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Cloud Control Oracle Fusion Middleware Management Guide

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Contributing Author: Namrata Bhakthavatsalam, Leo Cloutier, Genevieve D'Souza, Pradeep Gopal, Jacqueline Gosselin, Deepak Gujrathi, Dan Hynes, Aravind Jayaraaman, Dennis Lee, Pushpa Raghavachar, Paul Wright, Mike Zampiceni

Contributor: Enterprise Manager Cloud Control Fusion Middleware Management Development Teams, Quality Assurance Teams, Customer Support Teams, and Product Management Teams

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Preface

This document describes how to use Oracle Enterprise Manager Cloud Control to monitor and manage middleware software, including Oracle Fusion Middleware and Oracle WebLogic Server.

Audience

This document is intended for those who monitor and manage both Oracle applications and custom Java EE applications that run on a combination of Oracle Fusion Middleware, as well as non-Oracle middleware software.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Related Documents

For more information, see the following documents in the Oracle Enterprise Manager Release 12c documentation set:

- *Oracle Enterprise Manager Lifecycle Management Guide*
- *Oracle Enterprise Manager Cloud Control Administrator's Guide*

For the latest releases of these and other Oracle documentation, check the Oracle Technology Network at:

<http://www.oracle.com/technetwork/documentation/index.html#em>

Oracle Enterprise Manager also provides extensive Online Help. Click **Help** at the top of any Enterprise Manager page to display the online help window.

Conventions

The following text conventions are used in this document:

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

What's New in This Guide?

The changes in this guide reflect the new features in Enterprise Manager release 12.1.0.4 and Fusion Middleware plug-in release 12.1.0.8.

Note: Information in this manual reflects Fusion Middleware plug-in, releases 12.1.0.1 through 12.1.0.8.

Of particular interest:

- Added [Section 2.5.1, "Shutting Down, Starting Up, or Restarting a Middleware Target"](#)
- Added [Chapter 4, "Composite Applications"](#)
- Moved the majority of the information in [Chapter 5, "Monitoring an Exalytics Target"](#) to *Managing Oracle Exalytics In-Memory Machine with Oracle Enterprise Manager* manual available from the Management tab of the Enterprise Manager documentation library.
http://docs.oracle.com/cd/E24628_01/nav/management.htm
- Added [Chapter 31, "Discovering and Configuring Oracle Identity Management Targets"](#)
- Added [Section 35.5, "Migrating to JMX-Based Monitoring of JBoss Application Servers"](#).
- Added index entries.
- Added [Chapter 36, "Discovering and Monitoring Apache HTTP Server"](#).
- Updated [Chapter 24, "Getting Started with Management Pack for Oracle Coherence"](#).

Part I

Managing Oracle Fusion Middleware

The chapters in this part describe how you can monitor Oracle Fusion Middleware targets, including Oracle WebLogic Server and deployed Java EE applications.

The chapters are:

- [Chapter 1, "Introduction to Middleware Management"](#)
- [Chapter 2, "Managing Middleware Targets"](#)
- [Chapter 3, "Testing Application Load and Performance"](#)
- [Chapter 4, "Composite Applications"](#)

Introduction to Middleware Management

This chapter provides an introduction to how you can use Oracle Enterprise Manager Cloud Control to monitor and manage middleware software, including Oracle Fusion Middleware and Oracle WebLogic Server.

This chapter covers the following:

- [Middleware Management with Enterprise Manager Cloud Control](#)
- [Key Oracle Fusion Middleware Management Features](#)
- [Managing Fusion Middleware with Fusion Middleware Control](#)

1.1 Middleware Management with Enterprise Manager Cloud Control

Middleware is the software that enables your enterprise applications to run. Managing the underlying middleware technology can be difficult, and IT organizations often have to rely on a variety of specialized tools. This can lead to inefficiency and may introduce complexities and risks.

Enterprise Manager Cloud Control is the definitive tool for middleware management and allows you to manage both Oracle applications and custom Java EE applications that run on a combination of Oracle Fusion Middleware as well as non-Oracle middleware software.

Oracle Enterprise Manager Cloud Control is a Web browser-based, graphical user interface that you can use to monitor multiple Oracle Fusion Middleware Farms and Oracle WebLogic Domains. In fact, Cloud Control provides deep management solutions for Oracle technologies including Oracle packaged applications, Oracle Database and Oracle VM.

Enterprise Manager Cloud Control supports the discovery, monitoring and central management of the entire family of Oracle Fusion Middleware components, including:

- Oracle WebLogic Server domains, clusters and single server instances
- Oracle GlassFish Domains, Clusters, and Servers
- Clustered and standalone Java EE applications
- Oracle HTTP Server as well as standalone Oracle HTTP Server (that is, Oracle HTTP Server not associated with an Oracle WebLogic Domain) and Oracle Web Cache
- Service-Oriented Architecture (SOA) components
- Oracle Identity Management
- Metadata Services repositories

- Oracle WebCenter
- Oracle Portal
- Oracle Business Intelligence Discoverer
- Oracle Forms Services
- Oracle Reports
- Directory Server Enterprise Edition
- Oracle Coherence
- Oracle Exalogic Elastic Cloud
- Oracle Application Server
- Java EE

Cloud Control also offers extensive support for non-Oracle technologies through more than two dozen heterogeneous management plug-ins and connectors including IBM WebSphere Application Server, JBoss Application Server, EMC storage, F5 BIG IP, Check Point Firewall, Apache HTTP Server, Microsoft MOM, and BMC Remedy.

A key benefit of Enterprise Manager Cloud Control is that unlike other Fusion Middleware management utilities - such as Fusion Middleware Control and the WebLogic Server Administration Console - you can monitor and manage multiple middleware targets, such as all of your WebLogic Server domains, from a single console.

You can also view real time as well as historic performance metrics collected from middleware targets. This enables you to monitor the availability and performance of Oracle Fusion Middleware software both in real time and from a historical perspective for trend analysis and diagnosing availability and performance problems.

Enterprise Manager Cloud Control also enables you to manage the infrastructure upon which the middle tier depends. You can manage underlying operating systems and hosts on which the middleware software is installed. You can also monitor the databases used by deployed applications, enabling you to diagnose application performance problems and identify the true root cause of the problem and the tier (middleware, database) on which it occurs.

The built-in topology viewer allows you to visualize and monitor your entire Oracle Fusion Middleware environment in a graphical display. Topologies can be viewed for a single SOA composite, an Oracle WebLogic Domain, or across multiple Oracle WebLogic Domains.

Management of Service-Oriented Architecture (SOA) components such as BPEL processes and infrastructure components such as Oracle Service Bus, is also supported. The infrastructure provides monitoring, fault management, configuration management, deployment and dependency views of wiring between components.

1.2 Key Oracle Fusion Middleware Management Features

Cloud Control provides full historical monitoring across the middleware tier, from WebLogic Server instance and the Java virtual machine (JVM) it runs within, to the Oracle Fusion Middleware components running on the application server. It also provides full configuration and lifecycle management of middleware components, while the product's extensive performance monitoring and diagnostics capabilities enable troubleshooting issues anywhere within the middleware tier.

With Oracle Enterprise Manager Cloud Control, you can:

- Centrally manage multiple Oracle Fusion Middleware Farms and WebLogic Domains.
- Manage third party products such as IBM WebSphere Application Server, JBoss Application Server, Apache HTTP Server, Apache Tomcat and the Microsoft .NET Framework.
- Manage non-middleware software such as underlying operating systems and hardware on which the middleware software is installed. This allows administrators to correlate middleware performance with its underlying host performance.
- Manage database software and diagnose application performance problems and identify the true root cause of the problem and the tier (middleware, database) on which it occurs.
- Monitor the availability and performance of Oracle Fusion Middleware software in real time and from a historical perspective for trend analysis.
- Diagnose availability and performance problems.
- Monitor and trace important end-user requests from the client to the service endpoint across all the servers and applications associated with each transaction.
- Use Application Dependency and Performance (ADP) to analyze Java EE and SOA applications.
- Monitor Java applications and diagnose performance problems in production using JVM Diagnostics.
- Define Service Level Objectives (SLOs) in terms of out-of-box system-level metrics as well as end user experience metrics to accurately monitor and report on Service Level Agreement (SLA) compliance.
- Perform several critical tasks like:
 - Setting thresholds on performance metrics. When these thresholds are violated, e-mail and page notifications are sent.
 - Tracking configuration changes and comparing configurations between example test environment and production environment.
- View Business Applications to access RUEI and BTM performance data as well as information about the application's supporting infrastructure.

1.3 Managing Fusion Middleware with Fusion Middleware Control

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

Fusion Middleware Control is a part of the Oracle Fusion Middleware installation. With Fusion Middleware Control, you can:

- Manage a single Oracle Fusion Middleware Farm and a single WebLogic Domain.
- Monitor the availability and performance of Fusion Middleware software in real time mode.
- Perform routine administration tasks such as deploying applications, configuring parameters, and so on.

For more details, see the *Oracle Fusion Middleware Administrator's Guide 11g Release 2* and *Oracle Fusion Middleware Administering Oracle Fusion Middleware 12c*.

Managing Middleware Targets

This chapter describes how you can use Enterprise Manager to monitor Middleware software.

Note: Oracle provides a free self-paced course regarding the best practices on managing WebLogic and Service Oriented Architecture (SOA) applications and infrastructure. It consists of interactive lectures, videos, review sessions, and optional demonstrations, and lasts about two hours.

The *Oracle Enterprise Manager Cloud Control 12c: Best Practices for Middleware Management* self-study is available at <http://www.oracle.com/webfolder/technetwork/tutorials/tutorial/em/Oracle%20Enterprise%20Manager%20Cloud%20Control%2012c%20Middleware%20Management%20Best%20Practices%20Self-Study%20Course/player.html>

This chapter covers the following:

- Middleware Targets in Enterprise Manager
- Monitoring Middleware Targets
- Diagnosing Performance Problems
- Administering Middleware Targets
- Managing Problems with Support Workbench
- Lifecycle Management
- Managing Service Levels
- Job System
- Routing Topology Viewer

For information regarding discovery of middleware targets, see the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

2.1 Middleware Targets in Enterprise Manager

After you have added a Middleware target (for example, Oracle Fusion Middleware, Oracle WebLogic Domain, Oracle Application Server, JBoss Application Server), you can view general information about the targets including their status and availability on the Middleware page. You can drill down into each target to get further details like

how the target is performing, where it is deployed, the version, location of its home directory, and so on.

You can monitor the following middleware software using Oracle Enterprise Manager Cloud Control:

- Oracle Fusion Middleware software
- Oracle Application Server software
- Non-Oracle Middleware software

2.1.1 Oracle Fusion Middleware Components

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

Note: Enterprise Manager no longer creates farm targets for Fusion Middleware release 12.1.1 domains and later.

You can monitor the following Oracle Fusion Middleware components using Enterprise Manager:

- **Oracle WebLogic Domains, Clusters, and Managed Servers:** A WebLogic Server domain is a logically related group of WebLogic Server resources that you manage as a unit. A domain includes one or more WebLogic Servers and may also include WebLogic Server Clusters. Clusters are groups of WebLogic Servers instances that work together to provide scalability and high-availability for applications. With Oracle Enterprise Manager, you can monitor and manage the farm, domains, clusters, servers, and deployed applications.
- **Oracle SOA Suite:** The Oracle SOA Suite enables services to be created, managed, and orchestrated into SOA composite applications. Composite applications enable you to easily assemble multiple technology components into one SOA composite application. Oracle SOA Suite plugs into heterogeneous infrastructures and enables enterprises to incrementally adopt SOA. You can:
 - Automatically discover and model SOA components such as BPEL Process Manager, Oracle Service Bus, Service Engines, and so on.
 - Monitor the health and performance of the SOA components.
 - Trace the flow of an instance across all SOA Infrastructure applications.
 - Create systems, services, and aggregate services.
- **Oracle WebCenter:** The Oracle WebCenter is an integrated set of components with which you can create social applications, enterprise portals, collaborative communities, and composite applications, built on a standards-based, service-oriented architecture. It combines dynamic user interface technologies with which to develop rich internet applications, the flexibility and power of an integrated, multichannel portal framework, and a set of horizontal Enterprise 2.0 capabilities delivered as services that provide content, collaboration, presence, and social networking capabilities. Based on these components, Oracle WebCenter also provides an out-of-the-box, enterprise-ready customizable application, WebCenter Spaces, with a configurable work environment that enables individuals and groups to work and collaborate more effectively.

- **Oracle Web Tier:** This consists of:
 - **Oracle HTTP Server:** Oracle HTTP Server (OHS) is the underlying deployment platform for all programming languages and technologies that Oracle Fusion Middleware supports. It provides a Web listener and the framework for hosting static and dynamic pages and applications over the Web. Based on the proven technology of the Apache 2.x infrastructure, OHS includes significant enhancements that facilitate load balancing, administration, and configuration. It also includes a number of enhanced modules, or mods, which are extensions to the HTTP server that extend its functionality for other enterprise applications and services. You can:
 - * Discover and monitor Oracle HTTP Servers.
 - * View a list of metrics to gauge the server performance and virtual host performance.
 - * View the top URLs being accessed.
 - * Perform the enterprise configuration management tasks like viewing, comparing, and searching configuration information.
 - * Start, stop, and restart Oracle HTTP Servers. This applies to both managed and standalone Oracle HTTP Servers. Standalone servers are those that are not associated with a WebLogic Domain.

Note: Cloud Control console supports both managed, as well as standalone HTTP Servers.
 - **Oracle Web Cache:** Oracle Web Cache is a content-aware server accelerator, or reverse proxy, for the Web tier that improves the performance, scalability, and availability of Web sites that run on any Web server or application server, such as Oracle HTTP Server and Oracle WebLogic Server. Oracle Web Cache is the primary caching mechanism provided with Oracle Fusion Middleware. Caching improves the performance, scalability, and availability of Web sites that run on Oracle Fusion Middleware by storing frequently accessed URLs in memory. You can:
 - * Automatically discover and monitor OracleAS Web Cache instances running within application servers.
 - * View the metrics associated with this target to analyze their performance.
 - * Perform enterprise configuration tasks like viewing, comparing, and searching configuration information.
- **Oracle Identity Management:** This is an enterprise identity management system that automatically manages users' access privileges within the resources of an enterprise. The architecture of Oracle Identity Management works with the most demanding business requirements without requiring changes to existing infrastructure, policies, or procedures. It provides a shared infrastructure for all Oracle applications. It also provides services and interfaces that facilitate third-party enterprise application development. These interfaces are useful for application developers who need to incorporate identity management into their applications.
- **Oracle Portal:** This is a Web-based tool for building and deploying e-business portals. It provides a secure, manageable environment for accessing and interacting with enterprise software services and information resources. A portal page makes data from multiple sources accessible from a single location.

- **Oracle Forms Services** is a middle-tier application framework for deploying complex, transactional forms applications to a network such as an Intranet or the Internet. With Oracle Forms Services, business application developers can quickly build comprehensive Java client applications that are optimized for the Internet without writing any Java code, and that meet (and exceed) the requirements of professional user communities. These Java client applications are Web-deployed applications available on demand for rapid processing of large amounts of data and rapid completion of complex calculations, analysis, and transactions.
- **Oracle Coherence** is a component of Oracle Fusion Middleware that enables organizations to predictably scale mission-critical applications by providing fast and reliable access to frequently used data. By automatically and dynamically partitioning data in memory across multiple servers, Oracle Coherence enables continuous data availability and transactional integrity, even in the event of a server failure. As a shared infrastructure, Oracle Coherence combines data locality with local processing power to perform real-time data analysis, in-memory grid computations, and parallel transaction and event processing. Oracle Coherence comes in three editions. You can:
 - Discover and manage a Coherence cluster and its various entities.
 - Monitor and configure various components such as nodes, caches, services, connections, and connection manager instances of a Coherence cluster.
 - Deploy and install a Coherence node based on the Provisioning Advisory framework.
- **Oracle Business Intelligence** is a complete, integrated solution that addresses business intelligence requirements. Oracle Business Intelligence includes Oracle Business Intelligence Reporting and Publishing, Oracle Business Intelligence Discoverer, and Oracle Business Intelligence Publisher. You can:
 - Manually discover Oracle BI Suite EE targets, and monitor their overall health.
 - Diagnose, notify, and correct performance and availability problems in Oracle BI Suite EE targets.
 - Access current and historical performance information using graphs and reports.
 - Perform enterprise configuration management tasks like viewing, comparing, and searching configuration information.
- **Oracle Universal Content Management System** provides a unified application for several different kinds of content management. It is an enterprise content management platform that enables you to leverage document management, Web content management, digital asset management, and records retention functionality to build and complement your business applications. Building a strategic enterprise content management infrastructure for content and applications helps you to reduce costs, easily share content across the enterprise, minimize risk, automate expensive, time-intensive and manual processes, and consolidate multiple Web sites onto a single platform for centralized management. Through user-friendly interfaces, roles-based authentication and security models, Oracle Universal Content Management empowers users throughout the enterprise to view, collaborate on or retire content, ensuring that all accessible distributed or published information is secure, accurate and up-to-date.

2.1.2 Oracle Application Server Components

You can monitor Oracle Application Server 10g components like Oracle Application Server Farms, Oracle Application Server Clusters, Oracle Application Servers, OC4J, Oracle HTTP Servers, Oracle Web Cache, Oracle Portal, Oracle Wireless, Oracle Forms Services, Oracle Reports Services, Oracle Business Intelligence, and Oracle Identity Management.

2.1.3 Non-Oracle Middleware Components

In addition to monitoring Oracle Middleware components, Enterprise Manager can also be used to monitor non-Oracle Middleware software. The third-party Middleware software that can be monitored includes the following:

- WebSphere Application Server
- WebSphere MQ
- JBoss Application Server
- Apache Tomcat
- Apache HTTP Server

For additional third-party middleware software that can be monitored, please check the Enterprise Manager certification matrix on My Oracle Support (<http://support.oracle.com>).

2.2 Monitoring Middleware Targets

Enterprise Manager organizes a wide variety of performance data and administrative functions into distinct, Web-based home pages for the domain, servers, components, and applications.

2.2.1 Middleware Summary Page

Enterprise Manager provides centralized monitoring across domains, configuration management, provisioning, real time and historical performance analysis. Beginning with the Fusion Middleware Plug-in release 12.1.0.4, there are some administration features exposed within the Cloud Control console. These features enable you to perform configuration changes directly from the Cloud Control console rather than drilling down to administration consoles such as the WebLogic Server Administration Console or the Oracle Enterprise Manager Fusion Middleware Control console. Some examples of the administration features exposed from Cloud Control include: management of JDBC data sources (for example create, edit, delete, test, control data sources) and access to the System MBean Browser to view, edit and invoke MBeans. However, not all administration and configuration operations can be made from Cloud Control; in many cases, you still need to drill down to the administration consoles.

The Middleware summary page, accessed from the Targets menu, provides two different views of the middleware components configured as managed targets.

These two views are referred to as the Table view and the Heat Map view. While the more traditional Table view provides a detailed summary of status across middleware-related targets, the Heat Map view provides a graphical and more efficient way to analyze the same data. On the Heat Map view, targets are represented as boxes and the size and color of each box depicts potential problem areas. This view

enables administrators to quickly analyze a large amount of data, customize the filtering, and pinpoint problems more efficiently.

You can use the Table tab to add or remove middleware targets, as well as set certain monitoring configuration properties for targets.

By default, the Name, Type, Status, and Member Status Summary are listed for middleware targets. You can also add any of the global target properties such as Department and Line of Business as columns in this table. From the **View** menu, select **Columns**, then select **Manage Columns**.

Columns of particular interest are:

- **Type:** The type of target being managed.
- **Status:** The availability of the target, if applicable. Note that some targets that represent a collection of components, such as a Fusion Middleware Farm, will not have a standalone status.
- **Status Details:** The availability of the middleware components associated with the target. The total number of components associated with the target, such as the number of WebLogic Server instances associated with a WebLogic Domain, is shown outside of the parentheses.
- **Version:** The target version.
- **Compliance Score:** An overall evaluation of the target's compliance with compliance standard rules defined in your enterprise, presented as a percentage of compliance. A compliance score of 100% indicates full compliance with a policy.

2.2.1.1 Heat Map

You can use the Heat Map tab to view the Middleware Targets Heat Map, a graphical representation of a set of targets depicted as boxes in the heat map which are the root targets that are shown in the table tab. They can be grouped and optionally summarized by attributes like Version and Location. The size of the box represents the number of member targets. You can choose to color the boxes based on either the Status or the WebLogic Servers Only: CPU Usage. You can hover or click on graph elements to see more detail.

If you choose WebLogic Servers Only: CPU Usage, the graph displays boxes that are root targets containing WebLogic servers. If a root target does not contain any WebLogic servers, it is not displayed in the view. The box size is based on the number of WebLogic servers it contains. The box color is based on the average CPU value of all servers it contains. After selecting a box, the Properties region in the lower right corner shows the number of WebLogic servers it contains as well as the average CPU value. You can also use tooltips to display this information.

The color of the boxes is meaningful. If you choose Status, red means that several members of the target are down. If you choose WebLogic Servers Only: CPU Usage, then the color represents CPU Usage for the WebLogic Servers. Red would indicate high CPU usage values while green would indicate low.

The slider enables you to determine which CPU usage values are red and which are green.

Note: Enterprise Manager no longer creates farm targets for Fusion Middleware release 12.1.1 domains and later.

Status and CPU Usage

You can use the Show drop-down menu to change to either of two displays: Status or WebLogic Servers Only: CPU Usage.

The default view is by Status and organized by target version. While this is the default view, you can modify the default and organize the data in a variety of ways using the Options region. For instance, you can organize the data by location of the target or lifecycle status of the target. You can also provide multiple levels of organization; for example, you may want to first organize by location and then by version to gain an understanding of the health of different versions of middleware targets in different geographic areas.

The WebLogic Servers Only: CPU Usage option supports only WebLogic Servers. Each box represents a WebLogic Server or the parent of a WebLogic Server (a cluster, for example). A WebLogic Server will be excluded from the graph if it is down or if its CPU metric data has not yet been collected.

Organizing Data Using Options Region

Each box in the Heat Map view represents a target or set of targets; for example, a farm or domain target. The size of the box represents the number of member targets; therefore, the larger the box, the more members the target contains.

You can organize the display by using the Organize First By field and the Then By field, which allows you to choose a field on which to prioritize the display.

Drilling allows you to focus on one section of the heat map that was grouped using the Organize By menus. To focus on one section of the heat map, drill in by double-clicking on the section header. This displays only the boxes that are in that box and hides all others. To drill out from the view, use the locator links available above the heat map.

Using the Summarize option turns the deepest Organize First By box into one box by summarizing all of the individual boxes it contains.

To gain more information on the potentially problematic targets, you can hover over the target's box and click it. The Properties region, which appears on the right, provides additional details on the target and its members and enables you to drill-down further.

Properties Region

When you click on a box, properties relevant to the selected target are displayed in the Properties region. This may include a breakdown of the member statuses or the number of WebLogic Servers it contains, depending on the current heat map view.

The Properties region displays target properties such as Type and Target Version. It also displays any user-defined properties such as Contact, Location, or Department and so on, if they have been defined.

Incident information about this target and its descendants is also shown. Click on the counts to navigate to the Incidents Manager page where you can search, view, manage exceptions and issues, and track outstanding incidents and problems.

Importance of Color

The color of the boxes is also meaningful. For example, for Status, red indicates that the target is down and green indicates that the target is up. Using the Options region, you can customize the color range, that is, the meaning of red versus the meaning of green. By default, if 60% or less of the members in the target are up, then the box on the Heat Map view will be red; whereas, if at least 95% of the members of the

members are up then the box on the Heat Map will be green. In the case of the WebLogic Servers Only: CPU Usage view, the color represents a range of CPU Usage for the WebLogic Server targets – where the more red the box, the higher the CPU usage.

You can adjust the slider to change the color range.

2.2.1.2 Searching Middleware Managed Targets

To minimize the number of targets displayed in the table and graph, and improve page performance and usability, use the Search function.

The **Search** list, located on the left, is used to specify target types, as well as target properties, for example Cost Center. Target types only appear in the list if you have access to at least one target in that area.

Use the **View** menu located at the top right to select the properties you want displayed in chart format. For example, select Lifecycle status to see the distribution of lifecycle statuses across your targets.

The search results display as a hierarchy where all displayed targets match all search fields. The leaf nodes are shown in context with their parents. To show the results as a flat list without this hierarchical information, uncheck the "Show Hierarchy" box in the table toolbar.

To clear the filter, click the x next to the property name. Note that when multiple options for a property are selected in the Search list, that information is displayed at the top of the charts, for example Multiple Target Types.

Note: If you are searching for a single target and do not need hierarchy information, the Target Name option located in the upper right is available on most pages.

Additional highlights of the Search feature include:

- When options in the Search tree are collapsed, all the hidden search options still apply.
- If you change a search option, the page content is automatically refreshed. Your search criteria is automatically saved as the new default search the next time you visit the page.
- The Member Status Summary column in the table summarizes only the targets fetched by your search criteria. For example, if you decide to search the 'Oracle WebLogic' target type for targets with contact Smith, only targets matching Smith and their parents would be fetched and used to calculate the Member Status Summary column numbers. Targets which do not match Smith will not be shown or used in the summary column calculations.
- The table is populated only if the search query results are less than the threshold.

For example, if the site has 5000 Middleware targets and the threshold is set to display 2000 targets, the table will be empty with a statement explaining that there are too many targets and that you should filter the results. If after filtering there are now 1500 targets that match the criteria, all the targets will appear in the table, since the total number is under the 2000 limit. If the threshold had been set to 6000, you would have seen all the targets on the page. Note that if the threshold limit is very large, the page will run slower.

By default the threshold is 2000.

To change the threshold, update the `oracle.sysman.emfa.MWTableTargetLimit` property using the following `emctl` command:

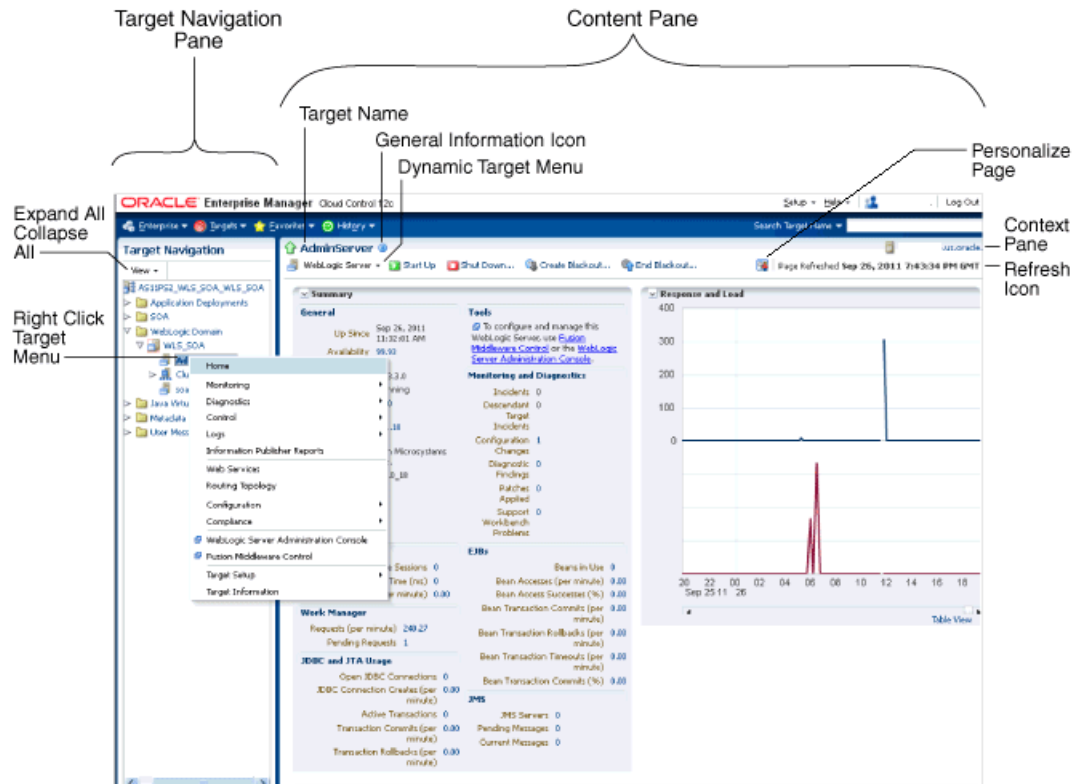
```
emctl set property -name oracle.sysman.emas.MWTableTargetLimit -value 2000
```

2.2.2 Target Home Page

The Home pages make it easy to locate the most important monitoring data and the most commonly used administrative functions—all from your Web browser.

When you login into Enterprise Manager and select a Middleware target, the Home page for the target is displayed. For example, when you click on a WebLogic Server target in the Middleware page, the following screen is displayed.

Figure 2–1 WebLogic Server Home Page



This figure shows the target navigation pane on the left and the content page on the right. From the target navigation pane, you can expand the tree and select a component or an application. When you select a target, the target's home page is displayed in the content pane and that target's menu is displayed at the top of the page, in the context pane. You can also view the menu for a target by right-clicking the target in the navigation pane.

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

- **Target Navigation Pane** lists all of the targets in a navigation tree
- **Personalize Page Link** displays the Personalize Page where you customize how the data on the page is rendered, for example, what regions should be displayed, the order of the regions, and so on.
- **Content Pane** shows the current page for the target. When you first select a target, that target's home page is displayed.
- **Dynamic Target Menu** provides a list of operations that you can perform on the currently selected target. The menu that is displayed depends on the target you

select. The menu for a specific target contains the same operations as those in the Right-Click Target Menu.

- **Right-Click Target Menu** provides a list of operations that you can perform on the currently selected target. The menu is displayed when you right-click the target name in the target navigation pane. In the figure, even though the WebLogic Server is selected and its home page is displayed, the right-click target menu displays the operations for the selected target.
- **Target Name** is the name of the currently selected target.
- **Context Pane** provides the host name, the time of the last page refresh, the Refresh icon, and the Personalize Page icon.
- **View:** You can select options to Expand All / Collapse All, Scroll First, and Scroll Last in the navigation tree.
- **Refresh** icon indicates when the page is being refreshed. Click it to refresh a page with new data. (Refreshing the browser window refreshes the page but does not retrieve new data.)

From the Home page, you can also access the Fusion Middleware Control and WebLogic Server Administration Console by clicking on the appropriate link or selecting the appropriate menu item on the page.

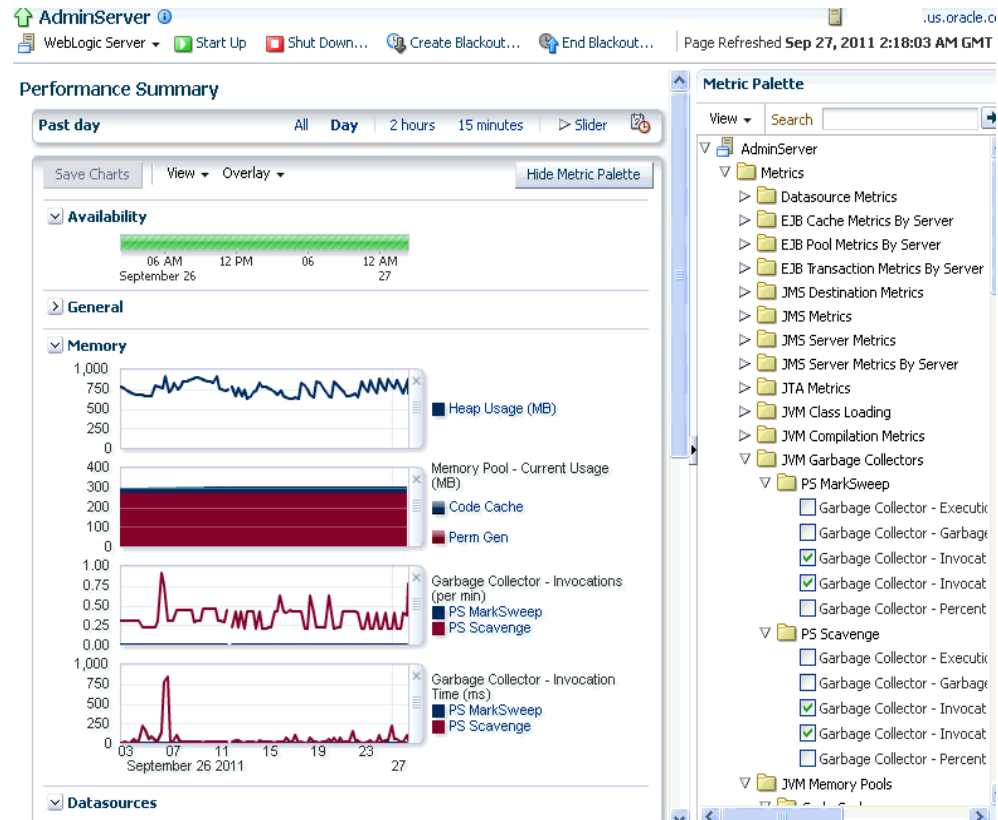
2.2.3 Out-of-box Performance Metrics

Enterprise Manager provides a set of pre-defined performance metrics for each Middleware target. The metric data is collected and stored in the Management Repository. For more details on the pre-defined metrics, see the *Oracle Fusion Middleware Metric Reference Guide*. For information regarding the Management Repository Data Retention Policies, refer to the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

For example, Enterprise Manager can automatically monitor:

- The CPU or memory consumption of the application server, including detailed monitoring of individual Java Virtual Machines (JVMs) being run by Oracle WebLogic servers.
- Java EE application responsiveness from the application down through individual servlets and Enterprise JavaBeans (EJBs)
- Oracle HTTP Server session volumes, connection duration, and error rates
- Oracle Web Cache hit rates and volumes
- Top servlets based on number of requests, maximum processing time, and highest average processing time

The performance metrics provide details about the metric as a current real time value (30 seconds, 1 minute, or 5 minutes) or a previous value (past 24 hours, 7 days, or 31 days). The historical information is displayed as graphs and a table. By using graphs, you can easily watch for trends, and by using tables, you can examine details of past metric severity history. The out-of-box metrics can be viewed from the performance summary pages as shown below:

Figure 2–2 Performance Summary Page

You can change which charts are displayed on the performance page and then save the changes on a per-user, per-target-type basis. You can also save multiple customized versions of a performance page, giving each version a name. This will save time by allowing quick access to previously created version of the page. The Performance Summary feature allows you to create named chart views. The generic performance page is always shown in the context of one primary target. However, the performance of that target may be dependent on, or affect the performance of other targets. To explore these relationships you can chart metrics for multiple related targets on one performance page. The Performance Summary feature allows you to chart metrics for multiple related targets.

2.2.4 Analyzing Historical Performance

Enterprise Manager allows you to analyze historic metric data and perform trend analysis. In Fusion Middleware Control, you cannot analyze historical metric data, and the real-time analysis is limited to a single domain. But in Enterprise Manager Cloud Control, the metrics are collected and stored in the Management Repository, so you can analyze the data well after the situation has changed. For example, you can use historical data and diagnostic reports to research an application performance problem that occurred days or even weeks ago.

You can even provide a customized time period for which the data should be retrieved from the Management Repository. You can customize the time period for:

- Pre-defined range of the last 24 hours, last 7 days, or last 31 days
- Customized range of any number of days, weeks, months, or years
- Any start date and end date (such that the duration is not greater than 99 years)

2.2.5 Setting Metric Thresholds for Alert Notifications

When editing metric settings, use the Threshold Suggestion feature to calculate thresholds based on deviations from past performance. Thresholds are boundary values against which monitored metric values are compared. You can specify a threshold such that, when a monitored metric value crosses that threshold, an alert is generated. You can get critical alerts when a monitored metric has crossed its critical threshold or warning alerts when a monitored metric has crossed its warning threshold.

To access the Threshold Suggestion feature from a target's home page:

1. Select **Monitoring** from the target's menu located at the top-left of the page, then select **Metric and Collection Settings**.
2. On the Metric and Collection Settings page, locate the metric in which you are interested and click the pencil icon associated with the metric.
3. On the Edit Advanced Settings page, locate the Threshold Suggestion region and change the thresholds as needed.

Enterprise Manager provides a comprehensive set of features that facilitates automated monitoring and generation of alerts. You can gather and evaluate diagnostic information for targets distributed across the enterprise, and an extensive array of Middleware performance metrics are automatically monitored against predefined thresholds. By selecting a metric, you can determine whether the thresholds have been defined for a particular metric. These thresholds are used as a mechanism to generate alerts. These alerts in turn are used to notify you whether a target is up or down, the response time is slow, and so on. Thus, you can monitor their overall performance.

You can set up corrective actions to automatically resolve an alert condition. These corrective actions ensure that routine responses to alerts are automatically executed, thereby saving you time and ensuring that problems are dealt with before they noticeably impact the users.

2.2.6 Monitoring Templates

You can also use monitoring templates to simplify the task of standardizing monitoring settings across your enterprise. You can specify the settings for performance metrics as well as configuration collections, and apply them across multiple targets of a specific target type.

A Monitoring template defines all the parameters you would normally set to monitor a Middleware target, such as:

- Target type to which the template applies
- Metrics (including user-defined metrics), thresholds, metric collection schedules, and corrective actions

When a change is made to a template, you can reapply the template across the affected targets in order to propagate the new changes. You can reapply monitoring templates as often as needed.

2.2.7 Managing and Creating Blackouts

Enterprise Manager comes with a bundle of performance and health metrics that enable automated monitoring of application targets in your environment. When a metric reaches the predefined warning or critical threshold, an alert is generated and the administrator is notified.

However, there are occasions when you want to perform maintenance work on your Middleware targets, but do not want any alerts to be generated while you are bringing them down. In this case, you can schedule a blackout and suspend monitoring of the Middleware targets.

Blackouts allow you to suspend any data collection activity on one or more monitored targets, thus allowing you to perform scheduled maintenance on targets. If you continue monitoring during these periods, the collected data will show trends and other monitoring information that are not the result of normal day-to-day operations. To get a more accurate, long-term picture of a target's performance, you can use blackouts to exclude these special-case situations from data analysis. Enterprise Manager allows you to define new blackouts; view the status of existing blackouts; and edit, stop, and delete blackouts that are not required.

2.2.8 Extend Monitoring for Applications Deployed to WebLogic Server

Many administrators often require custom logic to be written to check for conditions specific to their application environments. Enterprise Manager allows integration of application instrumentation in the Enterprise Manager event monitoring infrastructure. If application developers expose application instrumentation using standards like JMX or Web Services operations, then you can build management plug-ins for the instrumentation using easy-to-use command line tools, and leverage the Enterprise Manager event monitoring system to monitor it. You do not have to edit any XML files or write any integration code to integrate such instrumentation. Follow these procedures to integrate application-defined instrumentation:

- Use Command Line Interfaces that analyze MBean interfaces for JMX and WSDL for Web Services and create management plug-ins
- Import Management Plug-in Archive in Enterprise Manager
- Deploy Management Plug-in to Management Agents
- Create Target-type instances for the target types defined in Management Plug-in Archive
- Leverage the Enterprise Manager event monitoring system including monitoring templates, corrective actions, historical and real time metric views, alerts, customization of notification rules, and methods on events generated from application instrumentation metrics.

Administrators are able to add performance metrics beyond those available out-of-box for JMX-instrumented applications deployed on Oracle WebLogic Server.

Administrators can additionally monitor JMX-enabled applications by defining new target type that can be monitored using management plug-ins, and then use a command line tool `emjmxcli` to automate the generation of the target metadata and collection files. All JMX-enabled applications deployed to the WebLogic Server can be consolidated and monitored by a single management tool, Enterprise Manager.

For information on creating management plug-ins, see the *Oracle Enterprise Manager Cloud Control Extensibility Programmer's Guide*. For information on creating metric extensions, see the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

2.3 Diagnosing Performance Problems

This section describes the methods and tools used to diagnose performance problems. You can:

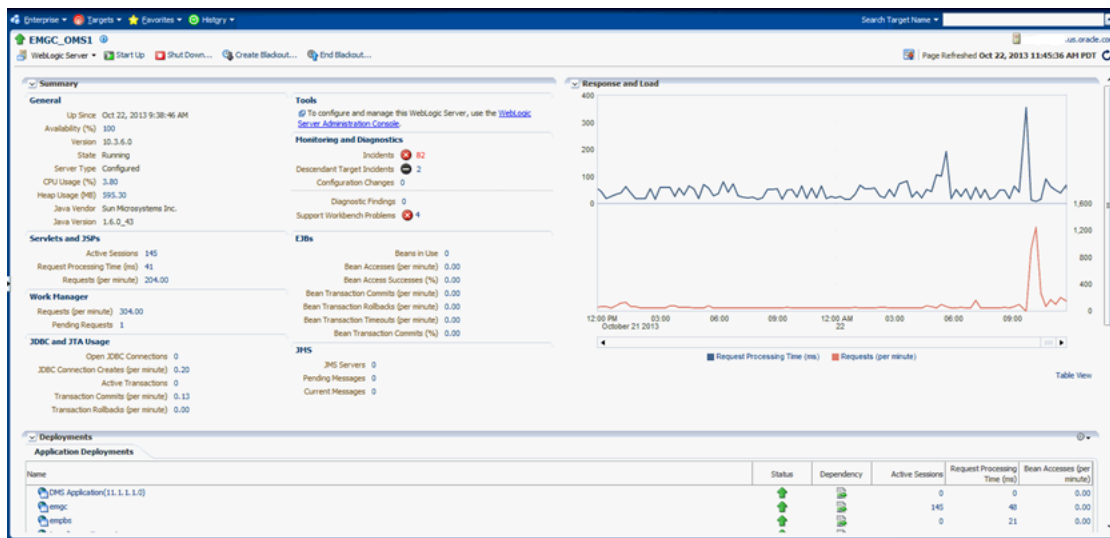
- View the list of most active Servlets and JSPs and identify the ones that are causing the bottleneck.
- Analyze Java EE and SOA applications using Application Dependency and Performance.
- Use Java Diagnostics to diagnose performance problems in production.

2.3.1 Using Home Pages to Diagnose Performance Issues

When you are troubleshooting performance problems, it can be helpful to know which servlets or JSPs are the most active. By viewing the Most Requested section on the WebLogic Server Home page, you can identify the most active Java servlets, JSPs, Web Services, or Java EE Services running on the WebLogic Server instance.

When you receive an alert notification, Enterprise Manager makes it easy for you to investigate the problem and take corrective actions wherever required. For example, notification of excessive CPU consumption by WebLogic Server may lead to investigation of the applications running on that instance. By using the Servlets and JSPs tab in the Most Requested section of the WebLogic Server Home page, you can quickly identify the highest volume or least responsive application. You can then drill down and diagnose application's servlets, Java Server Pages (JSPs), or EJBs to identify the bottleneck.

Figure 2–3 WebLogic Server Home Page



2.3.2 Diagnostic Snapshots

A diagnostic snapshot consists of all the necessary data to diagnose an issue. The actual diagnostic snapshot data depends on what targets are included in generating the diagnostic snapshot. It also provides a collective snapshot of both JVM and WebLogic Server diagnostics and log data that can be exported or imported into other Cloud Control systems for analysis at a later date. This allows administrators to determine the root cause of problems and ensure that they do not occur again. These snapshots supplement the Fusion Middleware Support Workbench feature that now includes attaching diagnostic snapshots to Support Requests.

Diagnostic snapshots can be generated in the context of one or more Enterprise Manager targets like WebLogic Java EE Server, Java EE Application, Fusion Java EE

Application, or Custom Java EE Application targets. These targets can be part of one single WebLogic Domain or multiple WebLogic Domains.

When generating the diagnostic snapshot, you can name the diagnostic snapshot, select the targets that should be used for generating the diagnostic snapshot, select the duration during which the data will be collected for the snapshot and also select an option to either import the generated diagnostic snapshot data into the same Enterprise Manager instance or export the generated diagnostic snapshot data into single or multiple files that can then be imported back into another Enterprise Manager instance (or the same Enterprise Manager instance) later.

Video Demonstration

To view a visual demonstration on how you can capture diagnostics snapshots, access the following URL and click **Begin Video**:

https://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5465,1

2.3.3 Log File Viewer

You can centrally search logs generated by WebLogic and Oracle Fusion Middleware across all Oracle Fusion Middleware components. You can perform structured log searches based on log properties such as time, severity, or Execution Context ID (ECID). You can also download log files or export messages to a file. This feature provides ready access to log files no matter where they are stored on the file system.

2.4 Managing Problems with Support Workbench

Enterprise Manager Support Workbench enables you to investigate, report, and, in some cases, repair problems (critical errors). You can gather first-failure diagnostic data, obtain a support request number, and upload diagnostic data to Oracle Support. Support Workbench also recommends and provides easy access to Oracle advisors that help you repair data corruption problems, and more.

Support Workbench Compatibility with Fusion Middleware Components

You can use Support Workbench with:

- Oracle WebLogic Server
- SOA Infrastructure

Basic Support Workbench Work Flows

You can use Support Workbench to manage problems in two basic ways:

- Respond to alert notifications by packaging associated problems and uploading them to Oracle Support for resolution.
- Proactively package observed problems and upload them to Oracle Support for resolution.

The process by which you receive alerts and use Support Workbench is as follows:

1. The Enterprise Manager Agent has collected one or more metrics that have exceeded the thresholds that have been set.
2. The alert log generates an incident and you are notified of a pending alert.
3. You search for and view problems within Support Workbench.

4. You access My Oracle Support to search for this problem or a similar problem, and to determine a proper course of action to resolve the problem. If the search is unsatisfactory, you continue to the next step.
5. You create a package for My Oracle Support that includes supporting material, such as external files, executed dumps, and so forth.
6. You create a service request.
7. You upload the package to My Oracle Support.

The process by which you proactively observe problems and upload them to Oracle Support is the same as steps 3 through 7 above, but you initiate a user-reported problem before proceeding to step 5.

The following sections provide procedures to perform these tasks.

2.4.1 Accessing and Logging In To Support Workbench

The following sections explain how to access and log in to Support Workbench.

2.4.1.1 Accessing Support Workbench

To access Support Workbench:

1. From the Middleware home page, click on either an **Oracle WebLogic Domain**, **Oracle WebLogic Cluster**, or **Oracle WebLogic Server** in the Details Table.
2. From the Oracle WebLogic Domain or Oracle WebLogic Server menu, select **Diagnostics**, then **Support Workbench**.

2.4.1.2 Logging In

You can log in using either preferred credentials or named credentials you have previously set up. Otherwise, you can choose the New Credentials option to override the other two login options.

■ Prerequisites

- The host credentials should have write privileges on the AdrHome location of the target.
- The WebLogic credentials should have Monitor privileges on the WebLogic server.

■ Preferred Credentials Choice

Select this choice if you want to use the credentials that you have already registered as preferred credentials on the Preferred Credentials page.

Preferred credentials simplify access to managed targets by storing target login credentials in the Management Repository. With preferred credentials set, you can access an Enterprise Manager target that recognizes these credentials without being prompted to log into the target. Preferred credentials are set on a per user basis, thereby ensuring the security of the managed enterprise environment.

■ Named Credentials Choice

Select this choice if you want to use the credentials of a named profile you created on the Named Credentials page.

You can override host or WebLogic Server preferred credentials with this option. A named credential specifies a user's authentication information on a system. A

named credential can be a username/password, a public key-private key pair, or an X509v3 certificate.

- **New Credentials Choice**

You can override previously defined preferred credentials or named credentials by using the New Credentials option. When you enter new credentials, you can save the credentials and give them a name, which consequently becomes Named Credentials.

Note: Support Workbench requires you to save the credentials when you choose the New Credentials option.

2.4.2 Using Fusion Middleware Support Workbench

You can use Support Workbench within Fusion Middleware to:

- View an aggregated diagnostic summary
- Execute tests to diagnose a problem
- Create a problem, package it, and upload it to Oracle Support

The following sections provide procedures for these diagnostic tasks.

2.4.2.1 Viewing Diagnostics

This procedure assumes that an incident occurred on a WebLogic Server, and you received an alert notification. You now need to determine the appropriate action to resolve the problem.

1. From the domain home page drop-down, select **Monitoring**, then **Incident Manager**.
2. Click the link in the **Target** column for the incident you want to investigate.
3. In the Monitoring and Diagnostics section of the page that appears, click the **Support Workbench Problems** numbered link.

