM_home/ProductCartridges/install/ReadMe.txt</i> for instructions about manually deploying the product cartridges after you have installed OSM.
Frontend-Host	The listen address of the HTTP proxy server for the WebLogic cluster.
Frontend-HTTP-Port	The HTTP listen port of the HTTP proxy server.
Frontend-HTTPS-Port	The HTTPS listen port of the HTTP proxy server.

OSM Parameters

Configuring the OSM parameters lets you customize web client behavior and enter specific information in the worklist rows, or the notification e-mail address or any of the nodes you see. Set these parameters depending on your preferences.

[Table D-2](#) lists the OSM parameters for a silent installation of OSM.

Table D-2 OSM Parameters for OSM Silent Installation

Parameter Name	Description
Session-Timeout	Time in minutes that Order Management web client and Task web client sessions remain active.
Server-Domain-Suffix	Domain suffix for the computer(s) on which the OSM server will run.
Support-Cluster	Provides special support for WebLogic clusters when selected.
Attachment-Path	The path used to locate the WebLogic file (T3) service used for storing OSM remark attachments.
Maximum-Attachment-Size	Maximum attachment size, in MB, that can be appended to a remark.
Remark-Change-Timeout	Length of time in hours that a remark can be edited following creation.
Worklist-Rows-Retrieved	Number of rows retrieved when the worklist is refreshed.
Worklist-Rows-per-Page	Number of rows displayed on each worklist page.
Query-Rows-Retrieved	Number of rows retrieved when a query is run.
Query-Rows-per-Page	Number of rows displayed on each query results page.
Notification-Rows-Retrieved	Number of rows retrieved when the notification is refreshed.
Notification-Rows-per-Page	Number of rows displayed on each notification page.
Notification-Email-Server	DNS name or IP address of your e-mail server.
Notification-Server-Port	Port on which the e-mail server is listening.
Notification-Email-Address	OSM Administrator's e-mail address.
Read-Only-Field-Length	Maximum length of read only fields in the Order Editor.
Event-Buffer-Interval	Interval used to buffer events before sending them to the automation framework.

Table D–2 (Cont.) OSM Parameters for OSM Silent Installation

Parameter Name	Description
Landing-Page	The page that by default all Task web client users will be directed to at log in.
Display-Namespace-Version	Set to 1 to show the cartridge namespace version on the Task web client's 'Create Order' page, or set to 0 to not display the cartridge namespace version on this page.
WLS-Server-SSL-Port	SSL Port on which the OSM server is listening.
Task-Processor-Interval	Enter the number of seconds between task processor polls.
Max-Rule-Processor-Count	Enter the maximum number of rule task processors used to evaluate rules.
Max-Delay-Processor-Count	Enter the maximum number of delay task processors used to evaluate delays.
Handler-Factory	For a clustered installation, set this parameter to com.mslv.oms.handler.cluster.ClusteredHandlerFactory . For a non-clustered installation, set this parameter to com.mslv.oms.security.HandlerFactory .

Database Parameters

The database parameters are optional except for the Database-Admin-Password.

[Table D–3](#) describes the Database Parameters for OSM silent installation.

Table D–3 Database Parameters for OSM Silent Installation

Parameter Name	Description
Analyze-Database-Schema	Set to Yes to check to determine if a database upgrade is required or No to skip the check.
Model-Index-Tablespace	The tablespace in which OSM model index tables will be created.
Error-Property	dbm.error.
Orders-per-Partition	The number of orders stored per Oracle database partition (assumes a value of Yes in the Use-Partitioning parameter).
Default-Tablespace	The tablespace in which by default all OSM tables will be installed.
Summary-Start-Datetime	Date and Time information for Summary.
Summary-PriorTo-Year	Summary Prior To year.
Order-Index-Tablespace	The tablespace in which OSM order index tables will be created.
Create-Or-Upgrade-Database-Schema	Set to Create to create a new database schema. Set to Upgrade to upgrade an existing database schema.
Order-Data-Tablespace	Tablespace in which OSM order data tables will be created.
Use-Partitioning	Set to true to use Oracle database partitioning for order data tables or false not to use partitioning.
RuleEngine-Schema-Username	Name to use for the OSM 'rule engine' Oracle database schema.