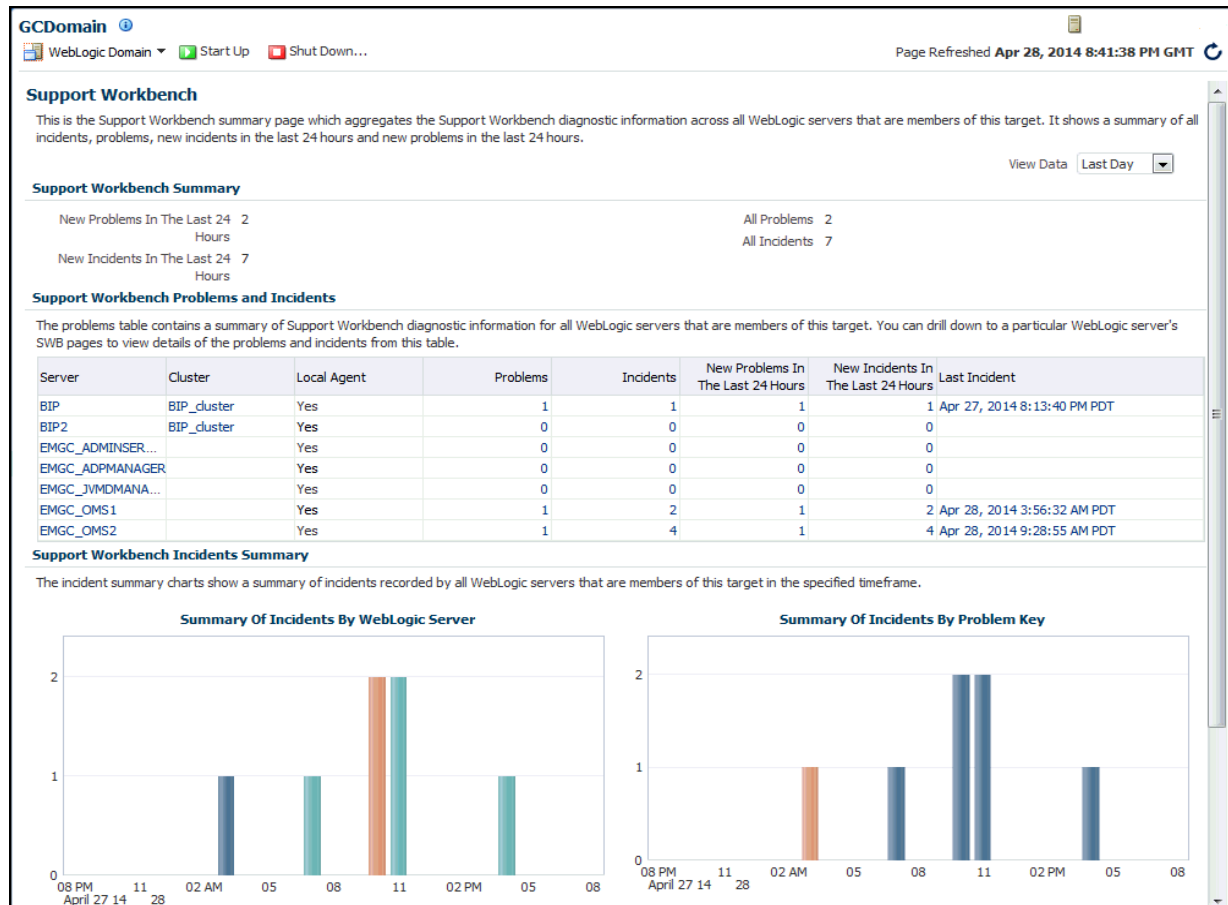
2.4.2.2 Viewing an Aggregated Diagnostic Summary

Fusion Middleware is deployed across multiple systems, and incidents are therefore recorded in multiple Automatic Diagnostic Repository homes. The following procedure describes how to get a quick summary of diagnostic data across all targets and Automatic Diagnostic Repository homes aggregated by the instance, product family, or cluster application.

This procedure is applicable to a WebLogic Domain and WebLogic Cluster in the context of Fusion Middleware. The procedure assumes that multiple Fusion Middleware incidents occurred on the servers deployed in a WebLogic domain, and you received multiple alerts from related servers.

1. After receiving alerts from related targets, access the Fusion Middleware instance, product family, or cluster application home page.
2. From the drop-down menu, select **Diagnostics**, then **Support Workbench**.

The Support Workbench home page appears, and displays a summary table with the problems and incidents aggregated by the application.

Figure 2–4 Aggregated Diagnostic Summary

- Sort the tables to see which WebLogic Server(s) have had the highest number of problems and incidents.
- Drill down through an individual server's Support Workbench pages to view detailed diagnostics information for the server, such as problems and incidents.

2.4.2.3 Searching for Problems

The following procedure assumes that problems are already recorded in Enterprise Manager.

- From the Support Workbench home page, enter search criteria in the **Filter by problem key field**, then click **Go**.

Search criteria includes keywords to use in the search, such as date range, problem key, SR number, and bug number.

You can also alternatively click the **Advanced Search** link, provide search criteria, then click **Search**.

2.4.2.4 Annotating a Problem

You may want to add short notes to a problem and then communicate this to other administrators.

- From the domain home page drop-down, select **Monitoring**, then **Incident Manager**.

The Incident Manager page appears, and displays all open incidents in the table.

2. From the lower right side of the Incident Manager page, click the **Add Comment** link.
3. Add your comment in the pop-up that appears, then click **OK**.

Enterprise Manager records the comment and then redispays it if this administrator or a different one looks at this problem.

2.4.2.5 Adding More Files

You may want to add more diagnosability information, such as diagnostic dumps, to an incident.

1. From the Support Workbench home page, select the ID link for the problem for which you want to add diagnostics.
2. From the Incident Details page that appears, click the ID for the associated incident.
3. Select the **Additional Diagnostics** tab.
4. Select a diagnostic from the list in the table, then click **Run**.
5. Enter values for required parameters on the Run User Action page, schedule the run, then click **Submit**.
6. When the confirmation message appears, click **OK**.

The diagnostic dump executes, and the results are attached to the incident.

2.4.2.6 Creating a Package

You have two options for creating a package. You can:

- Create a package initiated from alert notifications
- Proactively create a package from observed problems

To create a package initiated from alert notifications:

1. From the Support Workbench home page, select the ID link for the problem that you want to package.
2. From the Problem Details page that now appears, click **Quick Package**.

The Quick Packaging wizard appears.

3. Provide the requisite input in the wizard, then click **Submit**.

Most of the wizard is self-explanatory. Your input is required for the following wizard steps:

- Create New Package
 - Package Name — Accept the default system-supplied name, or provide your own descriptive name.
 - Package Description — Provide a description of any length as a reminder what this package consists of.
 - Send to Oracle Support — If you enable this option, a confirmation message appears when processing has completed stating that the upload file for the package has been successfully generated, and also provides the location of the file.

If you decide not to send the package to Oracle support now, you can do so later From the Package Details page. The upload file is generated but not sent to Oracle if you choose No.

- Service Request Number — Enter the SR associated with this package. This is only required if you are uploading.
- Schedule
 - Immediately/Later — If you want to generate the upload files later rather than now, you do not need to change the time zone unless you want to specify a time in another time zone, such as the database time zone or the OMS time zone.
 - Host Credentials — The required host credentials should be the same as the credentials used to start up the target database.

To proactively create a package from observed problems:

1. From the Support Workbench home page, click **Create User-Reported Problem** in the Related Links section.
2. In the page that appears, select the issue type, then click **Continue with Creation of Problem**.
3. Follow the instructions in steps 2 and 3 above.

2.4.2.7 Providing Additional Files

You may want to add more information, such as external files, to a package. This procedure assumes that a package has been created and additional diagnostics have been generated for the problem.

1. From the Support Workbench home page, click the **Yes** link in the Packaged column for the package you want to modify.
2. From the Packages page, click the package name link.
3. From the Package Details page, click **Customize Package**.

The Customize Package page appears, where you can edit the package contents, generate and include additional diagnostic data, or scrub user data.

2.4.2.8 Uploading a Package to Oracle Support

1. From the Package Details page, described in the previous section, click **Generate Upload File**.
2. Indicate the package file type, select the schedule, then click **Submit**.
3. After the confirmation message appears, click **OK**.
4. Click **Send to Oracle**.
5. Choose an existing SR or create a new SR to upload the package to.

2.4.2.9 Creating a Service Request

Following packaging and uploading the problem to Oracle support, you may want to create service request to address a problem through Oracle support.

1. From the Cloud Control console Enterprise menu, select **My Oracle Support**, then **Service Requests**.

After providing your Single Sign-on credentials, the Service Requests tab of the My Oracle Support site opens.

2. Click **Create "Contact Us" SR**.
3. Provide the necessary input in the wizard that appears, then click **Submit**.

2.4.2.10 Managing Problem Resolution

After the problem is resolved, close it so that Automatic Diagnostic Repository (ADR) can purge the required memory for the problem.

1. From the Support Workbench home page, select the ID link for the problem you want to manage.
2. From the Problem Details page, click the **Manage problem resolution** link in the Investigate and Resolve section of the page.

Several management options are available on the Incident Manager page that appears.

For more information about managing incidents in Enterprise Manager, see the *"Using Incident Management"* chapter in the *Cloud Control Administrator's Guide*.

2.5 Administering Middleware Targets

IT organizations typically have several WebLogic Domains - spanning test, stage, and production environments - to manage and administer on a regular basis. Remembering details (such as URLs and credentials) for each of these domain's administration consoles can be difficult, and logging on to the appropriate console each time an administrative operation needs to be performed can be tedious.

Enterprise Manager Cloud Control addresses these challenges by exposing common WebLogic administration operations using its console directly; thereby, removing the need to drill down to the Oracle WebLogic Server Administration Console or to the Oracle Enterprise Manager Fusion Middleware Control console.

Administration operations available directly from the Cloud Control console and the Fusion Middleware Plug-in include the following:

- Locking a domain configuration using the Change Center prior to making configuration changes to prevent other administrators from making changes during their edit session. Administrators can continue to manage the changes using the Change Center by understanding which server instances need to be restarted for configuration changes to take effect, by releasing a lock, by activating changes, or by undoing changes.
- Viewing, configuring, and using MBeans for a specific Oracle WebLogic Server or Application Deployment target using the System MBean Browser.
- Creating, editing, deleting, controlling, or testing JDBC data sources.
- Recording configuration actions performed from within the Cloud Control console as a series of WebLogic Scripting Tool (WLST) commands, and then using WLST to replay the commands to help automate the task of configuring a domain.
- Configuring log file settings such as log file location, format of messages (for example, Oracle Diagnostic Logging - Text, Oracle Diagnostics Logging - XML), log level for both persistent loggers and active runtime loggers, and rotation policy (either size based or time based). Such settings are available for log files for the following Fusion Middleware target types: Oracle WebLogic Server, Application Deployment, SOA Infrastructure, Essbase Server, Directory Integration Platform Server, Oracle Virtual Directory, Oracle Reports Application, Oracle Reports Bridge, Oracle Reports Server, and Oracle Reports Tools.

- Performing selective tracing to gain more fine-grained logging data that is limited to a specific application name or other specific attributes of a request (for example, user name or client host).
- Starting, stopping, or restarting administration servers, managed servers, clusters, domains or other Fusion Middleware components (for example, managed and standalone Oracle HTTP Server, Oracle Data Integrator Agents, and so on) immediately or scheduling the operation to occur at a future point in time. For more information, see [Section 2.5.1](#).
- Viewing and editing settings for the Oracle WebLogic Domain, Oracle WebLogic Cluster, Oracle WebLogic Server, Server Template (applicable to only WebLogic release 12 and later), and Machine configurations. Changes made to these configurations are managed by the Change Center feature of the Cloud Control console.

2.5.1 Shutting Down, Starting Up, or Restarting a Middleware Target

You can shut down, start up, or restart administration servers, managed servers, clusters, domains or other Fusion Middleware components (for example, managed and standalone Oracle HTTP Server, Oracle Data Integrator Agents, and so on). To do so, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select either an administration server, a managed server, a cluster, a domain, or any other Fusion Middleware component (for example, managed or standalone Oracle HTTP Server, Oracle Data Integrator Agents, and so on).
3. On the Home page, from the context menu, select **Control**, then select either **Start Up**, **Shut Down**, or **Restart** depending on your requirement.

Note: For Oracle WebLogic Domain and Cluster, only start and stop operations are supported. Restart operation is not supported.

4. On the Start Up, Shut Down, or Restart page, provide the following details, and click **OK**.

Element	Default Value	Description
Create Blackout Before Shutting Down <i>(Appears only for shutdown operation)</i>	Selected	<p>Creates blackouts on targets before they are shut down. By default, the option is selected. Deselect it if you do not want Enterprise Manager to automatically create blackouts on the targets.</p> <p>Note:</p> <ul style="list-style-type: none"> ■ This option does not appear for restart operation. ■ If the selected target is a composite target, then Enterprise Manager creates blackouts for all its member targets. ■ If the option is selected, then the blackouts are created on targets even if the start up or shut down operation fails.

Element	Default Value	Description
End Blackout After Starting Up <i>(Appears only for start up operation)</i>	Selected	Ends blackouts on targets after they are started. By default, the option is selected. Deselect it if you do not want Enterprise Manager to automatically end blackouts on the targets. Note: <ul style="list-style-type: none"> This option does not appear for restart operation. If the selected target is a composite target, then Enterprise Manager ends blackouts for all its member targets. If the option is selected, then the blackouts are ended on targets even if the start up or shut down operation fails.
Include Administration Server <i>(Appears only for Oracle WebLogic Domains)</i>	Not Selected	Select this if you want to start or stop even the Administration Server when the Oracle WebLogic Domain to which the Administration Server belongs, is started or stopped. Note: The Administration Server can be stopped only if the Management Agent that is monitoring it is running on the same host as the Administration Server.
Time Out After (in minutes)	5 Minutes Per Target	Set the time limit (in minutes) for the job to wait while it is trying to start, stop, or restart a target before terminating the attempt and generating an error. By default, it is set to 5 minutes, and it applies to each target. If a composite target is selected, then the timeout is per member target.
Process Control Method <i>(Appears only for Oracle WebLogic Domains, Oracle WebLogic Clusters, Oracle WebLogic Servers)</i>	Administration Server	Select one of the following ways in which the shutdown, start-up, or restart operation can be performed: Note: Options not applicable to a particular target type are disabled. <ul style="list-style-type: none"> Administration Server Uses the Administration Server to start up, shut down, or restart a target. For this option, as a prerequisite, ensure that the Administration Server is up and is accessible by the Oracle Management Agent monitoring the server. Default Script Uses the startManagedWeblogic script and the stopManagedWeblogic script located in the <DOMAIN_HOME>/bin directory to start up, shut down, or restart a target. For this option, as a prerequisite, ensure that the Administration Server is up and is accessible by the Oracle Management Agent monitoring the server. Also, configure the boot.properties file for the server. For information on boot identity files and instructions to configure them, see <i>Oracle Fusion Middleware Administering Server Startup and Shutdown for Oracle WebLogic Server</i>. Custom Script Uses a custom script you specify to start up, shut down, or restart a target. For this option, as a prerequisite, ensure that the Administration Server is up and is accessible by the Oracle Management Agent monitoring the server. Also, configure the boot.properties file for the server. For information on boot identity files and instructions to configure them, see <i>Oracle Fusion Middleware Administering Server Startup and Shutdown for Oracle WebLogic Server</i>.
Credentials	Preferred	For standalone Oracle HTTP Server target type, enter the credentials of the host where the standalone Oracle HTTP Server is running. For all other target types, enter the credentials of the host where the target is running, and the credentials of the Oracle WebLogic Domain. You can use preferred or named credentials if you have already registered the credentials with Enterprise Manager Cloud Control, or you can enter a new set of credentials to override the preferred or named credentials.

Note: If a remote Management Agent is monitoring a Java EE application target, such as Oracle Data Integrator Agent, then while starting up, shutting down, or restarting that Java EE application target, you might see errors. A remote Management Agent is a Management Agent that is not installed on the host where the target is running.

To circumvent this error, follow these steps:

1. On the host where the Java EE application target is running, navigate to the following location in the middleware home:

```
cd $<MIDDLEWARE_HOME>/wlserver_10.3/server/lib
```

For example,

```
cd /u01/software/middleware/wlserver_10.3/server/lib/
```

2. Generate the `wlfullclient.jar` file:

```
java -jar wljarbuilder.jar
```

3. On the remote host where the Management Agent is running, copy the generated `wlfullclient.jar` file to the following location in the Management Agent home:

```
<AGENT_HOME>/sysman/jlib
```

For example,

```
cp /u01/software/middleware/wlserver_10.3/server/lib/wljarbuilder.jar /u01/software/agent/core/12.1.0.3.0/sysman/jlib/
```

Note: If a job fails at the *Start/Stop/Restart* step with the following error, then follow the workaround steps outlined in this note to resolve the issue.

Remote operation finished but process did not close its stdout/stderr

1. Open the user-defined custom script file.
2. Identify the line where command, which caused the error, was invoked.

For example,

```
my $startStopScript = "/scratch/aime/wl_home/user_projects/domains/base_domain/bin/startManagedWebLogic.sh";
```

3. Add the following code snippet after the above line:

```
if($isWindows){
    $startStopScript= "cmd /c start /b $startStopScript";
    # redirecting to NUL
    close STDOUT;
    close STDERR;
    open(STDOUT, ">", "NUL");
    open(STDERR, ">", "NUL");
} else{
    $startStopScript= "$startStopScript > /dev/null 2>&1 &";
}
```

2.6 Lifecycle Management

Enterprise Manager Cloud Control offers lifecycle management solutions that help you meet all lifecycle management challenges easily by automating time-consuming tasks related to cloning, patching, configuration management, ongoing change management, compliance management, and disaster recovery operations.

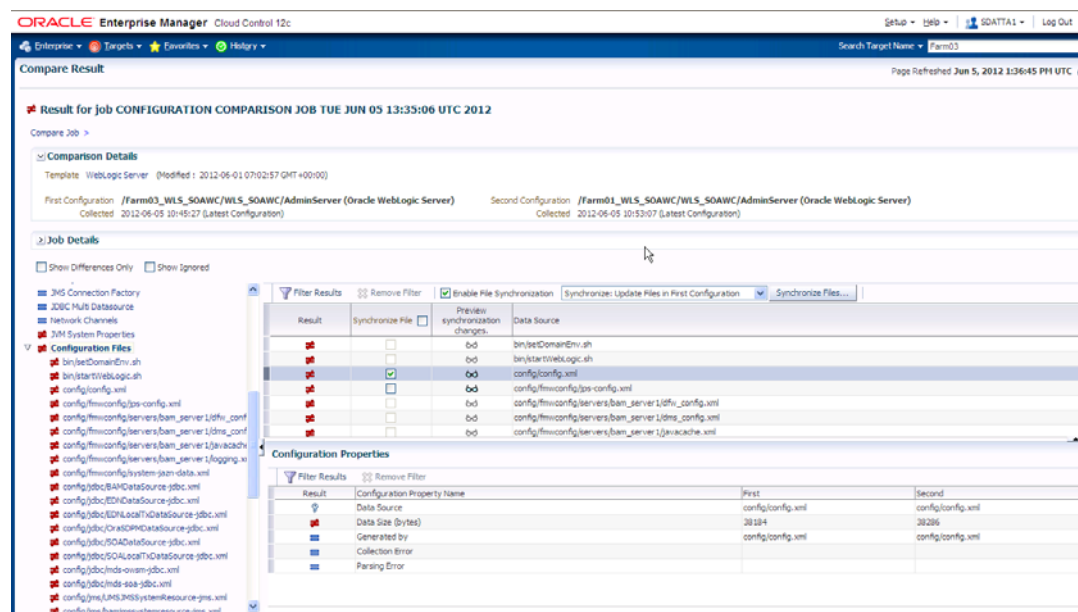
2.6.1 Managing Configurations

Enterprise Manager provides a suite of configuration management functions that can be performed on Middleware targets.

Oracle Management Agent collects configuration information about Oracle Fusion Middleware targets from their respective configuration, and communicates this information over HTTP/HTTPS to Oracle Management Service, which stores it in the Management Repository. This information is periodically collected and updated while maintaining the audit of changes. Configurations for Middleware targets are also collected. For example, for WebLogic Server, the `config.xml` configuration file is collected from the WebLogic Administration Server. The Enterprise Manager configuration management capabilities efficiently guide the users to desired configuration data in a particular component.

You can compare these configuration details and view the differences and similarities between the two instances of a Middleware target. You have the flexibility to compare two last collected configurations or two saved configurations. You can also compare one configuration with multiple configurations or one configuration in the Management Repository with a saved configuration. When a comparison operation results in differences that you do not require, you can synchronize the configurations so that one of the configurations replaces the other one. This synchronization can be performed on demand based on the configurations being compared.

Figure 2-5 Comparing Configurations



You can also compare configurations by using the default comparison templates. A comparison template is associated with a specific target type that determines the configuration item type and property that is to be compared. A template can specify

rules or expressions that enable you to parse comparison data and fine-tune comparisons. For example, you can specify rules that indicate which differences must initiate email notifications and which differences must be ignored when the configuration is compared.

Using Enterprise Manager, you can search configurations across Middleware targets and find configuration anomalies - whether they are a mismatch of an install/patch version of Oracle Fusion Middleware software, or they are a mismatch of the software configuration data. You can perform more intelligent searches to identify all the components hosting a particular application or other resources. You can create and save more intelligent searches. For example, you can create a new search to retrieve all 10.3.5 WebLogic Server targets running on the Linux 64 bit platform that are using JDK 1.6.0_31.

In addition, for BPEL Process Manager targets, you can view the BPEL Processes, its different versions, and the suitcase files associated with each version. You can also compare the BPEL Process suitcase files of different versions and track the changes that were made to a version. This allows you to identify the cause for improved or deteriorated performance due to a change in the BPEL Process suitcase file.

2.6.2 Compliance Management

Enterprise Manager Cloud Control offers the following compliance management features:

- The compliance results capability enables you to evaluate the compliance of Middleware targets and systems as they relate to your business best practices for configuration, security, and storage. In addition, compliance results provide advice on how to change configuration to bring your Middleware targets and systems into compliance.
- Using the compliance library, you can define, customize, and manage:
 - Compliance frameworks
 - Compliance standards
 - Compliance standard rules

By using these self-defined entities, you can test your environment against the criteria defined for your company or regulatory bodies.

For additional information about compliance management, refer to the *Oracle Enterprise Manager Lifecycle Management Administrator's Guide*.

2.6.3 Patch Management

Patching is one of the critical phases of the software lifecycle that helps you maintain the software over a period of time and keep it updated with bug fixes and latest features offered by the software vendor. However, in today's world, with numerous software deployments across your enterprise, patching becomes very complex and virtually impossible to manage.

You can get automated patch recommendations from My Oracle Support on what patches to apply and then use patch plans to apply them. Patch Plans enable you to create a collection of patches you want to apply to one or more targets. Each target can have a separate group of patches.

In addition, you can save the deployment options of a patch plan as a patch template, and have new patch plans created out of the patch template. This gives you the ability

to apply patches in a rolling fashion to minimize downtime or in parallel fashion, thus implementing the best possible patch rollout for your organization.

Fusion Middleware best uses patch management for:

- Applying one or more patches to WebLogic Servers spanning one or more domains
- Applying patches to SOA Infrastructure targets
- Using validation checking to identify patch conflicts or other potential problems before the patches are actually applied.

For additional information about patching, refer to the *Oracle Enterprise Manager Lifecycle Management Administrator's Guide*.

2.6.4 Provisioning

Rather than spend resources on manually installing and configuring Oracle Fusion Middleware software, administrators would rather spend time and money on more strategic initiatives. To help achieve this, Enterprise Manager has automated common provisioning operations such as scaling out an Oracle WebLogic Domain. Making such critical datacenter operations easy, efficient and scalable results in lower operational risk and lower cost of ownership. To access these provisioning operations, from the **Enterprise** menu, select **Provisioning and Patching**, then select **Middleware Provisioning**.

From the Middleware Provisioning page, you can:

- Gain access to all Fusion Middleware related operations.
- Create profiles in the software library that can be used for future cloning operations. A WebLogic Domain Provisioning Profile consists of the Middleware Home, binaries and the domain configuration. You can create a profile, save it in the Software Library, and then use the saved profile as the source for creating new WebLogic domains. This will ensure that future WebLogic installations follow a standard, consistent configuration.
- Deployment procedures, both pre-defined and user-defined, can be accessed to provision software and configurations.
- Automate the cloning of WebLogic Domains and / or Middleware Homes either from a reference installation or from a profile present in the software library.
- Automate the scaling up or scaling out of a domain or cluster by adding a new managed server to an existing cluster or by cloning a managed server.

For more details on using provisioning, see Middleware Provisioning section in the *Enterprise Manager Lifecycle Management Guide*.

2.6.4.1 Cloning from Test to Production Environments

Typically, creating a new environment to support WebLogic domains entails several manual, error prone installation and configuration steps. With Oracle Enterprise Manager this can be accomplished with very little effort and time using a predefined, customizable deployment procedure. This deployment procedure clones an existing WebLogic domain environment to a new set of hardware per a hierarchical series of steps. These predefined steps can be edited or disabled and new steps or custom scripts can be added to the deployment procedure to satisfy unique business needs.

The deployment procedure also supports secure host authentication using super user do (sudo) or pluggable authentication modules (PAM). While running the deployment

procedure, administrators can specify configuration settings such as the domain name, credentials for the administration console, port values, and JDBC data resources. After the procedure completes, the newly created WebLogic domain environment is discovered and automatically added to the console for centralized management and monitoring.

2.6.4.2 Scaling Out Domains

To address growing business demands, modern data centers must augment and relocate resources quickly. Using Oracle Enterprise Manager, administrators can rapidly scale out a WebLogic Domain and Cluster with additional managed servers to accommodate an increase in application load.

2.6.4.3 Deploying / Undeploying Java EE Applications

You can deploy, undeploy, and redeploy Java EE applications (for example, .war and .ear files) on a WebLogic Server. You can create a Java EE Application component in the Software Library and deploy multiple versions of an application, or roll-back to a previous version.

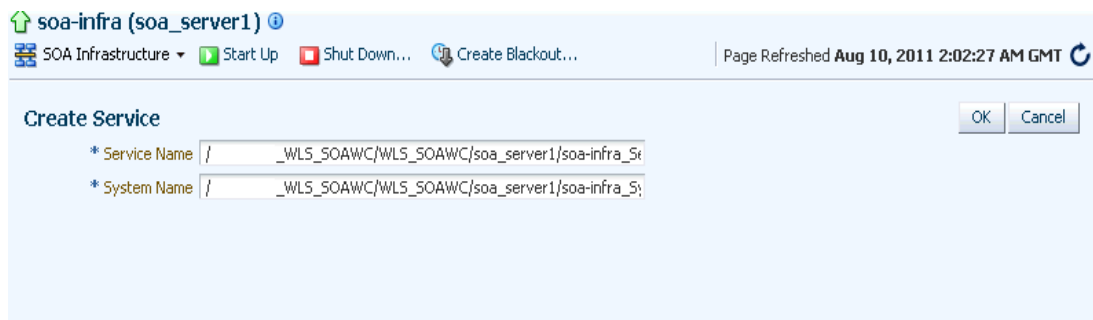
2.7 Managing Service Levels

Enterprise Manager allows you to create infrastructure services for Middleware targets such as Oracle BPEL Process Manager targets, Oracle Service Bus targets and Oracle SOA Composite and SOA Infrastructure instances.

An infrastructure service is a dependency service that is created to identify the infrastructure components on which the Middleware target depends. Here, the infrastructure components refer to hosts, databases, application servers, and so on that work together to host the Middleware target.

You can either create an infrastructure service with a new system or an existing system, or simply refresh an existing infrastructure service, if there is already one existing. By creating infrastructure services and systems, you can better manage your Middleware targets and also the components on which the Middleware targets depend.

Figure 2–6 Create Service for SOA Infrastructure



The screenshot shows the Oracle Enterprise Manager console interface. At the top, there is a breadcrumb trail: 'soa-infra (soa_server1)'. Below this, there are several tabs: 'SOA Infrastructure', 'Start Up', 'Shut Down...', and 'Create Blackout...'. The 'SOA Infrastructure' tab is selected. The main content area displays the 'Create Service' dialog. The dialog has two input fields: '* Service Name' and '* System Name'. Both fields contain the text '/_WLS_SOAWC/WLS_SOAWC/soa_server1/soa-infra_5i'. To the right of the input fields are 'OK' and 'Cancel' buttons. The top right corner of the console shows 'Page Refreshed Aug 10, 2011 2:02:27 AM GMT'.

For example, once you create an infrastructure service for an Oracle SOA Infrastructure target, Enterprise Manager allows you to create an aggregate service for every process within that SOA Infrastructure target. An aggregate service is a logical grouping of services, in this case, infrastructure services and availability services. Aggregate Services give you a bird's-eye view of the services that have been created for the SOA Infrastructure target and helps you monitor their availability,

performance, and usage. Service availability can be composed of both metrics on the underlying target and service test results from period synthetic transaction execution.

You can define service level (measure of service quality) for a service. A service level is defined as the percentage of time during business hours a service meets specified availability, performance and business criteria.

A Service Level specifies the percentage of time a service meets the performance and availability criteria as defined in the Service Level Rule. By default, a service is expected to meet the specified criteria 85% of the time during defined business hours. You may raise or lower this percentage level according to service expectations. A service level measures service quality using two parameters: Expected and Actual Service Levels.

- **Expected Service Level:** A Service Level specifies the percentage of time a service meets the performance and availability criteria as defined in the Service Level Rule. By default, a service is expected to meet the specified criteria 85% of the time during defined business hours. You may raise or lower this percentage level according to service expectations.
- **Actual Service Level:** The Actual Service Level defines the baseline criteria used to define service quality.

2.7.1 Service Dashboard

The Service Dashboard provides a consolidated view of the critical aspects of the service including the status, availability, type of service, performance, and the SLAs that have been enabled for this service. It also shows the performance and usage metrics for the service, status of the key components, and any system incidents.

You can view all the information related to the service on a single page and assess the health of the service. You can customize the dashboard by adding or removing regions according to your requirements and make these changes available to all the users.

You can also personalize the dashboard and make changes that are visible only to you and not to the other users.

2.8 Job System

You can use Enterprise Manager job system to schedule tasks you want to automate. You can schedule a job for a target by selecting the **Control** menu option (only available for process control jobs) on the Home page. For example, for an Oracle WebLogic Server, you can create a job to schedule a start or stop operation for that WebLogic Server. You can view details about the jobs that are scheduled, running, suspended, or the ones that have a problem. You can also use jobs to automate the execution of the WLST (WebLogic Scripting Tool) scripts.

To access the WLST scripts:

1. From the **Enterprise** menu, select **Job**, then select **Library**.
2. From the **Create Library Job** field, select WLST Script.

See the *Enterprise Manager Cloud Control Administrator's Guide* for more details on the Job System and its functionality.

2.9 Routing Topology Viewer

Enterprise Manager provides a Routing Topology Viewer which is a graphical representation of routing relationships across targets, components and elements. You

can easily determine how requests are routed across components. For example, you can see how requests are routed from Oracle Web Cache, to Oracle HTTP Server, to a Managed Server, to a data source.

The Routing Topology Viewer provides the basic navigation applications, such as zoom, pan, and fit-to-contents. You can change the source of data being viewed, the layout mode, and the flow direction between objects. Using filters you can alter global properties of the topology diagram, such as the visibility of link labels or altering the link style. It enables you to easily monitor your environment including performance metric data. You can see which entities are up and which are down. You can also print the topology using the Print to File feature on your printer's settings/options. For more details, see the *Enterprise Manager Online Help*.

Testing Application Load and Performance

This chapter describes how you can perform load and performance testing of applications with real-world production workloads using the Application Replay feature of Enterprise Manager. With Application Replay you can capture application workloads on production systems, and then replay them against test systems while maintaining the precise timing, concurrency, and transaction order of the workload.

This chapter covers the following:

- [Introduction to Application Replay](#)
- [Testing Against Real-World Application Workloads](#)
- [Capturing Application Workload Using RUEI](#)
- [Prerequisites and Considerations When Using Application Replay](#)
- [Understanding the Application Capture and Replay Process](#)
- [Creating Application Workload Captures](#)
- [Monitoring the Application Capture Process](#)
- [Replaying Application Workload Captures](#)
- [Importing Replay Session Divergences into OpenScript](#)
- [Troubleshooting Application Replay](#)

3.1 Introduction to Application Replay

Application Replay enables realistic testing of planned changes to any part of the application stack from application server down to disk, by re-creating the production workload on a test system. Using Application Replay, you can capture a workload on the production system and replay it on a test system with the exact timing, concurrency, and transaction characteristics of the original workload. This enables you to fully assess the impact of the change, including undesired results, new contention points, or plan regressions. In addition, extensive analysis and reporting is provided to help identify any potential problems, such as new errors encountered and performance divergence. Types of changes that can be tested with Application Replay include application server upgrades, hardware updates, O/S changes, configuration changes, and so on. Capturing real-world production workload eliminates the need to develop simulation workloads or scripts, resulting in significant cost reduction and time savings. By using Application Replay, realistic testing of complex applications that previously took months using load simulation tools can now be completed in days. As a result, you can rapidly test planned changes and adopt new technologies with a higher degree of confidence and at lower risk.

3.2 Testing Against Real-World Application Workloads

Today's enterprise application deployments are highly complex and, therefore, challenging to manage. They comprise multiple tiers, such as Web servers, application servers, and databases, running on multiple hosts. Their software architecture combines multiple independent components, such as client-side user interfaces, business logic and data access mechanisms, in addition to stateful client-server protocols typically built over HTTP.

Due to the complexity of these structures, predicting the behavior of the entire stack in a production environment is extremely difficult. Given the complexity of these deployments, and the absence of system-wide verification techniques, effective testing is critical to ensuring successful deployment after an infrastructure change.

The Application Replay feature provides a testing structure that works by first capturing the entire workload relevant to an application (as generated by the application's Web interface) at the production site.

The captured application workload is then moved to the test environment, where the replay driver infrastructure on one or more hosts, reproduce the captured workload, preserving its original properties, such as concurrency and request timings.

Finally, extensive performance and correctness data from all layers of the stack is collected and reported. This enables you to compare the replay with the original captured workload. In this way, any issues resulting from infrastructure changes that occurred during the replay can be identified, and appropriate troubleshooting action undertaken to prevent them from occurring in production. Moreover, it increases your confidence in a successful deployment.

The use of *real* workloads offers a number of significant advantages over testing techniques based on synthetic workloads. In particular:

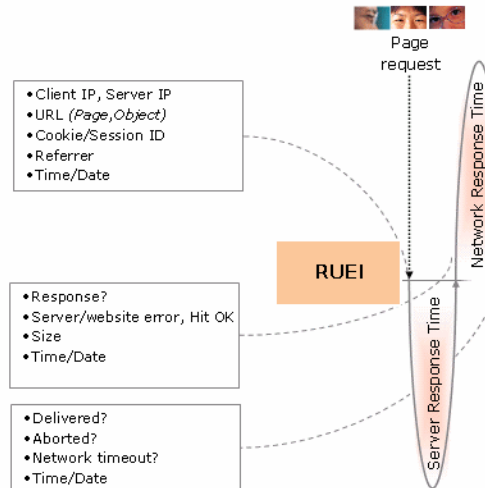
- It provides a system-wide perspective starting from the user's activity. This is in contrast to the traditional piecemeal testing of individual components that provides little information on their combined behavior and performance under a realistic workload.
- Rather than relying on pre-determined scenarios, the use of real workloads provides comprehensive testing, subjecting the system to real users operations. For Web applications, this not only means exploring all possible ways a user interacts with the system, but also all possible load conditions. This is necessary because systems behave quite differently under different workload characteristics (for example, the number of concurrent users).
- Far greater insight is obtained into possible errors. Test results include data for every layer of the stack, and these can be correlated across different layers. Besides performance, it also provides a means to verify correct execution, by checking for errors or unexpected server responses.

3.3 Capturing Application Workload Using RUEI

In order to capture Web application workloads, Application Replay uses Oracle Real User Experience Insight (RUEI). This is a Web-based utility to report on real-user traffic requested by, and generated from, your Web infrastructure. It measures the response times of pages and user flows at the most critical points in your network infrastructure. It provides you with powerful analysis of your network and business infrastructure, while an insightful diagnostics facility allows application managers and IT technical staff to perform root-cause analysis.

Typically, RUEI is installed before the Web servers, behind a firewall in the DMZ. The data collection method is based on Network Protocol Analysis (NPA) technology. This data collection method is shown in [Figure 3-1](#).

Figure 3-1 How RUEI Collects Data



When an object is requested by a visitor, RUEI sees the request and starts measuring the time the Web server requires to present the visitor with the requested object. At this point, RUEI knows who requested the page (IP client), which object was requested, and from which server the object was requested (IP server).

When the Web server responds and sends the object to the visitor, RUEI sees that response, and stops timing the server response time. At this stage, RUEI can see whether there is a response from the server, whether this response is correct, how much time the Web server required to generate the requested object, and the size of the object.

RUEI is also able to see whether the object was completely received by the visitor, or if the visitor aborted the download (proof of delivery). Therefore, RUEI can determine the time it took for the object to traverse the Internet to the visitor, and can calculate the Internet throughput between the visitor and the server (connection speed of the visitor).

Further information about RUEI is available from the following location:

<http://www.oracle.com/us/products/enterprise-manager/index.html>

3.4 Prerequisites and Considerations When Using Application Replay

This section describes the requirements that must be met, and the issues that should be considered, in order to use the Application Replay facility for workload capture and replay. It is *strongly* recommended that you carefully review this information before proceeding with a workload capture.

Important: It is *strongly* recommended that you review the Oracle Support Web site to obtain up-to-date information about supported RUEI, application server, and database versions, as well as patches, configurations, known issues, and workarounds.

This section covers the following:

- [Using RUEI to Capture Application Workloads](#)
- [Configuring Required User Privileges in Enterprise Manager](#)
- [Setting up the Test System Database for Application Replay](#)
- [Setting up the Capture Directory for Application Replay](#)

3.4.1 Using RUEI to Capture Application Workloads

In order to use RUEI to capture your application workloads, you must ensure that:

- RUEI version 12.1 (or higher) has been configured to monitor the required applications. See the Oracle Support Web site (<http://www.oracle.com/support/contact.html>) for information about required releases and hot fixes. Information about deployment options and requirements is available from the *Oracle Real User Experience Insight Installation Guide*.
- You have a valid user name and password combination. If necessary, contact your RUEI Administrator. Note that the user account must have Security Officer permission. For further information about roles and permissions, see the *Oracle Real User Experience Insight User's Guide*.
- You have the URL used to access the RUEI installation. If necessary, contact your RUEI Administrator.
- The configured RUEI logging and masking policies are consistent with the use of Application Replay. This is described in the following section.

RUEI Configuration for Application Replay

As mentioned above, you must ensure that the RUEI logging and masking policies are configured as follows:

1. Select **Configuration, Security, Masking, URL prefix masking**, and click the Default masking action setting. This must be set to "Logging".
2. Note that if you expect a high level of traffic during the workload capture, it is recommended that you select **Configuration, Security, Collector data retention policy**, and ensure that sufficient storage has been assigned for each application that is planned to be captured.

For further information on these configuration procedures, see Chapter 13 "Managing Security-Related Information" of the *Oracle Real User Experience Insight User's Guide*.

3.4.2 Configuring Required User Privileges in Enterprise Manager

The following Enterprise Manager privileges must be assigned to users of the Application Replay facility:

- ASREPLAY_VIEWER in order to view captures, replays, and replay tasks.
- ASREPLAY_OPERATOR in order to create, modify, or submit captures, replays, and replay tasks.

In addition to the above, users must also be assigned the `PERFORM_OPERATION_ANYWHERE` privilege.

In order for database users to run the Application Replay facility with database capture, the following privileges must be granted to the user:

```
GRANT ADMINISTER ANY SQL TUNING SET TO asreplay;
```



```

GRANT EXECUTE ON DBMS_LOCK TO asreplay;
GRANT EXECUTE ON DBMS_WORKLOAD_CAPTURE TO asreplay;
GRANT EXECUTE ON DBMS_WORKLOAD_REPLAY TO asreplay;
GRANT CREATE SESSION TO asreplay;
GRANT CREATE ANY DIRECTORY TO asreplay;
GRANT SELECT_CATALOG_ROLE TO asreplay;
GRANT BECOME USER TO asreplay;
GRANT DROP ANY DIRECTORY to asreplay;

```

Note that in the above example, the database user is assumed to be called asreplay.

3.4.3 Setting up the Test System Database for Application Replay

Before a workload can be replayed, the logical state of the application data on the replay system should be similar to that of the capture system when replay begins. Therefore, you should have a strategy in place to restore the application server and database state on the test system. To restore the application server state, you should consult your application administrator. To restore the database state, consider using one of the following methods:

- Recovery Manager (RMAN) `DUPLICATE` command. For further information, see the *Oracle Database Backup and Recovery User's Guide*.
- Snapshot standby. For further information, see the *Oracle Data Guard Concepts and Administration*.
- Data Pump Import and Export. For further information, see the *Oracle Database Utilities*.

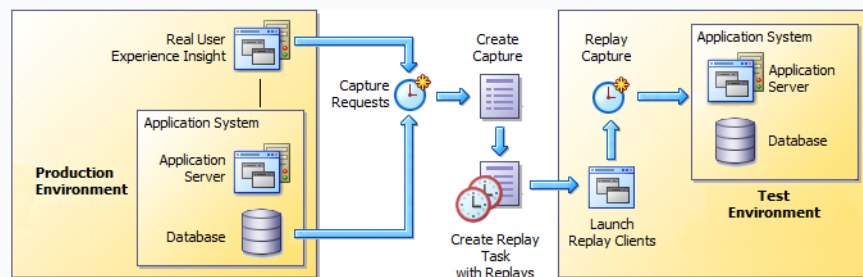
3.4.4 Setting up the Capture Directory for Application Replay

Determine and set up the directory where the captured workload will be stored. Before starting the capture, ensure that the directory has sufficient disk space to store the workload. If the directory runs out of disk space during a capture, the capture will be terminated.

To estimate the required disk space, it is recommended that you run a test capture on your workload for a short duration (typically, a few minutes), and then use this to extrapolate the space required for a full capture. To avoid potential performance issues, you should also ensure that the target replay directory is mounted on a separate file system.

3.5 Understanding the Application Capture and Replay Process

Figure 3–2 shows the architecture of the Application Replay facility.

Figure 3–2 Application Capture and Replay Architecture

The capture part of Application Replay operates within the context of a production environment. This deployment comprises Web and application servers, and a database. The Web-tier capture mechanism is provided by RUEI. It writes information about the monitored traffic to capture files. These contain HTTP requests, responses, and timings, along with all other data necessary to accurately reproduce the production workload against a test system. Once the capture is complete, the generated files constitute a complete representation of the entire production workload.

The replay part of Application Replay operates within the context of a test system. This comprises an application stack that runs the system configuration under test. One or more Replay Clients reproduce the captured workload, preserving its original properties, such as concurrency and request timings. Further, the Application Replay facility uses synchronization to ensure that each replayed request sees the exact application state it saw during capture so that the responses are directly comparable. Finally, it collects a wealth of performance and verification data from all layers of the stack, and allows you to compare the replay with the original capture upon which it is based.

Depending on the volume and concurrency of the workload capture, it may be necessary to deploy multiple Replay Clients, each assigned a portion of the workload. Recommendations about required Replay Clients based on the captured workload are available when scheduling a replay.

3.6 Creating Application Workload Captures

To create an application workload capture:

1. From the **Enterprise** menu, select **Quality Management**, then **Application Replay**.
2. Click **Captures**. The currently defined captures are listed. An example is shown in [Figure 3–3](#).

Figure 3–3 Application Replay Page

Application Replay

Overview

Selected Item: Captures

Item: Replay Tasks

View Menu

Create...

Create Like...

Edit...

Delete

Query By Example

Previous

1-16 of 16

Next

Select	Name	Status	System	Replay Tasks	Owner	Creation Date	Description
<input checked="" type="radio"/>	manula_ip2	Completed	EBS6170_system	1	JSMITH	02-Sep-2011 20:46:50	
<input type="radio"/>	ebs_ats_ip	Completed	EBS6170_system	1	PJONES	02-Sep-2011 16:40:55	
<input type="radio"/>	ruei12_form_https_cookei	Completed	EBS6170_system	1	PJONES	01-Sep-2011 20:52:26	
<input type="radio"/>	ebs_manual_ip	Completed	EBS6170_system	1	PJONES	01-Sep-2011 16:28:07	
<input type="radio"/>	manual_compare_http_form	Failed	EBS6170_system	0	JSMITH	01-Sep-2011 15:53:06	
<input type="radio"/>	EBS_https_Form_cookie	Completed	EBS6170_system	1	PJONES	01-Sep-2011 15:01:39	
<input type="radio"/>	EBS_Form_HTTPS_R12	Completed	EBS6170_system	1	PJONES	31-Aug-2011 23:34:21	
<input type="radio"/>	fod_synch2	Completed	EBS6170_system	1	JSMITH	31-Aug-2011 00:23:35	
<input type="radio"/>	fod_synch	Failed	EBS6170_system	0	JSMITH	30-Aug-2011 22:40:18	

- Click **Create** or **Create Like**. The page shown in Figure 3–4 appears.

Figure 3–4 Create Capture (Overview) Page

Application Replay	
<div> <div>Overview</div> <div>System</div> <div>RUEI Application</div> <div>Database</div> <div>Storage</div> <div>Schedule</div> <div>Review</div> </div>	
<div> <div>Create Capture : Overview</div> <div>Back Step 1 of 7 Next Cancel</div> </div>	
<div> <div>* Name Siebel CRM</div> <div>Description North America and Europe Siebel CRM application.</div> </div>	
<div> <div>Capture Prerequisites</div> <div>These prerequisites should be completed before performing a capture.</div> <div> <input checked="" type="checkbox"/> Ensure there is sufficient free disk space on the selected host system to store the capture. You should consider performing a short duration capture, and using it as the basis for estimating the requirements for a full capture. If you intend to enable database capture for this capture (and enable database synchronization for its subsequent replay), ensure that you can restore the test system database state to match that of the database at the start of the capture. A successful replay requires application transactions accessing application data identical to that on the capture system. Common methods to restore application data state include point-in-time recovery, flashback, and import/export. </div> </div>	

- Specify a unique name for the new capture. Optionally, specify a brief description for the traffic to be captured. It is recommended that you include an indication of the purpose and scope of the capture. Carefully review the prerequisite information, and click the acknowledgement check boxes to indicate that they have been met. When ready, click **Next**. The page shown in Figure 3–5 appears.

Figure 3–5 Create Capture (System) Page

Application Replay

Overview **System** RUEI Application Database Storage Schedule Review

Create Capture : System Back Step 2 of 7 Next Cancel

Select the System target representing the application for which traffic is to be captured. The system members will be used to determine whether a database capture can be made and used later for synchronized replay. Note that if the selected system does not contain a supported version of Fusion Middleware and Oracle Database, the option to enable database capture will not be available in the subsequent Database step.

* System Name: pcc41689.us.myshop.com

System Members

Name	Type	Status
myshop_test_db	Database Instance	↑
pcc41689.us.myshop.com	Host	↑

- Click the **Select System** icon, and select the target that represents the applications for which traffic is to be captured. It is recommended that you review the status of the selected component, and ensure that it will be available throughout the planned capture. Note that if the selected target does not include supported versions of Oracle Fusion Middleware and Oracle Database components, the Create Capture (Database) Page (shown in Figure 3–7) is not available, and is skipped. When ready, click **Next**. The page shown in Figure 3–6 appears.

Figure 3–6 Create Capture (RUEI Application) Page

Application Replay

Overview System **RUEI Application** Database Storage Schedule Review

Create Capture : RUEI Application Back Step 3 of 7 Next Cancel

Specify the URL and credential for the Real User Experience Insight (RUEI) instance to be used for the capture. After providing these details, click **Show Applications** to select the application(s) to be included in the capture.

* RUEI URL: https://myshop.com/ruei

* RUEI Username: admin

* RUEI Password: *****

Show Applications

* Applications

Select	Name	Data Size (MB)	Sessions	Hits	Page Views
<input checked="" type="checkbox"/>	bookings	37	1212	4523678	1734
<input type="checkbox"/>	EBSR12	89	681	84564323	6534
<input checked="" type="checkbox"/>	Siebel	21	869	739135	9212
<input type="checkbox"/>	Buss-partner	91	5478	3568902	9371
<input checked="" type="checkbox"/>	CRM	45	732	5345657	78321
<input checked="" type="checkbox"/>	catalog	121	932	9249123	2952

- Specify the URL used to access the RUEI installation. This must be based on a secure (HTTPS) connection. Specify a valid user name and password combination. The specified user must have Security Officer permission. If necessary, contact your RUEI Administrator for this information.

Click **Show Applications** to view the applications currently being monitored by the specified RUEI deployment. Note that you can use the traffic information available for each application to determine its suitability for capture. In particular, when selecting the applications to be included in the capture, you should ensure

that the applications are running, and traffic volumes and error levels are within acceptable bounds. When ready, click **Next**. The page shown in [Figure 3–7](#) appears.

Figure 3–7 Create Capture (Database) Page

Application Replay

Overview System RUEI Application **Database** Storage Schedule Review

Create Capture : Database Back Step 4 of 7 Next Cancel

Select whether database capture should be enabled during application capture and specify the necessary database credential. If database capture is enabled, select whether Automatic Workload Repository (AWR) data should be exported.

Database Capture Disabled Enabled

Information
Database capture is necessary to provide synchronized replay. Assuming replay starts from a database state as similar as possible to the state when capture started, replay synchronization attempts to order requests so that every replayed request operates on the same data as it did during capture. Disabling synchronization generates a replay in which the recorded timings are reproduced without taking into account the data dependencies.

Database Name: Oemrep_Database Database Host Name: pc041689.us.mysshop.com

Database Credential

Credential Preferred Credential Named Credential **New Credential**

* Username: admin

* Password: *****

* Confirm Password: *****

Role: NORMAL

☒ Save As: NC_OEMREP_D_2011-04-27-045237

☐ Set As Preferred Credentials

Database Host Credential

Credential Preferred Credential Named Credential **New Credentials**

* Username: admin

* Password: *****

* Confirm Password: *****

☒ Save As: NC_OEMREP_D_2011-04-27-045238

☐ Set As Preferred Credentials

* Database Capture Intermediate Storage Location: /tmp

Information
If you have an Oracle cluster database, make sure this directory is on a shared file system and accessible by all database instances using the same directory path.

Automatic Workload Repository

AWR Data Export Disabled Enabled

Information
Exporting of AWR data during capture enables performance comparison of the database between capture and replay. Because AWR data exportation can have a significant impact on the production system, it should be scheduled at a time that will not negatively impact the production system.

Start: ☒ Immediately ☐ Later (UTC-08:00) US Pacific Time

- Specify whether database capture should be enabled during application capture. This is required for synchronized replay. If enabled, specify the necessary database and host credentials, the file system location on the database host system used for intermediate capture storage, and whether Automatic Workload Repository (AWR) data should be exported. Note that if AWR export is enabled, you need to specify when exporting should begin. By default, it is performed immediately after capture is completed. When ready, click **Next**. The page shown in [Figure 3–8](#) appears.

Figure 3–8 Create Capture (Storage) Page

Application Replay

Overview System RUEI Application Database **Storage** Schedule Review

Create Capture : Storage Back Step 5 of 7 Next Cancel

Specify the file system location at which the capture data should be stored. Note that this includes not only the capture files themselves, but also the storage of the RUEI files from which they are derived, as well as any data synchronization information.

*Storage Host pcc41689.us.myshop.com

*Storage Location /tmp

Storage Host Credential

Credential ☐ Preferred Credential ☐ Named Credential ☒ New Credentials

*Username admin

*Password

*Confirm Password

☒ Save As admin

☐ Set As Preferred Credentials

Test

8. Specify the host and file system location where the capture data should be stored. Note that this includes not only the capture files themselves, but also the storage of the RUEI files from which they are derived, as well as any data synchronization information.

Important: Capture files can require large amounts of disk space. Therefore, it is recommended that you perform a short capture, and then use that as the basis for calculating the required disk space for the planned capture. In addition, be aware that the generated capture files are in a proprietary format, and should *not* be modified.

Click the **Select Target** icon. A new window opens that allows you to view the available targets. Click a target to select it. Note that only one host target can be selected. You can use the **Target Type** menu to restrict the listing of targets to specific types. Note that it is also recommended that you review the status of the selected targets, and ensure that they will be available throughout the planned capture. Specify the credentials of the selected storage host. When ready, click **Next**. The page shown in [Figure 3–9](#) appears.

Figure 3–9 Create Capture (Schedule) Page

Application Replay

Overview System RUEI Application Database Storage **Schedule** Review

Create Capture : Schedule Back Step 6 of 7 Next Cancel

Schedule start time and duration for capture.

Start ☐ Immediately ☒ Later 27/04/2011 05:31:59 (UTC-08:00) US Pacific Time

Duration ☐ Indefinitely ☒ For 90 minutes ☐ Until

9. Specify the start and stop times for the planned capture. By default, capture starts immediately. Note that, by default, the capture will run for the next 15 minutes. It is *strongly* recommended that you carefully consider the capture's duration and, if scheduled to run indefinitely, regularly review the capture process to prevent the creation of excessively large capture files. When ready, click **Next**. The page shown in Figure 3–10 appears.

Important: If the capture is configured to run indefinitely, it must be stopped manually from the Capture Page. It is *strongly* recommended you regularly check the size of the created capture to prevent running out of storage space.

Figure 3–10 Create Capture (Review) Page

Application Replay

Overview System RUEI Application Database Storage Schedule **Review**

Create Capture : Review Back Step 7 of 7 Next Submit Cancel

Review details before initiating capture.

Overview

Capture Name Siebel CRM
Capture Description North America and Europe Siebel CRM application.

System

System Name myshop_bookings_db

RUEI Application

RUEI URL https://myshop.com/ruei
RUEI Username admin
RUEI Applications bookingsSiebelCRMcatalog

Database

Enable Database Capture Yes
Database Name myshop_test_db
Database Username admin
Database Host Name pcc41689.us.myshop.com
Database Host Username admin
Database Capture Intermediate Storage Location /tmp
Enable AWR Data Export Yes
AWR Data Export Schedule Start Immediately

Storage

Storage Host pcc41689.us.myshop.com
Storage Host Username admin
Storage Location /tmp

Schedule

Start Later 27/04/2011 05:31:59 (UTC-08:00) US Pacific Time
Duration For 90 minutes

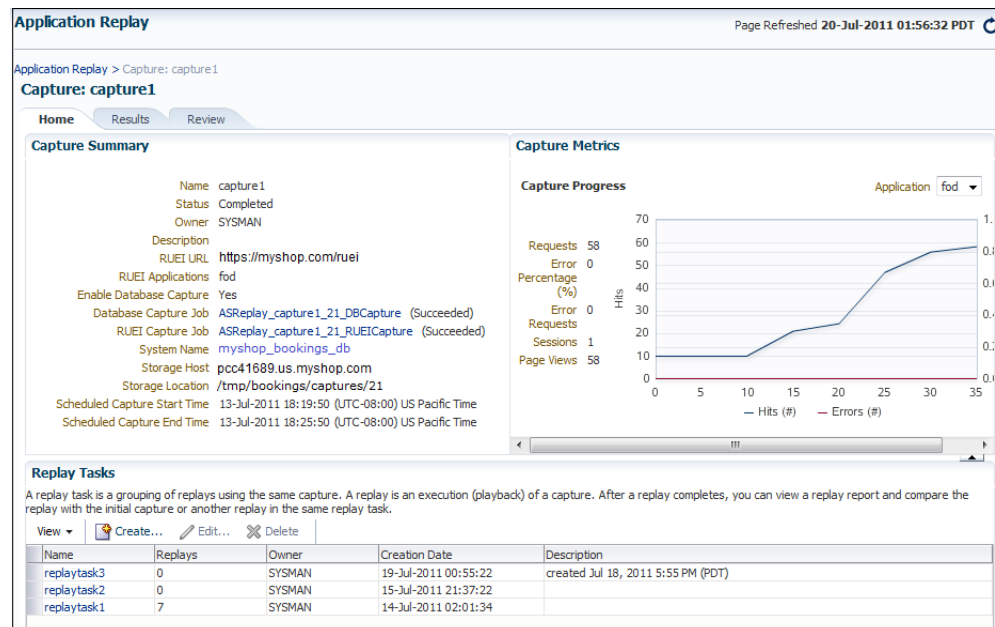
10. Review the planned capture's properties before launching it. If necessary, use the **Back** and **Next** buttons to amend the capture's properties. When ready to launch the new capture, click **Submit**.

3.7 Monitoring the Application Capture Process

Once a capture has been started, you can monitor the capture process to ensure that the intended traffic is being correctly captured, and that the application system is working under normal conditions. An example of a capture progress report is shown

in Figure 3–11.

Figure 3–11 Capture Page



Be aware that there is a lead time of approximately 10 minutes after the start of a capture before progress information about it becomes available. This is available from the Application Replay page (Figure 3–3). In either case, the characteristics of the capture are detailed in terms of its volume, performance, and errors. In this way, you can assess the quality of the capture, and its usefulness for testing purposes.

Note that the number of requests monitored during the capture process is particularly useful for assessing the capture's progress. In the event of an unusually high level of errors, you can use the Job page (available by clicking the RUEI Capture Job setting) to drill-down into specific errors.

3.8 Replaying Application Workload Captures

You can replay a workload capture against a test system. Besides issuing identical HTTP requests, the replay mechanism also mimics the characteristics of the capture in terms of concurrency and timing. This section provides information about the following parts of the replay process:

- [Preparing to Replay Workload Captures](#)
- [Understanding Application Replays and Replay Tasks](#)
- [Resolving References to External Systems for Application Replays](#)
- [Remapping URLs for Application Replays](#)
- [Substituting Sensitive Data for Application Replays](#)
- [Replaying Workload Captures](#)
- [Analyzing Application Replay Results](#)

3.8.1 Preparing to Replay Workload Captures

Proper planning of the workload replay ensures that the replay will be accurate. Replaying a workload capture requires the following steps:

- Ensure that the application data state on the test system is logically equivalent to that of the capture system at the start time of workload capture. This is described in ["Setting up the Test System Database for Application Replay"](#).
- All references to external systems have been resolved. This is explained in ["Resolving References to External Systems for Application Replays"](#).

3.8.2 Understanding Application Replays and Replay Tasks

It is important to understand that a replay is an execution (playback) of a workload capture. A replay task is a group of replays based on the same capture. After a replay is completed, you can view a replay report and compare the replay with the initial capture, or create another replay within the same replay task. Typically, the replays within a replay task perform the same purposes. For example, a database or host system configuration with multiple parameter changes.

It is recommended that replays be grouped into the same replay task in order to facilitate comparison. For example, replays that relate to the testing of the same database upgrade patch should be grouped into the same replay task.

3.8.3 Resolving References to External Systems for Application Replays

A captured workload may contain references to external systems, such as database links or external tables. It is critical that you reconfigure these external interactions to avoid impacting other production systems during replay. Typical external references that need to be resolved before replaying a workload are shown in [Table 3–1](#).

Table 3–1 *References to External Systems*

Type	Description
Database links	Typically, it is not desirable for the replay system to interact with other databases. Therefore, you should reconfigure all database links to point to an appropriate database that contains the data needed for replay.
External tables	All external files specified using directory objects referenced by external tables need to be available to the database and application server during replay. The content of these files should be the same as during capture, and the filenames and directory objects used to define external tables should also be valid.
Directory objects	You should reconfigure any references to directories on the production system by appropriately redefining the directory objects present in the replay system after restoring the database.
URLs	URLs/URIs that are stored in the database and application server need to be configured so that Web services accessed during the capture will point to the appropriate URLs during replay. If the workload refers to URLs that are stored in the production system, you should isolate the test system network during replay.
E-mails	To avoid resending E-mail notifications during replay, any E-mail server accessible to the replay system should be configured to ignore requests for outgoing E-mails.

Important: To avoid impacting other production systems during replay, it is *strongly* recommended that you run the replay within an isolated private network that does not have access to the production environment hosts.

3.8.4 Remapping URLs for Application Replays

URLs in the workload capture files need to be remapped to different values before replay within the test environment. For example, the Web application URL in every request needs to be remapped to that of the test system.

Note that wildcard characters are not supported within remapped URLs. All required domain and port numbers must be fully specified.

3.8.5 Substituting Sensitive Data for Application Replays

The RUEI installation monitoring your network traffic can be configured to omit the logging of sensitive information. This is called *masking*, and prevents passwords and other sensitive information from being recorded on disk. Further information on the use of this facility is available from the *Oracle Real User Experience Insight User's Guide*.

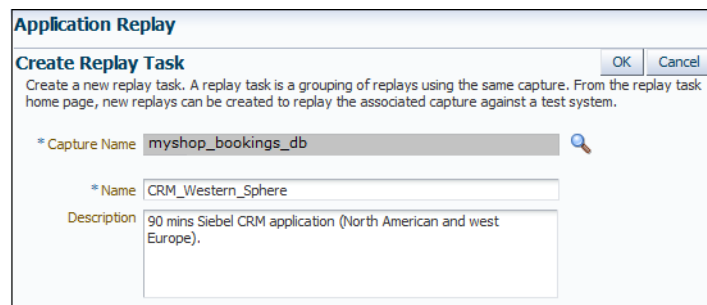
It is important to understand that Application Replay only supports the substitution of one value for each masked field. For example, if an application logon password field is masked, you will need to set up one common alternative logon password for all user accounts in the test system.

3.8.6 Replaying Workload Captures

To replay a workload capture using Enterprise Manager:

1. From the **Enterprise** menu, select **Quality Management**, then **Application Replay**. The page shown in [Figure 3–3](#) appears.
2. From the **Replay Tasks** section, click **Create** or **Create Like**. The page shown in [Figure 3–12](#) appears.

Figure 3–12 Create Replay Task Page



3. Click the **Select Capture** icon. A new window opens that allows you to select the capture upon which the replay task should be based. Specify a unique name for the new replay task. Optionally, specify a brief description. It is recommended that you include an indication of the replay task's purpose and scope. When ready, click **OK**. You are returned to the page shown in [Figure 3–3](#).
4. Click the newly created replay task. The page shown in [Figure 3–13](#) appears.

Figure 3–13 Create Replay (Overview) Page

Application Replay

Create Replay

BackNextSubmitCancel

Tasks

OverviewSystemCapture Storage CredentialReplay ClientsSynchronizationURL MappingsMasked Data SubstitutionAdditional Replay ParametersScheduleReview

Overview

* NameSiebel CRM

DescriptionNorth America and Europe Siebel CRM application.

Replay Prerequisites

These prerequisites should be completed before replaying a capture.

☒ Restore database to match the state of the production database at the start of capture.

☒ Resolve any references to external systems.

External Production System Warnings

A replay should be performed in a completely isolated test environment. Make sure to resolve all references to external systems before starting a replay so that your production environment is not harmed. The following are examples of external references that an application might have. Your application may have additional or different external references.

Web Services

Authentication Servers (e.g. SSO, LDAP)

Application URLs

Database Links

Directory Objects

Streams

5. Specify a name for the replay. It must be unique among the selected replay task. Optionally, specify a brief description for the traffic to be replayed. It is recommended that you include an indication of the purpose and scope of the replay. Carefully review the required information, and click the acknowledgement check boxes to indicate that they have been met. When ready, click **System**. The page shown in Figure 3–14 appears.

Figure 3–14 Create Replay (System) Page

Application Replay

Create Replay

BackNextSubmitCancel

Tasks

OverviewSystemCapture Storage CredentialReplay ClientsSynchronizationURL MappingsMasked Data SubstitutionAdditional Replay ParametersScheduleReview

System

Select the System target that represents the test application against which the associated capture is to be replayed. The selected system members determine whether database synchronization can be performed during replay. If the selected system does not contain supported versions of Fusion Middleware and Oracle Database targets, the subsequent Synchronization task will be disabled.

* Replay Systempcc41689.us.myshop.com

Name	Type	Status
myshop_test_db	Database Instance	
pcc41689.us.myshop.com	Host	

6. Click the **Select System** icon, and select the targets that represent the test environment against which the capture should be replayed. It is recommended that you review the status of the selected components, and ensure that they will be available throughout the planned replay. When ready, click **Capture Storage Credential**. The page shown in Figure 3–15 appears.

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Figure 3–15 Create Replay (Capture Storage Credential) Page

Application Replay

Create Replay Back Next Submit Cancel

Tasks

- Overview
- System
- Capture Storage Credential**
- Replay Clients
- Synchronization
- URL Mappings
- Masked Data Substitution
- Additional Replay Parameters
- Schedule
- Review

Capture Storage Credential

Specify the capture storage host credential.

Storage Host pcc41689.us.myshop.com

Storage Location /tmp/bookings/captures/21

Storage Host Credential

Credential ☒ Preferred Credential ☐ Named Credential ☐ New Credentials

Preferred Credential Name Privileged Host Credentials

Credential Details

Attribute	Value
UserName	jsmith
Password	*****

[More Details](#)

- Specify the credentials of the selected storage host. When ready, click **Replay Clients**. The page shown in Figure 3–16 appears.

Figure 3–16 Create Replay (Replay Clients) Page

Application Replay

Create Replay Back Next Submit Cancel

Tasks

- Overview
- System
- Capture Storage Credential
- Replay Clients**
- Synchronization
- URL Mappings
- Masked Data Substitution
- Additional Replay Parameters
- Schedule
- Review

Replay Clients

Specify the distribution of replay clients among hosts.

Estimated Replay Clients Needed 1

Replay Client Hosts

Using the provided estimate as a guide, specify the replay client hosts and the distribution of replay clients among them.

View

Host	Username	Replay Clients	Status
pcc41689.us.myshop.com	admin	1	

Replay File System

Specify a shared file directory location that is accessible from all replay client hosts. This location will be used for staging the capture to be replayed and storing the replay results.

* Replay File Location

Information

If you enable synchronized replay, make sure this directory is on a shared file system and accessible by all database instances using the same directory path.

- Specify the Replay Clients that will be used to generate the workload on the test system. Note that the provided estimate should be used as a basis for scaling the planned replay. Specify the file system location to be used for storing the capture files and replay results. This location must be on a shared file system and accessible from the Replay Client hosts and database hosts (if synchronization is enabled) via exactly the same file directory path. When ready, click **Synchronization**. The page shown in Figure 3–17 appears.

Figure 3–17 Create Replay (Synchronization) Page

Application Replay

Create Replay

Back

Next

Save

Submit

Cancel

Tasks

Overview

System

Capture Storage Credential

Replay Clients

Synchronization

URL Mappings

Masked Data Substitution

Additional Replay Parameters

Schedule

Review

Synchronization

Select whether database synchronization should be enabled during replay. If enabled, provide the necessary database credential.

Database Synchronized Replay

Enabled

Disabled

Information

Assuming replay starts from a database state as similar as possible to the state when capture started, database synchronization attempts to order requests so that every replayed request operates on the same data as it did during capture. Disabling synchronization generates a replay in which the recorded timings are reproduced without taking into account the data dependencies.

Database Name

Oemrep_Database

Database Host Name

EBS6170_system.us.myshop.com

Database Credential

Credential

Preferred

Named

New

Credential Name

SYS

Credential Details

Attribute	Value
Username	sys
Password	*****
Role	sysdba

More Details

Database Host Credential

Credential

Preferred

Named

New

Credential Name

JSMITH

Credential Details

Attribute	Value
UserName	jsmith
Password	*****

More Details

Database Version

11.2.0.2.0

Database Port

15044

Database SID

sc121s1

9. Specify whether database synchronization should be enabled during the replay. Note that, if enabled, you will need to provide relevant database and host credentials. When ready, click **URL Mappings**. The page shown in Figure 3–18 appears.

Figure 3–18 Create Replay (URL Mappings) Page

Application Replay

Create Replay

Back

Next

Submit

Cancel

Tasks

Overview

System

Capture Storage Credential

Replay Clients

Synchronization

URL Mappings

Masked Data Substitution

Additional Replay Parameters

Schedule

Review

URL Mappings

Add mappings from capture URLs to URLs for replay.

+

 Add

×

 Delete

Capture URL	Replay URL
http://myshop.com	http://testenv-myshop.com

10. Specify the URL mappings that should be used during the replay. That is, how the URLs encountered during capture should be substituted when replayed within the test environment. When ready, click **Masked Data Substitution**. The page shown in Figure 3–19 appears.

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Figure 3–19 Create Replay (Masked Data Substitution) Page

Masked Data Substitution

These sensitive data fields are masked by RUEI during capture. Specify the new replay values to substitute during replay.

Sensitive Data Field	Replay Value	URL	RUEI Application	
			Name	Type
passwordField	*****	http://myshop.testenv.com:8083/OA_HTML/OA.jsp	EBSR 12	EBS
_password	*****	http://myshop.com/StoreFrontModule/faces/check	Catalog	ADF
SWEPassword	*****	http://sd4.corp.siebel.com/calcenter_enu/start.swe	Contact	Siebel
fidPassword	*****	http://myshop.com/basket/login	MyShop	MyShop

11. RUEI can be configured to omit the logging of sensitive information (such as passwords, credit card details, and so on) from being recorded on disk. Because the values of these fields are not recorded, they need to be explicitly specified for replay. When ready, click **Additional Replay Parameters**. The page shown in Figure 3–20 appears.

Figure 3–20 Create Replay (Additional Replay Parameters) Page

Additional Replay Parameters

Replay Rate
Configure parameters controlling the rate at which replay progresses.

Run Replay ☐ Same Rate As Captured ☒ Custom Rate

Session Start Time Scale

Think Time Scale

Maintain Request Rate ☒

About Custom Replay Rate Parameters

Session Start Time Scale: Scales the elapsed time from when the capture started to when the session connects with the specified value. Controls the rate of logon activity during replay.

Think Time Scale: Scales the elapsed time between two successive user calls for the same session. Controls the replayed request rate.

Maintain Request Rate: If enabled, the system will correct the think time (based on the think_time_scale parameter) between calls when user calls take longer to complete during replay than during capture. Maintains capture request rate.

Advanced Replay Configuration

Add custom values for parameters used during replay.

Advanced Settings ☒ Standard ☐ Custom

12. Specify whether the replay should progress at the same rate as in the original capture or at an alternative rate. In the case of the latter, you need to specify the appropriate session start time scale, think time scale, and whether the request rate should be maintained at the original rate. Expand the **Advanced Replay Parameters** section to specify whether the standard advanced settings should have

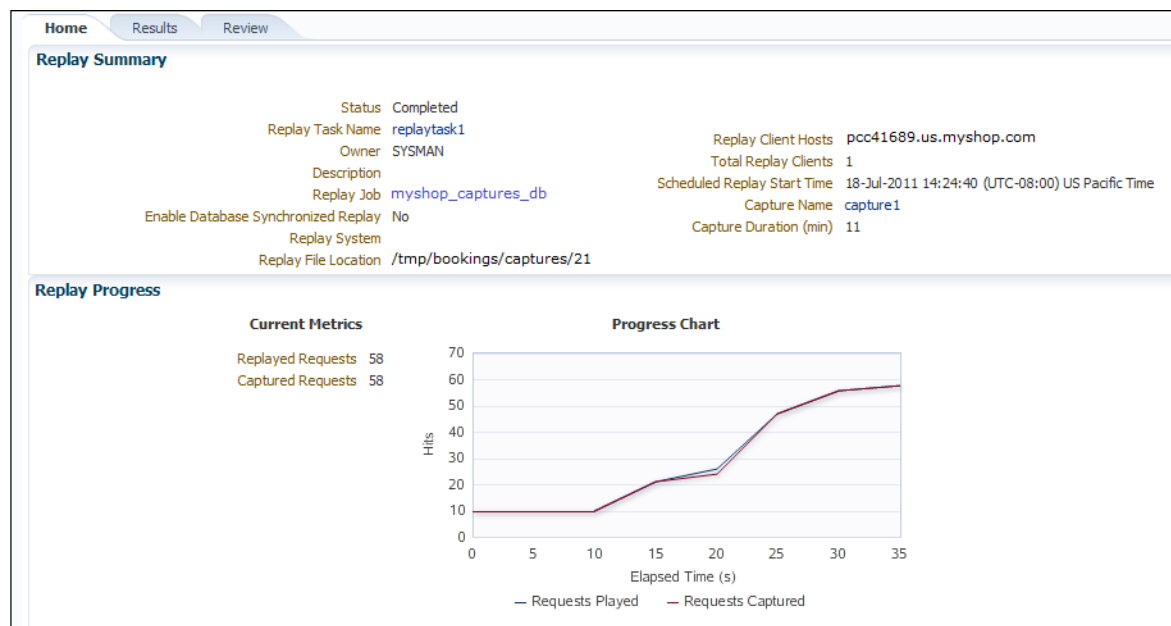
their standard values or custom values. When ready, click **Schedule**. The page shown in [Figure 3–21](#) appears.

Figure 3–21 Create Replay (Schedule) Page

13. Specify when the replay should start. When ready, click **Review**.
14. A summary of the planned replay is displayed. If necessary, use the **Back** and **Next** buttons to move between sections. When ready, click **Submit** to launch the replay.

3.8.7 Analyzing Application Replay Results

Detailed information about a selected replay is available by clicking it within the Application Replay Page. An example of a replay overview is shown in [Figure 3–22](#).

Figure 3–22 Example Replay Summary

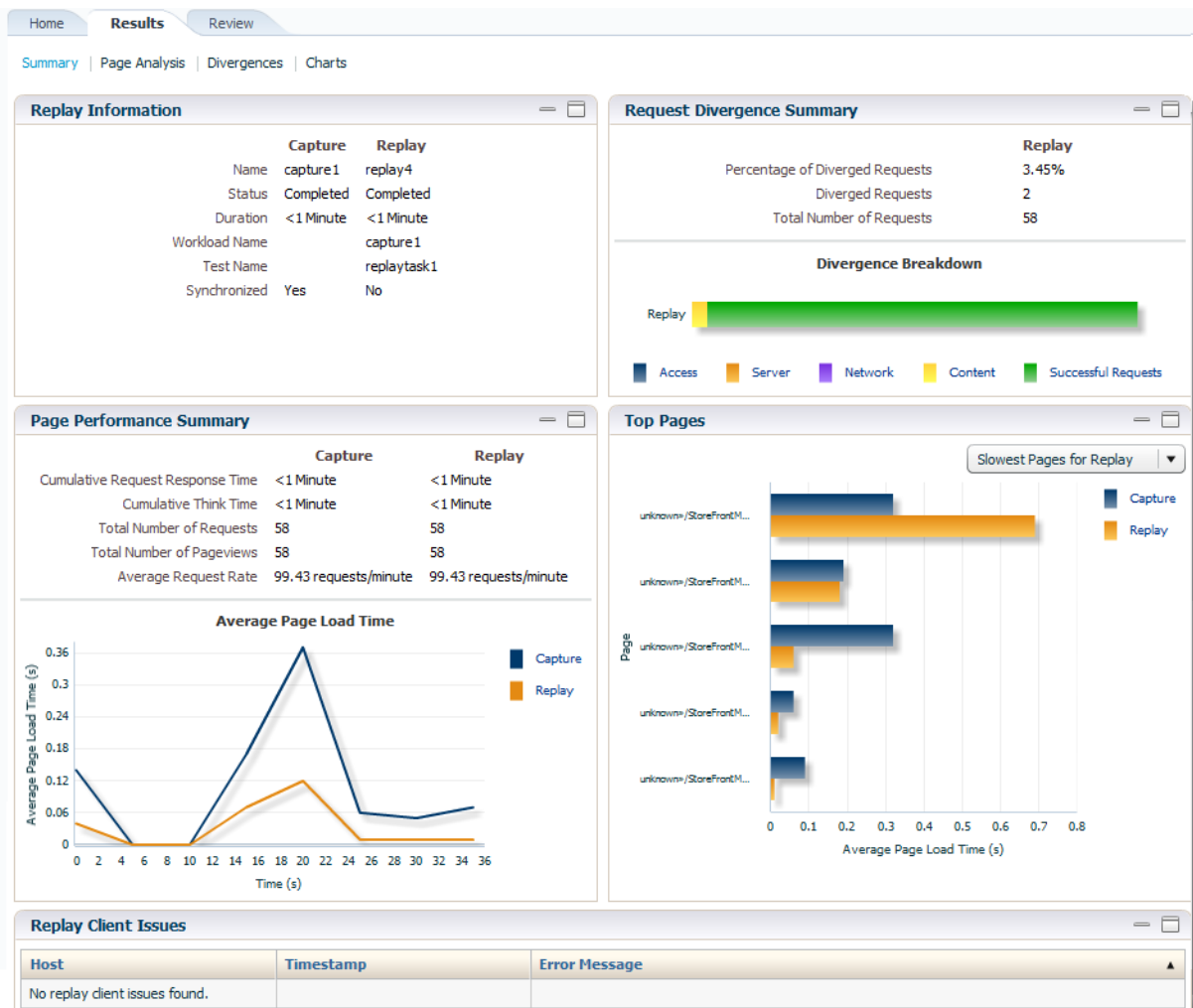
It consists of three parts:

- **Home:** provides a overview of the replay, its associated replay task, and the capture upon which it based. The progress of the replay, and a comparison with the original capture, is also provided.
- **Results:** provides more detailed information about the request divergence. This includes a comparison of page performance during the original capture and the replay, and the application pages that experienced the highest level of divergence. An example is shown in [Figure 3–23](#).

Within this section, The **Page Analysis** section allows you to perform an analysis of each application page across selected metrics. The **Divergences** section allows you to view information restricted to specific divergence types (such as access, content, and so on). The **Charts** section allows you to view detailed replay information across specific metrics (such as average page load time).

- **Review:** provides information about the replay environment (such as the credentials, host, and replay clients), as well as the URL mappings and masked data substitutions used during the replay.

Figure 3–23 Example Replay Results Summary



3.9 Importing Replay Session Divergences into OpenScript

Using the Oracle Application Testing Suite's OpenScript module, you can further analyze divergence errors by viewing them by session. Currently Application Replay calculates divergence statistics and presents them on a per page basis. Enterprise Manager allows you to export this session data to a .zip file and import this data into OpenScript.

Creating a Session .zip File

The session .zip file generated from Enterprise Manager contains both capture and replay data.

To create a .zip file:

1. Navigate to the *Replay Divergence* Page.
2. Choose **View by Session** as the viewing **Mode**.
3. In the **Sessions** list, click on the Session ID that contains divergences (shown in the *Divergences* column). The *Session Divergence Detail* dialog appears.

4. In the *Pages* region, click **Fetch Page Details**.
5. In the *Export Session Data* region, click **Export**.

Once the export operation is complete, a link to the session data .zip file appears.

6. Click on the link to download the session data .zip file and save the file to your local system.

Importing a Session .zip File into OpenScript

Once you have created a .zip file containing the capture and replay data, you must import this data into OpenScript.

To import the contents of the .zip file:

1. From OpenScript, you next need to create a Load Testing script.
From the **File** menu, select **New**. The **New Project** dialog displays. From here, you can choose a wizard to create a new Load Testing script.
2. From the tree list, choose an application type and click **Next**. The New Script dialog appears.
3. Enter a script name and click **Finish**. OpenScript creates the new script.
4. From the OpenScript Tools menu, select Import Oracle Real User Experience Insight (RUEI) Session Log. The *Import RUEI Log* dialog appears.
5. Click **Browse...** The *Open RUEI Log* dialog appears.
6. Navigate to the session .zip file you created earlier, select the file and click **Open**.
7. Click **OK**.

3.10 Troubleshooting Application Replay

This section provides guidance on dealing with the most common problems encountered when capturing and replaying workloads. In addition, it is recommended that you review the Oracle Support Web site for information about known issues and workarounds. It is available at the following location:

<https://support.oracle.com>

RUEI Installation

Ensure that the RUEI installation used to monitor the applications in the workload capture meets the following requirements:

- Check the Oracle Support Web site for information about supported versions and required hot fixes.
- Make sure RUEI has been configured to monitor the required applications. Information about deployment options and requirements is available from the *Oracle Real User Experience Insight Installation Guide*.
- Make sure you have a valid user name and password combination. If necessary, contact your RUEI Administrator. Note that the user account must have Security Officer permission. For further information about roles and permissions, see the *Oracle Real User Experience Insight User's Guide*.
- Ensure Full-Session Replay (FSR) has been enabled, and sufficient storage has been assigned, for each application that is planned to be captured. In addition, you should ensure that each application's data replay logging and masking settings are

compatible with the use of FSR. For information, see the *Oracle Real User Experience Insight User's Guide*.

- Ensure that your Web server has been configured to use static SSL certificates. This is necessary because RUEI does not support dynamic SSL certificates.
- If your application make use of jumbo frames, increase the RUEI capture length from its default 2kb to 64kb by issuing the following command on the RUEI Reporter system as the root user:

```
execsql config_set_profile_value wg System config CaptureLength replace 65536
```

Capture Checklist

In addition to the requirements indicated above, you should also ensure that:

- RUEI is correctly capturing all required traffic using the appropriate logging and masking policies. For information on verifying its configuration, see the *Oracle Real User Experience Insight User's Guide* available at the following location:

<http://www.oracle.com/technetwork/documentation/realuserei-091455.html>

- The database host user ID belongs to the same group as the Enterprise Manager Agent user account.

Replay Checklist

In addition to the requirements indicated above, you should also ensure that:

- All required URLs have been correctly remapped, as described in [Section 3.8.4, "Remapping URLs for Application Replays"](#). Check whether the test system has been configured as HTTP or HTTPS, the domain name of the Web server, and the relevant port number. In addition, verify that the full domain name is specified in the URL, and not just the host name.
- It is *strongly* recommended that you do not replay a captured workload in a production environment.
- Ensure that you have provided a substitute value for all sensitive data fields that were masked during capture. This is described in [Section 3.8.5, "Substituting Sensitive Data for Application Replays"](#).

Composite Applications

While individual Java EE applications can be managed using Enterprise Manager, your business needs may require that these applications be managed as a group. This logical application group is called a composite application.

To access composite applications in Enterprise Manager, select **Composite Applications** from the **Targets** menu. From the Composite Applications page you can view existing composite applications or create new ones. (For a demonstration of Composite Applications, see Composite Application Management.)

This chapter explains how to use composite applications in Enterprise Manager.

4.1 Viewing the Composite Application Dashboard

Each instance of Composite Application can have a different home page.

You can modify this page by adding and dropping regions using the Personalize Page icon located at the top-right of the page. In turn, you can customize each region by adding content and changing the configurable properties of the region.

The Target Navigation tree, located at the left, shows the direct members of the composite application. These are the members you selected when creating the composite application. The navigation tree also includes the related members that were selected during the creation process.

Each direct target lists its related members. The following lists the possible direct targets and their related members:

- **Application Deployments**
Contains Application Deployments, as well as clustered Application Deployments
- **Databases**
Contains only databases related to the targets in this composite application
- **Fusion Applications**
Contains Fusion Applications, as well as Fusion Application clusters
- **Hosts**
Contains associated host targets
- **Others**
Contains other targets that do not have their own folder, for example, Oracle Homes, Oracle Management Agent, and so on
- **Service Oriented Architecture (SOA)**

Contains OSBs, SOA Composites, and SOA Infrastructure

- WebLogic Domains

Contains all participating domains

The overall summary page provides additional details for the composite application (see [Figure 4-1](#)):

- Status

Availability of all the members

- Oracle WebLogic Server Load

Includes Requests (per minute) and Work Manager Requests (per minute)

- Request Processing Time and Cache Statements Used (%)

- Overview of Incidents and Problems

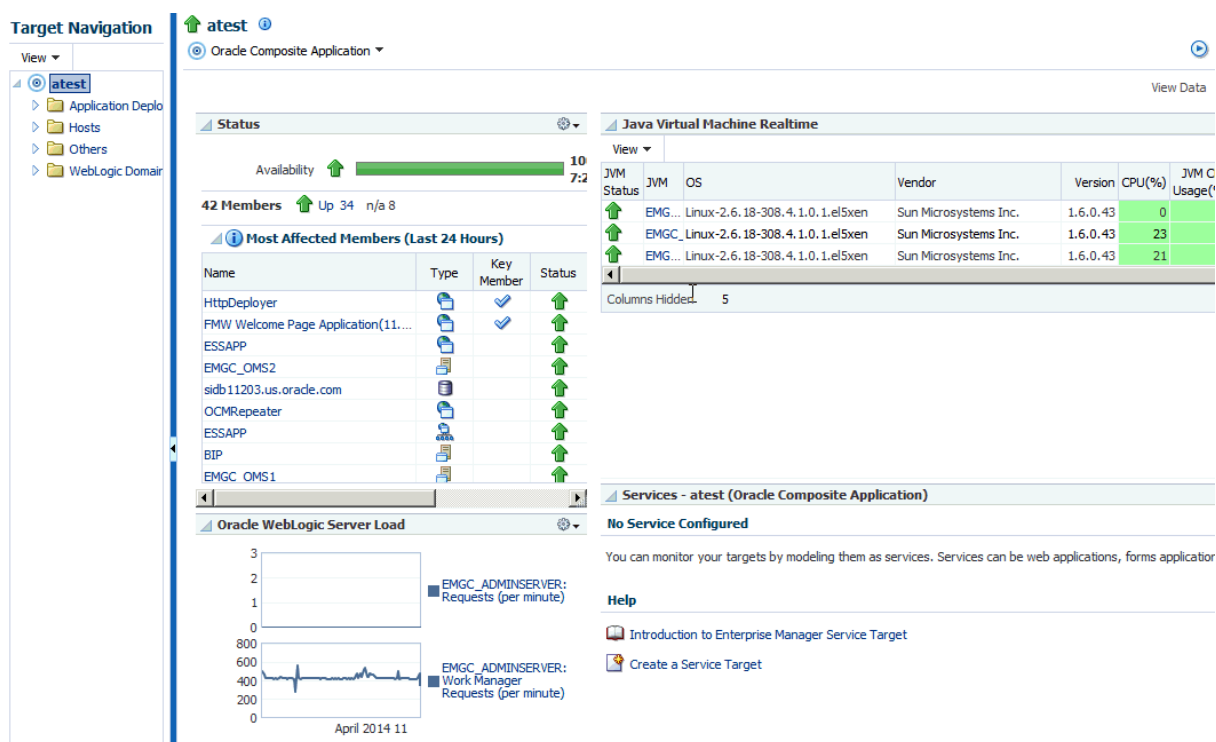
Click the number of incidents to view a table listing the reported incidents.

- Java Virtual Machine Realtime

- Services

- SLA Status

Figure 4-1 Composite Application Dashboard



4.2 Creating a Composite Application

To create composite applications, perform the following steps.

1. From the **Targets** menu, select **Composite Applications**.

2. On the Composite Applications page, click **Create**. The first page of the Create Composite Application wizard appears.

Figure 4–2 First Page of the Create Composite Application Wizard

Create Composite Application

Select Applications Create System Identify Signature Services Summary

Create Composite Application: Select Applications

This is the starting step of the wizard to build and define a composite application. Specify the name of the composite application, the timezone and the availability criteria. The Add button must be used to select the applications.

* Composite Application Name

* System TimeZone

Availability Criteria ☒ All of The Selected Applications ☐ Any of The Selected Applications

View

Application Display Name	Application Name	Application Type	Domain Name
No Applications Selected			

3. On the Select Applications page:
 - a. Enter the composite application name.
 - b. Specify a time zone.
 - c. Specify the Availability Criteria. Select either **All of the Selected Applications** or **Any of the Select Applications**. When you select 'All of the Selected Applications' option, the availability of the composite application is shown as Up when *all* the members of the composite application are up.
When you select 'Any of the Selected Applications' option, the availability of the composite application is shown as Up if *any* of the members of the composite application are up.
 - d. Click **Add**. The **Search and Select: Targets** dialog appears.
 - e. Filter the application list (optional). You can filter the list by Target Type, Target Name, or Host on which the application(s) reside. Specify the desired filter parameters and click **Go**.
 - f. Select the applications to be added. Use the Shift or Control key to select multiple applications.
 - g. Click **Select**. The selected applications now appear in the Select Applications page table.
 - h. Click **Next**.

Note: You can remove applications that you do not want to be part of the composite application. Select the target and click **Remove**.

4. On the Create System page:

Applications previously selected on the **Select Applications** page are displayed in the **Selected Members** table. Based on these applications, related targets are displayed in the **Related Members** table. In the Related Members table, you can edit the system membership to add additional components or remove existing components.

- a. From the **Related Members** table, click **Add**. The **Select Targets** dialog appears.

- b. Filter the application list (optional). You can filter the list by Target Type, Target Name, or Host on which the applications reside. Specify the desired filter parameters and click **Search**.
- c. Select the applications to be added. Use the Shift or Control key to select multiple targets.
- d. Click **Select**. The **Related Members** table automatically refreshes with the newly added targets.
- e. Click **Next**.

Note: You can remove targets that you do not want to be part of the composite application. Select the target and click **Remove**.

5. On the Identify Signature Services page:

Optionally, you can model the key entry points of the composite application by defining them as Enterprise Manager services, thus identifying them as signature services for the composite application. The **Services List** table lists all Web services exposed by the applications you selected in the first step of the wizard.

To identify signature services:

- a. Select the desired Web services from the **Services List** table.
 - b. Click **Edit**. The **Configure Service** dialog appears.
 - c. Enter the **EM System Name**. Note that you cannot change the name of the system if it is already defined within Enterprise Manager.
 - d. Click **OK** on the Configure Service dialog.
 - e. Click **Next**.
6. On the Summary page:

Review all selections you have made for the composite application. You can go back to any previous step of the wizard to make modifications. When ready, click **Submit** to create the composite application.

4.3 Editing a Composite Application

You can edit a composite application in two ways.

- From the **Targets** menu, select **Composite Applications**. Highlight a composite application and click **Edit**.
- If you are on the Composite Application home page, select **Target Setup** from the Oracle Composite Application menu, then select **Edit Composite Application**.

On the Edit Composite Application page, follow the steps. See [Creating a Composite Application](#) for information on how to fill out each step.

Note: Ensure to click **Save and Exit** when you have finished making changes. Any changes made will be applied for only *this* target.

4.4 Editing a Composite Application Home Page

You can change the layout of the composite application home page, add content, and edit and remove regions.

You can edit a composite application home page in two ways:

- On the Composite Applications home page, select a composite application and click **Edit Homepage**.
- On the Composite Application home page, click the **Personalize** button located adjacent to the Page Refreshed field.

When you choose to Add Content, you are adding regions to the page. When you edit a region, you change the properties of the region.

Note: Ensure to click **Close** when you have finished making changes. Any changes made will be applied for only *this* target.

4.5 Using Composite Applications

Using the Composite Applications page, you can view the status and statistics of the various components. In addition, using the target navigation tree enables you to access all related targets in the composite application.

Study the following regions to determine if the applications are running at optimal performance and if not, resolve the issues.

- **Status**

Provides the availability of the applications.

- Up (green) arrow means that at least one application is up or all applications are up.
- Down (red) arrow means that at least one application is down.
- n/a (not applicable) means that the target does not have a status.

If an application is down, determine if that is a scheduled down time.

- **Oracle WebLogic Server Load**

Analyze the Requests (per minute) and Work Manager Requests (per minute) metrics. By clicking the metric associated with an application, you can see problem analysis for the metric.

- **Request Processing Time (ms) and Cached Statements Used (%)**

By clicking the metric for the application, analyze the statistics for that metric.

- **Overview of Incidents and Problems**

Click the number associated with either an incident or a problem. For example, if a problem is reported for a particular application, the Incident Manager page summarizes the severity, what target is exhibiting the problem, and so on. The detailed information provides you the opportunity to acknowledge the problem, see other notifications that have been sent regarding the problem, resolve the problem using the guided resolutions, and so on.

- **Java Virtual Machine Realtime**

- **Services**

Provides the overall health of the services, how long the service has been up, and so on.

- **SLA Status**

Provides data regarding service level objectives. This section reports when a service has been breached.

Part II

Monitoring Exalytics Target and Traffic Director

The chapters in this part describe how you can monitor Oracle Exalytics Target and Oracle Traffic Director.

The chapters are:

- [Chapter 5, "Monitoring an Exalytics Target"](#)
- [Chapter 6, "Oracle Traffic Director"](#)

Monitoring an Exalytics Target

The Oracle Fusion Middleware Management plug-in provides a consolidated view of the Exalytics In-Memory System and Machine within Oracle Enterprise Manager, including a consolidated view of all the hardware components and their physical location with indications of status.

See the *Managing Oracle Exalytics In-Memory Machine with Oracle Enterprise Manager* manual available from the Management tab of the Enterprise Manager documentation library: http://docs.oracle.com/cd/E24628_01/nav/management.htm

In particular, see:

- Features and enhancements provided by the Oracle Fusion Middleware Management plug-in for the Exalytics In-Memory System.
- Instructions for discovering the Exalytics In-Memory System by Oracle Enterprise Manager Cloud Control 12c.
- Instructions for configuring the Exalytics In-Memory System within Oracle Enterprise Manager Cloud Control 12c.

Oracle Traffic Director

Oracle Traffic Director (Traffic Director) is a software-level load balancer, used to load-balance incoming HTTP connections among origin-servers (host:port pair) that host the actual content.

Traffic Director has the following functions:

- Reverse Proxy—Distributes incoming traffic among servers using load-balancing algorithms. The forwarding mechanism is based on URI and on handling sessions.
- Proxy Caching—Stores frequently accessed html pages.

You can use the Traffic Director to create a configuration that involves defining virtual-servers, listeners, origin-servers, and server-pools. This configuration is then deployed on a set of hosts. The instances of the same configuration form a configuration.

Note: In a High Availability configuration (Active-Passive or Active-Active), Oracle Traffic Director supports only 2 OTD instances for a given configuration. Hence, Enterprise Manager Cloud Control 12.1.0.3 and higher monitoring capability is limited to at most 2 OTD instances for a given OTD configuration.

The virtual-server is the main component that is configured with the load-balancing properties, for example, the servers to distribute traffic to (origin-servers and pools) to use, the IP-address and port on which to listen for requests (listener), and so on.

Hence, the typical hierarchy of a Traffic Director deployment is that of a Traffic Director configuration consisting of a set of instances deployed on hosts, and each instance has components like virtual-server, listener, proxy-cache along with origin-servers and origin-server-pools.

Following is the target list:

- Traffic Director Configuration

The Traffic Director Configuration target contains configuration and performance metrics pertaining to components like virtual-server, proxy-cache, tcp-proxy, origin-servers and server-pools, at the configuration-level.

- Traffic Director Instance

The Traffic Director Instance has performance metrics for the same components but at the instance level.

Traffic Director Instance target is used to monitor one instance of a Traffic Director Configuration running on a host. This target shows the performance information of the Instance running on that host.

Use the following sections in this chapter to learn more about Traffic Director.

- [Before Discovering Traffic Director](#)
- [Adding a Traffic Director to an Exalogic Target](#)
- [About Traffic Director Configuration](#)
- [About Traffic Director Instance](#)
- [About Traffic Director Refresh Flow](#)

For additional information refer to the *Oracle Traffic Director Administrator's Guide*.

6.1 Before Discovering Traffic Director

Before you discover Traffic Director, you need to configure Traffic Director instances for SNMP monitoring and start the SNMP subagent.

See the Monitoring Using SNMP chapter in the *Oracle Traffic Director Administrator's Guide*. In particular, perform the steps described in the following sections:

1. [Configuring Oracle Traffic Director Instances for SNMP Support](#)
2. [Configuring the SNMP Subagent](#)
3. [Starting and Stopping the SNMP Subagent](#)

6.2 Adding a Traffic Director to an Exalogic Target

To manually add the Traffic Director dashboard to an Exalogic target, perform the following steps:

1. From Enterprise Manager, select **Exalogic** from the **Targets** menu.
2. Click the link of the name of the Exalogic Elastic Cloud to which you want to add the Traffic Director dashboard.
3. On the Exalogic Elastic Cloud page, click the **Software** tab.
4. On the SYSMAN icon located at the top right of the page, select **Personalize Page**.
5. On the Editing Page, click **Add Content**. On the Add Content popup, move to the Traffic Director item and click the associated **Add** link. Click **Close**.
6. On the Editing page, click **Close**.

The Traffic Director region is now visible from the Exalogic Elastic Cloud dashboard (Software tab).

6.3 About Traffic Director Configuration

A configuration is used to create a configuration of Traffic Director instances all having similar functionality. The configuration mainly contains the description of:

- Servers to direct the incoming traffic (Origin Servers and Server Pools)
- IP address and port to listen for incoming requests (Listener)

The following steps must be performed when creating a configuration:

- A configuration must be created, with one HTTP virtual-server. This virtual server is configured to accept requests for www.oracle.com.
- A HTTP Listener must be created whose port is set as 80.
- Two origin-servers are created with the aforementioned host:port pairs.

- Then a server pool is created with these two servers, and the virtual server is associated with this server pool.

Once the entities are created, this configuration is deployed on the hosts.

6.3.1 Using the Traffic Director Configuration Page

The performance metrics, performance information, or performance summary visible on the configuration home page, is at the configuration level that is, the performance is an aggregate of that entity's performance across the hosts on which the configuration instances are running. For example, the virtual server metrics visible on the configuration home page, are an aggregate of metrics at the instance level.

The Traffic Director Configuration page lists the following regions:

- **Summary**—Provides the general information regarding the configuration including how long the configuration has been up, its availability and the version of configuration. In addition, you can go directly to configure and monitor the Traffic Director by using the link to the Traffic Director Admin Console.

Also, the Monitoring and Diagnostics section lists whether there are any incidents involving the Traffic Director. An incident is an event that represents an issue requiring resolution. Click the incident to determine what needs attention.

- **Response and Load**
- **Performance**
- **Instances**
- **Virtual Servers and Origin Servers**
- **Failover Group**—Shows all the failover groups in the configuration. However, failover groups in the Instance Target home page shows only the failover groups of which the instance is a part.
- **Exalogic**—Shows information about Traffic Director Instances associated to the Exalogic Elastic Cloud target on which the region has been added.

For seeing detailed information about the Traffic Director Instances/Configurations shown in this region, click the links to navigate to the respective target home pages.