Table D-3 (Cont.) Database Parameters for OSM Silent Installation

Parameter Name	Description
Halt-on-Warning	Set to true to stop the installation when a warning is produced or false to continue the installation even when warnings are produced.
Model-Data-Tablespace	Tablespace in which OSM model data tables will be created.
Database-Admin-Password	Database administrator password
Number-of-Subpartitions	Number of sub-partitions per partition (assumes a Use-Partitioning parameter value of Yes).
Existing-Schema-Action	Set to upgrade .
Use-Localized-Data	Set to true to use localized data or false not to use localized data. Setting this value to true requires that you also set the Localization-Jar-File parameter.
Database-Admin-Username	The Oracle database administrator user name.
Temporary-Tablespace	Temporary tablespace used for OSM-related database operations.
Halt-on-Error	Set to true (default) to stop the installation when an error occurs or false to continue the installation even when errors occur.
Warning-Property	dbm.warning.
RuleEngine-Schema-Password	Password to use for the OSM rule engine Oracle database schema.
Localization-Jar-File	Full path to the jar file containing localized OSM initial data. This parameter is mandatory when Use-Localized-Data is set to true .
Reporting-Schema-Password	Password to use for the OSM reporting interface Oracle database schema.
Reporting-Schema-Username	Name to use for the OSM reporting interface Oracle database schema.

Installing OSM on Engineered Systems

This appendix describes recommendations for installing Oracle Communications Order and Service Management (OSM) on engineered systems.

JDBC Recommendations

This section includes recommendations for JDBC.

For engineered systems, Oracle recommends that you use SDP protocol over Infiniband (IB). This protocol enables multiple performance enhancements, such as input/output, thread management, and request handling efficiency. Typical steps to enable SDP protocol include:

- Ensure the physical Infiniband connection exists and is operational between the WebLogic server host and the database host.
- Set up an SDP listener on the Infiniband network.
- In the JDBC URL, replace TCP protocol with SDP protocol.
- If necessary, change the port number to match the SDP listener's port in the JDBC URL.
- Manually add the system properties **-Djava.net.preferIPv4Stack=true** and **-Doracle.net.SDP=true** to the startWebLogic.sh script (or run **startManagedServer_XX.sh**).
- **Initial Capacity:** Oracle recommends setting this value to Max Capacity for production deployments to avoid shrinking and growing of the JDBC pool size. Setting the Initial Capacity value impacts available resources on both WebLogic server and database server by consuming additional resources at the start up time, and also lengthens the server start up time.
- **Max Capacity:** Set this to a peak and sustainable value, which can be supported by both by WebLogic server (additional memory and processing) and the database server (session resources and concurrency). In uniform cluster deployments of JDBC connection pools to a cluster, the Max Capacity value applies to each WebLogic server node individually, not for the whole cluster. Select the Max Capacity such that $((\text{number of nodes in WebLogic server cluster} \times \text{Max Capacity}) \leq \text{number of peak, concurrent and safely sustainable sessions to the database server})$.

Note: Max Capacity is an important parameter that requires iterative tuning based on scenario and workload. One approach is to set it to a high value for peak load tests, and monitor what percentage of it has been used, and then adjust the **MaxCapacity** to at least that high.

- Statement Cache Size:** The prepared statement cache size is used to keep a cache of compiled SQL statements in memory, thus improving the performance by avoiding repeated processing in the WebLogic server and database. For lightly used DataSources, the default value of **10** is sufficient.

Note: Each JDBC connection in the Connection Pool creates its own prepared statement cache. When you tune this parameter, consider the additional memory consumption demand caused by $(\{\text{steady size of Connection Pool}\} \times \{\text{Prepared Statement Cache Size}\})$. Too high may cause **Out of Memory** exceptions on WebLogic server and may disable the connection pool altogether, rendering the server useless. Tuning Statement Cache Size is achieved by an iterative process, influenced by factors of the scenario, workload, and steady state size of the connection pool for the given data source.

Configuring Exalogic

The following sections provide recommendations for configuring the application layer.

Exalogic User Process Limit

Table E-1 shows the user process limit for Exalogic systems.

Table E-1 Exalogic User Process Limits

Parameter	Value
Core file size	0
Data seg size	Unlimited
Scheduling priority	0
File size	Unlimited
Pending signals	774889
Max locked memory	Unlimited
Max memory size	Unlimited
Open files	65536
Pipe size	8
POSIX message queues	819200
Real-time priority	0
Stack size	8192
CPU time	Unlimited
Max user processes	774889
Virtual memory	Unlimited
File locks	Unlimited

Exalogic Kernel Parameters

Table E-2 shows the kernel parameters for Exalogic systems.

Table E-2 Exalogic Kernel Parameters

Parameter	Value
net.ipv4.ip_forward	0
net.ipv4.conf.default.rp_filter	2
net.ipv4.conf.default.accept_source_route	0
kernel.sysrq	0
kernel.core_uses_pid	1
net.ipv4.tcp_syncookies	1
kernel.msgmnb	65536
kernel.msgmax	65536
kernel.shmmax	68 719 476 736
kernel.shmall	4 294 967 296
net.ipv4.tcp_rmem	16 777 216 16 777 216 16 777 216
net.ipv4.tcp_wmem	16 777 216 16 777 216 16 777 216
net.ipv4.tcp_mem	16 777 216 16 777 216 16 777 216
net.core.optmem_max	16 777 216
net.core.rmem_max	16 777 216
net.core.wmem_max	16 777 216
net.core.rmem_default	16 777 216
net.ipv4.ip_local_port_range	9000 65500
vm.nr_hugepages	10000
fs.file-max	262144
net.core.netdev_max_backlog	250000
net.ipv4.tcp_timestamps	1
net.ipv4.tcp_window_scaling	1
vm.dirty_background_ratio	3
vm.min_free_kbytes	1 048 576
net.ipv4.tcp_fin_timeout	15
net.ipv4.tcp_keepalive_time	120
net.core.somaxconn	1024
net.ipv4.tcp_sack	0
net.ipv4.tcp_dsack	0
net.ipv4.tcp_keepalive_probes	3