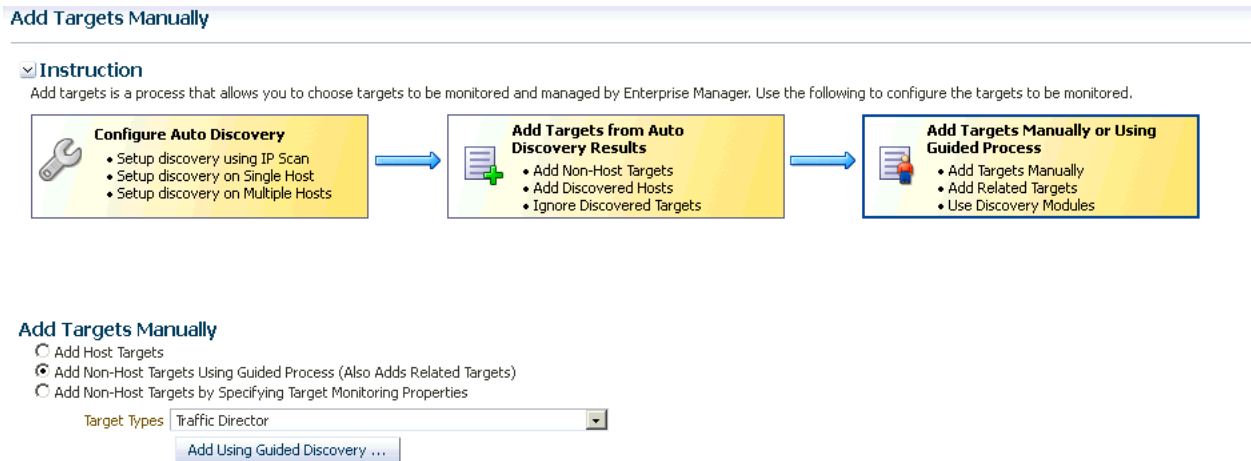
Note: You can view the Traffic Director Configuration details by selecting **Configuration** from the **Target** menu, then selecting **Last Collected**.

6.3.2 Adding Traffic Director Target Configuration

To manually add Traffic Director Configuration to Enterprise Manager, perform the following steps:

1. From Enterprise Manager, select **Add Target** from the **Setup** menu located at the top-right of the page, then select **Add Targets Manually**.
2. On the Add Targets Manually page, choose **Add Non-Host Targets Using Guided Process (Also Adds Related Targets)**. In the Target Types menu, select **Traffic Director**.
3. Click **Add Using Guided Discovery**.

Figure 6–1 shows how the resulting screen should look.

Figure 6–1 Filled in Add Targets Manually Screen

Fill out the pages as described in:

- [Finding Configurations and Instances](#)
- [Discovered Targets](#)
- [Viewing Results](#)

6.3.2.1 Finding Configurations and Instances

Use the Find Configurations and Instances page to supply the Administration Server Properties:

- **Administration Server Host**
The name of the host where the Traffic Director Administration Server is running. Search for a host by clicking the Search icon located at the end of the field.
Note: On selecting the host, the Agent URL field will be automatically populated.
- **Administration Server SSL Port**
SSL Port of the Administration Server.
- **User Name**
Name of the administrator allowed to access the Traffic Director Administration Server.
- **Password**
Password of the administrator allowed to access the Traffic Director Administration Server.
- **SNMP Port**
The port on which the SNMP agent is listening. All the SNMP agents on all Traffic Director instance hosts should be running on the same port.
- **Oracle Home**
Directory where the Traffic Director binaries have been installed.
- **Agent URL**
Enter the URL of the Management Agent running on the Administration Server host.

- **Setup Prefix**

Unique identifier for this setup. This ID will be prefixed to the names of the targets being discovered.

After you supply the information and click **Continue**, the Confirmation popup appears.

Click **Close** on the Confirmation popup and then click **Continue**.

Possible Error Messages

These are the typical messages you see when the entered information is incorrect.

Failed to find targets. Please check entered details OTD-70104 Unable to communicate with the administration server: Connection refused

Cause: This typically means the host or port entered is incorrect.

Action: Enter the correct host or port.

Failed to find targets. Please check entered details OTD-70104 Unable to communicate with the administration server: Invalid user or password

Cause: This typically means the user name/password entered is incorrect.

Action: Enter the correct user name and password.

Failed to find targets. Please check entered details OracleHome - xxxxxx not valid

Cause: This typically means the Oracle Home entered is incorrect.

Action: Check if the Oracle Home is correct and has no spelling errors.

6.3.2.2 Discovered Targets

The Add Traffic Director: Discovered Targets screen shows the discovered Traffic Director configurations and instances, along with the Management Agents that will be used for monitoring them.

Note: At this point, the targets have not yet been saved.

Click **Add Targets** to save them, or **Back** to go to the previous screen to review the details you entered.

The table on the page lists the Targets and Agent Assignments. The fields in the table are:

- **Name**—Name of the Traffic Director Configuration/Instance target.
- **Type**—Type of the target discovered. Discovered target types include Traffic Director Configuration and Traffic Director Instance.
- **Agent URL**—Management Agent that will be monitoring the target. All targets discovered are monitored by the Management Agent located on the Administration Server.

6.3.2.3 Viewing Results

The goal of the Add Traffic Director: Results page is to provide results. When you arrive at this page, the targets are already saved. Click **OK** to return to the Middleware page.

The Agent URL that you entered on the Find Configurations and Instances screen is used for monitoring all discovered targets. Once you assign the Management Agent, it cannot be changed.

For additional information refer to the *Oracle Enterprise Manager SNMP Support Reference Guide*.

6.4 About Traffic Director Instance

Once discovered, you can view the performance of entities like virtual-server, origin-servers, and instances, on the instance home page.

The performance visible in the instance home page (tables/charts showing metrics), is at the instance level and the metrics are calculated based on the data/traffic to/from that instance

You access this page by clicking an instance in the Instance region of the Traffic Director Configuration page.

The performance metrics, performance information, or performance summary visible on the instance home page is at the instance level.

The Traffic Director Instance page lists the following regions:

- **Summary**—Provides the general information regarding the instance including how long the instance has been up, its availability and the version of the instance. In addition, you can go directly to configure and manage the Traffic Director instances by using the link to the Traffic Director Admin Console.

Also, the Monitoring and Diagnostics section lists whether there are any incidents involving the Traffic Director instances. An incident is an event that represents an issue requiring resolution. Click the incident to determine what needs attention.

The Summary region also includes statistics for the following: Instance, Resource Usage, and Proxy Cache.

- **Response and Load**
- **CPU and Memory Usage**
- **Virtual Servers and Origin Servers**
- **Failover Groups**—Shows only the failover groups to which the instance belongs.
- **Exalogic**—Shows information about Traffic Director Instances associated to the Exalogic Elastic Cloud target on which the region has been added. The Exalogic region is a region you can add using the Exalogic Elastic Cloud target home page.

For seeing detailed information about the Traffic Director Instances/Configurations shown in this region, click the links to navigate to the respective target home pages.

Note: You can view the Traffic Director Configuration details by selecting **Configuration** from the **Target** menu, then selecting **Last Collected**.

6.5 About Traffic Director Refresh Flow

After configurations are created, you can add new targets for newly added Configurations or Instances in the Traffic Director Administration Server, or delete the targets corresponding to Configurations or Instances that no longer exist in the Traffic Director Administration Server.

You can also modify target properties to reflect the addition or deletion of children. Only Configuration target properties are modified to reflect the addition or deletion of Instances.

You can access this flow by selecting **Refresh Configuration** from Traffic Director Configuration target menu.

Note: This flow adds and removes targets corresponding to all Traffic Director Administration Servers whose Configurations and Instances have been discovered under different setup prefixes.

6.5.1 Adding New Targets to Newly Added Configurations

To add new targets to newly added configurations, perform the following steps:

1. From the **Targets** menu, select **All Targets**, then select a Traffic Director target.
2. From the Traffic Director Configuration menu, select **Refresh Configuration**.
3. Click **Add Targets**.
4. On the resulting page, review that the newly added Configurations and their Instances are shown with refresh status *New* in the table. Click **Save Updates** to save the changes.

Now all new Configurations and their Instance targets are saved to the Repository and are being monitored.

6.5.2 Adding New Targets for Newly Added Instances of Configurations

To add new targets for newly added instances of configurations, perform the following steps:

1. From the **Targets** menu, select **All Targets**, then select a Traffic Director target.
2. From the Traffic Director Configuration menu, select **Refresh Configuration**.
3. Click **Add Targets**.
4. On the resulting page, review that the newly added Instances are shown as targets with refresh status *New* and their Configurations are shown with refresh status *Modified* in the table. Click **Save Updates** to save the changes.

Now all new Instance targets are saved to the Repository and are being monitored.

6.5.3 Deleting Targets of Configurations That Have Been Removed

To delete targets of configurations that have been removed, perform the following steps:

1. From the **Targets** menu, select **All Targets**, then select a Traffic Director target.
2. From the Traffic Director Configuration menu, select **Refresh Configuration**.
3. Click **Delete Targets**.
4. On the resulting page, review that the removed Configurations and their removed Instances are shown with refresh status *Deleted* in the table. Click **Save Updates** to save the changes.

Now all targets of removed Configurations and Instances have been removed from the Repository.

6.5.4 Deleting Targets of Instances That Have Been Removed

To delete targets of instances that have been removed, perform the following steps:

1. From the **Targets** menu, select **All Targets**, then select a Traffic Director target.

2. From the Traffic Director Configuration menu, select **Refresh Configuration**.
3. Click **Delete Targets**.
4. On the resulting page, review that the removed Instances are shown with refresh status *Deleted* in the table and their Configurations are shown with refresh status *Modified*. Click **Save Updates** to save the changes.

Now all targets corresponding to all removed Instances have been removed from the Repository.

Part III

Monitoring Oracle WebLogic Domains and Oracle GlassFish Domains

The chapters in this part describe how you can monitor Oracle WebLogic Domains and Oracle GlassFish Domains.

The chapters are:

- [Chapter 7, "Monitoring WebLogic Domains"](#)
- [Chapter 8, "Overview of Oracle GlassFish Server Management"](#)

Monitoring WebLogic Domains

When using Enterprise Manager version 12.1 and a Secure Socket Layer (SSL) protocol to discover and monitor WebLogic servers, the Management Agent must be able to *trust* the server before it can establish a secure communication link. The Agent maintains a Java Keystore (JKS) truststore containing certificates of Certification Authorities (CAs) that it can trust when establishing a secure connection. The Agent comes with nine well-known CA certificates.

It is recommended that customers using WebLogic t3s in a production environment use certificates signed by a well-known Certification Authority (CA), such as VeriSign or Thawte, on their WebLogic servers. A few popular Root CA certificates are available out-of-box in the Agent's JKS-based truststore and does not require any action by the customer. However, if self-signed certificates or the default (out-of-box) demo certificate are being used on the Weblogic servers, then the following step is needed to explicitly import the Root CA certificate for these server certificates to the Agent's truststore.

The JKS Agent truststore is located at the following location:

```
$ORACLE_HOME/sysman/config/montrust/AgentTrust.jks
```

Note: ORACLE_HOME is the Management Agent's instance home.

Updating the Agent truststore is required on ALL Enterprise Manager Agents involved in the discovery and monitoring of the WebLogic domain using any secure protocol.

7.1 Updating the Agent Truststore

To update the Agent truststore (AgentTrust.jks), you use EMCTL. If the default demo certificate, or a self-signed certificate is being used on the WebLogic servers for t3s/iiops, then the Root CA certificate for this must be added to AgentTrust.jks in order for the Agent to be able to discover and monitor these WebLogic servers and J2EE applications using t3s. An EMCTL command is provided for this purpose.

```
emctl secure add_trust_cert_to_jks [-password <password> -trust_certs_loc <loc> -alias <alias>]
```

Where:

- password = password to the AgentTrust.jks (if not specified, you will be prompted for the password at the command line)
- trust_certs_loc = location of the certificate file to import
- alias = alias for the certificate to import

7.1.1 Importing a Demo WebLogic Server Root CA Certificate.

To import the Root CA certificate for a Demo WebLogic server into the Agent's truststore, the EMCTL *secure* command needs to be executed from the host on which the Agent is located.

```
<ORACLE_HOME>/bin/emctl secure add_trust_cert_to_jks -password "welcome"
```

Note: ORACLE_HOME is the Management Agent's instance home.

The following example demonstrates a typical session using the secure command with the *add_trust_cert_to_jks* option.

Example 7-1 Sample Session

```
./emctl secure add_trust_cert_to_jks -password welcome
Oracle Enterprise Manager 12c Release 1 Cloud Control 12.1.0.2.0
Copyright (c) 1996, 2012 Oracle Corporation. All rights reserved.
```

```
Message      : Certificate was added to keystore
ExitStatus: SUCCESS
```

The default out-of-box password for the AgentTrust.jks is "welcome" and it is recommended that this be changed using the JDK keytool utility. If no password is specified along with the EMCTL command, the system will prompt you for the password.

7.1.2 Importing a Custom Root CA Certificate

If the WebLogic servers are secured with another certificate, such as a self-signed certificate, then that Root CA certificate must be imported into the Agent's truststore as follows:

```
<ORACLE_HOME>/bin/emctl secure add_trust_cert_to_jks -password "welcome"
trust_certs_loc <location of certificate> -alias <certificate-alias>
```

Note: ORACLE_HOME is the Management Agent's instance home.

7.2 Changing the Default AgentTrust.jks Password Using Keytool

The following JVM keytool utility command will let you change the default out-of-box password to the AgentTrust.jks.

```
<ORACLE_HOME>/jdk/bin/keytool -storepasswd -keystore AgentTrust.jks -storepass
welcome -new myNewPass
```

Note: ORACLE_HOME is the Management Agent's instance home.

7.3 Collecting JVM Performance Metrics for WebLogic Servers

In order to collect JVM performance metrics from platform MBeans, the Mbeans must be made accessible via the runtime MBeanServer. To do this, from the WebLogic console, set **PlatformMBeanServerEnabled=true**. *Domain->Advanced*

Note: This only applies to WebLogic server installations where Java Required Files (JRF) are not installed.

7.3.1 Setting the PlatformMBeanServerUsed Attribute

If you are using WebLogic server versions 9.2.0.40, 10.0.2.0, 10.3.1 and 10.3.2 and certain patch releases of 9.x, you must explicitly set the *PlatformMBeanServerUsed* attribute to *TRUE* in addition to setting the *PlatformMBeanServerEnabled* (shown in the previous section). You set the *PlatformMBeanServerUsed* attribute using the WebLogic Scripting Tool (WLST), as shown in the next section.

Note: From WebLogic server versions 10.3.3 onwards, the default out-of-box behavior enables platform MBeans to be accessible via runtime MBeanServers. Hence, this section can be skipped.

7.3.2 Activating Platform MBeans on WebLogicServer 9.x to 10.3.2 versions

The following WebLogic Scripting Tool session shown in [Example 7-2](#) demonstrates how to use, check, and set the PlatformMBeanServerUsed attribute.

User actions are shown in bold.

Example 7-2 Setting PlatformMBeanServerUsed

```
cd common/bin/
```

```
ade:[ adminsw_easvr ] [adminsw@mymachine bin]$ ./wlst.sh
```

```
CLASSPATH=/net/mymachine/scratch/shiphomes/wl/wl10/patch
wls1002/profiles/default/sys_manifest_classpath/weblogic
patch.jar:/net/mymachine/scratch/shiphomes/wl/wl10/patch
cie640/profiles/default/sys_manifest_classpath/weblogic
patch.jar:/net/mymachine/scratch/shiphomes/wl/wl10/jrockit_150
15/lib/tools.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/weblogic_sp.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/weblogic.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/fea
ures/weblogic.server.modules
10.0.2.0.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/features/com.bea.ci
.common-plugin.launch
2.1.2.0.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/webservices.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/
rg.apache.ant
1.6.5/lib/ant-all.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/net.sf.ant
ontrib_1.0b2.0/lib/ant-contrib.jar:
PATH=/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/bin:/net/mymachine/scratch/shiphomes/wl/wl10/modules/org.apache.ant
1.6.5/bin:/net/mymachine/scratch/shiphomes/wl/wl10/jrockit_150
15/jre/bin:/net/mymachine/scratch/shiphomes/wl/wl10/jrockit_150
15/bin:/home/adminsw/products/valgrind/bin:/ade/adminsw
easvr/oracle/jdk/bin:/ade/adminsw
easvr/oracle/work/middleware/oms/perl/bin:/bin:/usr/local/bin:/usr/local/remote/p
ckages/firefox-1.5.0.3:/ade/adminsw_easvr/oratst/bin:/ade/adminsw
easvr/oracle/buildtools/bin:/ade/adminsw_easvr/oracle/emdev/merge:/ade/adminsw
easvr/oracle/emdev/utl:/ade/adminsw_easvr/oracle/utl:/pdp/pds/utl:/ade/adminsw
easvr/oracle/work/middleware/oms/bin:/ade/adminsw
easvr/oracle/nlsrt13/bin:/opt/SUNWspro/bin:/usr/ccs/bin:/usr/bin:/usr/sbin:/ade/a
minsw
easvr/oracle/opmn/bin:/usr/X11R6/bin:/home/adminsw/products/valgrind/bin:/home/ad
insw/products/valgrind/bin:/usr/kerberos/bin:/home/adminsw/products/valgrind/bin:
bin:/usr/bin:/usr/local/bin:/usr/X11R6/bin:/usr/local/ade/bin:/bin:/usr/local/bin
```

Your environment has been set.

```
CLASSPATH=/net/mymachine/scratch/shiphomes/wl/wl10/patch
wls1002/profiles/default/sys_manifest_classpath/weblogic
patch.jar:/net/mymachine/scratch/shiphomes/wl/wl10/patch
cie640/profiles/default/sys_manifest_classpath/weblogic
patch.jar:/net/mymachine/scratch/shiphomes/wl/wl10/jrocket_150
15/lib/tools.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/weblogic_sp.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/weblogic.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/fea
tures/weblogic.server.modules
10.0.2.0.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/features/com.bea.ci
.common-plugin.launch
2.1.2.0.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/server/lib/webservices.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/
rg.apache.ant
1.6.5/lib/ant-all.jar:/net/mymachine/scratch/shiphomes/wl/wl10/modules/net.sf.ant
ontrib
1.0b2.0/lib/ant-contrib.jar:/net/mymachine/scratch/shiphomes/wl/wl10/wlserver
10.0/common/eval/pointbase/lib/pbembedded51.jar:/net/mymachine/scratch/shiphomes/
l/wl10/wlserver
10.0/common/eval/pointbase/lib/pbtools51.jar:/net/mymachine/scratch/shiphomes/wl/
l10/wlserver_10.0/common/eval/pointbase/lib/pbclient51.jar
```

Initializing WebLogic Scripting Tool (WLST) ...

Welcome to WebLogic Server Administration Scripting Shell

Type help() for help on available commands

wls:/offline>

wls:/offline> connect('weblogic','welcome1','mymachine:7501')

Connecting to t3://mymachine:7501 with userid weblogic ...

Successfully connected to Admin Server 'AdminServer' that belongs to domain 'base domain'.

Warning: An insecure protocol was used to connect to the server. To ensure on-the-wire security, the SSL port or Admin port should be used instead.

wls:/base_domain/serverConfig> edit()

Location changed to edit tree. This is a writable tree with DomainMBean as the root. To make changes you will need to start an edit session via startEdit().

For more help, use help(edit)

wls:/base_domain/edit> startEdit()

Starting an edit session ...

Started edit session, please be sure to save and activate your changes once you are done.

wls:/base_domain/edit !> cd('JMX')

wls:/base_domain/edit/JMX !> ls()

drw- base_domain

wls:/base_domain/edit/JMX !> cd ('base_domain')

wls:/base_domain/edit/JMX/base_domain !> ls()

-rw-	CompatibilityMBeanServerEnabled	true
-rw-	DomainMBeanServerEnabled	true

```

-rw- EditMBeanServerEnabled true
-rw- InvocationTimeoutSeconds 0
-rw- ManagementEJBEnabled true
-rw- Name base_domain
-rw- Notes null
-rw- PlatformMBeanServerEnabled true
-rw- PlatformMBeanServerUsed false **
-rw- RuntimeMBeanServerEnabled true
-r-- Type JMX

-r-x freezeCurrentValue Void : String(attributeName)
-r-x isSet Boolean : String(propertyName)
)
-r-x restoreDefaultValue Void : String(attributeName)
-r-x unSet Void : String(propertyName)

```

```
wls:/base_domain/edit/JMX/base_domain !> set('PlatformMBeanServerUsed','true')
```

```
wls:/base_domain/edit/JMX/base_domain !> ls()
```

```

-rw- CompatibilityMBeanServerEnabled true
-rw- DomainMBeanServerEnabled true
-rw- EditMBeanServerEnabled true
-rw- InvocationTimeoutSeconds 0
-rw- ManagementEJBEnabled true
-rw- Name base_domain
-rw- Notes null
-rw- PlatformMBeanServerEnabled true
-rw- PlatformMBeanServerUsed true **
-rw- RuntimeMBeanServerEnabled true
-r-- Type JMX
-r-x freezeCurrentValue Void : String(attributeName)
-r-x isSet Boolean : String(propertyName)
)
-r-x restoreDefaultValue Void : String(attributeName)
-r-x unSet Void : String(propertyName)

```

```
wls:/base_domain/edit/JMX/base_domain !> activate()
```

Activating all your changes, this may take a while ...

The edit lock associated with this edit session is released once the activation is completed.

The following non-dynamic attribute(s) have been changed on MBeans

that require server re-start: **

MBean Changed : com.bea:Name=base_domain,Type=JMX

Attributes changed : PlatformMBeanServerUsed

Activation completed

```
wls:/base_domain/edit/JMX/base_domain> ade:[ adminsw_easvr ] [adminsw@mymachine
bin]$
```

```
ade:[ adminsw_easvr ] [adminsw@mymachine bin]$
```

****NOTE:** *PlatformMBeanServerUsed* attribute is present in WebLogic releases 10.3.1.0 and 10.3.2.0 and also for certain patch releases of prior versions. If above *PlatformMBeanServerUsed* attribute is NOT present, or if it is present and already set to true, then running the commands are not necessary.

Overview of Oracle GlassFish Server Management

Oracle GlassFish Server (GlassFish Server) provides the server environment needed for the development and deployment of Java Platform, Enterprise Edition (Java EE platform) applications and web technologies based on Java technology.

Enterprise Manager Cloud Control provides the ability for you to monitor Oracle GlassFish Domains, Servers, and Clusters.

This chapter provides the following:

- [Before Getting Started](#)
- [Understanding the Oracle GlassFish Domain](#)
- [Understanding the Oracle GlassFish Server Home Page](#)
- [Understanding the Oracle GlassFish Cluster Home Page](#)
- [Viewing Collected Configuration Data for Oracle GlassFish Members](#)

8.1 Before Getting Started

Before you start using Oracle GlassFish, ensure you are familiar with the Oracle GlassFish concepts. Refer to the Oracle GlassFish Server documentation available at <http://www.oracle.com/technetwork/middleware/glassfish/documentation/index.html>.

Also, ensure you have been granted the roles and privileges needed to use Oracle GlassFish.

8.1.1 GlassFish Roles and Privileges

Before you start using Oracle GlassFish, ensure you have access to the following privileges:

Task	Privilege
Start and stop GlassFish targets	FMW_PROCESS_CONTROL_TARGET; CREATE_JOB
View start, stop, and restart menus	FMW_PROCESS_CONTROL_TARGET
Use start, stop, and restart menus	CREATE_JOB
Discovery and refresh	CREATE_PROPAGATING_GROUP

8.1.2 Adding Domain Certificate to Activate Start and Stop Operations

To start or stop Oracle GlassFish targets, you must manually export the domain certificate from the Oracle Glassfish domain for which you want to perform start and stop operations and add it to the AgentTrust.jks file of the Agent which is used to monitor that domain.

Perform the following steps to add the certificate. The first step extracts the Oracle GlassFish domain certificate to a temporary certificate file (server.cer). The second step adds this certificate to the Agent trust store.

1. This step should be run from the location where the GlassFish domain's configuration is installed, then copy this server.cer file over to the specified location under the Agent monitoring that domain and servers.

```
keytool -keystore <GlassFish Domain>/config/cacerts.jks -export -alias  
<alias> -file <file> -noprompt -storepass <password>
```

Where:

<GlassFish Domain> - Domain where file is located
<alias> - Alias of Oracle Glassfish domain certificate in cacerts.jks (Default is slas)
<password> - Password for cacerts.jks (Default is changeit)
<file> - Temporary certificate file to which domain certificate is added, for example, server.cer

2. Import the Certificate to the AgentTrust.jks file using the keytool *or* emctl commands. This should be run on the Agent.

```
emctl secure add_trust_cert_to_jks [-password <password>  
-trust_certs_loc <loc> -alias <alias>]
```

Where:

<password> - password to the AgentTrust.jks file
<loc> - location of the certificate(certificate.cer) file to import
<alias> - alias for the certificate to import

OR

```
keytool -import -alias <alias> -file <file>  
-keystore <AGENT_HOME>/sysman/config/montrust/AgentTrust.jks  
-noprompt -storepass <password>
```

Where:

<alias> - alias for the certificate to import
<file> - temporary file to which certificate was exported in step 1
<AGENT_HOME> - path to agent_inst directory
<password> - password to the AgentTrust.jks file

8.2 Understanding the Oracle GlassFish Domain

As a GlassFish Server Administrator, you can use the GlassFish Domain home page to understand the overall health of the GlassFish Domain. This home page provides summary information about the domain, as well as specifics about clusters and servers.

Note: You will see errors if you do not have the server or cluster configured to enable the monitoring attributes and/or component monitoring levels required by Enterprise Manager. To collect and view metrics in Enterprise Manager, monitoring must be enabled on the servers. Go to the GlassFish Server Administration Console and click the **Configure Monitoring** link for each server. Ensure that both the Monitoring Service and Monitoring MBeans are enabled.

In addition, ensure the Monitoring Level is set to HIGH for the following components:

- Connector Connection Pool
 - Connector Service
 - EJB Container
 - JDBC Connection Pool
 - JMS Service
 - JVM
 - Transaction service
 - Web Container
-

Note: At the top of the page, the host that appears above the timestamp is the host of the agent monitoring the target. This may or may not be the Administration Server host.

Summary

The Summary section provides general information about the domain, a link to the GlassFish Server Administration Console, and monitoring and diagnostics statistics.

- General

Shows the administration server for this domain, the host on which the administration server is deployed, the listener port and listener port for the secure sockets layer (SSL), and when the domain was last refreshed.

Note that the listener ports are associated with the administration server.

Click the name link to drill down to the Administration Server's Home page.

- Tools

Provides a link to the GlassFish Server Administration Console where you can configure and manage the GlassFish Server.

- Monitoring and Diagnostics

- Provides the number of incidents that occurred in the last 7 days. An incident is an event or a set of closely correlated events that represent an observed issue requiring resolution through immediate action or root-cause problem resolution.
- Provides the number and severity of incidents on any descendant target. Descendant targets are the members (children, grandchildren, and so on) within the domain. For example, a domain's descendant targets are any clusters or servers in that domain, as well as any other targets under them.

Note that the descendant target incident count does *not* include incidents on itself (only children).

- Alerts you to changes made to the configuration. Click the link next to Configuration Changes to learn what configurations changed and when.

Clusters

If the domain contains clusters, this region lists the clusters. If the domain does not contain clusters, the table appears with the message "No Clusters Found".

For each cluster, the name, status, servers, and incidents fields appear.

Servers

The domain home page lists all servers that are contained within the domain, including servers that are contained within any clusters in the domain.

For each server, the name, status, host, associated cluster, configuration data, as well as performance data appear. For additional information regarding a server, click the server name.

Domain Target Menu

The domain home page provides a menu of additional functions you can perform from this page. The menu is located under the name of the domain.

Menu options of particular interest are:

- **Diagnostics** - These tools enable you to detect and resolve availability and performance issues on your Java applications. In addition, you can monitor Java applications, configure JVM pools, analyze live threads, as well as view snapshots for threads, heaps, and JFRs. See [Chapter 21, "Using JVM Diagnostics"](#) for a detailed description of the JVM diagnostics tools.
- **Control** - Allows you to start all servers, shut down all servers, create blackouts of all servers and end blackouts of all servers. Other than blackout operations, these operations do not impact the GlassFish Administration Server.
- **GlassFish Server Administration Console** - Opens a new window to the GlassFish Server Administration Console. This console allows for greater control and administration of the GlassFish Domains and its members such as servers and clusters.
- **Refresh GlassFish Domain** - Refreshes the domain.

This operation rediscovers the domain. When refresh is performed, the Management Agent connects to the Administration Server by way of the REpresentational State Transfer (REST) interface to obtain any changes in domain membership.

Changes in membership could include the addition or removal of new GlassFish Servers or the creation or removal of GlassFish Clusters. When a refresh is performed, the Administration Server must be up and running.

8.2.1 How to Add an Oracle GlassFish Domain To Be Monitored

There are two ways to add an Oracle GlassFish Domain to Enterprise Manager Cloud Control.

If you need to discover several domains, consider using the Enterprise Manager Command Line Interface (EMCLI). This allows you to discover multiple domains in

one operation. See the *Oracle Enterprise Manager Command Line Interface* manual for additional information.

To watch a video about how to discover an Oracle GlassFish Domain, click [here](#).

Method 1

1. From the **Targets** menu, select **Middleware**.
2. Click the **Add** button, then select **Oracle GlassFish Domain**.
3. On the **Add GlassFish Domain: Find Targets** page, provide the required information denoted by an asterisk. Click **Continue**.
4. Reassign the agents.

Method 2

1. From the Enterprise Manager Setup menu located at the top right of the screen, select **Add Target**, then select **Add Targets Manually**.
2. On the Add Targets Manually page, select **Add Targets Using Guided Process (Also Adds Related Targets)**.
3. In the Target Type menu, select **Oracle GlassFish Domain**.
4. Then click the **Add Using Guided Process** button.
5. On the **Add GlassFish Domain: Find Targets** page, provide the required information denoted by an asterisk. Click **Continue**.
6. Reassign the agents.

8.2.2 Adding an Oracle GlassFish Domain: Finding and Assigning Targets

After adding the domain to the Cloud Control console, consider performing the following tasks:

- Configure notification methods and your notification schedule to receive email and page notifications when potential problems occur, for example, GlassFish Server goes down unexpectedly, key performance metric threshold is reached, and so on.
- Create a monitoring template for GlassFish related components to set thresholds for key performance metrics and collection frequency of configuration and monitoring data. You can then apply this template to several GlassFish components to ensure that all components are monitored in a similar fashion.

Before you can add (discover) an Oracle Glassfish Domain as a managed target, you must provide the information Cloud Control requires to find the targets associated with the domain. Provide the required information as follows:

Field	Description
Administration Server Host	<p>Name of the Domain Administration Server Host. Select a host from the list provided. This is the host name for where the Administration Server is installed and running.</p> <p>Ensure that the Administration Server is up and accessible prior to initiating discovery. While the Administration Server must be up in order to perform discovery, it need not remain up for Cloud Control to monitor the availability and performance of the domain and its members. However, any time you want to refresh the domain (that is, rediscover the domain to begin monitoring newly created components or to remove recently removed components), you must ensure that the Administration Server is up.</p>

Field	Description
Port	<p>Administration Server Host port number. The default port number is 4848. This is the port on which the Administration Server is listening. The default port in the Discovery UI is 7001.</p> <p>If the port is configured for the HTTPS protocol only, then you must also specify 'HTTPS' as the protocol in the Advanced section of this page. For discovering secure domain, use the https protocol.</p> <p>If the agent needs to be secured, use emctl. If the default demo certificate, or a self-signed certificate is being used on the GlassFish Servers for t3s/iiops, then the Root CA certificate for this must be added to the AgentTrust.jks in order for the Agent to be able to discover and monitor these GlassFish Servers and Java EE applications using t3s. An emctl command is provided for this purpose.</p> <pre>emctl secure add_trust_cert_to_jks [-password <password> -trust_certs_loc <loc> -alias <alias>]</pre> <p>where</p> <ul style="list-style-type: none"> ■ alias - alias for the cert to import ■ password - password to the AgentTrust.jks (if not specified will be prompted for) ■ trust_certs_loc - location of the cert file to import
Username	User name of the Administration Server Domain. User needs CREATE_PROPAGATING_GROUP privilege for discovery/refresh.
Password	Password of the Administration Server Domain
Unique Domain Identifier	<p>Used as a prefix to ensure domain names are unique in environments with the same domain name. For example, if the Unique Domain Identifier is Domain01 and the domain name is production_domain then the domain name in Enterprise Manager would be Domain01_production_domain.</p> <p>The default Unique Domain Identifier is Domain01. This identifier is incremented each time an additional domain is discovered. For example, if you discover a domain with the name stage_domain, then the domain name in Enterprise Manager is Domain02_stage_domain.</p> <p>You can change the default identifier. However, the identifier must only contain alphanumeric characters and the special character '_'. No other special characters can be used in the identifier.</p>
Agent	<p>Agent used to discover the target; that is, the agent used to connect to the GlassFish Administration Server.</p> <p>The specified Management Agent can be local to the Administration Server (that is, installed on the same host machine as the Administration Server) or can be remote to the Administration Server (that is, installed on a different host machine as the Administration Server). The Management Agent uses the REST Interface to connect to the Administration Server (thus, requiring the Administration Server to be up) in order to discover the details of the domain and its members.</p> <p>This agent does not have to be the same agent that is used for monitoring. Typically, when you discover a target, you select the agent local to the GlassFish Administrator Server. When you choose the agent for monitoring, you choose the local agent to each managed server. If there is no local agent to each managed server, then by default, the agent used for discovery is used.</p> <p>You can choose the agent from the drop-down list. The agent must be a version 12.1 Management Agent.</p>

In the Advanced Section, provide additional information for discovering and assigning targets.

Field	Description
Protocol	Use either http or https to make the connection to the Administration Server. The default value for the Protocol field is http.
Service URL	Connection string used to make a JMX connection to the GlassFish domain.

Field	Description
External Parameters	Optional field for passing parameters to the Java process used for connecting to the Administration Server. These parameters must begin with -D. You can name value pairs which are separated by a space (), such as -Dkerborosekey=a -Dparam2=b -Dparam3=c. For example: -Dname=foo -Dparam1=abcd
Discovery Debug File Name	The agent side discovery messages for this session will be logged into this file. This file will be generated in the discovery agent's log directory <agent home>/sysman/log. If this file already exists, it will be updated.

Once you have provided all the information, click **Continue**.

A processing page appears indicating that Enterprise Manager is attempting to find targets. When processing is complete, the processing page displays the number of targets found. The Assign Agents page displays.

Note: If the process of discovering or refreshing a farm fails because the system has reached the maximum number of HTTP socket connections, you must edit the emd.properties file and increase the MaxInComingConnections parameter to 500. After you make the change then bounce the agent.

Assigning Agents

The agents will be assigned automatically. If a local agent is found where a server is running, that agent is assigned. Otherwise the agent that you entered in the Find Targets page is assigned.

The Saving Target to Agent processing window appears indicating how many total targets have been added and successfully saved. It will also indicate the number of targets were unsuccessfully added.

If there are no warnings due to a failure to assign agents, the Show/Hide section is hidden by default. If there are any warnings, the Show/Hide section will automatically expand to display the Results table.

If the targets of the domain change in the future, you can use the Refresh Domain option to add or remove targets.

After Discovery

After adding the domain to the Cloud Control console, consider performing the following tasks:

- Configure notification methods and your notification schedule to receive email and page notifications when potential problems occur, for example, GlassFish Server goes down unexpectedly, key performance metric threshold is reached, and so on.
- Create a monitoring template for GlassFish related components to set thresholds for key performance metrics and collection frequency of configuration and monitoring data. You can then apply this template to several GlassFish components to ensure that all components are monitored in a similar fashion.

Notes

- If the process of discovering or refreshing a domain fails because the system has reached the maximum number of HTTP socket connections, you must edit the emd.properties file and increase the MaxInComingConnections parameter to 500. After you make the change, bounce the agent.

- When a user discovers a secure GlassFish Domain with a custom certificate, they also must import the certificate to the agent trust store of the following agents:
 - In the discovery agent
 - In all the agents used for monitoring the targets which belong to that GlassFish Domain
- If a local Management Agent is found on the same host machine as a GlassFish Server within the domain, then that agent is automatically assigned to monitor the GlassFish Server.
- If there are any validation errors in the discovery process, errors will display in a message box. Similarly, if agents to which targets are being pushed are down at the time of discovery, an error message displays stating that the operation for that target will fail.
- You can easily change the monitoring configuration of a target. For more information, see *Modifying the Monitoring Configuration of a Target*.
- You can refresh an existing domain by using the Refresh GlassFish Domain option on the GlassFish Domain menu.

8.2.3 Adding an Oracle GlassFish Domain: Displaying Results

After the Assign Agents page displays the number of targets discovered, you can use Cloud Control to display the targets that have been discovered in the domain. The Results page may indicate that all targets have been successfully added or that the process was partially successful. The Results page lists the number of successful targets along with the number of unsuccessful targets. You have the option of retrying targets with errors by using the Retry Targets with Errors feature.

If there were no warnings due to a failure to assign agents, the Show/Hide section is hidden by default. If there are any warnings, the Show/Hide section will automatically expand to display the Results table.

The Results table lists the Target, Type, Host, Configured Agent, and Status. The targets are displayed in an expanded hierarchy. If you had selected the option to manually assign an agent to a target, you can enter the agent in the Configured Agent field. Otherwise if a local agent is found where a server is running, that agent is assigned or the agent that you entered in the Find Targets page is assigned.

You can change the agent only for targets to which you can assign an agent. You cannot modify the monitoring agent of targets that use a parent agent such as J2EE applications, soa-infra, and so on.

The Status column displays the results of each target and displays the following values:

- Success (Green check mark) -- Target is pushed to the agent successfully
- Failure (Red X) -- Failed to push target to agent
- Already Saved -- Target already saved

If agents to which targets are being pushed are down at the time of discovery, an error message displays stating that the operation for that target will fail.

When all processing completes, you can choose to fix any issues caused by targets not being added because of errors related to agent assignments by pressing the Retry Targets with Errors button. The Retry Targets with Errors window appears. A scrollable table displays showing each target that was not added due to errors. Often targets are not added because agents were not started at the time of discovery. You can

either change the agent in the Agent field or simply click Retry to initiate the process again.

Alternatively, you can leave this page and return later to address any issues. If you press Cancel, all targets that have been discovered will be monitored by Cloud Control and the Middleware page is then displayed.

Note: If the process of discovering or refreshing a domain fails because the system has reached the maximum number of HTTP socket connections, you must edit the `emd.properties` file and increase the `MaxInComingConnections` parameter to 500. After you make the change then bounce the agent.

8.2.4 How to Access an Oracle GlassFish Domain

To access the Oracle GlassFish Domain home page, perform the following steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select **Oracle GlassFish Full Hierarchy** in the Area field and click **Search**. In the table, click the GlassFish Domain in which you are interested. The GlassFish Domain page appears.

On this page, you can:

- Easily access the GlassFish Server Administration Console to make configuration changes to the domain and perform administration operations.
- Start up and shut down all servers and clusters except for the Domain Administration Server.
- Blackout the domain when the domain must go down for maintenance. By blacking out the domain, alert notifications are not sent. Click **Create Blackout...** at the top of the page to access this functionality. You can also use the **GlassFish Domain** menu: from the **Control** menu, select **Create Blackout...**
- Customize the layout and data displayed in target home pages. The changes you make are persisted for all targets' home pages of the particular target type you are customizing and are persisted for the user you are currently logged in as; this enables you to create customized consoles for monitoring various target types.
- Refresh the domain after creating a new server or deploying a new application. This enables you to see the most up-to-date information on this page.
- Perform configuration management operations such as viewing and analyzing collected configuration data, comparing configurations between servers, tracking configuration changes over time, and searching configuration data across the enterprise.

To view a video about monitoring an Oracle GlassFish Domain, click [here](#).

8.2.5 Refreshing an Oracle GlassFish Domain

Enterprise Manager is not informed when changes are made to the domain configuration and membership. For example, if someone using the GlassFish Server Administration Console adds a new managed server, removes a server, adds a cluster, removes a cluster, and so on, Enterprise Manager does not know about the changes until the target is refreshed or rediscovered. It is only then that Enterprise Manager knows of the newly added targets and you can add them to Enterprise Manager for centralized management and monitoring.

By using Enterprise Manager, you are informed when target members are removed. You can remove these targets from Enterprise Manager. It is by design that Enterprise Manager does not automatically remove the targets.

When you refresh the domain, historical data is not lost unless you choose to delete a target that has been removed outside of Enterprise Manager. When new members are found, you must choose the agent to monitor them.

To manually refresh the GlassFish Domain to ensure you are monitoring the complete domain, follow these steps.

1. On the GlassFish Domain page, locate the GlassFish Domain menu.
2. From the menu, select **Refresh GlassFish Domain**.

8.3 Understanding the Oracle GlassFish Server Home Page

As a GlassFish Server Administrator, you can review the GlassFish Server home page to understand the overall health of the GlassFish Server. The GlassFish Server home page provides summary information about the server, and statistics regarding the most requested servlets and response and load.

The home page provides the following:

- Current status of GlassFish Server
- Key GlassFish Server performance metrics including: Java Message Service (JMS), Enterprise JavaBeans (EJB), Java Transaction API (JTA) usage
- Indication of any recent configuration changes
- Incidents

Summary

This section provides general information about the server, link to the GlassFish Server Administration Console, monitoring and diagnostics statistics, and so on.

- General

Shows the status and resource usage of the server. Click any link to get additional information on a metric.
- Servlets

Shows an overview of all the servlets present on the server. Some of the individual servlet metrics can be found in the Most Requested region.
- Connection Pool and JTA Usage

Shows metrics relating to connection pool and Java Transactions API (JTA) usage.
- Tools

Provides a link to the GlassFish Server Administration Console where you can configure and manage the GlassFish Server.
- Monitoring and Diagnostics
 - Provides the number of incidents that occurred in the last 7 days. An incident is an event or a set of closely correlated events that represent an observed issue requiring resolution through immediate action or root-cause problem resolution.
 - Alerts you to changes made to the configuration. Click the link next to Configuration Changes to learn what configurations changed and when.

- **EJBs**
Shows statistics pertaining to Enterprise JavaBeans (EJBs) accesses and the cache.
- **JMS**
Shows Java Message Service (JMS) statistics for this server.

Most Requested Servlets

This region lists the servlets that have had requests during the past 24 hours.

Response and Load

Shows the request processing time and requests per minute of all servlets over time.

GlassFish Server Menu

The server home page provides a menu of additional functions you can perform from this page. The menu is located under the name of the server.

Menu options of particular interest are:

- **Diagnostics** - These tools enable you to detect and resolve availability and performance issues on your Java applications. In addition, you can monitor Java applications, configure JVM pools, analyze live threads, as well as view snapshots for threads, heaps, and JFRs. See [Chapter 21, "Using JVM Diagnostics"](#) for a detailed description of the JVM diagnostics tools.
- **Control** - Allows you to start, restart, and shut down the server, as well as create and end blackouts for the server. You cannot start and stop the GlassFish Administration Server.
- **GlassFish Server Administration Console** - Opens a new window to the GlassFish Server Administration Console. This console allows for greater control and administration of the GlassFish Servers.
- **Configuration** - Enables you to compare server configurations, track history, search, as well as study the last configuration data.
- **Monitoring** - You can customize the Performance Summary metrics, as well as the metric and collection settings where you can set thresholds and the frequency of collections.

8.3.1 How to Access an Oracle GlassFish Server

To access the Oracle GlassFish Server home page, perform the following steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select **Oracle GlassFish Full Hierarchy** in the Area field and click **Search**.
3. In the table, expand the Oracle GlassFish Domain node that contains the GlassFish Server of interest.
4. Click the GlassFish Server. The GlassFish Server home page appears.

This page provides a summary of the server's health, as well as key performance indicators for the server, like Enterprise JavaBeans (EJBs) and Java Message Service (JMS).

In addition, you can:

- Easily access the GlassFish Server Administration Console (in the Summary region) to make configuration changes to the server and perform administration operations. Click the link, then log in with your user name and password.
- Create and end blackouts.
Blackouts allow Enterprise Manager users to suspend management data collection activity on one or more managed targets. For example, administrators use blackouts to prevent data collection during scheduled maintenance or emergency operations. By blacking out the server, alert notifications are not sent.
- Start up, shut down, and restart servers.
These operations call predefined jobs that perform the operations. Credentials are needed for each of these operations.
- Customize the layout in target home pages. For example, you can customize the page to show particular GlassFish Server metrics.
For more information, see [Personalizing a Cloud Control Page](#).
- View historical performance metrics from the GlassFish Server menu by selecting **Monitoring**, then selecting **Performance Summary**. You can customize the Performance Summary page.
- Customize the layout and data displayed in target home pages. The changes you make are persisted for all targets' home pages of the particular target type you are customizing and are persisted for the user you are currently logged in as; this enables you to create customized consoles for monitoring various target types.
- Perform configuration management operations such as viewing and analyzing collected configuration data, comparing configurations between servers, tracking configuration changes over time, and searching configuration data across the enterprise.

8.4 Understanding the Oracle GlassFish Cluster Home Page

As a GlassFish Server Administrator, you can review the GlassFish Cluster home page to understand the overall health of the GlassFish Cluster by way of its status as well as its key performance and configuration data.

The home page provides the following:

- Current availability of GlassFish Cluster
- Key GlassFish Cluster resource usage metrics
These metrics are based on the servers within the cluster not on the cluster itself.
- Indication of any recent configuration changes
- Incidents

Summary

The Summary section provides general information about the cluster, link to the GlassFish Server Administration Console, and monitoring and diagnostics statistics.

- Availability
Shows the availability of the cluster. The cluster is considered up as long as one server in the cluster is up.
- Tools

Provides a link to the GlassFish Server Administration Console where you can configure and manage the GlassFish Cluster.

- **Monitoring and Diagnostics**
 - Provides the number of incidents that occurred in the last 7 days. An incident is an event or a set of closely correlated events that represent an observed issue requiring resolution through immediate action or root-cause problem resolution.
 - Provides the number and severity of incidents on any descendant target. Descendant targets are the members (children, grandchildren, and so on) within the domain. For example, a domain's descendant targets are any clusters or servers in that domain, as well as any other targets under them.

Note that the descendant target incident count does not include incidents on itself (only children).
 - Alerts you to changes made to the configuration. Click the link next to Configuration Changes to learn what configurations changed and when.

Servers

The domain lists all servers that are contained within the cluster.

For each server, the name, status, host, configuration data, as well as performance data appear. For additional information regarding a server, click the server name.

Resource Usage

Shows the CPU usage over time and the Heap Usage over time graphs for every server the cluster contains.

GlassFish Cluster Target Menu

The cluster home page provides a menu of additional functions you can perform from this page. The menu is located under the name of the cluster.

Menu options of particular interest are:

- **Diagnostics** - These tools enable you to detect and resolve availability and performance issues on your Java applications. In addition, you can monitor Java applications, configure JVM pools, analyze live threads, as well as view snapshots for threads, heaps, and JFRs. See [Chapter 21, "Using JVM Diagnostics"](#) for a detailed description of the JVM diagnostics tools.
- **Control** - Allows you to start all servers, shut down all servers, create blackouts of all servers and end blackouts of all servers within the cluster.

Note: There is *no* rolling process control for the cluster, that is, all the servers are brought up (or down) together in parallel.
- **GlassFish Server Administration Console** - Opens a new window to the GlassFish Server Administration Console. This console allows for greater control and administration of the GlassFish Servers.

8.4.1 How to Access an Oracle GlassFish Cluster

To access the Oracle GlassFish Cluster home page, perform the following steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select **Oracle GlassFish Full Hierarchy** in the Area field and click **Search**.

3. In the table, click the GlassFish Cluster in which you are interested. The GlassFish Cluster home page appears.

On this page, you can:

- Easily access the GlassFish Server Administration Console (in the Summary region) to make configuration changes to the cluster and perform administration operations. Click the link, then log in with your user name and password.
- You can customize the layout and data displayed in target home pages to suit your specific needs. The changes you make are for a target type and user.

For more information, see [Personalizing a Cloud Control Page](#).

8.5 Viewing Collected Configuration Data for Oracle GlassFish Members

Configuration data is available for Oracle GlassFish Domains, Clusters, and Servers. To view the configuration data:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select **Oracle GlassFish** in the Area field and click **Search**. In the table, click the target of interest, that is, a GlassFish Domain, Cluster, or Server.
3. On the resulting page, click the menu located under the page title, for example, GlassFish Server, GlassFish Domain, or GlassFish Cluster.
4. Select **Configuration**, then select **Last Collected**.

In addition to viewing the Last Collected data, from the Configuration menu you can:

- Save current collected configuration data with which to compare future collections
- Create configuration searches against GlassFish related targets so you can search for specific configurations across a data center. Oracle provides the following predefined configuration searches: Oracle GlassFish Server: Ports and Oracle GlassFish Server: Datasources.
- Compare current configurations between two different GlassFish Servers, for example, production server versus QA server. You can also compare domains.
- Use predefined GlassFish Server configuration comparison template while comparing servers.

For example, use a template to ignore data in the comparison results (for instance configuration data that you EXPECT to be different) or to notify you of detected configuration differences that you deem critical.

Oracle also provides a template for comparing GlassFish Domains.

8.6 Creating an Oracle GlassFish Server Configuration Comparison Template

Enterprise Manager provides a monitoring template for GlassFish that you can customize. For example, you can set metric thresholds and collection frequency (for both performance and configuration data), and then apply these settings in the template to several servers of the domain or across several domains.

This ensures a consistent way of monitoring across targets and eliminates the need to go to each server to specify thresholds and collection settings.

To create a configuration comparison template, perform these steps:

1. From Enterprise menu, select **Configuration**, then **Comparison Templates**.
2. Click the **Help** button located at the top right of the page for information on how to create a new comparison template.

Part IV

Managing Oracle SOA

The chapters in this part describe how you can discover and monitor Oracle BPEL Process Manager, Oracle Service Bus, and Oracle SOA Suite.

The chapters are:

- Chapter 9, "Overview of Oracle SOA Management"
- Chapter 10, "Discovering and Monitoring Oracle BPEL Process Manager"
- Chapter 11, "Discovering and Monitoring Oracle Service Bus"
- Chapter 12, "Discovering and Monitoring the SOA Suite"

Overview of Oracle SOA Management

The Oracle SOA Management Pack Enterprise Edition delivers comprehensive management capabilities for a Service-Oriented Architecture-based (SOA) environment. By combining SOA runtime governance, business-IT alignment, and SOA infrastructure management with Oracle's rich and comprehensive system management solution, Enterprise Manager Cloud Control significantly reduces the cost and complexity of managing SOA-based environments.

Table 9–1 Highlights of Oracle SOA Management Pack Enterprise Edition

Feature	Benefit
Centralized management console	Provides administrators managing SOA environments with a consolidated browser-based view of the entire enterprise, thereby enabling them to monitor and manage all of their components from a central location.
Discovery and service modeling	Provides discovery of the following: <ul style="list-style-type: none"> ■ Oracle SOA Infrastructure deployed to the WebLogic Server. ■ Oracle SOA Composite applications deployed to the SOA Infrastructure. ■ Oracle BPEL processes deployed to the Oracle BPEL Process Manager (BPEL Process Manager) server and the dependent partner links. ■ Oracle Service Bus-based business and proxy services. ■ Service modeling offers out-of-the-box automated system modeling capabilities for the SOA infrastructure.
Runtime governance	Defines SOAP tests to measure and record availability and performance of partner links (or any Web service) and business/proxy services for historical trending, troubleshooting, and root cause analysis purposes. Also provides an error list of process instances with drill-downs into instance details.
Infrastructure management	Monitors the availability and performance of the SOA infrastructure components. Both current and historic availability of targets (such as BPEL Process Manager or Oracle Service Bus) are recorded for troubleshooting and root cause analysis.
Configuration management	Collects configuration information for the BPEL Process Manager server/domains/processes and Oracle Service Bus. The parameters can be refreshed, saved, or compared with another target. Different versions of the same target can also be compared.
Deployment automation	Automates the deployment of the following: <ul style="list-style-type: none"> ■ SOA Artifacts Provisioning: This includes provisioning of SOA Composites, Oracle WebLogic Server Policies, Assertion Templates, and JPS Policy and Credential Stores. ■ BPEL processes on BPEL Process Managers ■ Oracle Service Bus resources from a source OSB domain to a target OSB domain. For detailed information on the provisioning procedures, see <i>Enterprise Manager Administrator's Guide for Software and Server Provisioning and Patching</i> .
Business-IT alignment	Enables you to consolidate the IT and business management tools into a unified system. BAM-EM integration unites business KPIs and system metrics in one system for correlation and trending.
Service level management	Enables you to monitor services from the end-user's perspective using service tests or synthetic transactions, model relationships between services and underlying IT components, and report on achieved service levels.

Table 9–1 (Cont.) Highlights of Oracle SOA Management Pack Enterprise Edition

Feature	Benefit
Application Dependency and Performance	Enables you to manage your SOA solutions by leveraging a model-driven top-down approach within your development, quality assurance (QA), staging, and production environments. Business application owners and operational staff can automatically discover your BPEL workflows and correlate them with the underlying Web services; Enterprise Service Buses (ESBs); and back-end Java 2 Platform, Enterprise Edition (Java EE) resources through detailed modeling and drill-down directly into the performance metrics at the component level. For more information, see Chapter 38, "Introduction to Application Dependency and Performance"
Historical analysis and reporting	Stores the collected metric and configuration data in a central repository, thereby enabling administrators to analyze metrics through various historical views and facilitate strategic trend analysis and reporting.
Instance Tracing	Allows you to trace the message flow across SOA Composites and SOA Infrastructure instances monitored by Enterprise Manager Cloud Control.
Business Transaction Management	Provides monitoring of business transactions as they flow across tiers and continuous discovery of components, transaction flow, service dependencies and relationships.
Dehydration Store	Shows the performance of the database that is used by the SOA Infrastructure. Using this data, the SOA administrator can identify problems that are causing the performance bottleneck.
Error Hospital	Enables you to view an aggregate count of errors that have occurred in all SOA Composites deployed in the SOA Infrastructure. SOA Administrator can use this report to perform bulk recovery on a selected group of similar faults.

Discovering and Monitoring Oracle BPEL Process Manager

This chapter describes how you can discover and monitor Oracle BPEL Process Manager (BPEL Process Manager) using Enterprise Manager Cloud Control.

In particular, this document covers the following:

- [Supported Versions](#)
- [Understanding the Discovery Mechanism](#)
- [Understanding the Discovery Process](#)
- [Setting Up Oracle Software Library](#)
- [Discovering BPEL Process Manager](#)
- [Configuring BPEL Process Manager](#)
- [Troubleshooting BPEL Process Managers](#)

10.1 Supported Versions

The following are the versions of BPEL Process Manager that are supported for monitoring in Enterprise Manager Cloud Control.

Table 10–1 Supported Versions

Supported BPEL Process Manager Version	Application Server Deployed To	Supported in Enterprise Manager
Oracle BPEL Process Manager 10.1.2	Oracle Application Server 10g Release 1 (10.1.2)	Enterprise Manager 10g Release 4 (10.2.0.4) or higher Enterprise Manager 11g Enterprise Manager 12c
Oracle BPEL Process Manager 10.1.3.1 and 10.1.3.3 (Part of Oracle SOA Suite 10.1.3.1 and 10.1.3.3)	Oracle Application Server 10g Release 1 (10.1.3.1) and (10.1.3.3)	Enterprise Manager 10g Release 3 (10.2.0.3) or higher Enterprise Manager 11g Enterprise Manager 12c
Oracle BPEL Process Manager 10.1.3.1 and 10.1.3.3 (Part of Oracle SOA Suite 10.1.3.1 and 10.1.3.3)	Oracle WebLogic Managed Server 9.2	Enterprise Manager 10g Release 5 (10.2.0.5) or higher Enterprise Manager 10 g Release 4 (10.2.0.4) with one-off patches applied. For details, see Section 10.3, "Understanding the Discovery Process" . Enterprise Manager 11g Enterprise Manager 12c

Table 10–1 (Cont.) Supported Versions

Supported BPEL Process Manager Version	Application Server Deployed To	Supported in Enterprise Manager
Oracle BPEL Process Manager 10.1.3.1 and 10.1.3.3 <i>(Part of Oracle SOA Suite 10.1.3.1 and 10.1.3.3)</i>	IBM WebSphere Application Server 6.1	Enterprise Manager 10g Release 5 (10.2.0.5) or higher Enterprise Manager 10g Release 4 (10.2.0.4) with one-off patches applied. For details, see Section 10.3, "Understanding the Discovery Process" . Enterprise Manager 11g Enterprise Manager 12c
Oracle BPEL Process Manager 10.1.3.4 <i>(Part of Oracle SOA Suite 10.1.3.4)</i>	Oracle Application Server 10g Release 1 (10.1.3.1) and (10.1.3.3)	Enterprise Manager 10g Release 5 (10.2.0.5) or higher Enterprise Manager 11g Release 1 (11.1.0.1) Enterprise Manager 12c
Oracle BPEL Process Manager 10.1.3.4 <i>(Part of Oracle SOA Suite 10.1.3.4)</i>	Oracle WebLogic Managed Server 9.2	Enterprise Manager 10g Release 5 (10.2.0.5) or higher Enterprise Manager 11g Enterprise Manager 12c
Oracle BPEL Process Manager 10.1.3.4 <i>(Part of Oracle SOA Suite 10.1.3.4)</i>	IBM WebSphere Application Server 6.1	Enterprise Manager 10g Release 5 (10.2.0.5) or higher Enterprise Manager 11g Enterprise Manager 12c

10.2 Understanding the Discovery Mechanism

The following describes the mechanism followed for discovering BPEL Process Managers in Enterprise Manager Cloud Control.

Table 10–2 Mechanism for Discovering BPEL Process Managers

BPEL Process Manager Version	Application Server Deployed To	Discovery Mechanism	Process
Oracle BPEL Process Manager 10.1.2	Oracle Application Server 10g Release 1 (10.1.2)	Manual/ Automatic Discovery	<ul style="list-style-type: none"> ■ If the Management Agent is installed before Oracle Application Server and BPEL Process Manager are installed, then you must manually discover that Oracle Application Server and BPEL Process Manager in Enterprise Manager Cloud Control. ■ If the Management Agent is installed after Oracle Application Server and BPEL Process Manager are installed, then Enterprise Manager Cloud Control automatically discovers that Oracle Application Server and BPEL Process Manager <p>The Management Agent can be installed along with Enterprise Manager Cloud Control or separately as a standalone product.</p> <p>For discovery procedures, see Section 10.5.1, "Deployed to Oracle Application Server".</p>
Oracle BPEL Process Manager 10.1.3.1, 10.1.3.3, 10.1.3.4 (Part of Oracle SOA Suite 10.1.3.1, 10.1.3.3, 10.1.3.4)	Oracle Application Server 10g Release 1 (10.1.3.1) and (10.1.3.3)	Manual/ Automatic Discovery	<ul style="list-style-type: none"> ■ If the Management Agent is installed before Oracle Application Server and BPEL Process Manager are installed, then you must manually discover that Oracle Application Server and BPEL Process Manager in Enterprise Manager Cloud Control. ■ If the Management Agent is installed after Oracle Application Server and BPEL Process Manager are installed, then Enterprise Manager Cloud Control automatically discovers that Oracle Application Server and BPEL Process Manager <p>The Management Agent can be installed along with Enterprise Manager Cloud Control or separately as a standalone product.</p> <p>For discovery procedures, see Section 10.5.1, "Deployed to Oracle Application Server".</p>
Oracle BPEL Process Manager 10.1.3.1, 10.1.3.3, 10.1.3.4 (Part of Oracle SOA Suite 10.1.3.1, 10.1.3.3, 10.1.3.4)	Oracle WebLogic Managed Server 9.2	Manual Discovery	<p>First, manually discover Oracle WebLogic Managed Server. For procedures, see Section 10.5.2.1, "Discovering Oracle WebLogic Managed Server".</p> <p>Then, manually discover BPEL Process Manager. For procedures, see Section 10.5.2.2, "Deployed to Oracle WebLogic Managed Server".</p>
Oracle BPEL Process Manager 10.1.3.1, 10.1.3.3, 10.1.3.4 (Part of Oracle SOA Suite 10.1.3.1, 10.1.3.3, 10.1.3.4)	IBM WebSphere Application Server 6.1	Manual Discovery	<p>First, manually discover IBM WebSphere Application Server. For procedures, see Section 10.5.3.1, "Discovering IBM WebSphere Application Server".</p> <p>Then, manually discover BPEL Process Manager. For procedures, see Section 10.5.3.2, "Deployed to IBM WebSphere Application Server".</p>
Oracle BPEL Process Manager 10.1.3.5	Oracle WebLogic Managed Server 10.x	Manual Discovery	<p>First, manually discover Oracle WebLogic Managed Server. For procedures, see Section 10.5.2.1, "Discovering Oracle WebLogic Managed Server".</p> <p>Then, manually discover BPEL Process Manager. For procedures, see Section 10.5.2.2, "Deployed to Oracle WebLogic Managed Server".</p>

10.3 Understanding the Discovery Process

The following describes the overall process involved in discovering and monitoring BPEL Process Manager in Enterprise Manager Cloud Control. Follow the instructions outlined for each step in this process to successfully discover and monitor your BPEL Process Manager.

Table 10–3 Discovery Process

Step	Requirement	Description
1	BPEL Process Manager	<p>Install the BPEL Process Manager software in one of the following ways:</p> <ul style="list-style-type: none"> For Oracle middleware, download and install the BPEL Process Manager using Oracle BPEL Process Manager 10.1.2, Oracle SOA Suite 10.1.3.1, 10.1.3.3, or 10.1.3.4 from the following URL: http://www.oracle.com/technology/software/tech/soa/index.html For non-Oracle middleware, download and install the BPEL Process Manager from the following URL: http://www.oracle.com/technology/software/products/ias/bpel/index.html
2	Enterprise Manager Cloud Control	<p>To monitor BPEL Process Manager 10.x, install Enterprise Manager Cloud Control 12c. For information about installing the base release of Enterprise Manager Cloud Control, see the <i>Enterprise Manager Cloud Control Installation and Basic Configuration Guide</i> available at: https://docs.oracle.com/en/enterprise-manager/</p> <p>Oracle recommends that you install the Enterprise Manager Cloud Control components on a host that is different from the host where the BPEL Process Manager is installed. For example, if the BPEL Process Manager is installed on host1.xyz.com, then install and configure Oracle Management Service (OMS) and the Management Repository on host2.xyz.com.</p>
3	Oracle Management Agent (Management Agent)	<p>Install Oracle Management Agent 12c or higher on every host where BPEL Process Manager is installed.</p> <p>If Oracle Application Server/BPEL Process Manager and Enterprise Manager Cloud Control are all on the same host, then you do not have to install a separate Management Agent. The Management Agent that comes with Enterprise Manager Cloud Control is sufficient. However, if they are different hosts, then you must install a separate Management Agent on every host where BPEL Process Manager is installed.</p> <p>You can install the Management Agent in one of the following ways:</p> <ul style="list-style-type: none"> Invoke the installer provided with Enterprise Manager and select the installation type Additional Management Agent. Use the Agent Deploy application within the Cloud Control console. Use the full agent kit that is available at: http://www.oracle.com/technology/software/products/oem/htdocs/agentsoft.html <p>For information about installing the Management Agent, see the <i>Enterprise Manager Cloud Control Installation and Basic Configuration Guide</i> available at: https://docs.oracle.com/en/enterprise-manager/</p>
4	Discovery in Enterprise Manager Cloud Control	<p>BPEL Process Managers deployed to Oracle Application Servers are automatically discovered in Enterprise Manager Cloud Control.</p> <p>BPEL Process Managers deployed to Oracle WebLogic Managed Servers and IBM WebSphere Application Servers must be manually discovered in Enterprise Manager Cloud Control. For procedures to discover them, see Section 10.5, "Discovering BPEL Process Manager".</p>

10.4 Setting Up Oracle Software Library

If you are using Enterprise Manager 12c to discover and monitor the BPEL Process Manager deployed to Oracle WebLogic Managed Server 9.2 and IBM WebSphere Application Server 6.1, you must set up Oracle Software Library (Software Library) as described below:

To set up the Software Library:

1. From the **Enterprise** menu, select **Provisioning and Patching**, then select **Software Library**.
2. From the **Actions** menu, select **Administration**.
3. In the Software Library: Administration page, select the Storage Type and click **Add** from the Actions menu.
4. In the Add Software Library Location window, specify a valid directory path where you want to store the raw data for the components, and click **OK**.

Note: For more information about setting up the Software Library, see the *Enterprise Manager Advanced Installation and Configuration Guide* available at the following URL:

<https://docs.oracle.com/en/enterprise-manager/>

10.5 Discovering BPEL Process Manager

This section describes the procedures for discovering BPEL Process Managers. In particular, this section covers the following:

- Deployed to Oracle Application Server
- Deployed to Oracle WebLogic Managed Server
- Deployed to IBM WebSphere Application Server

10.5.1 Deployed to Oracle Application Server

A BPEL Process Manager deployed to Oracle Application Server is manually or automatically discovered in Enterprise Manager Cloud Control depending on when the Management Agent is installed.

- If the Management Agent is installed before Oracle Application Server and BPEL Process Manager are installed, then you must manually discover that Oracle Application Server and BPEL Process Manager in Enterprise Manager Cloud Control.
- If the Management Agent is installed after Oracle Application Server and BPEL Process Manager are installed, then Enterprise Manager Cloud Control automatically discovers that Oracle Application Server and BPEL Process Manager.

Note: You must install a Management Agent on every host where BPEL Process Manager is installed. If Oracle Application Server/BPEL Process Manager and Enterprise Manager Cloud Control are all on the same host, then you need not install a separate Management Agent. The Management Agent that comes with Enterprise Manager Cloud Control is sufficient. However, if they are different hosts, then you must install a separate Management Agent on every host where BPEL Process Manager is installed. The Management Agent can be installed along with Enterprise Manager Cloud Control or separately as a standalone product.

Also note that if you have added a new BPEL Process Manager to an Oracle Application Server that is already discovered and monitored in Enterprise Manager Cloud Control, then you must manually *rediscover* that Oracle Application Server.

To manually discover or *rediscover* Oracle Application Server:

1. From the **Targets** menu, select **Middleware**.

The Middleware page that lists all the middleware targets being monitored is displayed. In Enterprise Manager 10g Cloud Control Release 4 (10.2.0.4) or lower, the Middleware tab is Application Servers.

2. (Only for *Rediscovering*) In the Middleware page, select the Oracle Application Server that you want to rediscover and click **Remove**.

3. In the Middleware page, from the **Add** list, select **Oracle Application Server** and click **Go**. The Add Oracle Application Server Target: Specify Host page is displayed.
4. Enter the name of the host where that Oracle Application Server is running, and click **Continue**.

Enterprise Manager Cloud Control rediscovers that Oracle Application Server along with its core components and the newly added BPEL Process Manager.

10.5.2 Deployed to Oracle WebLogic Managed Server

To discover the BPEL Process Manager deployed to Oracle WebLogic Managed Server, you have to first discover and add Oracle WebLogic Managed Server to Enterprise Manager Cloud Control.

This section describes the procedures for the following:

- [Discovering Oracle WebLogic Managed Server](#)
- [Deployed to Oracle WebLogic Managed Server](#)

10.5.2.1 Discovering Oracle WebLogic Managed Server

To discover and add Oracle WebLogic Managed Server to Enterprise Manager Cloud Control:

1. From the **Targets** menu, select **Middleware**.

Enterprise Manager Cloud Control displays the Middleware page that lists all the middleware targets being monitored. In Enterprise Manager 10g Cloud Control Release 4 (10.2.0.4) or lower, the Middleware tab is Application Servers

2. In the Middleware page, from the **Add** list, select **Oracle Fusion Middleware / WebLogic Server Domain**, and click **Go**.

Enterprise Manager Cloud Control displays the Add Oracle Fusion Middleware / WebLogic Server Domain wizard that captures the details of the Oracle WebLogic Server Domain to be discovered and monitored.

3. In the wizard, specify the required details and click **Next** on each page to reach the end of the wizard.

For information about the details to be provided for each page of the wizard, click **Help** on each page.

4. In the last page of the wizard, click **Finish** to complete the discovery process and add the target to Cloud Control for monitoring purposes.

Enterprise Manager Cloud Control displays the Middleware page with a confirmation message that confirms that the Oracle WebLogic Manager Server has been successfully added to Cloud Control. In the Middleware page that shows all the middleware targets being monitored, you can see the Oracle WebLogic Managed Server you just added.

For additional information about Fusion Middleware discovery, see *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

10.5.2.2 Deployed to Oracle WebLogic Managed Server

To discover and add the BPEL Process Manager deployed to Oracle WebLogic Managed Server:

1. From the **Setup** menu, select **Add Targets**, then select **Add Targets Manually**. Now select the **Add Non-Host Targets by Specifying Target Monitoring Properties** option.
2. Select the target type from the drop-down list and click the torch icon to select a Monitoring Agent. Click **Add Manually**. The Select Application Server page of the Add BPEL Process Manager wizard is displayed.
 - a. In the Select Application Server page, provide the following details and click **Next**.

Table 10–4 Select Application Server Page - Element Description

UI Page Element	Description
Application Server Type	Select the type of application server where the BPEL Process Manager to be discovered is running.
Application Server Name	Specify the name of the application server where the BPEL Process Manager to be discovered is running. If you are not sure about the name, click the search icon (torch icon) to view a list of application servers and select the appropriate one. The application server name must be suffixed with <i>oracleBPELServer</i> .

- b. In the Target Details page, provide the following details and click **Next**.

Table 10–5 Target Details Page - Element Description

UI Page Element	Description
Oracle Home	Specify the full path to the Oracle Application Server home directory where the BPEL Process Manager is installed. For example, <code>/opt/app/orabpel/product/10.1.3.1/OracleAS</code> .
Application Server Home	Specify the full path to the directory where Oracle WebLogic Managed Server (to which the BPEL target is deployed) is running. For example, <code>/opt/wls9.2/weblogic9.2</code> .

Note:

- Enterprise Manager Cloud Control checks the configuration settings of the associated application server and prefills the values for fields such as BPEL Process Manager Name, Display Name, Context Provider URL, and Oracle BPEL PM Console URL.
- At this point, if you encounter a discovery failure error, then follow the workaround steps given in [Table 10–9](#) to resolve the issue.

- c. In the Host Credentials page, specify the operating system credentials of the host where BPEL Process Manager is running. By default, the fields are prefilled with preferred credentials that are stored in the Management Repository for the selected host. You can either use these prefilled values or edit them to override the preferred credentials with your new credentials.
 - d. In the Review page, review the details and click **Finish** to complete the discovery process and add the target to Enterprise Manager Cloud Control.

Enterprise Manager Cloud Control displays the Agent home page with a confirmation message that confirms that the BPEL Process Manager has been successfully added for monitoring.

3. To verify whether the BPEL Process Manager has been added, click **Targets** and then **Middleware**.

Enterprise Manager Cloud Control displays the Middleware page that shows all the middleware targets being monitored, including the Oracle WebLogic Managed Server and the BPEL Process Manager you just added.

10.5.3 Deployed to IBM WebSphere Application Server

To discover the BPEL Process Manager deployed to IBM WebSphere Application Server, you have to first discover and add IBM WebSphere Application Server to Enterprise Manager Cloud Control.

This section describes the procedures for the following:

- [Discovering IBM WebSphere Application Server](#)
- [Deployed to IBM WebSphere Application Server](#)

10.5.3.1 Discovering IBM WebSphere Application Server

To discover and add IBM WebSphere Application Server to Enterprise Manager Cloud Control:

1. From the **Targets** menu, select **Middleware**.

Enterprise Manager Cloud Control displays the Middleware page that lists all the middleware targets being monitored.

2. In the Middleware page, select **IBM WebSphere Application Server** from the **Add** drop-down list and click **Go**.

Enterprise Manager Cloud Control displays the Add IBM WebSphere Application Server wizard that captures the details of the IBM WebSphere Application Server to be discovered and monitored.

3. In the Add IBM WebSphere Application Server wizard, specify the required details and click **Next** on each page to reach the end of the wizard.

For information about the details to be provided for each page of the wizard, click **Help** on each page.

4. In the last page of the Add IBM WebSphere Application Server wizard, click **Finish** to complete the discovery process and add the target to Enterprise Manager Cloud Control for monitoring purposes.

Enterprise Manager Cloud Control displays the Middleware page with a confirmation message that confirms that the IBM WebSphere Application Server has been successfully added for monitoring. In the Middleware page that shows all the application server being monitored, you can see the IBM WebSphere Application Server you just added.

10.5.3.2 Deployed to IBM WebSphere Application Server

To discover and add the BPEL Process Manager deployed to IBM WebSphere Application Server:

1. From the **Setup** menu, select **Add Targets**, then select **Add Targets Manually**. Now select the **Add Non-Host Targets** by Specifying Target Monitoring Properties option.
2. Select the target type from the drop-down list and click the torch icon to select a Monitoring Agent. Click **Add Manually**. The Select Application Server page of the Add BPEL Process Manager wizard is displayed.
 - a. In the Select Application Server page, provide the following details and click **Next**.

Table 10–6 Select Application Server Page - Element Description

UI Page Element	Description
Application Server Type	Select IBM WebSphere Application Server from the list.
Application Server Name	Specify the name of IBM WebSphere Application Server where the BPEL Process Manager to be discovered is running. If you are not sure about the name, click the search icon (torch icon) to view a list of application servers and select the appropriate one. The application server name must be suffixed with <i>oracleBPELServer</i> .

- b. In the Target Details page, provide the following details and click **Next**.

Table 10–7 Target Details Page - Element Description

UI Page Element	Description
Oracle Home	Specify the full path to the Oracle Application Server home directory where the BPEL Process Manager is installed. For example, /opt/app/orabpel/product/10.1.3.1/OracleAS.
Application Server Home	Specify the full path to the directory where IBM WebSphere Application Server (to which the BPEL target is deployed) is running.
BPEL Application Installation Location	Specify the full path to the installation directory where the BPEL application is installed. For example, if the BPEL application is installed in <\$WEBSPPHERE_HOME>/profiles/AppSrv01/installedApps/sta00114Cel101/CollaxaWebApplications-sta00114Node01.ear, then specify the path as <\$WEBSPPHERE_HOME>/profiles/AppSrv01/installedApps. Here, replace \$WEBSPPHERE_HOME with the full path of the application home location.

Note: Enterprise Manager Cloud Control checks the configuration settings of the associated application server and prefills the values for fields such as BPEL Process Manager Name, Display Name, Context Provider URL, and Oracle BPEL PM Console URL.

- c. In the Host Credentials page, specify the operating system credentials of the host where BPEL Process Manager is running. By default, the fields are prefilled with preferred credentials that are stored in the Management Repository for the selected host. You can either use these prefilled values or edit them to override the preferred credentials with your new credentials.
 - d. In the Review page, review the details and click **Finish** to complete the discovery process and add the target to Enterprise Manager Cloud Control.

Enterprise Manager Cloud Control displays the Agent home page with a confirmation message that confirms that the BPEL Process Manager has been successfully added for monitoring.

Note: At this point, if you encounter a discovery failure error, then follow the workaround steps given in [Table 10–10](#) and resolve the issue.

3. To verify whether the BPEL Process Manager has been added, select Middleware from the Targets menu. /

Enterprise Manager Cloud Control displays the Middleware page that shows all the middleware targets being monitored, including the IBM WebSphere Application Server and the BPEL Process Manager you just added.

10.6 Configuring BPEL Process Manager

After discovering BPEL Process Manager, you must perform the following configuration steps:

- [Specifying Details for Monitoring BPEL Process Manager](#)
- [Registering BPEL Process Manager Credentials and Host Credentials](#)

10.6.1 Specifying Details for Monitoring BPEL Process Manager

Follow these steps to specify the details required for monitoring BPEL Process Managers. If the values are prefilled, then validate them.

1. In the BPEL Process Manager Home page, select **Target Setup**, then select **Monitoring Configuration** from the **BPEL Process Manager** menu.
2. In the Monitoring Configuration page, specify the following details. If these values are prefilled, then validate them.
 - **BPEL Admin Username** - Specify the BPEL administrator user ID.
 - **BPEL Password** - Specify the BPEL admin password.

When adding the credentials, validate the following two criteria:

- BPEL Admin User ID and password should have BPEL Admin role
- The same credentials should succeed for the BPEL console login operation

- **Initial Context Factory** - Specify the initial context factor. You can copy the following string value:

```
com.evermind.server.rmi.RMIInitialContextFactory
```

- **Context Provider URL** - Specify the context provider URL. You can copy the following string value:

```
opmn:ormi://<host>:<opmn_port>:home/orabpel
```

Note: Replace the <host>,<opmn port> with the correct host address and opmn port number details for the Oracle Application Server where the BPEL Process Manager is deployed.

To retrieve SOA Applications Server OPMN PORT details, follow these steps:

1. Open the configuration file `$SOA_ORACLE_HOME/opmn/conf/opmn.xml`.
\$SOA_ORACLE_HOME corresponds to SOA Application server home location.
 2. Identify the value of the request port attribute in the configuration file.
-

- **BPEL Repository Host Name** - Specify the BPEL Dehydration store (database) host name.
 - **BPEL Repository Port** - Specify the BPEL Dehydration store (database) port.
 - **BPEL Repository SID** - Specify the BPEL Dehydration store (database) SID.
 - **BPEL Repository User Name** - Specify the BPEL Dehydration store (database) user name. By default, the user name is `orabpel`.
 - **BPEL Repository Password** - Specify the BPEL Dehydration store (database) password. By default, the password is `welcome1`.
 - **Recoverable Instances Time Threshold (Days)** - Specify the number of days for which the retryable instances must be shown.
 - **Process Aggregate State** - Specify 5, a numeric value that signifies the **constant** state of the BPEL target.
3. Click **OK** to save the settings.

10.6.2 Registering BPEL Process Manager Credentials and Host Credentials

Follow these steps to register the credentials of the BPEL Process Manager, and the credentials of the host where BPEL Process Manager is running.

1. From the **Setup** menu, select **Security**, then select **Preferred Credentials**.
2. Select the Host target type and click **Manage Preferred Credentials**.
3. Select **Normal Host Credentials** in the Credential Set column in the Default Preferred Credentials section and click **Set**.
4. In the Select Named Credential window, enter the user name and password and click **Save** to return to the Preferred Credentials page.
5. Select Oracle BPEL Process Manager target type and click **Manage Preferred Credentials**.
6. Select **Monitoring Administrator Credentials** in the Credential Set column in the Default Preferred Credentials section and click **Set**.
7. In the Select Named Credential window, enter the user name and password and click **Save**.

10.7 Troubleshooting BPEL Process Managers

This section describes the errors you might encounter while discovering BPEL Process Managers, and the workaround steps you can follow to resolve each of them.

This section covers the following:

- [Discovery Errors on Target Details Page](#)
- [Discovery Errors on Review Page](#)
- [Discovery Errors on Review Page](#)

10.7.1 Discovery Errors on Target Details Page

The following error occurs in the Target Details page of the Add BPEL Process Manager wizard where you provide details about the BPEL Process Manager installed on Oracle WebLogic Managed Server.

Table 10–8 Errors on Target Details Page While Adding BPEL Process Manager Deployed to Oracle WebLogic Managed Server

Error Message	Workaround Steps
Oracle BPEL Process Manager not found in the selected Application Server. Select another Application Server.	<p>This error may occur if BPEL is not deployed on the selected Application Server or if the configuration data has not been collected.</p> <p>To resolve this issue:</p> <ol style="list-style-type: none"> 1. Select another Application Server. 2. Navigate to the Application Server Home page and select Configuration, then select Last Collected from the Application Server target menu.

10.7.2 Discovery Errors on Review Page

The following errors occur in the Review page of the Add BPEL Process Manager wizard when you are about to add a BPEL Process Manager installed on Oracle WebLogic Managed Server, to Enterprise Manager Cloud Control for monitoring purposes.

Table 10–9 Errors on Review Page While Adding BPEL Process Manager Deployed to Oracle WebLogic Managed Server

Error Message	Workaround Steps
Discovery Failure - Oracle BPEL Process Manager target discovery failed due to incorrect host credentials.	<ol style="list-style-type: none"> 1. In the last page of the Add BPEL Process Manager wizard where you see this error message, click Previous to reach the Host Credentials page. 2. In the Host Credentials page, specify the correct host credentials or set the preferred credentials for the specific host. Ensure that these are Agent user credentials.
Oracle BPEL Process Manager Discovery Failed - Unable to connect to Oracle BPEL Process Manager. The possible reasons can be incorrect path or insufficient permission to access Oracle BPEL Process Manager home location or inaccessible Oracle BPEL Process Manager home location. Review the specified value.	<ol style="list-style-type: none"> 1. In the last page of the Add BPEL Process Manager wizard, click Previous repeatedly to reach the Target Details page. 2. In the Target Details page, verify the Oracle home location of the BPEL Process Manager. 3. In the Target Details page, verify the installation location of the associated application server.
Oracle BPEL Process Manager Discovery Failed - Unable to connect to Oracle BPEL Process Manager. The possible reasons can be incorrect path or insufficient permission to access Oracle BPEL Process Manager home location or inaccessible Oracle BPEL Process Manager home location. Review the specified value.	Ensure that the BPEL directories have read permission for the Agent user.

10.7.3 Discovery Errors on Review Page

The following errors occur in the Review page of the Add BPEL Process Manager wizard when you are about to add a BPEL Process Manager installed on IBM WebSphere Application Server, to Enterprise Manager Cloud Control for monitoring purposes.

Table 10–10 Error on Review Page While Adding BPEL Process Manager Deployed to IBM WebSphere Application Server

Error Message	Workaround Steps
Discovery Failure - Oracle BPEL Process Manager target discovery failed due to incorrect host credentials.	<ol style="list-style-type: none"> 1. In the last page of the Add BPEL Process Manager wizard where you see this error message, click Previous to reach the Host Credentials page. 2. In the Host Credentials page, specify the correct host credentials or set the preferred credentials for the specific host. Ensure that these are Agent user credentials.
Oracle BPEL Process Manager Discovery Failed - Unable to connect to Oracle BPEL Process Manager. The possible reasons can be incorrect path or insufficient permission to access Oracle BPEL Process Manager home location or inaccessible Oracle BPEL Process Manager home location. Review the specified value.	<ol style="list-style-type: none"> 1. In the last page of the Add BPEL Process Manager wizard where you see this error message, click Previous repeatedly to reach the Target Details page. 2. In the Target Details page, verify the BPEL application installation location. For example, the BPEL application may be installed at the following location: <code><\$WEBSPPHERE_HOME>/profiles/AppSrv01/installedApps/sta00114Cell101/CollaxaWebApplications-sta00114Node01.ear</code> In this case, the path you specify must look like this: <code><\$WEBSPPHERE_HOME>/profiles/AppSrv01/installedApps</code> Note: Replace \$WEBSPPHERE_HOME with the absolute application home location. 3. In the Target Details page, verify the application server home location of the associated application server. 4. In the Target Details page, verify the Oracle home location of the BPEL Process Manager.

10.7.4 Display Errors on Processes Page

Sometimes, after the discovery of a BPEL Process Manager, the BPEL process may occasionally not be listed in the BPEL Process Manager Processes page in Enterprise Manager Cloud Control.

There are two causes for this and two ways to ensure they display on the Processes page. The sections below discuss these causes and workaround steps to fix them.

10.7.4.1 No Credentials Specified for Monitoring BPEL Process Manager

You may not have specified the credentials required for monitoring BPEL Process Managers. To address this, do the following:

1. In the BPEL Process Manager Home page, select **Target Setup**, then select **Monitoring Configuration** from the **BPEL Process Manager** menu.
2. In the Monitoring Configuration page, check the following fields:
 - **BPEL Admin Username** - Provide the BPEL administrator user ID.
 - **BPEL Password** - Provide the BPEL admin password.

When adding the credentials validate the following two criteria:
 - BPEL Admin User ID and password should have BPEL Admin role
 - The same credentials should succeed for the BPEL console login operation
 - **Initial Context Factory** - In case this field is empty, copy the following string value:

com.evermind.server.rmi.RMIInitialContextFactory

- **Context Provider URL** - In case this field is empty, copy the following highlighted string value:

opmn:ormi://<host>:<opmn_port>:home/orabpel

Note: Replace the <host>,<opmn port> with the correct host address and opmn port number details for the Oracle Application Server where the BPEL Process Manager is deployed.

3. Click **OK** to save the settings.

10.7.5 Retrieving the OPMN Port

To retrieve SOA Applications Server OPMN PORT details, follow these steps.

1. Open the configuration file \$SOA_ORACLE_HOME/opmn/conf/opmn.xml. \$SOA_ORACLE_HOME corresponds to SOA Application server home location.
2. Identify the value of the request port attribute in the configuration file.

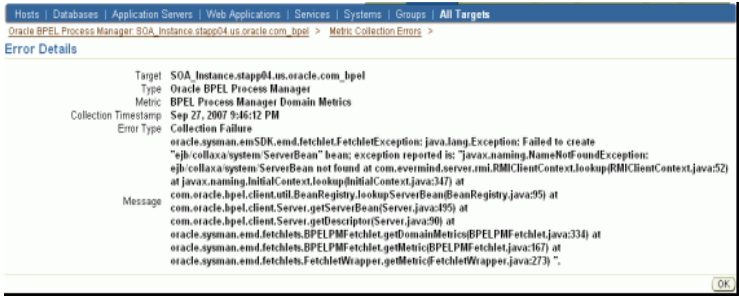
10.7.6 javax.naming.NameNotFoundException Error

The following error occurs in the error details page when incorrect provider URL is specified.

Table 10–11 javax.naming.NameNotFoundException Error - Workaround Steps

Error Message	Workaround Steps
oracle.sysman.emSDK.emd.fetchlet.FetchletException: java.lang.Exception: Failed to create "ejb/collaxa/system/ServerBean" bean; exception reported is: "javax.naming.NameNotFoundException: ..."	<ol style="list-style-type: none">1. Validate the format of the string.2. Verify if the OPMN port is correct.3. Verify if the <oc4j_instance> name is properly substituted with the correct value, that is, the OC4J name value. The format must be like this: opmn:ormi://<host>:<opmn_port>:home/orabpel

Figure 10–1 javax.naming.NameNotFoundException Error



10.7.7 javax.naming.NamingException Error

The following error occurs in the error details page when incorrect password is specified.

Table 10-12 *javax.naming.NamingExceptionError* - Workaround Steps

Error Message	Workaround Steps
<pre>oracle.sysman.emSDK.emd.fetchlet.FetchletException: java.lang.Exception: Failed to create "ejb/collaxa/system/ServerBean" bean; exception reported is: "javax.naming.NamingException: Lookup error:...</pre>	<ol style="list-style-type: none">1. Validate the values specified for BPEL Admin username and BPEL Password fields in the Monitoring Configuration page. (Confirm the validity of credentials by using the same credentials to log in to the BPELConsole).

(See [Figure 10–2](#))

Figure 10–2 *javax.naming.NamingException* Error

Error Details	
Target	SOA_Instance_stapp04.us.oracle.com_bpel
Type	Oracle BPEL Process Manager
Metric	BPEL Process Manager Server Metrics
Collection Timestamp	Sep 27, 2007 10:08:55 PM
Error Type	Collection Failure
Message	<pre> oracle.osman.com.SDK...and fetchlets.FetchletsException: java.lang.Exception: Failed to create "/gbl/cell/Java/system/ServerBean" bean; exception reported is: 'javax.naming.NamingException: Lookup error: javax.naming.AuthenticationException: Not authorized; nested exception is: javax.naming.AuthenticationException: Not authorized'. See exception in javax.naming.AuthenticationException: Not authorized at com.evermind.server.rmi.RMIClientContext.lookup(RMIClientContext.java:54) at javax.naming.InitialContext.lookupInitialContext(javax.naming.InitialContext.java:341) at com.oracle.bpel.client.cmtl.BeaasRegistry.lookupServerRegistry(javax.naming.InitialContext.java:55) at com.oracle.bpel.client.Server.getServerBean(Server.java:495) at com.oracle.bpel.client.Server.getDescription(Server.java:506) at oracle.osman.com.fetchlets.BPELPFPMFetchlets.getServerBean(BPELPFPMFetchlets.java:301) at oracle.osman.com.fetchlets.BPELPFPMFetchlets.getMetric(BPELPFPMFetchlets.java:175) at oracle.osman.com.fetchlets.FetchletWrapper.getMetric(FetchletWrapper.java:273) Called by: javax.naming.AuthenticationException: Not authorized at oracle.oc4j.rmi.ClientRMITransport.connectToServer(ClientRMITransport.java:59) at oracle.oc4j.rmi.ClientSocketRMITransport.connectToServer(ClientSocketRMITransport.java:58) at com.evermind.server.rmi.RMIClientConnection.connect(RMIClientConnection.java:546) at com.evermind.server.rmi.RMIClientConnection.sendLookupRequest(RMIClientConnection.java:190) at com.evermind.server.rmi.RMIClientContext.lookup(RMIClientContext.java:174) at com.evermind.server.rmi.RMIClient.lookup(RMIClient.java:293) at com.evermind.server.rmi.RMIClientContext.lookup(RMIClientContext.java:51) ... 7 more </pre>

10.7.8 javax.naming.NoInitialContextException Error

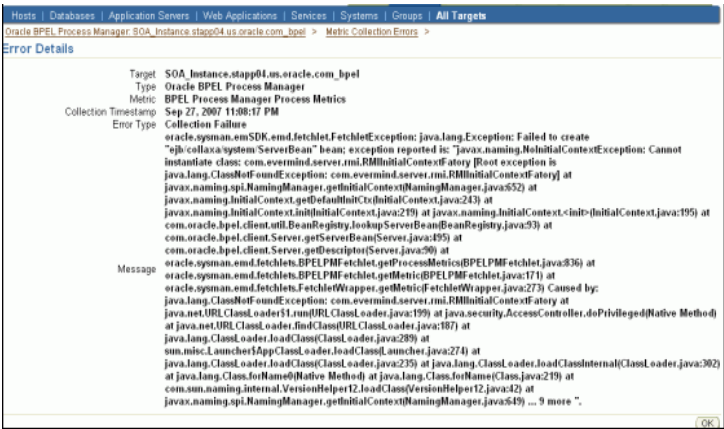
The following error occurs in the error details page when incorrect *Initial Context Factory* value is specified.

Table 10–13 *javax.naming.NoInitialContextException* Error - Workaround Steps

Error Message	Workaround Steps
<pre>oracle.sysman.emSDK.emd.fetchlet.FetchletException: java.lang.Exception: Failed to create "ejb/collaxa/system/ServerBean" bean; exception reported is: "javax.naming.NoInitialContextException : Cannot instantiate class:...</pre>	<ol style="list-style-type: none">1. Provide the following value for the Initial Context Factory field in the Monitoring Configuration page: <code>com.evermind.server.rmi.RMIInitialContextFactory</code>

(See Figure 10–3)

Figure 10–3 *javax.naming.NoInitialContextException Error*



10.7.9 Error While Creating BPEL Infrastructure Services

The following error occurs when you are creating a new BPEL infrastructure service.

Table 10–14 *javax.naming.NoInitialContextException Error - Workaround Steps*

Error Message	Workaround Steps
An error encountered while discovering the dependencies. Please try again.	<div>1. Apply patch 10849036 on the OMS and try creating the BPEL infrastructure service again:</div> <div>com.evermind.server.rmi.RMIInitialCo ntextFactory</div>

10.7.10 Metric Collection Errors for BPEL Process Manager Partner Link Metrics

The following metric collection error appears on the home page when you monitor BPEL 10.1.3.3 or 10.1.3.4 using Oracle Management Agent 12c:

Table 10–15 *Metric Collection Errors for BPEL Process Manager Partner Link Metrics - Workaround Steps*

Error Message	Workaround Steps
java.rmi.UnmarshalException: Error deserializing return-value: java.io.InvalidClassException: javax.xml.namespace.QName; local class incompatible: stream classdesc serialVersionUID = -916876369326528164, local class serialVersionUID = -9120448754896609940 at com.oracle.bpel.client.util.ExceptionUtils.handleServerException(ExceptionUtils.java:82) at com.oracle.bpel.client.BPELProcessHandle.getDescriptor(BPELProcessHandle.java:207) at oracle.sysman.emd.fetchlets.BPELPMFFetchlet.getPartnerLinkMetrics(BPELPMFFetchlet.java:873) at oracle.sysman.emd.fetchlets.BPELPMFFetchlet.getMetric(BELPMFFetchlet.java:235) at oracle.sysman.emd.fetchlets.FetchletWrapper.getMetric(FetchletWrapper.java:382)	<div>Follow the workaround described in the My Oracle Support Note 735128.1. You can access My Oracle Support at the following URL:</div> <div>https://support.oracle.com/CSP/ui/flash.html</div>

10.7.11 Agent Monitoring Metric Errors

This error occurs if the same Agent is used to monitor the BPEL 10g and OSB, and BPEL 10g and SOA 11g targets.

Table 10–16 Metric Errors During Agent Monitoring

Error Message	Workaround
The following exception has occurred: Exception at getPartnerLinkMetrics: java.lang.NoClassDefFoundError: Could not initialize class javax.rmi.PortableRemoteObject	The same Management must not be used to monitor BPEL 10g and OSB, and BPEL 10g and SOA 11g targets.

Discovering and Monitoring Oracle Service Bus

This chapter describes how you can discover and monitor Oracle Service Bus (OSB) using Enterprise Manager Cloud Control.

In particular, this document covers the following:

- [Supported Versions](#)
- [Understanding the Discovery Mechanism](#)
- [Understanding the Discovery Process](#)
- [Downloading One-Off Patches](#)
- [Discovering Oracle Service Bus](#)
- [Enabling Management Packs](#)
- [Monitoring Oracle Service Bus in Cloud Control](#)
- [Generating Oracle Service Bus Reports Using BI Publisher](#)
- [Troubleshooting Oracle Service Bus](#)

11.1 Supported Versions

The following are the versions of OSB that are supported for monitoring in Enterprise Manager Cloud Control Release 12c.

- Aqualogic Service Bus 2.6
- Aqualogic Service Bus 3.0
- Oracle Service Bus 10gR3
- Oracle Service Bus 11.1.1.2.0
- Oracle Service Bus 11.1.1.3.0
- Oracle Service Bus 11.1.1.4.0
- Oracle Service Bus 11.1.1.5.0
- Oracle Service Bus 11.1.1.6.0
- Oracle Service Bus PS6 (11.1.1.7.0)
- Oracle Service Bus (12.1.0.3)

11.2 Understanding the Discovery Mechanism

The OSB deployed to Oracle WebLogic Managed Server is automatically discovered in Enterprise Manager Cloud Control when that Oracle WebLogic Managed Server is discovered and added to Enterprise Manager Cloud Control.

The discovery of OSB depends on whether the Oracle WebLogic Managed Server is already being monitored in Enterprise Manager Cloud Control.

- If Oracle WebLogic Managed Server is not being monitored in Cloud Control, then first discover and add it to Cloud Control; this will automatically discover the OSB that is deployed to it.
- If Oracle WebLogic Managed Server is already being monitored in Cloud Control, then refresh the membership of the Oracle WebLogic Server Domain to which the Oracle WebLogic Managed Server belongs. This will automatically discover the OSB that is deployed to it.

For instructions to discover OSB, see [Section 11.5, "Discovering Oracle Service Bus"](#).

11.3 Understanding the Discovery Process

The following table describes the overall process involved in discovering and monitoring OSB in Enterprise Manager Cloud Control. Follow the instructions outlined for each step in this process to successfully discover and monitor your OSB.

Table 11–1 *Discovery Process*

Step	Requirement	Description
1	Oracle Service Bus	Install the OSB software. Note: Before you launch the OSB Deployment Procedure, ensure that Sun JDK has been installed.
2	Enterprise Manager Cloud Control	Install Enterprise Manager 12c. For information about installing the base release of Enterprise Manager Cloud Control, see the <i>Enterprise Manager Cloud Control Basic Installation and Configuration Guide</i> available at: https://docs.oracle.com/en/enterprise-manager/ Oracle recommends that you install the Enterprise Manager Cloud Control components on a host that is different from the host where OSB is installed. For example, if OSB is installed on host1.xyz.com, then install and configure Oracle Management Service (OMS) and the Management Repository on host2.xyz.com.

Table 11–1 (Cont.) Discovery Process

Step	Requirement	Description
3	Oracle Management Agent (Management Agent)	<p>Install Oracle Management Agent 12c on the host where OSB is installed.</p> <p>If OSB and Enterprise Manager Cloud Control are on the same host, then you do not have to install a separate Management Agent. The Management Agent that comes with Enterprise Manager Cloud Control is sufficient. However, if they are different hosts, then you must install a separate Management Agent on the host where OSB is installed. Alternatively, the Management Agent can also be installed on a different host and made to remotely monitor the OSB target on another host.</p> <p>You can install the Management Agent in one of the following ways:</p> <ul style="list-style-type: none"> ■ Invoke the installer provided with Enterprise Manager 12c, and select the installation type Additional Management Agent. Then apply the 10.2.0.5 Agent patch on it. ■ Use the Agent Deploy application within the Enterprise Manager 12c. ■ Use the full agent kit that is available at: http://www.oracle.com/technology/software/products/oem/htdocs/agentsoft.html <p>For information about installing the Management Agent, see the <i>Enterprise Manager Cloud Control Basic Installation and Configuration Guide</i> available at: https://docs.oracle.com/en/enterprise-manager/</p>
4	One-Off Patches	<p>The support for discovering and monitoring of OSB is enabled only when the one-off patches as described in Section 11.4, "Downloading One-Off Patches" are applied to the WebLogic Server Home where OSB is running.</p>
5	Discovery in Enterprise Manager Cloud Control	<p>OSB is automatically discovered when the Oracle WebLogic Server Domain to which it is deployed is discovered and added to Enterprise Manager Cloud Control.</p>

11.4 Downloading One-Off Patches

To view OSB services in Enterprise Manager Cloud Control, you must apply the following patches to your OSB servers.

Table 11–2 One-Off Patches

Oracle Service Bus Version	ID	Password
Oracle Service Bus 2.6	EMMU	83XNT2D4
Oracle Service Bus 2.6.1	9NAF	TLZE4IPI
Oracle Service Bus 3.0	RPCD	JJEC2EY2
Oracle Service Bus 10.3.0	9HPA	FFLQHDHP
Oracle Service Bus 10.3.1	No Patch Required	
Oracle Service Bus 11.1.1.3.0 and 11.1.1.4.0, and Oracle Service Bus PS4, PS5 and PS6	No Patch Required	
Oracle Service Bus 12.1.0.3	No Patch Required	

You can apply the patches in one of the following ways:

- **Online mode** - Using the SmartUpdate tool available with Oracle WebLogic Managed Server
- **Offline mode** - Manually copying the JAR files and classes to the OSB directories

For information about downloading these patches and applying them in either offline or online mode, see My Oracle Support Note 804148.1. You can access My Oracle Support at:

<https://support.oracle.com/CSP/ui/flash.html>

Note: After applying the patches, restart the WebLogic domain and all of the management agents monitoring the domain.