Table E-2 (Cont.) Exalogic Kernel Parameters

Parameter	Value
net.ipv4.tcp_keepalive_intvl	30

OSM WebLogic Server Configuration

Table E-3 shows the WebLogic Server configuration.

Table E-3 OSM WebLogic Server Configuration

Parameter	Value
JTA Timeout	1200 seconds
JMS Persistence Mechanism	FileStore on SAN
# of SAF Agents	32: OSM
JDBC: Initial Capacity	64: OSM
JDBC: Increment	1
Statement Cache Size	48: OSM
Work Managers	80: OSM oms.automation.core; 10: oms.xml
Message Bridge Threads	2
Accept backlog	900
FileStore Write Policy	Direct-Write-With-Cache
JDBC: Max Capacity	128: OSM
JDBC: Shrink Frequency	60
JDBC: Row Prefetch Size	200
WLS: Native IO	True
Cluster Messaging Mode	Multicast1

JVM Options

Table E-4 shows the Java virtual machine (JVM) options for an Exalogic system.

Table E-4 JVM Options

Parameter	Value
64-bit packages	Yes
64 bit mode	-d64
Production Mode	True
JVM HotSpot	-server
JVM: net IPv4	-Djava.net.preferIPv4Stack=true
SDP	-Doracle.net.SDP=true
WLS: Sockets	-Dweblogic.SocketReaders=16
WLS: Threads	-Dweblogic.threadpool.MinPoolSize=300

Tuning Oracle Database

For every Oracle Database installation, there are a number of **init.ora** (or **spfile.ora**) parameters that affect performance. The following table lists important **init** parameters for use with OSM:

Table E-5 Recommendations for init Parameters for Oracle Database

Parameter Name	Sparc SuperCluster (SSC)	Exadata
commit_wait	transaction commit	transaction commit
db_block_size	8192	8192
db_writer_processes	8	3
filesystemio_options	'setall'	'setall'
memory_max_target	0	0
memory_target	134217728000	0
O7_DICTIONARY_ACCESSIBILITY	TRUE	TRUE
open_cursors	15000	1000
pga_aggregate_target	0	8589934592
processes	5000	5000
sessions	7680	7536
sga_max_size	77846282240	34359738368
sga_target	77846282240	34359738368
undo_retention	1800	1800
deferred_segment_creation	true	true

Note: Oracle recommends that you use the default value for **commit_wait** and ensure that values for **sga_max_size** and **sga_target** for SSC are equal. This is to avoid major issues with the Solaris kernel.

For information about collecting more accurate database statistics, see the knowledge article about best practices for managing optimizer statistics [Doc ID 1662447.1], available from the Oracle support website:

<https://support.oracle.com>

Configuring Database Schema Partitioning

For detailed information about partitioning the database schema, see *OSM System Administrator's Guide*.

Multi-database Source Configuration Using N-RAC Nodes

Oracle recommends that you use an Active-Active Oracle RAC database configuration to provide scalability and high availability for the database. For more information about high availability and its impact on the database Oracle RAC, see Appendix B of *OSM Installation Guide*.

Note: OSM installer sets up only two active Oracle RAC nodes, by default. For information about adding more nodes, see "[Changing the WebLogic Server of Oracle RAC Database Size](#)".

Database Storage

Recommendations for setting up database storage include the following:

- Use Automatic Storage Management (ASM) for managing data disk storage.
- For storage reliability, use Normal (two-way mirrored) Redundancy and ensure that the tablespace, data files, and redo logs are on this storage.
- Place redo logs, which are sensitive to storage response time, should be put on storage with a service time of less than 5 ms.
- Specify large redo log files to avoid frequent redo log switching. For redundancy, use a mirrored configuration for redo logs.
- Finalize the requirements for latency and IOPS during your hardware sizing exercise.

Recommendations for configuring tablespaces include the following:

- Use Automatic Segment Space Management (ASSM) for each tablespace.
- Whenever disk space permits, use BIGFILE for tablespace creation. This simplifies the management of tablespace allocation by using a single data file for tablespace.
- If you must use a SMALLFILE tablespace, plan for the possibility that a large number of data files might be created for OSM schema. Plan to implement a naming convention for data files and find an ideal location for data files that allows for future growth.