11.5 Discovering Oracle Service Bus

The OSB deployed to Oracle WebLogic Managed Server is automatically discovered in Enterprise Manager Cloud Control when that Oracle WebLogic Managed Server is discovered and added to Enterprise Manager.

Before discovering OSB, identify whether the Oracle WebLogic Managed Server is already being monitored in Enterprise Manager.

- If Oracle WebLogic Managed Server is not being monitored in Enterprise Manager, then first discover and add it to Enterprise Manager Cloud Control; this will automatically discover the OSB that is deployed to it.
- If Oracle WebLogic Managed Server is already being monitored in Enterprise Manager, then refresh the membership of the Oracle WebLogic Server Domain to which the Oracle WebLogic Managed Server belongs. This will automatically discover the OSB that is deployed to it.

This section outlines the instructions for discovering OSB for the cases described above. In particular, this section covers the following:

- [Discovering OSB Deployed to WLS Not Monitored by Enterprise Manager](#)
- [Discovering OSB Deployed to WLS Monitored by Enterprise Manager](#)

11.5.1 Discovering OSB Deployed to WLS Not Monitored by Enterprise Manager

To discover OSB deployed to Oracle WebLogic Manager Server that is not monitored in Cloud Control, first discover that Oracle WebLogic Manager Server in Enterprise Manager Cloud Control; this will automatically discover the OSB that is deployed to it. To discover Oracle WebLogic Manager Server, follow these steps:

1. From the **Targets** menu, select **Middleware**.

Enterprise Manager Cloud Control displays the Middleware page that lists all the middleware targets being monitored.

2. In the Middleware page, select **Oracle Fusion Middleware/WebLogic Server Domain** from the **Add** drop-down list and click **Go**.

Enterprise Manager Cloud Control displays the Add Oracle Fusion Middleware / WebLogic Server Domain wizard that captures the details of the Oracle WebLogic Server Domain to be discovered and monitored.

3. In the Add Oracle Fusion Middleware / WebLogic Server Domain wizard, specify the required details and click **Next** on each page to reach the end of the wizard.

For information about the details to be provided for each page of the wizard, click **Help** on each page.

4. In the last page of the Add Oracle Fusion Middleware / WebLogic Server Domain wizard, click **Finish** to complete the discovery process and add the target to Cloud Control for monitoring purposes.

Enterprise Manager displays the Middleware page with a confirmation message that confirms that the Oracle WebLogic Manager Server has been successfully added to Cloud Control.

In the Middleware page that shows all the middleware targets being monitored, you can see the Oracle WebLogic Managed Server and the OSB you just added. Note that, at this point, OSB will be the last target listed in the table. To see it nested under its Oracle WebLogic Managed Server, click **Refresh** on this page. Alternatively, navigate to another tab or page, and then return to the Middleware page.

Note:

- After discovering and adding OSB to Enterprise Manager Cloud Control, you can monitor its status from the OSB Home page. You can use the Services page to view a list of services.

For the first collection that happens, you will see the value "0" for all the metrics that are enabled in Oracle Enterprise Manager Release 12c. This is an expected behavior. From the second collection onwards, you should see the actual metric values. However, if you still see the value "0", then perhaps the service monitoring is turned off. To resolve this issue, on the Services page, click Launch Console to access the OSB Console, and turn on the service monitoring and set the level to "pipeline" or "action"

- In the case of clustered OSB domain, the Management Agent installed on Admin Server host should be used to discover the entire domain. This constraint is not applicable for version 12.1.0.2 of Cloud Control. This is only valid up to version 12.1.0.1 of Cloud Control.
-

For additional information about Fusion Middleware discovery, see *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

11.5.2 Discovering OSB Deployed to WLS Monitored by Enterprise Manager

To discover OSB deployed to Oracle WebLogic Managed Server that is already being monitored in Cloud Control, refresh the membership of the Oracle WebLogic Server Domain to which the Oracle WebLogic Managed Server belongs. This will automatically discover the OSB that is deployed to it.

To refresh the membership of the Oracle WebLogic Server Domain to which the Oracle WebLogic Managed Server belongs, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the **Middleware** page, select the **Oracle WebLogic Server Domain** target from the list of Middleware targets being monitored.
3. On the Oracle WebLogic Server Domain Home page, in the General section, click **Refresh Domain**. Enterprise Manager Cloud Control displays the membership page that lists the OSB that is currently not being monitored. Click **OK**.

Enterprise Manager Cloud Control refreshes the membership and returns to the Oracle WebLogic Server Domain Home page.

Note: On the Oracle WebLogic Server Domain Home page, in the Status section, the legend of the status pie chart may not show an increased count to indicate the newly added OSB target. This is an expected behavior because Enterprise Manager Cloud Control takes a few seconds to reflect the membership details in this section.

4. Click the **Members** tab and verify whether the OSB has been added.

11.6 Enabling Management Packs

Besides monitoring the status of OSB, if you want to gain access to additional value-added features, then you must enable the Management Pack for SOA.

To enable the Management Pack for SOA:

1. From the **Setup** menu, select **Management Packs**, then select **Management Pack Access**.

Enterprise Manager Cloud Control displays the Management Pack Access page.

2. In the Management Pack Access page, from the Search list, select **Oracle Service Bus**.

Enterprise Manager Cloud Control lists all the Oracle Service Bus targets being monitored.

3. From the table, for the Oracle Service Bus target you are interested in, enable the SOA Management Pack Enterprise Edition and click **Apply**.

11.7 Monitoring Oracle Service Bus in Cloud Control

Enterprise Manager Cloud Control helps you monitor the health of Oracle Service Bus targets deployed to Oracle WebLogic Managed Servers. When you discover Oracle WebLogic Managed Servers, Cloud Control automatically discovers the Oracle Service Bus targets deployed to them and adds them for central monitoring and management.

For each Oracle Service Bus target being monitored, Cloud Control provides information about its status, availability, performance, services, alerts, business services, proxy services, pipeline services, and split-join services. It also allows you to view the latest configuration details, save them at a particular time, and compare them with other Oracle Service Bus instances. Oracle Service Bus also provides a graphical view representation for the dependencies between proxy services and business services.

In addition to monitoring capabilities, Cloud Control also allows you to black out an Oracle Service Bus target and create infrastructure services. While blackout helps you suspend the monitoring of the target for a temporary period (for example, during maintenance), infrastructure services are dependency services that are created to identify the infrastructure components on which the Oracle Service Bus target depends.

11.7.1 Enabling Monitoring for OSB Services

If you are not able to view OSB data on Enterprise Manager pages, it may be because monitoring is disabled for OSB Services. Before you can view OSB data in Enterprise Manager, check to see if monitoring is enabled for OSB Services. You can do that by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select a Oracle Service Bus target. The Oracle Service Bus home page is displayed.
3. On the Oracle Service Bus home page, click **Fusion Middleware Control**.
4. Log into the OSB target.
5. To enable monitoring, on the Global Settings tab, select **Monitoring Enabled** option.

Note: For a more information about monitoring Oracle Service Bus, see *Oracle Fusion Middleware Administrator's Guide for Oracle Service Bus*.

6. Click **Apply**.

11.8 Generating Oracle Service Bus Reports Using BI Publisher

You can use Enterprise Manager to print Oracle Service Bus reports using BI Publisher Enterprise Reports. Oracle Business Intelligence (BI) Publisher is an enterprise reporting solution for authoring, managing, and delivering highly formatted documents. Oracle BI Publisher also allows you to build custom reporting applications that leverage existing infrastructure. Reports can be designed using familiar desktop products and viewed online or scheduled for delivery to a wide range of destinations.

For example, you can generate an OSB Services Report that describes the way OSB services have been performing over a period of time. The report provides charts to list the top 5 OSB Services and a table with critical metric details for all the services.

The following table describes the OSB-related reports you can choose.

Table 11–3 OSB Reports

OSB Report	Description
OSB Service Summary Report	The OSB Service Summary Report provides information about the Average Response Time, Open Instances Count, Fault Instances Count, and Web Service Security Violation Count for the selected service. The OSB Service Summary Report displays a chart with the top 5 OSB services based on Average Response Time or Throughput across the selected OSB services for the specified time period. The report can be sorted based on a performance metric (for example, Average Response Time) or a usage metric (for example, Instance Count). As part of the report parameters setting, you can use options that allow you to select the OSB Service by Projects or by selecting individual services.
OSB Service Operations Summary Report	The OSB Service Operations Summary Report provides internal operation level details for the selected service. The details in the report cover the Average Response Time, Open Instances Count, Fault Instances Count, and Web Service Security Violation Count. The report can be sorted based on a performance metric or a usage metric. As part of the report parameters setting, you can use options that allow you to select the OSB Service by Projects or by selecting individual services.

Table 11–3 (Cont.) OSB Reports

OSB Report	Description
OSB Proxy Service Flow Component Performance Summary Report	A message flow is composed of components that define the logic for routing and manipulating messages as they flow through a proxy service. The OSB Proxy Service Flow Component Performance Summary Report provides internal flow component details for the selected proxy service. The details in the report display the Average Response Time, Open Instances Count, Fault Instances Count, and Web Service Security Violation Count. The report can be sorted based on a performance metric or a usage metric. As part of the report parameters setting, you can use options that allow you to select the OSB Service by Projects or by selecting individual services.

To print OSB reports using BI Publisher Enterprise reports, follow these steps:

1. From the Enterprise menu, click **Reports**, and then click **BI Publisher Enterprise Reports**.

Enterprise Manager Cloud Control displays the login page for BI Publisher Enterprise Reports.

2. Enter your credentials to log into BI Publisher.

The BI Publisher Enterprise page displays, showing you Recent reports, Others, and Favorites. You can use this page to create a new report, submit a report job, and perform other tasks.

3. Click the Report you want to display.

4. On the Report page, use the parameter filters to tailor the report structure that displays, then click **Refresh**.

You can view the OSB Services Report using the filters based on the various search parameters available at the top of the page, such as Target Name, Date Range, and so on. Similarly, you can view the report based on the Sort By option as well, allowing you to sort the report by Service Name or Average Response Time, for example.

You can refresh the report anytime by clicking the Refresh icon on the upper right side of the OSB Service Report tab. You can hide or display the search parameters by clicking the Parameters icon. You can choose to view the report in various formats such as HTML, PDF, RTF, Excel, and PowerPoint by clicking the View Report icon. Likewise you can display more available actions by clicking the Actions icon. For more help about using BI Publisher, click the help icon.

11.9 Troubleshooting Oracle Service Bus

This section describes the errors you might encounter while discovering OSB, and the workaround steps you can follow to resolve each of them.

11.9.1 Required Patches Missing

The following error occurs when you try to discover OSB from an Oracle WebLogic Admin Server that has not been patched with the required one-off patches.

Table 11–4 *oracle.sysman.emSDK.emd.fetchlet.FetchletException Error - Workaround Steps*

Error Message	Workaround Steps
oracle.sysman.emSDK.emd.fetchlet.FetchletException: The MBean is not available on the OSB instance. The required EM plug in patch should be missing on OSB instance.	Apply the one-off patches as described in Section 11.4 , "Downloading One-Off Patches".

11.9.2 System and Service

The following error occurs if configuration information has not been collected for the selected Application Server.

Table 11–5 *Create System and Service Error - Workaround Steps*

Error Message	Workaround Steps
An error encountered while discovering the dependencies. This may occur if some configuration information is missing. Check whether the configuration information was collected for the dependent targets and then try again.	Collect the latest configuration data by navigating to the Application Server Home page and clicking Configuration and then select Last Collected from the Application Server menu.

11.9.3 SOAP Test

The following error occurs when the Management Agent is upgraded to Enterprise Manager 12c with OMS 10.2.0.5.

Table 11–6 *SOAP Test Error - Workaround Steps*

Error Message	Workaround Steps
Add SOAP Test failed. The selected service has an invalid or incorrect WSDL URL. Check whether the Oracle Service Bus Target URL value is valid in the Monitoring Configuration page of the selected target. To access the Monitoring Configuration page, go to the Oracle Service Bus Homepage and from the Related Links section, select Monitoring Configuration.	<p>If the Management Agent has been upgraded to 12c, the following workaround must be applied to support the SOAP test.</p> <p>In the Monitoring Configuration page for the OSB target, set the Server URL to Access Proxy Services property to the URL for the specific WebLogic Server target. The URL must be in the format: <code>http://<host>:<port>/</code>. For example, <code>http://stade61.us.example.com:7001/</code></p>

Discovering and Monitoring the SOA Suite

This chapter describes how you can discover and configure the components of the SOA Suite 11g using Enterprise Manager Cloud Control.

In particular, this document covers the following:

- [New Features in This Release](#)
- [List of Supported Versions](#)
- [Monitoring Templates](#)
- [Overview of the Discovery Process](#)
- [Discovering the SOA Suite](#)
- [Metric and Collection Settings](#)
- [Setting Up and Using SOA Instance Tracing](#)
- [Monitoring Dehydration Store](#)
- [Viewing the Service Topology](#)
- [Publishing a Server to UDDI](#)
- [Generating SOA Reports](#)
- [Provisioning SOA Artifacts and Composites](#)
- [Diagnosing Issues and Incidents](#)
- [Verifying Target Monitoring Setup](#)
- [Searching Faults in the SOA Infrastructure](#)
- [Recovering Faults in Bulk](#)
- [Generating Error Hospital Reports](#)
- [Recovering BPEL/BPMN Messages](#)
- [Troubleshooting](#)

12.1 New Features in This Release

The new features that have been introduced in the 12c version of the SOA Suite are:

- **Error Hospital** allows you to view an aggregate count of errors that have occurred in all SOA Composites deployed in the SOA Infrastructure. The Error Hospital page is available at the SOA Infrastructure level, where system-wide faults data is aggregated. When accessed at the partition level, the Error Hospital page is

limited to faults data associated only with that partition. You can perform the following operations:

- Generating a Error Hospital Report
- Performing a Bulk Recovery
- **Target Setup Verification** allows you to perform a series of tests that can help diagnose and repair setup problems required for target monitoring.
- **Fault Management** allows you to perform a real-time search and recovery of faults and BPEL/BPMN messages. In addition to this, you can perform bulk recovery of faults, and track and monitor the status of submitted bulk recoveries.
- **Oracle RAC Database Support for Dehydration Store Performance** allows you to monitor the health and performance of RAC-based Dehydration Store for Multi Data Source or GridLink Data Source type.
- **Instance Tracing Enhancements** allows you to perform the following operations:
 - Tracing instances using the Instance Id.
 - Viewing payloads for BPEL component instances.
 - Tracing instances at SOA Infrastructure level.
- **Support Work Bench Enhancements** is enhanced to generate BPEL and Mediator dumps. The enhanced capability is supported for SOA PS6 (11.1.1.7.0).
- **SOA Composite Targets Discovery** is enhanced to discover only the default versions of SOA Composites, if required. Unlike the previous release, where the default and only option was to discover all the deployed SOA Composites, you can now choose to only discover the default versions of the SOA composites. To do so, follow the steps listed in [Section 12.5.1](#).
- **SOA Diagnostic Reports** collects fine-grained data about messages or instances which help you monitor and diagnose the execution and performance issues of BPEL and Mediator Components.

12.2 List of Supported Versions

The following are the versions of the SOA Suite that are supported in Enterprise Manager Cloud Control 12c:

- 11.1.1.2.0 (PS1)
- 11.1.1.3.0 (PS2)
- 11.1.1.4.0 (PS3)
- 11.1.1.5.0 (PS4)
- 11.1.1.6.0 (PS5)
- 11.1.1.7.0 (PS6)
- 12.1.0.3.0 (SOA 12c)

12.3 Monitoring Templates

The following Oracle-certified default templates are being shipped for Enterprise Manager Cloud Control 12c Release 2 and Enterprise Manager Cloud Control 12c Release 3 agents. [Table 12–1](#) describes the available templates, and the agents to which they apply:

Table 12–1 *Monitoring Templates*

Target Type	Agent Name	Template Name
SOA Infrastructure	PS1 Agent	Oracle Certified Fusion Apps Template for SOA Infrastructure for FMW Plugin 12.1.0.3.0
SOA Infrastructure	PS1 Agent	Oracle Certified FMW Template for SOA Infrastructure for FMW Plugin 12.1.0.3.0
SOA Infrastructure	PS3 Agent	Oracle Certified Fusion Apps Template for SOA Infrastructure
SOA Infrastructure	PS3 Agent	Oracle Certified FMW Template for SOA Infrastructure
SOA Composite	PS1 Agent	Oracle Certified Fusion Apps Template for SOA Composite for FMW Plugin 12.1.0.3.0
SOA Composite	PS1 Agent	Oracle Certified FMW Template for SOA Composite for FMW Plugin 12.1.0.3.0
SOA Composite	PS3 Agent	Oracle Certified Fusion Apps Template for SOA Composite
SOA Composite	PS2 and PS3 Agent	Oracle Certified FMW Template for SOA Composite

Note: The templates created using older versions of OMS (Enterprise Manager Cloud Control 12c Release 2, Enterprise Manager Cloud Control 12c BP1, and so on) should not be used in Enterprise Manager Cloud Control 12c Release 3.

12.4 Overview of the Discovery Process

This section describes the overall process involved in discovering and monitoring SOA Suite in Enterprise Manager Cloud Control. Follow the instructions outlined against each step in this process to successfully discover and monitor the SOA Suite.

Table 12–2 Understanding the Discovery Process

Oracle SOA Suite Version	Application Server Deployed To	Discovery Mechanism	Process
Oracle SOA Suite	Oracle WebLogic Managed Server	Manual Discovery	<ol style="list-style-type: none"> 1. First, manually discover Oracle WebLogic Managed Server. For procedures, see Section 10.5.2.1, "Discovering Oracle WebLogic Managed Server". 2. To monitor the SOA Suite, you can use an agent running locally on the Administration Server of the WebLogic domain or a remote management agent running on another host that is not part of the WebLogic domain. Note: If you use a remote agent to monitor the SOA Suite, then the following operations are not supported: - Provisioning SOA Artifacts is not supported. - Host Metrics cannot be captured by the remote agent. 3. To ensure the all the metric data is collected, add the <code>soa-infra-mgmt.jar</code> and the <code>oracle-soa-client-api.jar</code> files to the <code>\$AGENT_HOME/plugins/oracle.sysman.emas.agent.plugin_<FMW_Plugin_Version>/archives/jlib/</code> (the Agent Home directory). If the <code>extjlib</code> directory does not exist, it can be created under <code>\$FMW_PLUGIN_HOME/archives/jlib</code>. This step is required only if you are using a remote agent to monitor the SOA Suite. Note: For SOA PS3 (11.1.1.4.0) and higher, the <code>jrf-api.jar</code> file must also be present in the Agent Home directory.

12.5 Discovering the SOA Suite

This section describes the procedure for discovering the SOA Suite 11g.

- [Discovering the SOA Suite](#)
- [Configuring the SOA Suite](#)

12.5.1 Discovering the SOA Suite

You can use a local or a remote Management Agent to perform the discovery process, as follows:

- [Discovering the SOA Suite Using a Local Agent](#)
- [Discovering the SOA Suite Using a Remote Agent](#)

Discovering the SOA Suite Using a Local Agent

If you use a local agent, you need to use a Management Agent that is running on the same host as the Administration Server.

1. From the **Targets** menu, select **Middleware**.

Oracle Enterprise Manager Cloud Control displays the Middleware page that lists all the middleware targets being monitored.

2. On the Middleware page, from the **Add** list, select Oracle Fusion Middleware / WebLogic Domain and click **Go**.
3. On the **Find Targets** page, specify the **Administration Server Host**, **Port**, **Username**, **Password**, and **Agent** (local or remote) details.

Figure 12–1 New Domain Discovery

Add Oracle Fusion Middleware/Weblogic Domain: Find Targets Continue Cancel

To discover a WebLogic Domain, a Management Agent uses JMX protocol to make a t3/t3s connection to the domain's Administration Server. If only SSL communication is allowed, expand the Advanced section and modify the JMX protocol from the default t3 to t3s.

* Administration Server Host:

* Port:

* Username:

* Password:

* Unique Domain Identifier:

* Agent:

Advanced

JMX Protocol:

Discover Down Servers ☐

Discover Application Versions ☒

Enable Automatic Refresh ☐

Use Host Name in Service URL ☐

JMX Service URL:

External Parameters:

Discovery Debug File Name:

In the Advanced section, select the **JMX Protocol** from the list. By default, the Discover Application Versions appears checked which enables administrators to discover all versions of deployed SOA Composites. However, if you uncheck this option, then you can discover only the latest default version of SOA composites.

Note: When the SOA Infrastructure application is down, if you uncheck the **Discover Application Versions** check box, then, only composites with single version is discovered. If there are composites with multiple versions, they are ignored.

Figure 12–2 Upgrade Domain Discovery

base_domain

WebLogic Domain Start Up Shut Down...

Monitoring Configuration

Domain Home: /scratch/soaps5_08070/user_projects/domains/base_domain

Disabled Target Types:

Discover application versions (Default is true):

Discover down servers (Default is true):

Platforms for Servers:

URI for Fusion Middleware Control:

Is Fusion Middleware Deployed on this Domain? true

Note:

- If you have targets which were discovered with the **Discover Application Versions** box checked (which is the default, see [Figure 12-1](#)), but now want to disable this option, perform the following steps:
 - Go to the WebLogic Domain target page.
 - On the Monitoring Configuration page, update the value of Discover application versions to false. (See [Figure 12-2](#).)
 - Perform a domain refresh

Doing this will discover new composite targets (without any version numbers in their names) that will not contain the metric history from the previous targets.

- Once you are in a state where you have composite targets without version numbers in their names, if you add more SOA composite versions, the version specified as the default version in the SOA Suite will be monitored. Historical metrics will be retained on the same target whenever the default version changes.

Click **Continue**.

4. You will return to the Middleware page. You will see the SOA instances under the WebLogic Domain.

Note: SOA Composites that are created after the discovery of SOA Suite Domain are not displayed automatically. To view all the SOA Composites, navigate to the Home page of the WebLogic Server target and select the **Refresh Domain** option from the menu.

Discovering the SOA Suite Using a Remote Agent

You can discover the SOA Suite using a remote agent which may be running on a host that is different from the host on which the Administration Server is running. In this case, you may not be able to provision SOA Artifacts remotely, or capture the host metrics.

To collect metric data, ensure that you copy the jar files listed in [Table 12-3](#) to the Agent Home Directory, which is located at: `$AGENT_HOME/plugins/oracle.sysman.emas.agent.plugin_<plugin version>/archives/jlib/extjlib`. If the `extjlib` directory does not exist, it can be created. This step is required only if you are using a remote agent to monitor the SOA Suite.

Table 12-3 Metric Data Collection

SOA Target	Files Names
SOA 11g targets	soa-infra-mgmt.jar oracle-soa-client-api.jar

Table 12–3 (Cont.) Metric Data Collection

SOA Target	Files Names
SOA PS3 (11.1.1.4.0) and higher targets	soa-infra-mgmt.jar oracle-soa-client-api.jar jrf-api.jar
SOA 12c targets	soa-infra-mgmt.jar oracle-soa-client-api.jar tracking-api.jar jrf-api.jar To enable Error Hospital and Instance Tracing, you additionally require: wlthint3client.jar
To enable BPMN instance tracing	For SOA 11g targets: oracle.bpm.bpmn-em-tools.jar wsclient_extended.jar For SOA 12c targets: rulesdk2.jar xmlparserv2.jar com.oracle.webservices.fabric-common-api_12.1.3.jar oracle.bpm.bpmn-em-tools.jar

12.5.2 Configuring the SOA Suite

After discovering the SOA Suite 11g, you must perform the following additional configuration steps:

1. Set the SOA database details like the host name, port, and credentials.
 - a. From the **Targets** menu, select **Middleware**.
Oracle Enterprise Manager Cloud Control displays the Middleware page that lists all the middleware targets being monitored.
 - b. Select a SOA Infrastructure home from the list and click **Configure**. The Monitoring Configuration page is displayed.
 - c. Set the SOA database details in the Monitoring Configuration page.
2. Set preferred credentials for the WebLogic Domain.
 - a. From the **Setup** menu, select **Security**, then select **Preferred Credentials**.
 - b. Select the Oracle WebLogic Domain target and click **Managed Preferred Credentials**.
 - c. Select WebLogic Administrator Credentials in the Target Preferred Credentials and click **Set**.
 - d. Enter the user name and password in the Select Named Credentials window and click **Save**.

12.6 Metric and Collection Settings

For the following metrics the collection schedule is not available on the Metric and Collection Settings page. Detailed steps to update the collection intervals are listed in the following table:

Table 12–4 Metric and Collection Settings

Target Type	Metric Name	Collection Interval Update Steps
SOA Infrastructure	Response	<p>Navigate to the associated weblogic server where SOA is deployed, to do so, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Targets menu, select Middleware. 2. On the Middleware page, select a SOA Infrastructure home. 3. On the WebLogic Server home page, from WebLogic Server menu, select Monitoring, and click Metric and Collection Settings. 4. Click Other Collected Items tab. 5. Click Collection Schedule corresponding to Application Metrics to update the collection interval. <p>Note: This change is applicable to all the applications deployed in that WebLogic server.</p>
SOA Composite	Response	<p>For SOA PS5 (11.1.1.6.0) or earlier, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Targets menu, select Middleware. 2. On the Middleware page, click the SOA Composite target. 3. On the SOA Composite target page, from SOA Composite menu, select Monitoring, and click Metric and Collection Settings. 4. Click Other Collected Items tab. 5. Update the collection interval for the metric SOA Composite Status (11.1.1.6.0 and earlier) <p>For SOA PS6 (11.1.1.7.0) onwards, navigate to the associated SOA Infrastructure where SOA composite is deployed. To do so, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Targets menu, select Middleware. 2. On the Middleware page, click the SOA Infrastructure where SOA composite is deployed. 3. On the SOA Infrastructure target page, from SOA Infrastructure menu, select Monitoring, and click Metric and Collection Settings. 4. Click Other Collected Items tab. <p>Update the collection interval for the metric SOA Composite Status.</p> <p>Note: This change is applicable to all the SOA composites which are deployed in that SOA Infrastructure</p>

Table 12–4 (Cont.) Metric and Collection Settings

Target Type	Metric Name	Collection Interval Update Steps
SOA Composite	SOA Composite - Component Detail Metrics	<p>Navigate to the associated SOA Infrastructure where soa composite is deployed. To do so, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Targets menu, select Middleware. 2. On the Middleware page, click the SOA Infrastructure where SOA composite is deployed. 3. On the SOA Infrastructure target page, from SOA Infrastructure menu, select Monitoring, and click Metric and Collection Settings. 4. Click Other Collected Items tab. <p>Update the collection interval for the metric SOA Infrastructure - Recoverable Faults.</p>
SOA Composite	SOA Composite - Recoverable And Rejected Messages	<p>Navigate to the associated SOA Infrastructure where soa composite is deployed. To do so, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Targets menu, select Middleware. 2. On the Middleware page, click the SOA Infrastructure where SOA composite is deployed. 3. On the SOA Infrastructure target page, from SOA Infrastructure menu, select Monitoring, and click Metric and Collection Settings. 4. Click Other Collected Items tab. <p>Update the collection interval for the metric SOA Infrastructure - Recoverable And Rejected Messages.</p>

12.6.1 Viewing Application Dependency and Performance (ADP) Metrics

If the SOA instance is being monitored by the ADP Manager, additional metrics such as Arrival Rate, Minimum, Maximum, and Average Response Time will be collected.

Tip: The ADP Manager must be registered before it can collect the metric data. For details on registering the ADP Manager, see *Oracle Enterprise Manager Cloud Control Advanced Installation and Configuration Guide*.

12.7 Setting Up and Using SOA Instance Tracing

Instance Tracing allows you to trace the message flow across SOA Composites and SOA Infrastructures monitored by Oracle Enterprise Manager Cloud Control. The flow of message can be traced across servers, clusters, and WebLogic domains.

The section contains the following topics:

- [Configuring Instance Tracing \(SOA 11g Targets Only\)](#)
- [Setting Search Criteria for Tracing an Instance](#)
- [Tracing an Instance Within a SOA Infrastructure](#)
- [Tracing Instance Across SOA Infrastructures](#)

12.7.1 Configuring Instance Tracing (SOA 11g Targets Only)

Before enabling Instance Tracing, ensure that you meet the following prerequisites:

- Ensure that the SOA infrastructure is monitored by an Oracle Management Agent (Management Agent).
- Set the following as preferred credentials:
 - Credentials of the host on which the SOA server is running.
 - Administrator credentials of the Oracle WebLogic Domain.

To enable Instance Tracing for any SOA Infrastructure 11g instances involved in executing composite instances:

1. Set the preferred credentials for the WebLogic Domain. To do so, follow the steps listed in [Section 12.5.2](#).
2. To view the state of the listed SOA instances, enable the Capture Composite State flag on the instance tracing page as follows:
 - a. On the SOA Infrastructure home page, from **SOA Infrastructure** menu, select **Fusion Middleware Control**.
 - b. Navigate to the home page of the SOA Infrastructure target.
 - c. From **SOA Infrastructure** menu, select **SOA Administration**, and then click **Common Properties**.
 - d. On the SOA Infrastructure Common Properties page, select the **Capture Composite Instance State** check box.

12.7.2 Setting Search Criteria for Tracing an Instance

Select the appropriate search link based on the version of your SOA target:

- [Instance Tracing for SOA 11g Targets](#)
- [Instance Tracing for SOA 12c Targets](#)

Instance Tracing for SOA 11g Targets

To search for faults and messages, enter details as described in the following table, and click **Search**.

Table 12–5 *Setting Search Criteria*

Field	Description
Instance ID	Specify the ID of the instance that is to be traced. The flow trace is a runtime trail of a message flow identified by an Instance ID. It enables you to track a message flow that crosses instances of different composites.
Start Time From - To	The time period the instances were initiated.
Name	The name of the instance.
Conversation ID	The conversation ID of the instance.
Instance Count	The number of instances that should be retrieved by the Search.
ECID	The ECID enables you to track the message flow across different SOA Composite instances that span across SOA Infrastructure.

Table 12–5 (Cont.) Setting Search Criteria

Field	Description
Composite Name	The name of the composite. Use this to restrict your search for business flows to a specific composite. Note that wild-card search is supported. For example, (%<part_of_composite_name>%)

Click **Search** after you have specified the required criteria. A list of Instance IDs that meet the criteria are displayed. Click **Trace** to generate trace data for the specified instance and period.

Note: To trace an instance, credentials must be set for the WebLogic domain of each SOA Infrastructure monitored by Oracle Enterprise Manager Cloud Control and for the host on which the Management Agent monitoring each SOA Infrastructure application is present.

Click the Instance ID link to see the flow trace which includes the list of SOA Infrastructure instances involved in the flow, faults, the domain, and the list of faults.

Instance Tracing for SOA 12c Targets

To search for faults and messages, enter details as described in the following table, and click **Search**.

Table 12–6 Setting Search Criteria

Field	Description
Time	<p>Use this filter to restrict your query to a specific time in the past. A time filter is required to search for faults. Ensure that you enter appropriate values in Instance Created From and Instance Created To fields. By default, all the instances created in the last one day are displayed.</p> <p>Additionally, you can add the following filters:</p> <p>Instance Updated</p> <p>If you set this value to None, then it means that instance updated filter is not set at all.</p> <p>Fault Occurred</p>
Composite	<p>Use to restrict your search for business flows to a specific composite.</p> <p>If you trace an instance at the composite level, then the Composite value is pre-populated. However, if you trace an instance at SOA infrastructure level, then select any of the following:</p> <ul style="list-style-type: none"> ▪ Initiating limits your search to only the business flows that started in the selected composite. ▪ Participating allows you to search for all business flows in that composite. <p>Click the torch icon. In the Search and Select Targets wizard, select the target name from the table and click Select. A faults search is performed on the selected composite.</p>
Sensor	Ensure that you select a composite to view the sensors associated with it.

Table 12–6 (Cont.) Setting Search Criteria

Field	Description
Flow Instance	<p>Flow ID: use this to search for the flow ID of the business flow instance.</p> <p>Flow Correlation ID: use this to search for the flow correlation ID of the business flow instance.</p> <p>Initiating ECID: use this to search for the ECID of the business flow instance.</p> <p>Flow Instance Name: use this to search for unique system and business identifiers that help you isolate a specific flow instance</p> <p>Composite Instance Name: use this to specify the name or title of the composite instance name.</p>
State	<p>Select one of the following states:</p> <p>Select Active to search active instances. If you select a blank, then the filtering is ignored.</p> <ul style="list-style-type: none"> ■ All active: Finds all business flows in active states. ■ Running: A business flow is currently running. The flow may include a human task component that is currently awaiting approval. ■ Suspended: A business flow that is typically related to migration of one version of the SOA composite application to another. ■ Recovery: A business flow with a recoverable fault. <p>Select Inactive to search inactive instances. If you select a blank, then the filtering is ignored.</p> <ul style="list-style-type: none"> ■ All inactive: Finds all terminated business flows. ■ Completed: A business flow has completed successfully. There are no faults awaiting recovery. ■ Failed: Finds completed business flows with non-recoverable faults. ■ Aborted: Finds business flows explicitly terminated by the user or for which there was a system error.
Fault	<p>Use to limit your search for business flows to only those with faults. If you leave this field blank, the Fault filter is ignored.</p> <p>To search for faults in any state, select All.</p> <p>To search for faults in a particular state, select one of the following:</p> <ul style="list-style-type: none"> ■ Recovery Required indicates business faults and some specific system faults. For example, Oracle Mediator input file path and output directory mismatch faults, and other faults related to Oracle BPM Worklist, where the user is not authorized to perform any relevant (expected) actions. ■ Not Recoverable, indicates rejected messages, most system faults, non-existent references, service invocation failures, and policy faults. ■ Recovered, indicates flows that contain at least one recovered fault. ■ System Auto Retries, indicates the faulted flows in which system auto retries occurred.

Table 12–6 (Cont.) Setting Search Criteria

Field	Description
Fault Type	<p>To search for all types of faults, select All</p> <p>To search for a particular type of fault, select one of the following:</p> <ul style="list-style-type: none"> ■ System Faults, indicate all network errors or other types of errors such as a database server or a web service being unreachable. ■ Business Faults, indicate all application-specific faults that were generated when there was a problem with the information processed (for example, a social security number is not found in the database). ■ OWSM Faults, indicate Oracle Web Service Manager Errors on policies attached to SOA composite applications, service components, or binding components. Policies apply security to the delivery of messages.
Fault Owner	<p>Use the Name field to enter a fault owner name. Ensure that the name entered is in the following format:</p> <pre><partition>/<composite name>!<composite version>/<component name></pre> <p>Use this to further filter your search for faulted business flows to stuck flows awaiting a particular type of recovery action from the administrator. To search for faults belonging to all the owners, select All.</p> <p>To drill down to a particular fault owner, select one of the following:</p> <ul style="list-style-type: none"> ■ BPEL ■ BPMN ■ Mediator ■ Human Workflow ■ Decision ■ Spring ■ Case Management
Fault Details	<p>You can fine grain your search parameters to drill down to granular result by providing all or some of the following details:</p> <ul style="list-style-type: none"> ■ Error Message Contains: Use to find only faulted business flows with the same error message text. You can enter any part of the message. This search is case sensitive. ■ Fault Name: Use to find only faulted business flows with a specific descriptive fault name such as Negative Credit. You must enter the exact name (the entire string). This search is case sensitive. <p>Expand Other to display additional fields for filtering:</p> <ul style="list-style-type: none"> ■ HTTP Host ■ JNDI Name
Restrict Search Rows	<p>By default, the search results are restricted to 10 rows in the table. If you want to modify this limit or restriction, enter a suitable value.</p> <p>The highest value you can enter as the limit depends on the limit set on the OMS. When no limit is set on the OMS, the limit that is honored by default is 2000, so the default range you can enter in the Restrict Search Result (rows) field is 1 to 2000.</p> <p>To modify this maximum limit set on the OMS, run the following command:</p> <pre>emctl set property -name oracle.sysman.core.uifwk.maxRows -value <max_limit_value></pre> <p>Note: The higher the value you set as the limit, the longer the time it takes to retrieve the faults, and that entering a higher value than the default in Restrict Search Result (rows) can lead to longer time to get the faults, and hence a longer load time.</p>

12.7.3 Tracing an Instance Within a SOA Infrastructure

To trace an instance within the context of a SOA Infrastructure, follow these steps:

1. In Cloud Control, from the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the target you are interested in. For example, SOA Infrastructure.
3. From the SOA Infrastructure menu, select **Trace Instance**.
4. On the Instance Tracing page, perform instance search. To do so, see [Table 12–6](#).
5. To trace an instance across composites, do the following:
 - For a SOA 12c target, click **Flow Instance ID**.
 - For a SOA 11g target, click **Composite Instance ID**.

You can further drill down to the component audit trail by clicking the component instance available in the trace table.

6. Click **OK**.

12.7.4 Tracing Instance Across SOA Infrastructures

To trace an instance across SOA Domains, follow these steps:

1. In Cloud Control, from the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the target you are interested in. For example, SOA Infrastructure.
3. From the SOA Infrastructure menu, select **Trace Instance**.
4. On the Instance Tracing page, perform instance search. To do so, see [Table 12–6](#).
5. Select an instance, and Click **Trace**.
6. In the Trace Instance dialog box, click **Add** to add the other SOA Infrastructure targets where this SOA instance has been executed.
7. In the Search and Add targets dialog box, select the other SOA Infrastructure targets, and click **Select**.
8. Click **Set** to set the WebLogic Domain Credentials, and Host Credentials if you haven't already set them.
9. Click **OK**. A flow trace job is scheduled to run immediately to collect the instance trace data across domains. On completion, a status is displayed in Trace Job Status column. Click the status link to drill down to the Flow Trace page.
10. Click **OK**.

12.8 Monitoring Dehydration Store

The Dehydration Store Diagnostics feature provides a dedicated view that allows you to analyze the behavior of the SOA Dehydration database. You can monitor SQL performance metrics and table growth specifically in the context of the SOA Suite's use of the database. The view displays both throughput and wait bottleneck data which allows you to monitor the general health of the target database instance. Using Active Session History, you can track usage data and display it as a table space chart, a growth rate chart, or an execution chart.

Note: In addition to monitoring Oracle standalone database, the Dehydration Store now supports reviewing the general health of the RAC database engine, and identifying problems that are causing performance bottlenecks.

You can also monitor Real Application Cluster (RAC) databases. For RAC, you can monitor Multi Data Source and GridLink Data Sources. In RAC scenario, the dehydration store tab lists all the associated database nodes in the form of a drop down menu. You can select any particular instance from the **Show Database Instance** menu, and view the associated metric data.

12.8.1 Enabling Monitoring of the SOA Dehydration Store

To configure and enable monitoring of the SOA Dehydration Store, follow these steps:

1. From the **Targets** menu, select **Databases** to check if the database target representing the SOA Dehydration Store has been discovered in Enterprise Manager.
2. Check if at least one configuration for the SOA Infrastructure and WebLogic Server targets is available.
3. On the monitoring configuration for the SOA Infrastructure target, the following fields related to SOA Repository must be configured:
 - SOA Repository Connection Descriptor: The connection URL string specified for the JDBC data source on the WebLogic server. This configuration is collected as part of the configuration collection mechanism for the SOA Server instance. For example,

On Single Instance Database

host:port/sid (or service_name)

On RAC Database

– Multi Data Source:

```
(DESCRIPTION= (ADDRESS_LIST= (ADDRESS= (PROTOCOL=TCP) (HOST=<Host 1>) (PORT=<Port 1>))) (CONNECT_DATA= (SERVICE_NAME=<Service Name>) (INSTANCE_NAME=<Instance 1>))) ; (DESCRIPTION= (ADDRESS_LIST= (ADDRESS= (PROTOCOL=TCP) (HOST=<Host 2>) (PORT=<Port 2>))) (CONNECT_DATA= (SERVICE_NAME=<Service Name>) (INSTANCE_NAME=<Instance 2>)))
```

– GridLink:

```
(DESCRIPTION= (ADDRESS_LIST= ADDRESS= (PROTOCOL=TCP) (HOST=<Host>) (PORT=<Port>))) (CONNECT_DATA= (SERVICE_NAME=<Port>))
```

- SOA Repository Host Name: The database listener host for the SOA database instance. This is optional if the connection string has already been configured.
- SOA Repository Port: - The database listener port for the SOA database instance. This is optional if the connection string has already been configured.
- SOA Repository Schema Name: The schema name configured for SOA Dehydration Store.
- SOA Repository User Name: The schema name configured for SOA Dehydration Store.

- SOA Repository Password: The password for the SOA schema user.SOA Repository SID: The SID for the SOA database instance.

If you do not see data after these configuration details have been specified, you must wait for the next collection interval.

12.8.2 Viewing the SOA Dehydration Store Data

To view the dehydration diagnostics data, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a SOA Infrastructure target.
2. In the SOA Infrastructure Home page, click the **Dehydration Store** tab.
3. The following details area displayed:
 - Throughput indicators that provide details of the general health of the database instance.
 - Wait bottleneck issues related to the CPU, I/O, and Wait events.
 - Tablespace utilization for the SOA schema.
 - Performance data recorded by the ASH.
 - Key SOA tables and tablespace details related to the SOA schema.

12.9 Viewing the Service Topology

The Service Topology provides a graphical end to end view of the composite applications. It depicts the various application components and their interactions happening at runtime. It allows you to view the service level dependencies among the components and provides key performance statistics and incidents information for them. Composite applications are distributed in nature and this view helps you quickly visualize the structure, status, availability, dependencies, configuration changes, and performance of business-critical distributed applications from one place and easily identify any availability or performance issues.

The Service Topology Viewer shows the following:

- Service to Service Calls: It allows you to view the Service to Service calls between any two SOA entities (Composites/J2EE Applications/OSB/BPEL 10g instances) by clicking the link between the entities.
- Dependency Highlighting: It allows you to view the dependencies for any service. If you click on a service, all the services that it is dependent on and vice versa are highlighted.
- Database Associations: Shows all the databases used by the SOA Composites, BPEL 10g instance and J2EE applications.
- External Services: Shows the services that are used by a SOA Composite application but are external to it or not managed by Enterprise Manager Cloud Control.

12.10 Publishing a Server to UDDI

To publish a service to UDDI, navigate to the Services and References Home page, select a service from the table and click **Publish to UDDI** from the menu. The Publish Service to UDDI window is displayed with the following fields:

- **Service Name:** The name of Web Service to be published to the UDDI Registry. This is a Read Only field.
- **Service Description:** The description of the selected Web Service.
- **Service Definition Location:** The URL location of the Service Definition. This is a Read Only field.
- **UDDI Source:** A logical name for an external UDDI registry source. Select the UDDI Source from the drop-down list.
- **Business Name:** The name of the data structure in the UDDI registry. Select a Business Name that has been registered with the UDDI from the list.

Click **OK** to start the process that publishes the web service to UDDI or click **Cancel** to cancel publishing the service.

12.11 Generating SOA Reports

This section describes the steps to use Enterprise Manager to print SOA reports using BI Publisher Enterprise Reports, or using Information Publisher.

- [Generating SOA Reports Using BI Publisher](#)
- [Generating SOA Reports Using Information Publisher](#)
- [Generating SOA Diagnostic Reports](#)
- [Viewing SOA Diagnostics Jobs](#)

12.11.1 Generating SOA Reports Using BI Publisher

Oracle Business Intelligence (BI) Publisher is an enterprise reporting solution for authoring, managing, and delivering highly formatted documents. Oracle BI Publisher also allows you to build custom reporting applications that leverage existing infrastructure. Reports can be designed using familiar desktop products and viewed online or scheduled for delivery to a wide range of destinations.

The following table describes the SOA reports that can be generated using BI Publisher:

Table 12–7 SOA Reports

SOA Report	Description
SOA Infrastructure Performance Report	<p>The SOA Infrastructure Performance Summary Report provides information about the average response time, error rate, throughput, system faults, business faults, web service policy violation faults for selected SOA Composite. It displays a chart with the top 5 SOA Composites based on average response time or throughput across the selected SOA composites for specified time period.</p> <p>The report can be sorted based on performance metric (average response time) or the usage metric (instance count). As part of the report parameters setting, you can use options that allow you to select the SOA Composite by Partitions or by selecting individual composites.</p>

Table 12–7 (Cont.) SOA Reports

SOA Report	Description
SOA Composite Detailed Performance Report	<p>The SOA Composite Detailed Performance Summary Report provides information about the average response time, error rate, throughput, system faults, business faults, web service policy violation faults for each selected composite assembly part such as service, reference, and service component. This is an in-depth report that provides complete details about the each assembly part in the SOA Composite.</p> <p>It displays a chart with the top 5 SOA Composites based on average response time or throughout across the selected SOA Composites for a specified time period. The report can be sorted based on performance metric (average response time) or the usage metric (instance count).</p> <p>As part of the report parameters setting, you can use options that allow you to select the SOA Composite by Partitions or by selecting individual composites.</p>
Top 5 SOA Composites (From Dehydration Store)	<p>This report shows how the SOA Composites have been performing over a period of time. Charts listing the top 5 SOA composites are displayed and critical metric data for all the SOA composites are displayed in a table.</p>

To print SOA reports using BI Publisher, follow these steps:

1. From the **Enterprise** menu, select **Reports**, then select **BI Publisher Enterprise Reports**.
Enterprise Manager Cloud Control displays the login page for BI Publisher Enterprise Reports.
2. Enter your credentials to log into BI Publisher.
3. The BI Publisher Enterprise page displays, showing you Recent reports, Others, and Favorites. You can use this page to create a new report, submit a report job, and perform other tasks.
4. Click the Report you want to view.
5. You can select different filters such as SOA Composite Name, Partition Name, Date Range, and so on to view the report. You can also select a Sort By option to sort the report on Composite Name, Sorted Instances, and so on.
6. You can refresh the report anytime by clicking the **Refresh** icon on the upper right side of the SOA Report tab. You can hide or display the search parameters by clicking the Parameters icon. You can choose to view the report in various formats such as HTML, PDF, RTF, Excel, and PowerPoint by clicking the **View Report** icon. Likewise you can display more available actions by clicking the **Actions** icon. For more help about using BI Publisher, click the help icon.

12.11.2 Generating SOA Reports Using Information Publisher

This section describes the procedure to create SOA Reports.

Note: These reports can be generated only for SOA 11g targets. Information Publisher reports are not supported for SOA 12c targets.

1. From the Targets menu, select **Middleware**, and click on a SOA Infrastructure target. The SOA Infrastructure Home page appears.

2. From the SOA Infrastructure menu, select the **Information Publisher Reports**.
The out-of-box SOA reports are displayed under the SOA Performance Reports section.
3. Select a report from the section (for example, you can select **Pending Instance Statistics**) and click **Create Like**. The Create Report Definition page is displayed.
4. In the General page, enter the following details:
 - a. Enter the BPEL Process Name as the title.
 - b. Click the Set Time Period to set the time interval for the report.
 - c. Click the **Run report using target privileges of the Report Owner (SYSMAN)** check box in the Privileges section.
5. Click the **Elements** tab and click the **Set Parameters** icon for the Pending Instance Statistics Element in the table.
6. In the Set Parameters page, click the torch icon to select a Composite Name. The Result Set Size with default values for the Pending Instance Statistics report is displayed.
7. Select a Component Name from the list, enter the Result Set Size and click **Continue** to return to the Elements page.
8. The selected target name is displayed in the Elements table.
9. To schedule periodic report generation, click the **Schedule** tab.
10. Specify the schedule type and other details and click **OK**.
11. You will return to the Report Home page where the newly scheduled report is displayed in the table. Click the report name to view the details.

12.11.3 Generating SOA Diagnostic Reports

To collect the SOA diagnostics data from SOA Dehydration Store, and generate report, follow these steps:

1. Ensure that you set the SOA Database Host Credentials and SOA Database user Credentials before scheduling a SOA diagnostics job.
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, select a SOA Infrastructure target. The SOA Infrastructure home page is displayed.
4. From the SOA Infrastructure target menu, select **Diagnostics**, then click **Schedule SOA Diagnostics Job**.
5. In the General section, enter a name and description for the job.
6. In the Target section, select a database instance from the table. To add an instance, click **Add**. From the target selector dialog box, select a database instance, and click **Select**.
7. In the Parameters section, enter the following details:
 - **Report Time Period** is the period for which you want to collect the diagnostic data. This is a mandatory field. By default, data for last one week is collected.
 - Optionally, you can select a desired value for System Backlog Report.
 - To get details about open instances, completed instances, or rolled back instances for a product, you must choose the Instance Growth Report.

- To get a report on invoke process delays, callback delays, callback processing delays, select BPEL Execution Report, and BPEL Performance Report
 - To understand invoke delays, and engine time better, select Mediator reports like Mediator Execution Report, and Mediator Performance Report.
 - To understand pending events in an event queue, select **EDN Report**.
 - To get a summary of all the faults, select Fault Summary Report and Detailed Fault Report
 - To view the human workflow tasks, select Human Workflow Report.
 - To receive a SOA Diagnostic report through an email, select **Email Notification**.
 - Subject, enter a subject for your email.
 - E-mail To, add contacts to whom this report must be sent.
 - E-mail Cc add contacts who must be copied on the diagnostics report email.
8. In the Credentials section, provide the SOA Infra Dehydration Store user Credentials, and host credentials for the SOA Dehydration Store.
 9. In the Schedule section, you can choose to either run job once or repeatedly. You can additionally schedule to run the job immediately or at a later point.
 10. The Access table gives a summary of all the users and roles who have access to this job.
 11. Click **Submit**.

12.11.4 Viewing SOA Diagnostics Jobs

To view all the SOA diagnostics jobs, follow these steps:

1. Ensure that you set the SOA Database Host Credentials and SOA Database user Credentials before scheduling a SOA diagnostics job.
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, select a SOA Infrastructure target. The SOA Infrastructure home page is displayed.
4. From the SOA Infrastructure target menu, select **Diagnostics**, then click **All SOA Diagnostics Job**.

This page displays all the diagnostics jobs that have run already, and are scheduled to run.

12.12 Provisioning SOA Artifacts and Composites

The SOA Artifacts Deployment Procedure allows you to:

- Provision SOA Artifacts from a reference installation or from a gold image
- Create a gold image of the SOA Artifacts
- Provision SOA Composites either from the Software Library or from another accessible location.

For more details on the SOA Artifacts Deployment Procedure, see the *Enterprise Manager Administrator's Guide for Software and Server Provisioning and Patching*.

12.13 Diagnosing Issues and Incidents

To access the diagnostic data for problems and incidents, access the Support Workbench page. To do so, navigate to the SOA Infrastructure Home page, and from the **SOA Infrastructure** menu, select **Diagnostics**, then select **Support Workbench**.

Enter the credentials for the host on which the WebLogic server is running and the WebLogic credentials for the WebLogic server. Click **Continue** to log into the Support Workbench page. On this page, you can do the following:

- View problem or incident details.
- View, create, or modify incident packages.
- View health checker findings
- Close resolved problems.

12.14 Verifying Target Monitoring Setup

As a prerequisite, verify the target monitoring setup before you perform any operations on the SOA infrastructure. Use the Target Setup Verification page to run a series of diagnostic scans and verify if you have met all functional as well as system-level prerequisites required for monitoring targets in Enterprise Manager. This helps you discover and repair all target monitoring setup-related issues beforehand.

This section describes the following:

- [Running Functionality-Level Diagnostic Checks](#)
- [Running System-Level Diagnostic Checks](#)
- [Repairing Target Monitoring Setup Issues](#)

Note: If you see the following error when you try to access the Target Setup Verification page, then you must upgrade the Management Agent version to 12.1.0.3 or higher:

Current agent version is not supported for Functionality Check scan. Upgrade to 12.1.0.3.0 agent version or higher for performing this scan.

Note: You will not be able to click on the torch icon available next to the database system field in Dehydration Store repair pop-up if an association exists between the database system and SOA infrastructure. It is enabled only when the association is missing. When the association is missing, you can select appropriate database system target from target selector popup. Pop-up can be launched by clicking on the torch icon.

12.14.1 Running Functionality-Level Diagnostic Checks

To run diagnostic scans on the functionalities associated with an Enterprise Manager target and to identify any setup issues, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the target you are interested in. For example, SOA Infrastructure.

3. On the Home page of the target, from the target-specific menu, select **Target Setup**, and click **Verification**.
4. On the Target Setup Verification page, in the Functionality Check section, click **Scan**.
5. If setup problems are detected, repair them. See [Section 12.14.3](#).

12.14.2 Running System-Level Diagnostic Checks

To run diagnostic scans on the system components that monitor an Enterprise Manager target and check their availability rate, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the target you are interested in. For example, SOA Infrastructure.
3. On the Home page of the target, from the target-specific menu, select **Target Setup**, and click **Verification**.
4. On the Target Setup Verification page, in the System Check section, click **Scan**.

Note:

- The **Availability(%)** column shows the availability rate of the target types. Click the rate to drill down and view more details.
 - The **Time since last collection (min)** column shows the total time elapsed since the last metric collection for the target.
-
-

12.14.3 Repairing Target Monitoring Setup Issues

To repair any target monitoring setup-related issues, follow these steps:

1. Run functionality-level diagnostic scan to identify setup-related issues. See [Section 12.14.1](#).
2. If setup issues are found in the Functionality Check section, click the repair icon against the functionality that requires to be fixed.

In the dialog that appears, enter the required details, and click **Re-Scan and Save** to validate the credentials, run the functionality check again, and save the details in Enterprise Manager. If you are sure the credentials are correct, then click **Save** to save the details without running the check again.

Note:

- The host credentials you are expected to provide are credentials of the host where the Management Agent, which monitors the SOA Infrastructure, is running.
- While repairing dehydration store issues, you are required to provide SOA dehydration store configuration details such as the database system and the SOA repository credentials.

If the configuration information has been collected, and if the association between the database system and the SOA infrastructure already exist, then the database system is prepopulated by default, and you need to enter only the credentials of the SOA repository. Otherwise, click the torch icon and manually select the database system with which the SOA infrastructure communicates, and enter the credentials of the SOA repository.

The connection descriptor is prepopulated by default is an editable field, and appears in multiple rows if it is an Oracle RAC database. Do not modify the descriptor unless you want to correct it.

The data source type is displayed only if the database system is an Oracle RAC database. The data source type can be either Multi Data Source or GridLink Data Source. Also note, that the data source type appears as 'NA' if details of the database system do not match with the connection descriptor.

12.15 Searching Faults in the SOA Infrastructure

This section describes how you can search faults in the SOA infrastructure. In particular, you can perform the following tasks:

- [Overview of Faults and Fault Types in SOA Infrastructure](#)
- [Overview of the Recovery Actions for Resolving Faults](#)
- [Prerequisites for Searching, Viewing, and Recovering Faults](#)
- [Searching and Viewing Faults](#)
- [Recovering a Few Faults Quickly \(Simple Recovery\)](#)

12.15.1 Overview of Faults and Fault Types in SOA Infrastructure

The following are the types of SOA composite application faults displayed in Enterprise Manager Cloud Control:

- **Business:** Application-specific faults that are generated when there is a problem with the information being processed (for example, a social security number is not found in the database).
- **System:** Network errors or other types of errors such as a database server or a web service being unreachable.
- **Oracle Web Service Manager (OWSM):** Errors on policies attached to SOA composite applications, service components, or binding components. Policies apply security to the delivery of messages.

The following are the categories of SOA composite application faults in Enterprise Manager Cloud Control:

- **Recoverable**
 - Business faults and some specific system faults
 - Oracle Mediator input file path and output directory mismatch
 - An Oracle BPM Worklist user is not authorized to perform relevant (expected) actions
- **Nonrecoverable**
 - Rejected messages
 - Most system faults
 - Non-existent references
 - Service invocation failures
 - Policy faults
- **Rejected Messages**

A fault is classified as a rejected message based on where it occurs. If a fault occurs before entering a SOA composite, without generating a composite instance, it is classified as a rejected message. A system or a policy fault can be identified as a rejected message.

12.15.2 Overview of the Recovery Actions for Resolving Faults

Recovery actions enable you to recover or resolve the SOA composite application faults. The following describes the recovery actions supported for different SOA engines.

Table 12–8 Overview of the Recovery Actions for Resolving Faults

Recovery Action	Description	Applicable To SOA Engine Type
Retry	Retries the instance directly. An example of a scenario in which to use this recovery action is when the fault occurred because the service provider was not reachable due to a network error. The network error is now resolved.	<ul style="list-style-type: none"> ■ BPEL ■ BPMN ■ Mediator
Abort	Terminates the entire instance.	<ul style="list-style-type: none"> ■ BPEL ■ BPMN ■ Mediator
Continue	Ignores the fault and continues processing (marks the faulting activity as a success).	<ul style="list-style-type: none"> ■ BPEL ■ BPMN
Rethrow	Rethrows the current fault. BPEL fault handlers (catch branches) are used to handle the fault. By default, all exceptions are caught by the fault management framework unless an explicit rethrow fault policy is provided.	<ul style="list-style-type: none"> ■ BPEL ■ BPMN
Replay	Replays the entire scope again in which the fault occurred.	<ul style="list-style-type: none"> ■ BPEL ■ BPMN

12.15.3 Prerequisites for Searching, Viewing, and Recovering Faults

Meet the following prerequisites before searching, viewing, and recovering SOA composite application faults:

- Ensure that the SOA infrastructure is monitored by an Oracle Management Agent (Management Agent) that is running on the same host as the SOA infrastructure. At the moment, there is no support for searching, viewing, and recovering faults from a SOA infrastructure that is monitored by a remote Management Agent.
- Set the following as preferred credentials. These credentials can be set from the Target Setup Verification page. To do so, from the **Targets** menu, select **Middleware**. On the Middleware page, click the target you are interested in. For example, SOA Infrastructure. On the Home page of the target, from the target-specific menu, select **Target Setup**, and click **Verification**:
 - Credentials of the host on which the SOA server is running.
 - Administrator credentials of the Oracle WebLogic Domain.

12.15.4 Searching and Viewing Faults

To search and view SOA composite application faults, follow these steps:

1. Meet the prerequisites. See [Section 12.15.3](#).
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, click the SOA Infrastructure target.
4. On the SOA Infrastructure target page, click **Faults and Rejected Messages**.
5. In the Faults and Rejected Messages tab, set the search criteria. See [Section 12.15.4.1](#).
6. Click **Search**.
7. View the faults:
 - To know the total faults in the SOA infrastructure, see **Total Faults in SOA Infrastructure**, which is placed in the footer of the results table.
 - To know the number of faults displayed in the table (out of the total number of faults in the SOA infrastructure), see **Displayed Faults**, which is placed in the footer of the results table.
 - To view details of each fault, see the results table.
 - To hide or unhide columns in the table, from the **View** menu, select **Columns**, then select the column name you want to hide or unhide.
 - To filter or perform a fine search for a particular column, enter a search keyword in the textbox placed above the column header. See [Section 12.15.4.7](#).
For example, to filter and list all faults related to the BPEL engine type, in the **Engine Type** column, type `bpel`.
 - To sort the fault details alphabetically, click the column header based on which you want to sort the details.
 - To find out the number of rows to which the search results have been restricted, see the note below the table.

For example, the following note appears if the rows were restricted to 20.

This table of search results is limited to 20 fault instances. Narrow the

results by using the search parameters.

12.15.4.1 Setting Search Criteria

To search for faults and messages, enter details as described in the following table, and click **Search**.

Table 12–9 *Setting Search Criteria*

Field	Description
Time	<p>Use this filter to restrict your query to a specific time in the past. A time filter is required to search for faults. Ensure that you provide values in the Fault Time From and Fault Time To fields.</p> <p>For example, enter 1/13/14 5:33:25 AM and 2/13/14 5:33:25 AM in the respective fields to query for all the faults that have occurred in this one month time window.</p>
Composite	<p>Use to restrict your search for business flows to a specific composite.</p> <p>Click the torch icon. In the Search and Select Targets wizard, select the target name from the table and click Select.</p> <p>A faults search is performed on the selected composite.</p>
Flow Instance	<p>Enter the Flow ID to isolate a specific flow instance. For each workflow involving different composites a unique flow ID gets generated. When there is an error in any component in a particular flow, the ID gets listed on the Faults and Rejected Messages tab. This ID is useful in assessing the error trend.</p>
Fault	<p>Use to limit the search for business flows to only those with faults. If you leave this field blank, the Fault filter is ignored.</p> <p>To search for faults of any type, select All or blank.</p> <p>To search for faults in a particular type, select one of the following:</p> <ul style="list-style-type: none"> ■ Recovery Required indicates business faults and some specific system faults. For example, Oracle Mediator input file path and output directory mismatch faults, and other faults related to Oracle BPM Worklist, where the user is not authorized to perform any relevant (expected) actions. ■ Not Recoverable, indicates rejected messages, most system faults, non-existent references, service invocation failures, and policy faults. ■ Recovered, indicates flows that contain at least one recovered fault. ■ System Auto Retries, indicates the faulted flows in which system auto retries occurred.
Fault Type	<p>To search for all types of faults, select All</p> <p>To search for a particular type of fault, select one of the following:</p> <ul style="list-style-type: none"> ■ System Faults, indicate all network errors or other types of errors such as a database server or a web service being unreachable. ■ Business Faults, indicate all application-specific faults that were generated when there was a problem with the information processed (for example, a social security number is not found in the database). ■ OWSM Faults, indicate Oracle Web Service Manager Errors on policies attached to SOA composite applications, service components, or binding components. Policies apply security to the delivery of messages.

Table 12–9 (Cont.) Setting Search Criteria

Field	Description
Fault Owner	<p>Use this to further filter your search for faulted business flows to stuck flows awaiting a particular type of recovery action from the administrator. To search for faults belonging to all the owners, select All.</p> <p>To drill down to a particular fault owner, select one of the following:</p> <ul style="list-style-type: none"> ■ BPEL ■ BPMN ■ Mediator ■ Human Workflow ■ Decision ■ Spring ■ Case Management
Fault Details	<p>You can fine grain your search parameters to drill down to granular result by providing all or some of the following details:</p> <ul style="list-style-type: none"> ■ Error Message Contains: Use to find only faulted business flows with the same error message text. You can enter any part of the message. This search is case sensitive. ■ Fault Name: Use to find only faulted business flows with a specific descriptive fault name such as Negative Credit. You must enter the exact name (the entire string). This search is case sensitive. <p>Expand Other to display additional fields for filtering:</p> <ul style="list-style-type: none"> ■ HTTP Host ■ JNDI Name
Restrict Search Rows	<p>By default, the search results are restricted to 10 rows in the table. If you want to modify this limit or restriction, enter a suitable value.</p> <p>The highest value you can enter as the limit depends on the limit set on the OMS. When no limit is set on the OMS, the limit that is honored by default is 2000, so the default range you can enter in the Restrict Search Result (rows) field is 1 to 2000.</p> <p>To modify this maximum limit set on the OMS, run the following command: <code>emctl set property -name oracle.sysman.core.uifwk.maxRows -value <max_limit_value></code></p> <p>Note: The higher the value you set as the limit, the longer the time it takes to retrieve the faults, and that entering a higher value than the default in Restrict Search Result (rows) can lead to longer time to get the faults, and hence a longer load time.</p>

12.15.4.2 Finding Total Faults in the SOA Infrastructure

To find the total faults in the SOA infrastructure, follow these steps:

1. Search for faults in the SOA infrastructure. See [Section 12.15.4](#).
2. Once the search results appear, see **Total Faults in SOA Infrastructure**, which is placed at the bottom-right corner, below the table.

Note: While retrieving the total faults in the SOA infrastructure, the **Restrict Search Result (rows)** field in the search criteria is not considered. For example, if there are a total of 700 faults, and if you enter 500 for this field, then the search is performed to list only 500 faults in the table, but the **Total Faults in SOA Infrastructure** field displays 700.

12.15.4.3 Limiting Faults Searched and Retrieved from the SOA Infrastructure

When you search for faults in the SOA infrastructure, the search might result in numerous faults. By default, the search results are restricted to 500 rows in the table. However, you can choose to modify this limit if you want.

To modify the limit, set the **Restrict Search Result (rows)** field to a suitable value while setting the search criteria (see [Section 12.15.4.1](#)). Then search.

The highest value you can enter as the limit depends on the limit set on the OMS. When no limit is set on the OMS, the limit that is honored by default is 2000, so the default range you can enter in the **Restrict Search Result (rows)** field is 1 to 2000.

To modify the maximum value set on the OMS, run the following command:

```
emctl set property -name oracle.sysman.core.uifwk.maxRows -value <max_limit_value>
```

Caution: The higher the value you set as the limit, the longer it takes to retrieve the faults. Entering a higher value than the default in **Restrict Search Result (rows)** field can lead to longer time to get the faults, and therefor result in a longer load time.

12.15.4.4 Searching Only Recoverable Faults

There might be numerous faults in the SOA infrastructure, but you can search and view only the recoverable faults. For example, there might be 700 faults in total, but there may be only 550 recoverable faults; you can search and list only those 550 faults if you want.

To search only for recoverable faults, while searching for faults (see [Section 12.15.4](#)), set the search criteria with the **Fault State** list set to **Recoverable**. If you set it to **All**, then faults that are recoverable and not recoverable are searched and listed.

12.15.4.5 Searching Faults in a Particular Service Engine

There might be faults across various service engines such as BPEL, BPMN, Mediator, Business Rules, and Human Workflow. You can search and view only faults occurred in a particular service engine.

To search for faults in a particular service engine, set the search criteria with the **Component Type** list set to a particular service engine of interest (see [Section 12.15.4.1](#)). Then search.

12.15.4.6 Searching Faults by Error Message

There might be numerous errors in the SOA infrastructure, but you might be interested only in those errors that contain some keywords of your interest. For example, you might be interested only in errors that contain the word `ORAMED`. You can search and view faults with such keywords.

To search faults by error messages, set the search criteria with the **Error Message Contains** field set to some keywords of your interest (see [Section 12.15.4.1](#)). Then search.

Note:

- By default, the entered keywords are searched anywhere in the error message.
 - The keywords you enter are case sensitive.
 - The only wildcard character permitted is %, which signifies all or anything after, before, or between two keywords. For example, `BPEL%fault` will result in faults with the error message `BPEL is a fault`.
-

12.15.4.7 Filtering Displayed Search Results

When you set the search criteria and search for faults in the SOA infrastructure, and when the search results appear in the results table, you can filter the search results further to show only those rows or fault instances that interest you, based on a keyword entered in the column header.

For example, from the displayed fault instances, to filter and view only the *bpel* service engine's results, enter the keyword `bpel` in the textbox placed above the **Component Type** column header. This is essentially the value shown in the *bpel* fault instance row for the **Component Type** column.

To filter the displayed search results, follow these steps:

1. Search for faults in the SOA infrastructure. See [Section 12.15.4](#).
2. Once the results appear in the table, in the textbox placed above the header of the column you want to filter, enter a search keyword.

For example, to filter and list all faults related to the BPEL engine type, in the textbox placed above the **Engine Type** column header, type `bpel`.

12.15.5 Recovering a Few Faults Quickly (Simple Recovery)

To recover only a few SOA composite application faults quickly, follow these steps:

1. Meet the prerequisites. See [Section 12.15.3](#).
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, click the SOA Infrastructure target.
4. On the SOA Infrastructure target page, click **Faults and Rejected Messages**.
5. In the Faults and Rejected Messages tab, set the search criteria. See [Section 12.15.4.1](#).
6. Click **Search**.
7. In the table, select one or up to 5 faults at a time, and from the **Recovery Options** menu, select an appropriate recovery action that matches your requirement. For information on the recovery actions, see [Section 12.15.2](#).
8. Enterprise Manager displays an informational message with one of the following mentioned to confirm whether or not it can submit the recovery job successfully. Click **OK**, and take the necessary action if required.

- If you have selected more than 5 faults, then the recovery job is not submitted. Select 5 or fewer faults, and try again. Alternatively, select 5 or more, and try a bulk recovery. See [Section 12.16](#).
 - If there are no recoverable faults, then the recovery job is not submitted.
 - If there are faults that are recoverable and not recoverable, then the recovery job is submitted only for recoverable jobs. You can track the recover job. See [Section 12.16.4.1](#).
9. Perform Step (1) to Step (5) again to verify if the faults you selected for recovery still appear in the search results. If they do not appear, then the recovery operation for those faults has been successfully submitted.

12.16 Recovering Faults in Bulk

The process of recovering similar type of faults in a single operation is called Bulk Recovery. In case of SOA 11g targets all the *Recoverable* faults can be recovered through bulk recovery option, and similarly for SOA 12c targets, all the *Recovery required* faults can be recovered through bulk recovery.

Note: For SOA 12c targets, you can supply either the composite details or the fault details to recover faults. It is mandatory that you supply at least one of these parameters, if not, bulk recovery cannot be performed. For SOA 11g targets, you must supply the composite details.

Bulk recovery can be performed when the following criteria are met:

- All faults to be recovered are in the same partition.
- The recovery required count is greater than zero.
- The **Fault Owner** type of the selected row is bpmn, mediator or bpel.
- A state for the fault is specified.

You can perform bulk recovery from Faults and Rejected Messaged tab, or Error Hospital tab available on the SOA Infrastructure home page. This way, the context of the fault is maintained, and is accordingly pre-populated on the Create Bulk Recovery Page. However, if you access it from the Bulk Recovery Jobs page, you will need to enter all the details afresh.

In particular, this section covers the following:

- [Performing Bulk Recovery from the Bulk Recovery Jobs Page](#)
- [Performing Bulk Recovery from Faults and Rejected Messages Tab](#)
- [Performing Bulk Recovery from the Error Hospital Tab](#)
- [Tracking Bulk Recovery Jobs](#)
- [Workflow Examples for Bulk Recovery](#)

12.16.1 Performing Bulk Recovery from the Bulk Recovery Jobs Page

To directly recover a large number of faults from the SOA database, follow these steps to perform a bulk recovery:

1. Meet the prerequisites. More

2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, select a SOA Infrastructure target.
4. On the SOA Infrastructure target page, from the **SOA Infrastructure** menu, select **Fault Management**, then select **Bulk Recovery**.
5. On the Bulk Recovery Jobs page, click **Create Job**.
6. On the Create Bulk Recovery Job, in the Composite section, enter the following details:
 - Select **Initiating** or **Participating** composite type from the menu.
 - Click **Add** to add additional composites for which faults must be searched. In the Search and Select dialog box, select all the targets that you want to add to the list, and click **Select**.
 - Click **Remove** to delete a composite.

Note: You can add only up to 10 composites.

7. In the Time section, enter the suitable values in the following fields to filter out the faults that you want to recover: **Instance Created From**, **Instance Created To**, **Instance Updated**, **Fault Time To**, and **Fault Time From**.
8. In the Fault Details section, set the details of the faults you want to recover. To do so, see [Table 12.16.1.1](#).
9. In the Recovery Options section, set the recovery and batch parameters. To do so, see [Section 12.16.1.2](#).
10. In the Job Parameters section, schedule the bulk recovery job. To do so, see [Section 12.16.1.3](#).
11. To verify the number of faults that will be recovered for the given criteria, click **Estimate Faults**.
 A pop-up appears informing you of the total number of faults in the SOA Infrastructure based on the criteria you have set. Based on the count, you can decide whether or not you want to proceed. If required, you can adjust the settings. For example, you can modify the fault time period.
12. Click **Submit**.
13. Track the status of the bulk recovery job. For more information, see [Section 12.16.4.1](#).

Note: For a SOA 12c target, faults with following recovery states are recovered:

- Admin Recovery
- Mediator Recovery
- BPEL Invoke Message Recovery
- BPEL Callback Message Recovery
- BPEL Activity Message Recovery

However, faults with recovery states EDN Recovery, Rejected Messages Recovery, and Human Workflow Recovery, cannot be recovered.

For a SOA 11g target, all faults with state **Recoverable** are recovered. However, faults with recovery states BPEL messages, rejected messages, and human workflow faults cannot be recovered.

12.16.1.1 Setting Fault Details for Recovering Faults in Bulk

To set the fault details while recovering faults in bulk, follow these steps:

1. In the Fault Details section, from the Engine Type menu, select an engine, so that fault search could be restricted to the selected type.
2. From the Fault Type menu, select the type of fault you want to recover. This could be, **System Faults**, **Business Faults**, or **OWSM Faults**.
3. In the Error Message Contains field, enter a keyword you are looking for in the error messages so that only faults with such error messages are recovered.
4. In addition to this, you can refine your fault search by providing details like Fault Name, Fault Code, HTTP Host, and JNDI Name.

12.16.1.2 Setting Recovery and Batch Details for Recovering Faults in Bulk

To set the recovery and batch details for recovering faults in bulk, follow these steps:

1. In the Recovery Options section, from the **Recovery Action** list, select a recovery action.
2. By default, **Batch by Fault Time** is enabled so that faults can be grouped into multiple, smaller units or batches based on the time they were created, and run sequentially. Oracle recommends that you keep the option enabled to simplify the fault recovery process. However, if you do not want to create batches for some reason, then deselect this option.
3. If you keep the **Batch by Fault Time** option enabled, then do the following:
 - a. By default, the batches are created with faults that occurred within every 60 minutes. If you want to change this time period, then enter a value in minutes in the **Batch Time Period** field. The minimum time period is 5 minutes and the maximum time period is 360 minutes.
 - b. By default, the delay time between two batches is set to 300 seconds. If you want to change this delay time, then enter a value in seconds in the **Delay between batches (sec)** field. The minimum delay time is 5 seconds and the maximum delay time is 900 seconds.

Batch Recovery ensures that all the faults that occurred in the specified fault

time period are recovered in a phased manner. For example, let's assume:
 Fault time period: 1 Mar 2013 2.00am to 1 Mar 2013 3.00am
 Batch time period: 10mins
 Batch Delay: 300secs (i.e 5mins)

This means, there are 60mins/10mins = 6 batches in all. The first batch recovers faults between 2.00am to 2.10am. The second batch recovers faults between 2.10am to 2.20am, and so on. After each batch runs, there is a delay of 300secs (5mins), after which the next batch execution begins.

12.16.1.3 Scheduling Bulk Recovery Jobs to Run Once or Repeatedly

To schedule bulk recovery jobs, on the Create Bulk Recovery page, in the Job Parameters section, select one of the following options:

- To run the jobs only once, select one of these options:
 - **Immediately**, if you want to run the job immediately.
 - **Later**, if you want to run the job just once, at a schedule date and time, and not immediately.
- To run the jobs repeatedly at a set frequency, select an appropriate value from the **Repeat** menu, and set the corresponding frequency.

Note: For a repeating job, ensure that you do not set a custom time period. If you do so, the job cannot track the faults properly, and in-turn recovers the same faults again and again. Instead, you can set a relative time period. For example, select **Last 1Day** from the **Fault Occurred** menu.

- To set a grace period, select **Do not run if it cannot start within**, and set an appropriate grace period.

A grace period is a period of time that defines the maximum permissible delay when attempting to run a scheduled job. If the job system cannot start the execution within a time period equal to the scheduled time + grace period you set, then it skips the job. By default, all jobs are scheduled with indefinite grace periods.

12.16.2 Performing Bulk Recovery from Faults and Rejected Messages Tab

To recover a large number of faults from the SOA database, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, select a SOA Infrastructure target.
3. On the SOA Infrastructure target page, click **Faults and Rejected Messages** tab.
4. In the Faults and Rejected Messages tab, set the search criteria. To do so, see [Table 12-9](#).
5. Click **Search**.
6. In the table, select one or more faults, and click **Bulk Recover**.
7. In the Navigate to Bulk Recovery wizard, select the details that you want to carry forward from the selected faults in the table to the Create Bulk Recovery page. Select one or more from the following list: **Composite**, **Fault start time**, **Fault end time**, and **Error message** for the fault, and click **OK**.
8. In the Composites section, the composite name and partition field is pre-populated with the values passed from the Faults and Rejected Messages tab.

If you want to add additional composites that need recovery, then click **Add**. You can add only up to 10 composites.

9. In the Time section, if you have passed custom values for **Faults Start Time** and **Fault End Time**, then the **Instance Created From** and **Instance Created To** fields are also updated with the same values. You can change these values if required. However, if you select **Last 1 Day**, then all the faults that have occurred across instances in the last one day since the previous bulk recovery job was submitted are displayed.
10. In the Fault Details section, the Error Message field may appear pre-populated if you have passed error message attribute using the Navigate to Bulk Recovery dialog box. If not, you can update this section. For more information, see [Section 12.16.1.1](#).
11. In the Recovery Options section, set the recovery and batch parameters. To do so, see [Section 12.16.1.2](#).
12. In the Job Parameters section, schedule the bulk recovery job. To do so, see [Section 12.16.1.3](#).
13. To verify the number of faults that will be recovered for the given criteria, click **Estimate Faults**.

A pop-up appears informing you of the total number of faults in the SOA Infrastructure based on the criteria you have set. Based on the count, you can decide whether or not you want to proceed. If required, you can adjust the settings. For example, you can modify the fault time period.

14. Click **Submit**.
15. Track the status of the bulk recovery job. For more information, see [Section 12.16.4.1](#).
16. Search for faults again (How?) to verify if the faults you selected for recovery still appear in the search results.

If they do not appear, then the recovery operation for those faults has been successful.

Note: For a SOA 12c target, faults with following recovery states are recovered:

- Admin Recovery
- Mediator Recovery
- BPEL Invoke Message Recovery
- BPEL Callback Message Recovery
- BPEL Activity Message Recovery

However, faults with recovery states EDN Recovery, Rejected Messages Recovery, and Human Workflow Recovery, cannot be recovered.

For a SOA 11g target, all faults with state **Recoverable** are recovered. However, faults with recovery states BPEL messages, rejected messages, and human workflow faults cannot be recovered.

12.16.3 Performing Bulk Recovery from the Error Hospital Tab

To recover a large number of faults from the SOA database, follow these steps:

1. Meet the prerequisites. [Section 12.15.3](#).
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, click the SOA Infrastructure target.
4. On the SOA Infrastructure target page, click **Error Hospital**.
5. In the Error Hospital tab, set the search criteria. To do so, see [Table 12–11](#).
6. Click **Search**.
7. In the table, select one or more faults, and click **Bulk Recover**.
8. The composite section appears pre-populated with **Composite**, **Composite type**, and **Fault Owner** details. You cannot add more composites or edit this section.
9. In the Time section, details like **Instance Created From** and **Instance Created to** are picked up from the Error Hospital page. Additionally, if you had provided **Fault Created From**, **Fault Created To**, **Instance Updated From** and **Instance Updated To** values, then these values will also appear pre-populated on this page. If not, you can enter these values to refine your search.
10. In the Fault Details section, usually, one of the fault parameters appear pre-populated, by default, it is fault name. However, if you have grouped your Error Hospital Report by other categories, then those values are populated accordingly. To refine your search, you may update the other fields in this section. For more information, see [Section 12.16.1.1](#).
11. In the Recovery Options section, set the recovery and batch parameters. To do so, see [Section 12.16.1.2](#).
12. In the Job Parameters section, schedule the bulk recovery job. To do so, see [Section 12.16.1.3](#).
13. To verify the number of faults that will be recovered for the given criteria, click **Estimate Faults**.

A pop-up appears informing you of the total number of faults in the SOA Infrastructure based on the criteria you have set. Based on the count, you can decide whether or not you want to proceed. If required, you can adjust the settings. For example, you can modify the fault time period.
14. Click **Submit**.
15. Track the status of the bulk recovery job. For more information, see [Section 12.16.4.1](#).
16. Search for errors again (How?) to verify if the errors you selected for recovery still appear in the search results.

If they do not appear, then the recovery operation for those errors has been successful.

Note: For a SOA 12c target, faults with following recovery states are recovered:

- Admin Recovery
- Mediator Recovery
- BPEL Invoke Message Recovery
- BPEL Callback Message Recovery
- BPEL Activity Message Recovery

However, faults with recovery states EDN Recovery, Rejected Messages Recovery, and Human Workflow Recovery, cannot be recovered.

For a SOA 11g target, all faults with state **Recoverable** are recovered. However, faults with recovery states BPEL messages, rejected messages, and human workflow faults cannot be recovered.

12.16.4 Tracking Bulk Recovery Jobs

This section describes the following:

- [Tracking Bulk Recovery Jobs, and Viewing Their Results and Errors](#)
- [Creating Bulk Recovery Jobs Using EMCLI and Web Services](#)

12.16.4.1 Tracking Bulk Recovery Jobs, and Viewing Their Results and Errors

To track bulk recovery jobs and view their results and errors, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the SOA Infrastructure target.
3. On the SOA Infrastructure target page, from the **SOA Infrastructure** menu, select **Fault Management**, then select **Bulk Recovery**.
4. On the Bulk Recovery Jobs page, you can view details such as the job name, the date and time when it ran or is scheduled to run, the user who scheduled the job, the current status of the job, the faults that were recovered and not recovered.

Note:

- This page lists only those jobs that ran in the last three days, and only for the current user. The list also include jobs submitted via EM Command Line Interface (EM CLI).
 - The Recovered Faults column displays the number of faults for which the recovery has been attempted by the SOA Suite so far for the job. The Not Recovered Faults column displays the number of faults for which the recovery could not be attempted by the SOA Suite due to some errors.
-

5. Click the name of the job for which you want to view more details such as its actual results, the job failure errors, and the recovery errors.

Enterprise Manager displays the Bulk Recovery Job Details page that provides the following information.

Section Name	Description
Results	<p>Provides the status of the recovery job, essentially details such as the composite selected for recovery, the ID of the faults selected for recovery, and the recovery attempt status of the faults, which can be either Recovered or Not Recovered.</p> <p>Note: The recovery status indicates only the recovery attempt status, and not the actual recovery status of the fault. To know the actual recovery status, search for the fault ID. How?</p>
Job Failure Error	<p>Provides details of the failed recovery jobs. The errors are shown from the last point of failure of the job.</p> <p>The details include:</p> <ul style="list-style-type: none"> ■ Failed Step Name, the name of the step of the recovery job that failed. The job has two steps, mainly <i>pre-check</i> and <i>recover_faults</i>. The <i>recover_faults</i> step runs once for every batch of the job, or only once if batching is not enabled. ■ Failed Step Output, the output of the failed job step. ■ Parsed Error Message, any known error message that is as part of the step output. ■ Composite, the name of the composite selected for the recovery job. ■ Fault Time From, the start date and time from when faults occurred and for which the recovery job was submitted ■ Fault Time To, the end date and time till when faults occurred and for which the recovery job was submitted ■ Error Details, the error indicating that the status of the recovery job could not be retrieved. This means that the recovery was attempted for the given composite and time period, but there was a time-out while retrieving the status. <p>To verify if the faults were recovered, search for the faults for the given composite and time period again. How?</p> <p>To run the recovery job again, reduce the batch time period to a value lower than the value you entered earlier, and submit the bulk recovery job again (see Section 12.16).</p>

12.16.4.2 Creating Bulk Recovery Jobs Using EMCLI and Web Services

You can create Bulk Recovery Jobs for a SOA Infrastructure Target from the command line using EM CLI, from EM Job Systems using Web-Service Interface, or from Cloud Control UI.

This section contains the following sections:

- [Creating Bulk Recovery Jobs Using EMCLI](#)
- [Viewing the Submitted Jobs and Outputs Using EMCLI](#)
- [Creating Bulk Recovery Jobs through Web-Service](#)

12.16.4.2.1 Creating Bulk Recovery Jobs Using EMCLI In EM CLI, use EM job system's `get_jobs` command to submit bulk recovery jobs. The inputs to the job are supplied using a properties file.

To create the bulk recovery job using EMCLI, follow these steps:

1. Log in to EMCLI. For example:

```
emcli login -username=sysman
```

2. Find out the input parameters to be entered in the property file to run the bulk recovery job. To do so, run the following command:

```
emcli describe_job_type -type=SOABulkRecovery
```

3. Use any editor to open the properties file, and provide your inputs. You can then save and close the properties file.

Using any editor, create a new text file. For example, temp.properties

Here's a sample Property File:

```
target_list=<soa-infra target name>:oracle_soainfra
variable.CompositeList=<composite1 target name>, <composite 2 target name>
variable.BatchDelay=300
variable.BatchSize=10
variable.EnableBatching=1
variable.EngineType=BPEL
variable.ErrorMsg=xxxx
variable.FaultStartTime=01-01-2013 00:00:00 PST
variable.FaultEndTime=01-02-2013 00:00:00 PST
variable.FaultTimePeriod=Custom
variable.RecoveryAction=Continue
```

Note: Currently, Oracle supports only one SOA-Infrastructure target to be entered in the *target_list* property.

4. Run the following command to submit a bulk recovery job with the updated property file as an input:

```
emcli create_job -name=bulk522 -job_type=SOABulkRecovery -input_file=property
file:/tmp/temp.properties
```

5. Set the preferred credentials or named credentials for the WebLogic Domain and SOA Server Host. By default, the job uses the preferred credentials, that is, WebLogic Administrator Credentials for the WebLogic domain and Normal Host Credentials for the SOA Server hosts.

To set the preferred credentials, run the following commands:

Setting WebLogic Domain Credentials:

```
emcli set_preferred_credential -target_type=weblogic_domain -target
name=<weblogic domain target name> -set_name=WLCredsNormal -credential
name=<existing named credential name> -credential_owner=<user>
```

Setting SOA Host Credentials:

```
emcli set_preferred_credential -target_type=host -target_name=<host target
name> -set_name=HostCredsNormal -credential_name=<existing named credential
name> -credential_owner=<user>
```

Alternately, you can override the preferred credentials by supplying the named credentials as an input to the property file for the current submission.

Following example describes how to set the named credentials for the WebLogic Domain and SOA Server host:

```
target_list=<SOA-Infra TargetName>:oracle_soainfra
cred.SOAAgentHostCred.<slc01nbo.us.example.com>:<host>=NAMED:xxxx
cred.SOADomainCreds.<target_name>:<target_type>=NAMED:xxxx
```

12.16.4.2.2 Viewing the Submitted Jobs and Outputs Using EMCLI The following table describes certain other operations that can be performed using EMCLI commands.

Table 12-10 EMCLI Commands For Bulk Recovery

EMCLI Command	Description	Example
get_jobs	This EMCLI command to view all the Bulk Recovery Jobs that have been submitted.	emcli get_jobs -targets=<SOA-Infra target name>:oracle_soainfra -format=name:csv grep BULK521
get_job_execution_detail	<p>This EMCLI command to view the output of the Bulk Recovery job execution. To view the details of the job steps, you need to supply the Execution ID of the job.</p> <p>Note: The output of the job that is displayed using the EMCLI command is unstructured. For a complete and structured report of the output, log in to Enterprise Manager Cloud Control. From Enterprise menu, select Job, and then click Activity. On the Job Activity Page, in the Advanced Search region, enter the name of the job, and then click Go. Select the job, and drill down to the steps by click Expand All.</p>	<p>Run the following command to get the Execution ID of the job:</p> <pre>emcli get_jobs -targets=<SOA-Infra target name>:oracle_soainfra -format=name:csv grep BULK521</pre> <p>Use the Execution ID in the following command to view the details of the job submitted:</p> <pre>emcli get_job_execution_detail -execution=D4081BAB8942F246E040F00A5AA93E04 -xml -showOutput</pre>

12.16.4.2.3 Creating Bulk Recovery Jobs through Web-Service In addition to EM User Interface and EMCLI, you can also use Web-Service Interface provided by EM job system to create Bulk Recovery Jobs. The web-service interface of the Job System is available by default in an EM installation, and the URL for the WSDL is as follows:

```
<protocol>://<machine>:<port>/em/websvcs/extws/JobControlService?wsdl
```

The EM job system web services are implemented as Simple Object Access Protocol (SOAP) end-points. Client programs can access these end-points using a variety of languages like Java, C++, and Ruby. The web service is used by sending a SOAP request message to one of the end-points, and retrieving the corresponding response message.

Typically, the operations exposed by Job system in the Web-Service Interface is very similar to the EMCLI operations such as create_job, describe_job_type, and so on.

12.16.5 WorkFlow Examples for Bulk Recovery

This section covers the following examples:

- [Running Bulk Recovery Job Every Night](#)
- [One Time Job With Specific Time Interval to Recover Faults](#)

Running Bulk Recovery Job Every Night

To schedule a bulk recovery job that runs at 12.00am every night, to recovers faults that have occurred through the day:

1. In the composites section, add the desired composites.

2. In the Time section, enter the following values:
 - a. For a SOA 12c target, from Instance Created menu, select **Custom**, and provide the custom values. To recover instances created during the day alone, select **Last 1 Day**.
 - b. From the Fault Occurred menu, select **Last One Day**.
 - c. Click **Estimate Faults** to view the number of faults that will be recovered.
3. In the Fault Details section, enter appropriate values.
4. In the Recovery Option section, enter the following values:
 - a. Select **Batch by Fault Time**.
 - b. In Batch Time Period, enter **10 mins**. This would mean that, every batch would recover faults in 10mins time window. Since you have already selected Last One day (Fault Time From value), there will be $24 \times 60 / 10 = 144$ batches in all.
 - c. In Delay Between Batches, enter **200 secs**. This will be the delay between each batch. The main intention behind a delay is to allow the SOA System time to stabilize after each recovery.
5. In the Job Parameters section, enter the following values:
 - a. Select **Immediately** to start the job as soon as it is submitted.
 - b. From repeat menu, select **Every N Days**.
 - c. Enter Frequency as **1 day**.
6. Click **Submit**.

One Time Job With Specific Time Interval to Recover Faults

To schedule a bulk recovery job that runs one time, and recover faults in a specific time interval, follow these steps:

1. In the composites section, add the desired composites.
2. In the Time section, enter the following values:
 - a. For a SOA 12c target, from Instance Created menu, select **Custom**, and provide the custom values. To recover instances created during the day alone, select **Last 1 Day**.
 - b. From the Fault Occurred menu, select **Custom**. Enter **3:00 am** in Fault Time From field, and **4:00 am** in Fault Time To fields.
 - c. Click **Estimate Faults** to view the number of faults that will be recovered.
3. In the Fault Details section, enter appropriate values.
4. In the Recovery Option section, enter the following values:
 - a. Select **Batch by Fault Time**.
 - b. In Batch Time Period, enter **10 mins**. This would mean that, every batch would recover faults in 10mins time window. Since you have selected a time window of one hour (3:00 am to 4:00 am), there will be $60 / 10 = 6$ batches in all.
 - c. In Delay Between Batches, enter **200 secs**. This will be the delay between each batch. The main intention behind a delay is to allow the SOA System time to stabilize after each recovery.
5. In the Job Parameters section, enter the following values:

- a. Select **Later**, and provide a date and time to schedule the job.
 - b. From repeat menu, select **Do not repeat**.
 - c. Enter Frequency as **1 day**.
6. Click **Submit**.

12.17 Generating Error Hospital Reports

Use the Error Hospital page to view an aggregate count of errors that have occurred in all SOA Composites deployed in the SOA Infrastructure. This page does not list out individual faulted instances. To view the individual flows that have faults, go to the Faults and Rejected Messages tab on the SOA Infrastructure Home page.

The Error Hospital page is available at the SOA Infrastructure level, where system-wide faults data is aggregated. When accessed at the partition level, the Error Hospital page is limited to faults data associated only with that partition.

The Error Hospital page is arranged in the following sections:

- **Search Region:** You can update the necessary filters available in the Search section to drill down to a more granular result that meets your requirements. By default, the total faults that have occurred across all instances created in the last 24 hours is displayed. You must provide the **Instance Created From** and **Instance Created To** values as they are mandatory fields. In addition to these values, you may specify a time window for the fault to restrict your query to a specific time in the past.

Additionally, you can select the fault attribute by which data is aggregated. For example, if you select Fault Code, each row in the first column represents a specific code and the remaining columns show the fault statistics aggregated for each code.
- **Error Hospital Report Table:** This table displays a report based on the filters specified in the search region. The data is always aggregated by one of the primary fault attributes selected from the list such as **Fault Name**, **Fault Code**, and so on. The default aggregation is by **Fault Name**. This report enables you to assess the error trends. For example, aggregate by Fault Code to see which code has the most faults. You can then select a single row which has maximum faults from the table, and perform a bulk recovery.
- **Charts Region:** The details of the Error Hospital Report are also available in a chart form. Essentially, the top faults aggregated by **Fault Name** are represented in a bar chart. The pie chart depicts the recovery required faults as against non-recoverable faults.

The major advantages are:

1. Error Hospital Report acts as a quick view of fault count for administrators to determine the error trends.
2. A consolidated report with all an aggregate error count is available on a single page.
3. You can also perform bulk recovery on a selected group of similar faults in a single operation.
4. Autoretries feature allows system to continuously retry a recoverable fault. When a fault is in recovery required state and an autoretry is setup, then a automated system call is generated at a certain interval to try and recover the error. This feature greatly benefits the Administrator as they have lesser faults to manually track.

To set the search criteria for Error Hospital, enter details as described in the following table, and click **Search**.

Table 12–11 Setting Search Criteria for Error Hospital

Field	Description
Time	<p>Use this filter to restrict your query to a specific time in the past. A time filter is required to search for faults. Ensure that you enter appropriate values in Instance Created From and Instance Created To fields. By default, all the instances created in the last one day is displayed.</p> <p>Additionally, you can add the following filters:</p> <ul style="list-style-type: none"> Instance Updated Fault Occurred
Composite	<p>Use to restrict your search for business flows to a specific composite.</p> <p>You can select the following option:</p> <ul style="list-style-type: none"> ■ Initiating limits your search to only the business flows that started in the selected composite. ■ Participating allows you to search for all business flows in that composite. <p>Click the torch icon. In the Search and Select Targets wizard, select the target name from the table and click Select. A faults search is performed on the selected composite.</p>
State	<p>Select one of the following states:</p> <p>Select Active to search active instances. If you select a blank, then the filtering is ignored.</p> <ul style="list-style-type: none"> ■ All active: Finds all business flows in active states. ■ Running: A business flow is currently running. The flow may include a human task component that is currently awaiting approval. ■ Suspended: A business flow that is typically related to migration of one version of the SOA composite application to another. ■ Recovery: A business flow with a recoverable fault. <p>Select Inactive to search inactive instances. If you select a blank, then the filtering is ignored.</p> <ul style="list-style-type: none"> ■ All inactive: Finds all terminated business flows. ■ Completed: A business flow has completed successfully. There are no faults awaiting recovery. ■ Failed: Finds completed business flows with non-recoverable faults. ■ Aborted: Finds business flows explicitly terminated by the user or for which there was a system error.

Table 12–11 (Cont.) Setting Search Criteria for Error Hospital

Field	Description
Fault	<p>Use to limit the search for business flows to only those with faults. If you leave this field blank, the Fault filter is ignored.</p> <p>To search for faults of any type, select All or blank.</p> <p>To search for faults in a particular type, select one of the following:</p> <ul style="list-style-type: none"> ■ Recovery Required indicates business faults and some specific system faults. For example, Oracle Mediator input file path and output directory mismatch faults, and other faults related to Oracle BPM Worklist, where the user is not authorized to perform any relevant (expected) actions. ■ Not Recoverable, indicates rejected messages, most system faults, non-existent references, service invocation failures, and policy faults. ■ Recovered, indicates flows that contain at least one recovered fault. ■ System Auto Retries, indicates the faulted flows in which system auto retries occurred.
Fault Type	<p>To search for all types of faults, select All</p> <p>To search for a particular type of fault, select one of the following:</p> <ul style="list-style-type: none"> ■ System Faults, indicate all network errors or other types of errors such as a database server or a web service being unreachable. ■ Business Faults, indicate all application-specific faults that were generated when there was a problem with the information processed (for example, a social security number is not found in the database). ■ OWSM Faults, indicate Oracle Web Service Manager Errors on policies attached to SOA composite applications, service components, or binding components. Policies apply security to the delivery of messages.
Fault Owner	<p>Use the Name field to enter a fault owner name. Ensure that the name entered is in the following format:</p> <pre><partition>/<composite name>!<composite version>/<component name></pre> <p>Use this to further filter your search for faulted business flows to stuck flows awaiting a particular type of recovery action from the administrator. To search for faults belonging to all the owners, select All.</p> <p>To drill down to a particular fault owner, select one of the following:</p> <ul style="list-style-type: none"> ■ BPEL ■ BPMN ■ Mediator ■ Human Workflow ■ Decision ■ Spring ■ Case Management

Table 12–11 (Cont.) Setting Search Criteria for Error Hospital

Field	Description
Fault Details	<p>You can fine grain your search parameters to drill down to granular result by providing all or some of the following details:</p> <ul style="list-style-type: none"> ■ Error Message Contains: Use to find only faulted business flows with the same error message text. You can enter any part of the message. This search is case sensitive. ■ Fault Name: Use to find only faulted business flows with a specific descriptive fault name such as Negative Credit. You must enter the exact name (the entire string). This search is case sensitive. <p>Expand Other to display additional fields for filtering:</p> <ul style="list-style-type: none"> ■ HTTP Host ■ JNDI Name
Restrict Search Rows	<p>By default, the search results are restricted to 10 rows in the table. If you want to modify this limit or restriction, enter a suitable value.</p> <p>The highest value you can enter as the limit depends on the limit set on the OMS. When no limit is set on the OMS, the limit that is honored by default is 2000, so the default range you can enter in the Restrict Search Result (rows) field is 1 to 2000.</p> <p>To modify this maximum limit set on the OMS, run the following command: <code>emctl set property -name oracle.sysman.core.uifwk.maxRows -value <max_limit_value></code></p> <p>Note: The higher the value you set as the limit, the longer the time it takes to retrieve the faults, and that entering a higher value than the default in Restrict Search Result (rows) can lead to longer time to get the faults, and hence a longer load time.</p>

In particular, you can perform the following tasks from this page:

- [Generating an Error Hospital Report](#)
- [Customizing the Error Hospital Report](#)

12.17.1 Generating an Error Hospital Report

To generate and view an error counts that have occurred across all SOA Composites using the search fields, follow these steps:

1. Meet the prerequisites. See [Section 12.15.3](#)
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, click the SOA Infrastructure target.
4. On the SOA Infrastructure target page, click **Error Hospital**.
5. In the Error Hospital tab, set the search criteria. For more information, see [Table 12–11](#).
6. Click **Search**.
7. View the results:
 - To view the aggregate count of errors for each fault, see the **Total Faults** column in the results table.
 - To hide or unhide columns in the table, from the **View** menu, select **Columns**, then select the column name you want to hide or unhide.

- To filter or perform a fine search for a particular column, enter a search keyword in the text-box placed above the column header. For more information, see [Section 12.15.4.3](#).
- To group the faults by different categories, select the relevant category. For more information, see [Section 12.17.2](#).
- To recover the faults in bulk, click **Bulk Recover**. For more information, see [Section 12.16.3](#).

12.17.2 Customizing the Error Hospital Report

After generating the report, if you want to group the results by some other category, then follow these steps:

1. Create an error report. See [Section 12.17.1](#).
2. In the Error Hospital page, select the fault attribute by which data is aggregated. To do so, from the **Group By** menu select one of the following fault attributes. By default, the faults are aggregated by the **Fault Name**. However, you can select any of the following options:
 - **Fault Code:** Aggregates the fault code.
 - **Fault Name:** Aggregates the fault name. This aggregation option is selected by default.
 - **Fault Type:** Aggregates the fault type:
 - **System:** Network errors or other types of errors such as a database server or a web service being unreachable.
 - **Business:** Application-specific faults that are generated when there is a problem with the information being processed (for example, a social security number is not found in the database).
 - **OWSM:** Errors on Oracle Web Service Manager (OWSM) policies attached to SOA composite applications, service components, or binding components. Policies apply security to the delivery of messages.
 - **JNDI Name:** Aggregates the JNDI name (for example, `eis/FileAdapter`).
 - **Composite:** Aggregate faults by the SOA composite application name.
 - **Fault Owner:** Aggregate faults by the name of the service component, service binding component, or reference binding component that handled the fault. In some cases, this can be both the fault owner and fault location.
 - **Fault Owner Type:** Aggregates the type of component, service, or reference that handled the fault (for example, if a BPEL process service component owns the fault, BPEL is displayed).
 - **Partition:** Aggregates the partition of the SOA composite application in which the fault occurred.
 - **HTTP Host:** Aggregates the HTTP host on which the fault occurred.

12.18 Recovering BPEL/BPMN Messages

To find recoverable instances of the BPEL or BPMN Service Engine, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the SOA Infrastructure target.

3. On the SOA Infrastructure target page, from the **SOA Infrastructure** menu, select **Service Engine**, then select **BPEL/BPMN**. Based on the selection, the home page of the service engine is displayed.
4. On the home page, select the **Recovery** tab.
5. To recover messages in which faults occurred, select one or more messages in the table, up to a maximum of 5 messages at a time, and click **Recover**.

Search again to verify if the faults you selected for recovery still appear in the search results. If they do not appear, then the recovery operation for those faults has been successfully submitted.

Note: To mark messages so that they are never delivered, select one or more message in the table, and click **Cancel**.

12.19 Troubleshooting

This section describes the errors you might encounter while discovering the SOA Suite 11g and the workaround steps you can follow to resolve each of them.

This section covers the following:

- [Discovery](#)
- [Monitoring](#)
- [Instance Tracing](#)
- [Recent Faults](#)
- [Fault Management](#)
- [Application Dependency and Performance Integration](#)
- [Information Publisher Reports](#)
- [BI Publisher Reports](#)
- [Systems and Services](#)
- [BPEL Recovery](#)
- [SOA License Issue](#)
- [Dehydration Store Issue](#)

12.19.1 Discovery

The following error occurs when the SOA instances are being discovered.

Table 12–12 Error Message

Error Message	Workaround Steps
New SOA Composite deployed on the SOA Server from JDeveloper are not displayed automatically in Enterprise Manager Cloud Control.	To discover the newly deployed SOA Composites in Enterprise Manager Cloud Control, you must run the Refresh Farm menu option for the associated WebLogic Domain.

12.19.2 Monitoring

The following error occurs when the collection frequency causes a delay in the collection of configuration data.

Table 12-13 Error Message

Error Message	Workaround Steps
All metrics are not displayed.	Enterprise Manager Cloud Control uses the Management Agent to collect metric data. For the first collection, the agent may need 15 minutes to upload the metric data.

12.19.3 Instance Tracing

The following error occurs when the instance is traced.

Instance Search Fails - Same reason as BPEL first column. If Management Agent is down or unreachable.

Table 12-14 Error Message

Error Message	Workaround Steps
Instance Tracing Job Fails	<ol style="list-style-type: none"> 1. Navigate to the Jobs page, and locate the Instance Tracing job (TRACE SOA INSTANCE ID + Instance ID + Submitted time) and view the output to identify the step that has failed. 2. Resolve the issue and run the job again by clicking Retry on the Jobs page. 3. Navigate to the Instance Tracing page to view the trace results. You can also submit a new job by running the Trace Instance option on the Instance Tracing page.

12.19.4 Recent Faults

The following errors occur when:

- All instances with faults are not displayed as only the last 10 values are collected.
- The most recently collected fault instances do not appear in the Faults and Messages page.

Table 12-15 Error Message

Error Message	Workaround Steps
All instances with faults are not populated in Enterprise Manager Cloud Control.	By default, you can only view the latest 10 faults collected during the last 15 minutes. To view additional faults, navigate to Fusion Middleware by clicking the link in the General section on the target Home page.

12.19.5 Fault Management

This section contains the troubleshooting information for fault management:

- [Bulk Recovery](#)
- [Fault Search and Recovery](#)
- [Fault Management and Instance Tracing Errors](#)

12.19.5.1 Bulk Recovery

In general when there is a Bulk Recovery Error, follow these steps to navigate to the page that describes the errors:

1. In Cloud Control, from the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the SOA Infrastructure target.
3. On the SOA Infrastructure target page, from the **SOA Infrastructure** menu, select **Fault Management**, then select **Bulk Recovery**.
4. On the Bulk Recovery Jobs page, select the job that has failed.
5. On the Bulk Recovery Job Details page, in the Job Failure Error section, check the **Parsed Error Message** and **Error Details** fields to understand about the error because of which the job failed.

The following are some of the error messages that you may see in the Parsed Error Message field along with their suggested fixes:

Table 12–16 Error Message

Error Message	Workaround Steps
<pre>java.lang.IllegalArgumentException: Invalid Job Identifier! The specified identifier does not match any valid fault recovery jobs.</pre>	<ol style="list-style-type: none"> 1. Ensure the SOA Infrastructure is up and running. 2. Choose a smaller value for Batch Time Period parameter that is entered while Creating a Bulk Recovery job. This will ensure lesser number of faults are recovered in each batch.
<pre>java.lang.IllegalStateException The results job xxxx are not available because the processing has not yet completed.</pre>	<ol style="list-style-type: none"> 3. Choose Fault time period appropriately excluding the fault time period for which faults have already been recovered by current job. To do so, follow these steps: <ol style="list-style-type: none"> a. The failed job details gives the Composite, Fault Time From and Fault Time To for which the recovery failed. b. Choose new Fault Time From of the new job as the Fault Time To of the failure point of the failed job. 4. Submit another bulk recovery job with same parameters but with the reduced Batch Time Period value, and the new Fault Time From and Fault Time To.

Table 12-16 (Cont.) Error Message

Error Message	Workaround Steps
<pre>t3://slc03dms.us.example.com:80 01 javax.naming.CommunicationExce ption [Root exception is java.net.ConnectException: t3://slc03dms.us.example.com:80 01 /soa-infra: Destination unreachable; nested exception is: java.net.ConnectException: Connection refused; No available router to destination]</pre>	Ensure that the SOA Infrastructure is up and running, and submit another bulk recovery job with the same parameters.

12.19.5.2 Fault Search and Recovery

The following error occurs when you are unable to connect to the SOA Infrastructure target:

Table 12-17 Error Message

Error Message	Workaround Steps
<pre>Error connecting to SOA Infra t3://slc03dms.us.example.com:80 01.</pre>	Ensure that the SOA Infrastructure is up and running.

12.19.5.3 Fault Management and Instance Tracing Errors

The following errors occur when the SOA database is not functional:

Table 12-18 Error Message

Error Message	Workaround Steps
<pre>Error occured when getting faults Java.rmi.RemoteException: EJB Exception: ; nested exception is: java.lang.RuntimeException: java.lang.RuntimeException: weblogic.jdbc.extensions.PoolD isabledSQLException: weblogic.common.resourcepool.R esourceDisabledException: Pool SOALocalTxDataSource is Suspended, cannot allocate resources to applications.</pre>	Ensure the SOA Database is up and running.

Table 12–18 (Cont.) Error Message

Error Message	Workaround Steps
t3://slc03dms.us.example.com:8001 javax.naming.CommunicationException [Root exception is java.net.ConnectException: t3://slc03dms.us.example.com:8001/soa-infra: Destination unreachable; nested exception is: java.net.ConnectException: Connection refused; No available router to destination]	Ensure the SOA Database is up and running.
Error occurred when getting faults oracle.sysman.emSDK.agent.comms.exception.ConnectException: Unable to connect to the agent at https://slc03dms.us.example.com:3872/emd/main/ [Connection refused]	Ensure the SOA Database is up and running.

12.19.6 Application Dependency and Performance Integration

When you click on the Application Dependency and Performance link in the SOA Instance Home page, you may see a blank page. This error may occur if:

- Application Dependency and Performance is not being used to monitor the SOA instance.
- Application Dependency and Performance has not been registered in Enterprise Manager Cloud Control.

Table 12–19 Error Message

Error Message	Workaround Steps
Missing ADP Data - Add the metrics - and add one for blank page.	To monitor data collected using ADP, the ADP Manager must be registered and configured.

12.19.7 Information Publisher Reports

This section lists report related errors.

Table 12–20 Error Message

Error Message	Workaround Steps
Report generation fails due to invalid database details.	<ol style="list-style-type: none"> 1. Navigate to the All Targets page. 2. Select the SOA Infrastructure target on which the specific SOA Composite has been deployed and click Configure. 3. In the Monitoring Configuration page, specify the database connection details and the credentials and click OK.

Table 12–20 (Cont.) Error Message

Error Message	Workaround Steps
No targets found message for Oracle SOA Composite Reports.	You cannot use the out-of-box reports directly. You must use the Create Like option to generate custom reports based on the SOA Composite Target type.
Report generation fails due to invalid host details.	Set valid credentials for the host target on which the SOA Infrastructure instance is running.

12.19.8 BI Publisher Reports

This section lists BI Publisher report related errors.

Table 12–21 Error Message

Error Message	Workaround Steps
Exception Encountered For One of SOA BIP Report If SOA Dehydration Is Not Configured	<p>If the SOA Dehydration store details are not configured in BI Publisher, the SOA Composite Report (from Dehydration Store) is not generated, and the following exception message is displayed:</p> <pre>The report cannot be rendered because of an error, please contact the administrator. Parameter name: P_PARTITION_NAME Can not establish database connection(EMSOA)</pre> <p>To work around this issue, you must manually create the SOA database connection by choosing JDBC Connection from the Administration menu after the BI Publisher setup has been configured. The name of the data source name should be EMSOA. Use the following steps to create the EMSOA data source:</p> <ol style="list-style-type: none"> 1. From the Enterprise menu, select Reports, and then select BI Publisher Reports. The BI Publisher Enterprise login page appears. 2. Enter your credentials to log in to BI Publisher. 3. Click the Administration link available at the top right corner. 4. Navigate to the Data Sources page by clicking the JDBC Connection link in the Data Sources section. Click Add Data Source. 5. Enter EMSOA in the Data Source field, specify the driver type, driver class, connection string, user name, and password. Click Test Connection to ensure that the connection can be established successfully. 6. Click Apply. The newly created EMSOA jdbc data source appears on the Data Sources page. <p>Once you have created the EMSOA data source, the issue should be resolved.</p>

12.19.9 Systems and Services

The following error occurs when you try to refresh a service that has not been created.

Table 12–22 Error Message

Error Message	Workaround Steps
Create Service option does not work.	System and service creation depends on the configuration collection of the SOA Infrastructure and related targets. Check the log file for details.
Refresh Service option does not work.	The Refresh Service function works for an existing Infrastructure service. In case the service does not exist, it should be created using the Create Service menu option.

12.19.10 BPEL Recovery

The following error occurs when invalid credentials are provided.

Table 12–23 Error Message

Error Message	Workaround Steps
Invalid Host and WebLogic Domain Credentials	For the BPEL Recovery functionality to work, the host credentials and WebLogic Domain credentials must to be available in the preferred credential store. Set the valid credentials and try again.

12.19.11 SOA License Issue

The following error occurs if the SOA Management Pack EE has not been enabled.

Table 12–24 Error Message

Error Message	Workaround Steps
The page requested is part of the SOA Management Pack EE.	<p>The SOA Management Pack EE must be enabled for the specific SOA Infrastructure target. To enable the license, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Setup menu, select Management Packs, then select Management Pack Access. 2. Select SOA Infrastructure in the Target Type drop-down box. 3. Uncheck and check the SOA Management Pack EE. 4. Click Apply and navigate to the SOA Composite page.

12.19.12 Dehydration Store Issue

Data is not displayed on the Dehydration Store page.

Table 12–25 Error Message

Error Message	Workaround Steps
Data is not displayed in the Dehydration Store page.	<p>This error may occur if there is a data mismatch between the values specified for the database target and the WebLogic Server Datasource. To resolve this issue, follow these steps:</p> <ol style="list-style-type: none"> 1. Compare the Database Host and SID value of the database target with the value collected for the WebLogic Server JDBC Datasource configuration. 2. If the values are different, select Services from the Targets menu. Select DataSources, then select SOALocalTxtSource, then click Connection Pool to update the Datasource Connection URL

Part V

Managing Oracle Business Intelligence

The chapter in this part describes how you can discover, monitor, and administer Oracle Business Intelligence instance and Oracle Essbase targets in Enterprise Manager Cloud Control 12c.

This part contains the following chapter:

- [Chapter 13, "Discovering and Monitoring Oracle Business Intelligence Instance and Oracle Essbase"](#)

Discovering and Monitoring Oracle Business Intelligence Instance and Oracle Essbase

Oracle Business Intelligence (Oracle BI), a part of Oracle Business Analytics, is a combination of technology and applications that provide a range of business intelligence capabilities, such as enterprise performance management, financial performance management, data integration, data warehousing, as well as a number of query, reporting, analysis, and alerting tools.

You can use Enterprise Manager Cloud Control 12c to monitor certain Oracle Business Intelligence targets. Monitoring the status, performance, and health of Oracle Business Intelligence targets enables you to set up a more efficient business intelligence system.

By monitoring a target using Enterprise Manager, you obtain a complete and up to date overview of the status, availability, performance, and health of the target. Enterprise Manager displays complex target performance data in a simple form, using graphs and pie charts. It also keeps you informed about target metrics crossing their threshold levels, target alerts, and target incidents that require user action.

This chapter explains how to monitor Oracle BI Instance and Oracle Essbase targets in Enterprise Manager Cloud Control 12c. It consists of the following sections:

- [Overview of Oracle Business Intelligence Targets You Can Monitor](#)
- [Understanding the Monitoring Process](#)
- [Discovering Oracle Business Intelligence Instance and Oracle Essbase Targets](#)
- [Monitoring Oracle Business Intelligence Instance and Essbase Targets](#)
- [Administering Oracle Business Intelligence Instance and Essbase Targets](#)

13.1 Overview of Oracle Business Intelligence Targets You Can Monitor

This section gives an overview of the Oracle Business Intelligence targets you can monitor using Enterprise Manager Cloud Control 12c Release 2 (12.1.0.2.0) or higher. It contains the following:

- [Oracle Business Intelligence Instance](#)
- [Oracle Essbase](#)

13.1.1 Oracle Business Intelligence Instance

Oracle Business Intelligence Instance (BI Instance) is a logical grouping of Business Intelligence components that can be configured as a unit to deliver a single integrated business intelligence capability. Every BI Instance target is part of a WebLogic domain.

For information on WebLogic domains, refer to *Oracle Fusion Middleware Creating Domains Using the Configuration Wizard*.

A BI Instance target consists of a number of components, which can be monitored individually using Enterprise Manager. [Table 13–1](#) describes these components.

Table 13–1 Oracle Business Intelligence Instance Components

Component	Description
BI Server	This component provides query and data access capabilities for Oracle Business Intelligence, and provides services for accessing and managing the enterprise semantic model.
BI Presentation Server	This component provides the framework and interface for the presentation of Oracle Business Intelligence data to web clients. It maintains an Oracle BI Presentation Catalog service on the file system for customizing this presentation framework.
BI Cluster Controller	This component manages Oracle Business Intelligence Server (BI Server) clusters. It also manages the active-passive clustering of the Oracle Business Intelligence Scheduler (BI Scheduler) components.
BI Scheduler	This component provides extensible scheduling for analyses to be delivered to users at specified times.
BI Java Host	This component provides component services that enable Oracle BI Presentation Services to support various components such as Java tasks for Oracle BI Scheduler, Oracle BI Publisher, and graph generation. It also enables Oracle BI Server query access to Hyperion Financial Management and Oracle Online Analytical Processing (OLAP) data sources.

13.1.2 Oracle Essbase

Oracle Essbase is a multidimensional database management system that provides business performance management solutions for meeting the complex calculation requirements of analysts across an enterprise.

Oracle Essbase consists of an Online Analytical Processing (OLAP) server that provides an environment for deploying pre-packaged applications and developing custom analytic and performance management applications. Every Essbase target is part of a WebLogic domain. For information on WebLogic domains, refer to *Oracle Fusion Middleware Creating Domains Using the Configuration Wizard*.

Using Enterprise Manager, you can monitor the Essbase server and every deployed Essbase application individually.

13.2 Understanding the Monitoring Process

To monitor Oracle Business Intelligence Instance (BI Instance) and Oracle Essbase targets, follow these steps:

1. Install Oracle Business Intelligence.

For information on how to install Oracle Business Intelligence, refer to *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence*.

2. Install the Enterprise Manager Cloud Control 12c Release 2 (12.1.0.2.0) system, or higher. If you are using an earlier version of Enterprise Manager Cloud Control, upgrade it to 12c Release 2 (12.1.0.2.0) or higher.

For information on how to install the Enterprise Manager Cloud Control 12c system, refer to *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

For information on how to upgrade to Enterprise Manager Cloud Control 12c Release 2 (12.1.0.2.0) or higher, refer to *Oracle Enterprise Manager Cloud Control Upgrade Guide*.

Note: Oracle recommends that you install the Enterprise Manager Cloud Control system on a different host, other than the one on which you have installed Oracle Business Intelligence.

3. If the host on which you installed Oracle Business Intelligence does not have Oracle Management Agent (Management Agent) installed, install a Management Agent of version 12.1.0.2.0 or higher. If the host has a Management Agent of version earlier than 12.1.0.2.0 installed, upgrade the Management Agent to 12.1.0.2.0 or higher.

For information on how to install a Management Agent, refer to *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

For information on how to upgrade a Management Agent, refer to *Oracle Enterprise Manager Cloud Control Upgrade Guide*.

4. If the Management Agent on the host on which you installed Oracle Business Intelligence does not have the Enterprise Manager for Oracle Fusion Middleware plug-in installed, deploy the 12.1.0.3.0 version, or a higher version of this plug-in on the host. If an earlier version of this plug-in is deployed to the Management Agent on the host, upgrade it to 12.1.0.3.0 or higher.

The 12.1.0.3.0 Enterprise Manager for Oracle Fusion Middleware plug-in is downloaded by default to the OMS host when you install a 12.1.0.2.0 OMS. The 12.1.0.4.0 Enterprise Manager for Oracle Fusion Middleware plug-in is downloaded by default to the OMS host when you install a 12.1.0.3.0 OMS.

For information on how to deploy a plug-in and upgrade an existing plug-in, refer to the Using Plug-Ins chapter of the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

5. Discover the required BI Instance and Essbase targets.

BI Instance and Essbase targets are automatically discovered when you discover the WebLogic domain that they are part of.

The BI Instance and Essbase targets you want to monitor may be part of an undiscovered WebLogic domain, or a previously discovered WebLogic domain.

For information on how to discover BI Instance and Essbase targets part of an undiscovered WebLogic domain, see [Section 13.3.1](#).

For information on how to discover BI Instance and Essbase targets part of a previously discovered WebLogic domain, see [Section 13.3.2](#).

6. Monitor the BI Instance and Essbase targets.

For information on how to monitor BI Instance and Essbase targets, see [Section 13.4](#).

13.3 Discovering Oracle Business Intelligence Instance and Oracle Essbase Targets

Oracle Business Intelligence Instance (BI Instance) and Oracle Essbase targets you want to discover may be part of an undiscovered WebLogic domain, or a discovered WebLogic domain.

This section contains the following:

- [Discovering Targets of an Undiscovered WebLogic Domain](#)
- [Discovering New or Modified Targets of a Discovered WebLogic Domain](#)

Note: This section is applicable only for Oracle Business Intelligence Enterprise Edition 11g targets.

13.3.1 Discovering Targets of an Undiscovered WebLogic Domain

To discover BI Instance and Essbase targets that are part of an undiscovered WebLogic domain, first discover the WebLogic domain that the targets are part of. To do so, either enable the automatic discovery of WebLogic domains, or discover the required WebLogic domains manually. After discovering the WebLogic domains, you must promote the targets and assign Management Agents to monitor them.

The following sections explain how to perform these actions. For additional information about Fusion Middleware discovery, see *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

Enabling Automatic Discovery of Targets

Using this method, you enable the automatic discovery of Fusion Middleware targets to automatically discover the various WebLogic domains in the enterprise. Also, you promote the BI Instance and Essbase targets part of the WebLogic domains, and assign Management Agents to monitor these targets.

Discovering Targets Manually

Using this method, you manually discover WebLogic domains. Also, you promote the BI Instance and Essbase targets part of the WebLogic domains, and assign Management Agents to monitor these targets.

13.3.2 Discovering New or Modified Targets of a Discovered WebLogic Domain

In a typical enterprise, WebLogic domains are not static. New or modified domain members, such as BI Instance and Essbase targets, may be added to a discovered WebLogic domain at any point of time. Either enable the automatic discovery of these added targets, or discover them manually. After discovering these targets, you must promote the targets and assign Management Agents to monitor them.

The following sections explain how to perform these actions. For additional information about Fusion Middleware discovery, see *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

Enabling Automatic Discovery of Targets

Using this method, you enable the automatic discovery of new or modified WebLogic domain member targets, such as BI Instance and Essbase targets. Also, you promote the new or modified domain member targets, and assign Management Agents to monitor them.

Discovering Targets Manually

Using this method, you manually check a WebLogic domain for new members, such as BI Instance and Essbase targets, and discover them. Also, you promote the new or modified domain member targets, and assign Management Agents to monitor them.

13.4 Monitoring Oracle Business Intelligence Instance and Essbase Targets

To monitor Oracle Business Intelligence Instance (BI Instance) and Essbase targets, navigate to the home page of the required target.

To navigate to the home page of a BI Instance or Essbase target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.

Using the target home page, you can perform a number of monitoring tasks. These tasks are described in this section, which contains the following:

- [Performing General Monitoring Tasks](#)
- [Performing Target-Specific Monitoring Tasks](#)

Note: This section is applicable only for Oracle Business Intelligence Enterprise Edition 11g targets.

13.4.1 Performing General Monitoring Tasks

This section explains how to perform general BI Instance and Essbase target monitoring tasks, such as viewing target status and availability, performance, health, alerts, incidents, and so on.

This section contains the following elements:

General

- [Viewing Target General and Availability Summary](#)
- [Viewing Target Status and Availability History](#)

Performance

- [Viewing Target Performance or Resource Usage](#)
- [Viewing Target Metrics](#)
- [Viewing or Editing Target Metric and Collection Settings](#)
- [Viewing Target Metric Collection Errors](#)

Health

- [Viewing Target Health](#)
- [Viewing Target Alert History](#)
- [Viewing Target Incidents](#)

- [Viewing Target Logs](#)

Configuration, Jobs, and Compliance

- [Viewing Target Configuration and Configuration File](#)
- [Viewing Target Job Activity](#)
- [Viewing Target Compliance](#)

13.4.1.1 Viewing Target General and Availability Summary

To view a general summary of the target details, navigate to the **Summary** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.

The **Summary** section provides background information about the target, which helps you locate the target binaries, log files, metadata files, and configuration files for viewing or editing purposes.

[Table 13–2](#) describes the elements of the **Summary** section.

Table 13–2 Target General and Availability Summary

Element	Description
Up Since	<i>(Displayed only when the target is up)</i> Time the target was last started successfully.
Down Since	<i>(Displayed only when the target is down)</i> Time the target was last stopped.
Availability	Percentage availability of the target.
Version	Version of the target software.
Oracle Home	Location of the target binaries.
Oracle Instance	Location of the target content files, metadata, configuration files and log files.
Port	Port used by the target for communication.
Running Applications (Only for Essbase Server targets)	Number of Essbase applications currently up and running.
Unexposed Applications (Only for Essbase Server targets)	Number of Essbase applications currently not being accessed by any user.
Connected Users (Only for Essbase Server targets)	Number of users currently connected through one or more of the applications.
Storage Type (Only for Essbase application targets)	Type of data storage used by the application.

Table 13–2 (Cont.) Target General and Availability Summary

Element	Description
Cubes (Only for Essbase application targets)	Number of cubes contained in the application.
Query Tracking (Only for Essbase application targets)	Whether or not query tracking, that is, tracking data combinations having a large number of data values that require aggregation, is enabled.
Memory Usage (MB) (Only for Essbase application targets)	Memory used by the application in MB.
Threads (Only for Essbase application targets)	Number of application threads.

13.4.1.2 Viewing Target Status and Availability History

To view the status and availability history of a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **Status History**.

Sometimes, due to network problems and system errors, the target might be down, or the Oracle Management Service (OMS) might not be able to reach the Management Agent that monitors the target. The Availability (Status History) page provides information about when, and for how long these situations occurred for a particular target. This information is essential for troubleshooting target related incidents.

The Availability (Status History) page consists of the **Overall Availability**, **Downtime History**, and **General** sections. The **Overall Availability** section consists of a pie chart depicting the availability of the target, from the time it was discovered. The **Downtime History** section provides detailed information about the periods when the target was down.

Table 13–3 describes the elements of the **General** section.

Table 13–3 Target Status and Availability History

Element	Description
Current Status	Current status of the target, whether it is up and running, or down.
Up Since	<i>(Displayed only when the target is up)</i> Time the target was last started successfully.
Down Since	<i>(Displayed only when the target is down)</i> Time the target was last stopped.
Availability (%)	Percentage availability of the target.
Down Time (minutes)	Duration for which the target was down.

Table 13–3 (Cont.) Target Status and Availability History

Element	Description
Blackout Time (minutes)	Total duration of blackouts set on the target.
Agent Down Time (minutes)	Duration for which the Oracle Management Agent monitoring the target was down.
System Error Time (minutes)	Duration for which the target could not be monitored, due to a system error.
Status Pending Time (minutes)	Duration for which the status of the target could not be determined.

13.4.1.3 Viewing Target Performance or Resource Usage

To view the performance or resource usage of a target, navigate to the **Response or CPU and Memory Usage** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target. Graphs depicting the target performance or target resource usage are displayed.
4. (Optional) To view the performance or resource usage data in a tabular format, click **Table View**.

Note: For the BI Instance, BI Server, and BI Presentation Server targets, you can view only performance data, and not resource usage data, on the target home page. For other BI Instance component targets and Essbase targets, you can view only resource usage data and not performance data on the target home page.

Target Performance

The **Response and Load** section displays the performance of the BI Instance, BI Server, or BI Presentation Server target. For these targets, the **Response and Load** section can consist of the following graphs:

- The variation of Average Query Time with time
Average Query Time is the average time the BI Server or BI Presentation Server takes to execute a query. The Average Query Time is collected and uploaded to the Oracle Management Repository every fifteen minutes, by default.
- The variation of Server Queries (per second) with time
Server Queries (per second) is the number of queries processed by the BI Server or BI Presentation Server in one second. Server Queries (per second) is collected and uploaded to the Oracle Management Repository every fifteen minutes, by default.
- The variation of Completed Requests (per second) with time
Completed Requests (per second) is the number of requests completed by the BI Presentation Server in one second. Completed Requests (per second) is collected and uploaded to the Oracle Management Repository every fifteen minutes, by default.

Carefully observing these graphs can sometimes provide early warnings about server overloading, reduced server access, and so on. Analyzing graphical data collected over a long period of time can help you set up a more efficient BI Server or BI Presentation Server.

For detailed information on target performance, access the Performance Summary page. To access this page, from the **Business Intelligence Instance, BI Server** or **BI Presentation Services** menu, select **Monitoring**, then select **Performance Summary**.

Target Resource Usage

The **CPU and Memory Usage** section displays the resource usage of the target. It consists of two graphs:

- The variation of CPU Usage (%) with time
CPU Usage specifies the percentage of CPU time used by the target. A large value of CPU Usage can cause the Business Intelligence components and applications to slow down, reducing their performance. The CPU Usage is collected and uploaded to the Oracle Management Repository every fifteen minutes by default.
- The variation of Memory Usage (MB) with time
Memory Usage specifies the amount of memory used by the target. A large value of Memory Usage can cause the Business Intelligence components and applications to slow down. The Memory Usage is collected and uploaded to the Oracle Management Repository every fifteen minutes by default.

Carefully observing these graphs can sometimes provide early warnings about application overloading, component downtime, and so on.

13.4.1.4 Viewing Target Metrics

To view all the metrics collected for a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **All Metrics**.

The All Metrics page displays details about all the metrics collected for a particular target. The average value, threshold values, collection schedule, and metric value history is displayed for each collected metric.

13.4.1.5 Viewing or Editing Target Metric and Collection Settings

To view and edit the metric and collection settings for a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.

4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **Metric and Collection Settings**.
5. To edit the collection schedule or thresholds of a metric, or any other collected item, click the corresponding icon present in the **Edit** column.

The Metric and Collection Settings page provides details about target metric collection thresholds and target metric collection schedules. Using this page, administrators can edit the warning threshold and critical threshold values of target metrics and other collected items, as well as the time intervals at which these are collected.

13.4.1.6 Viewing Target Metric Collection Errors

To view the metric collection errors for a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **Metric Collection Errors**.

The Metric Collection Errors page provides details about the errors encountered while obtaining target metrics. These details give you an idea of the metrics that may not represent the performance of the target accurately, as errors were encountered while collecting them.

13.4.1.7 Viewing Target Health

To view a summary of the health of the target, navigate to the **Monitoring and Diagnostics** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.

The **Monitoring and Diagnostics** section specifies the number of abnormal occurrences related to the target that require user action, and the number of changes made to the target configuration, within a particular time interval. This information is useful to administrators who want to quickly get an idea of the overall health of the target, and know the number of issues that need to be resolved. For more details on target configuration, access **Configuration** from the BI Instance component menu or Essbase target menu.

Table 13–4 describes the elements of the **Monitoring and Diagnostics** section.

Table 13–4 Target Health

Element	Description
Incidents	The number of unresolved situations or issues that impact the target negatively, and hence require user action. The displayed integer is also a link to the Incident Manager page.

Table 13–4 (Cont.) Target Health

Element	Description
Descendant Target Incidents (Only for Essbase Server Targets)	The number of incidents related to Essbase applications. The displayed integer is also a link to the Incident Manager page.
Configuration Changes	The number of changes made to the target configuration in the last seven days. The displayed integer is also a link to the Configuration History page.

13.4.1.8 Viewing Target Alert History

To view the alert history of a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **Alert History**.

The Alert History page provides details about target metrics, such as the periods when a particular metric was beyond its critical threshold value, the periods when the metric could not be calculated, and so on. These details help you plan corrective measures for metric-related problems, before any severe damage or prolonged downtime can occur.

Table 13–5 describes the elements of the Alert History page.

Table 13–5 Target Alert History

Element	Description
Metric	Parameter related to the performance of the target.
History	Condition of the metric at various times. The condition can have the values Critical, Warning, Clear, and No Data.

13.4.1.9 Viewing Target Incidents

To view the incidents related to the target, navigate to the **Incidents** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.

The **Incidents** section provides details about the various events, related to the target, that negatively impact the business intelligence system. These events require user action. The details provided by this section, such as the incident summary, severity, target, target type, and so on, are essential for troubleshooting.

For detailed reports on target incidents, access the Incident Manager page. To access this page, from the BI Instance component menu or Essbase target menu, select **Monitoring**, then select **Incident Manager**.

For details on the elements of the **Incidents** section, refer to *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

13.4.1.10 Viewing Target Logs

To view the log messages related to a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the BI Instance component or Essbase target menu displayed on the target home page, select **Logs**, then select **View Log Messages**.
4. (Optional) To view or download the target log files, click **Target Log Files**, select the required log file, then click **View Log File** or **Download**, respectively.
5. (Optional) To export log messages to a file, from the Log Messages page, select the required messages. From the **Export Messages to File** menu, click the file format you want to export the selected messages to. Choose a location, and download the file.

The target logs are a repository of target error messages, warnings, and notifications. They can be used for tracing the intermediate steps of an operation, and are essential for troubleshooting incidents and problems.

You can use the Log Messages page to view all log messages, search for a particular message, view messages related to a message, export messages to a file, view the target log files, and download the log files. For more information about log files, refer to *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

For the BI Instance target, this page displays log messages related to all system components and Java EE components. For the BI Instance component targets and Essbase targets, this page displays only those log messages that are related to the target.

Table 13–6 describes the elements of the Log Messages page.

Table 13–6 Target Log Messages

Element	Description
Time	Date and time when the log message was created.
Message Type	Type of the log message. Message Type can be Incident Error, Error, Warning, Notification, Trace, or Unknown. These types represent the decreasing severity of messages, with Trace representing the least severe message and Incident Error representing the most severe message. Unknown indicates that Message Type is not known.
Message ID	9-digit string that uniquely identifies the message within the framework.
Message	Text of the log message.
Execution Context ID (ECID)	Global unique identifier of the execution of a particular request, in which a target component participates. You can use the ECID to correlate error messages from different target components.
Relationship ID	Identifier which distinguishes the work done by a particular thread on a particular process, from the work done by any other thread on the same, or any other process, on behalf of the same request.

Table 13–6 (Cont.) Target Log Messages

Element	Description
Component	Target component that generated the message.
Module	Identifier of the module that generated the message.
Incident ID	Identifier of the incident to which the message corresponds.
Instance	Oracle Instance containing the target component that generated the message.
Message Group	Group containing the message.
Message Level	An integer value representing the severity of the message. Ranges from 1 (most severe) to 32 (least severe).
Hosting Client	Identifier of the client or security group related to the message.
Organization	Organization ID for the target component that generated the message. This ID is <code>oracle</code> for all Oracle components.
Host	Name of the host where the message was generated.
Host IP Address	Network address of the host where the message was generated.
User	User whose execution context generated the message.
Process ID	Identifier of the process or execution unit that generated the message.
Thread ID	Identifier of the thread that generated the message.
Upstream Component	Component that the message generating component works with, on the client side.
Downstream Component	Component that the message generating component works with, on the server side.
Detail Location	URL linking to additional information about the message.
Supplemental Detail	Detailed information about the message, more detailed than the message text.
Target Log Files	Link to the target log files.
Log File	Log file containing the message.

13.4.1.11 Viewing Target Configuration and Configuration File

To view the configuration data of a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Configuration**, then select **Last Collected** to access the Target Configuration browser.
5. (Optional) To export target configuration data to a configuration file, click **Export**. The exported target configuration data is stored in a `.xls` file.

Use the Target Configuration browser to view the latest configuration data of the target. Using the browser, you can also search for configuration data, view saved

target configurations, compare target configurations, and view the target configuration history.

13.4.1.12 Viewing Target Job Activity

To view the past, currently running, and scheduled jobs related to a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Job Activity**.

The Job Activity page displays target jobs related to target administrative tasks, such as starting the target, stopping the target, target blackouts, and so on.

Use the Job Activity page to search for a particular job and retrieve job details such as the owner, status, scheduled start time, and so on. You can also use the Job Activity page to perform target job administration tasks, such as creating, editing, suspending, and resuming a job.

13.4.1.13 Viewing Target Compliance

To view the compliance of a target to compliance standards or compliance frameworks, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Compliance**, then select **Results**.
5. To view the compliance results of a target with respect to a particular compliance standard, select **Compliance Standards**. To view the compliance results of a target with respect to a particular compliance framework, select **Compliance Frameworks**.

Use the Compliance Results page to view the compliance of a target to compliance standards and compliance frameworks. This page also lists the number of violations made to compliance standards and compliance frameworks, hence giving you an idea of whether the targets in your enterprise adhere to established standards or not.

For more information on target compliance, refer to *Oracle Enterprise Manager Lifecycle Management Administrator's Guide*.

13.4.2 Performing Target-Specific Monitoring Tasks

This section explains how you can perform target-specific BI Instance and Essbase target monitoring tasks, such as viewing BI Instance dashboard reports, BI Instance scheduler reports, Essbase application data storage details, and so on.

This section contains the following:

BI Instance

- [Viewing Oracle Business Intelligence Dashboard Reports](#)
- [Viewing Oracle Business Intelligence Scheduler Reports](#)
- [Viewing Oracle Business Intelligence Instance Key Metrics](#)

Essbase

- [Viewing Oracle Essbase Applications Summary](#)
- [Viewing Oracle Essbase Application Data Storage Details](#)

13.4.2.1 Viewing Oracle Business Intelligence Dashboard Reports

To view Oracle Business Intelligence dashboard reports, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance. Click the BI Instance name.
3. From the **Business Intelligence Instance** menu, select **Dashboard Reports**.
4. From the **View** list, select the set of dashboard reports you want to view.

Note: To view Oracle Business Intelligence dashboard reports in Enterprise Manager Cloud Control, you must enable usage tracking. For information on how to enable usage tracking, refer to the Managing Usage Tracking chapter of the *Oracle Fusion Middleware System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

Using this page, you can view the dashboard usage in the past 7 days, the dashboards that failed in the past 24 hours, the top dashboards by resource usage in the past 7 days, and the top users by resource usage in the past 7 days. These details tell you which dashboards are the most popular, which dashboards failed recently, which dashboards use the maximum resources, and which user is the most active. An in-depth analysis of these details can provide important insights into the functioning of an enterprise.

Note: Without specifying the correct credentials on the Monitoring Credentials page, you cannot access certain dashboard reports. Hence, ensure that you specify the appropriate credentials on the Monitoring Credentials page, before accessing the Dashboard Reports page.

To access the Monitoring Credentials page, from the **Business Intelligence Instance** menu, select **Target Setup**, then select **Monitoring Credentials**.

Table 13–7 describes the elements of the Dashboard Reports page.

Table 13–7 Oracle Business Intelligence Dashboard Reports

Element	Description
User	User who accessed the dashboard.
Total Sessions	Total number of user sessions which accessed the dashboard.

Table 13–7 (Cont.) Oracle Business Intelligence Dashboard Reports

Element	Description
Last Accessed On	Time when the dashboard was last accessed.
Dashboard	Dashboard name.
Error Code	Dashboard error code.
Error Message	Dashboard error message.
Repository	Name of the repository accessed by the dashboard.
Subject Area	Information about business areas, or the groups of users in an organization.
Start Time	Time when the server received the logical request for the dashboard.
End Time	Time when the server completed servicing the logical request for the dashboard.
View Log Messages	View log messages related to the dashboard.
Total Time	Total time taken to service all logical requests made for a particular dashboard. Note: In the Top Users by Resource Usage in Last 7 Days reports, this element represents the total time taken to service all logical requests made by a particular user.
Database Time	Time taken by the database to complete all physical requests made for a particular dashboard. Note: In the Top Users by Resource Usage in Last 7 Days reports, this element represents the time taken by the database to complete all physical requests made by a particular user.
Compile Time	Time taken to convert all logical requests made for a particular dashboard. Note: In the Top Users by Resource Usage in Last 7 Days reports, this element represents the time taken to convert all logical requests made by a particular user, to physical requests.
Failed Logical Requests	Number of logical requests made for the dashboard that failed. Note: In the Top Users by Resource Usage in Last 7 Days reports, this element represents the number of logical requests made by a particular user that failed.
Total Logical Requests	Total number of logical requests made for the dashboard. Note: In the Top Users by Resource Usage in Last 7 Days reports, this element represents the total number of logical requests made by a particular user.

13.4.2.2 Viewing Oracle Business Intelligence Scheduler Reports

To view Oracle Business Intelligence scheduler reports, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance. Click the BI Instance name.
3. From the **Business Intelligence Instance** menu, select **Scheduler Reports**.
4. From the **View** list, select the set of scheduler reports you want to view.

Using this page, you can view the BI Instance target jobs that failed in the past 24 hours, and the BI Instance target jobs that have been scheduled to begin later. These

details inform you about the jobs that failed recently and the jobs scheduled to take place in the future, giving you a summary of the BI Instance past and future job activity.

[Table 13–8](#) describes the elements of the Scheduler Reports page.

Table 13–8 Oracle Business Intelligence Instance Scheduler Reports

Element	Description
Job Name	Name of the job, as specified by the user who created it.
Instance ID	ID of the job instance.
Job ID	ID of the job.
Start Time	Time the job started.
End Time	Time the job ended or failed.
Error Message	Error message of the failed job.
User	User who created the job.
Scheduled Time	Time the job is scheduled to begin.
Script Type	Type of script to be executed.

13.4.2.3 Viewing Oracle Business Intelligence Instance Key Metrics

To view the key metrics related to the BI Instance target, navigate to the **Metrics** section by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance. Click the BI Instance name.

The **Metrics** section displays the key metrics used to monitor the performance of the BI Instance. Analyzing these metrics provides early warnings of errors and incidents, and helps you identify problem areas quickly.

To view all BI Instance metrics, access the All Metrics page. To access this page, from the **Business Intelligence Instance** menu, select **Monitoring**, then select **All Metrics**. For more information on this page, see [Section 13.4.1.4](#).

[Table 13–9](#) describes the elements of the **Metrics** section.

Table 13–9 Oracle Business Intelligence Instance Key Metrics

Metric	Description
Request Processing Time (ms)	Average time, in milliseconds, taken by the BI Servers to process a request. This metric is collected from the time the BI Analytics application was last started.
SOA Request Processing Time (ms)	Average time, in milliseconds, taken by the Oracle WebLogic Server cluster to process a web services request. This metric is collected from the time the BI SOA application was last started.
Average Query Time (seconds)	Average time, in seconds, taken by the BI Servers to process a query. This metric is collected from the time the BI Server was last started.
Active Sessions	Total number of active sessions for the BI Instance. This metric is collected from the time the BI Analytics application was last started.

Table 13–9 (Cont.) Oracle Business Intelligence Instance Key Metrics

Metric	Description
Requests (per minute)	Average number of requests, per minute, received by the BI Servers. This metric is collected from the time the BI Analytics application was last started.
SOA Requests (per minute)	Average number of servlet and/or JavaServer Pages (JSP) invocations, per minute, for web services requests across the Oracle WebLogic Server cluster. This metric is collected from the time the BI SOA application was last started.
Presentation Services Requests (per second)	Average number of requests, per second, received by the BI Presentation Servers. This metric is collected from the time the BI Presentation Server was last started.
Server Queries (per second)	Average number of queries, per second, completed by the BI Servers. This metric is collected from the time the BI Server was last started.
Failed Queries	Number of failed BI Server queries. This metric is collected from the time the BI Presentation Server was last started.

13.4.2.4 Viewing Oracle Essbase Applications Summary

To view a summary of Oracle Business Intelligence Essbase applications, navigate to the **Applications** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having an Essbase Server target. Click the Essbase Server name.

The **Applications** section provides details about the status, resource usage, and data storage type of the various Essbase applications under the Essbase server. This section is useful to administrators who want to quickly obtain an overview of the availability and storage details of the Essbase applications being monitored.

Note: If the applications displayed in the **Applications** section are different from the ones displayed in the **Target Navigation** window, refresh the Oracle Fusion Middleware farm. To do this, from the **Target Navigation** window, click the Oracle Fusion Middleware farm name. From the **Farm** menu, click **Refresh WebLogic Domain**. Click **Add/Update Targets**.

Table 13–10 describes the elements of this section.

Table 13–10 Oracle Essbase Applications Summary

Element	Description
Name	Name of the application.
Status	Application status, whether the application is up or down.
Storage Type	Type of application data storage.
Memory Usage (MB)	Memory, in MB, used by the application.
Cubes	Number of cubes contained in the application.

13.4.2.5 Viewing Oracle Essbase Application Data Storage Details

To view details about how data for an Oracle Business Intelligence Essbase application is stored, navigate to the **Cubes** section, by following these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having an Essbase Server target. Click the Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required Essbase application.

The **Cubes** section provides structural and usage information about the cubes contained in the Essbase application. These details tell you about how data storage is designed for the application, and how accessible the application data is at the moment.

Table 13–11 describes the elements of this section.

Table 13–11 Oracle Essbase Application Data Storage Details

Element	Description
Name	Name of the cube.
Dimensions	Number of dimensions the cube has.
Connected Users	Number of users currently connected to the cube data.
Locks	Number of data block locks currently held on the cube.
Data Cache Size (KB)	Size, in KB, of the buffer in memory that holds uncompressed data blocks.

13.5 Administering Oracle Business Intelligence Instance and Essbase Targets

To administer Oracle Business Intelligence Instance (BI Instance) and Essbase targets using Enterprise Manager Cloud Control, navigate to the home page of the required target. For information on how to do this, see [Section 13.4](#).

Using Enterprise Manager Cloud Control, you can perform general, as well as target specific administration tasks.

This section contains the following:

- [Performing General Administration Tasks](#)
- [Performing Target-Specific Administration Tasks](#)

Note: This section is applicable only for Oracle Business Intelligence Enterprise Edition 11g targets.

13.5.1 Performing General Administration Tasks

This section explains how to perform general BI Instance and Essbase target administration tasks, such as starting, stopping, or restarting the target, administering target access privileges, administering target blackouts, and so on.

This section contains the following:

- [Starting, Stopping, or Restarting the Target](#)
- [Administering Target Access Privileges](#)

- [Administering Target Blackouts](#)
- [Viewing Target Monitoring Configuration](#)

13.5.1.1 Starting, Stopping, or Restarting the Target

To start, stop, or restart a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. Click **Start Up**, **Shut Down**, or **Restart** to start, stop, or restart the target, respectively. Alternatively, from the BI Instance component menu or Essbase target menu, select **Control**, then select **Start Up**, **Shut Down**, or **Restart**.

To run certain patching and maintenance tasks, you may need to stop the target, perform the task, and restart it once the operation is complete.

13.5.1.2 Administering Target Access Privileges

To manage the access privileges for a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Target Setup**, then select **Administrator Access**.
5. Click **Add** to grant target access privileges to a role or an administrator.

Use the Access page to set target privileges for roles and administrators. The available privileges are View, Operator, and Full.

View only allows you to view the target in the console, whereas Operator allows you to view targets, and perform all administrative actions except deleting targets. Full allows you to view targets, and perform all administrative actions.

13.5.1.3 Administering Target Blackouts

To administer the blackouts for a target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Monitoring**, then select **Blackouts**.

Blackouts suspend data collection on a monitored target. Blackouts are useful when you want to perform scheduled maintenance tasks on monitored targets.

Use the Blackouts page to search for existing target blackouts, edit existing blackouts, define new blackouts, and stop blackouts. You can also create and stop blackouts using the BI Instance component menu, or the Essbase target menu. To create or stop a blackout, from the BI Instance component menu, or the Essbase target menu, select **Control**, then select **Create Blackout** or **End Blackout**, respectively.

13.5.1.4 Viewing Target Monitoring Configuration

To view the monitoring configuration details for a particular target, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance or Essbase Server target. Click the BI Instance or Essbase Server name.
3. From the navigation tree in the **Target Navigation** window, click the name of the required target.
4. From the BI Instance component menu or Essbase target menu displayed on the target home page, select **Target Setup**, then select **Monitoring Configuration**.

The Monitoring Configuration page provides information about instance properties of the target, which provide internal details about target monitoring.

Table 13–12 describes the elements of the Monitoring Configuration page.

Table 13–12 Target Monitoring Configuration

Element	Description
Canonical Path	Component path of the form <code>instance_name/component_name</code> .
Oracle Instance Home	Location of the target content files, metadata, configuration files and log files.
DB Class String	String needed to form a JDBC connection with a target repository.
DB Connection String	String that specifies information about the target repository, and the means to connect to it.
DB Password	Repository database password.
DB User Name	Repository database user name.
Domain Home	Domain home directory of the WebLogic domain that the target is a part of.
Is JRF Enabled	Whether Oracle Java Required Files (JRF) is applied to the target instance or not.
Monitoring Mode	Indicates whether the Enterprise Manager instance uses a repository while monitoring the target or not. Repo indicates that a repository is used, whereas Repo-less indicates that a repository is not used.
Version	Version of the target software.

13.5.2 Performing Target-Specific Administration Tasks

This section explains how to perform target-specific BI Instance and Essbase target administration tasks, such as viewing BI Instance component failovers, and editing BI Instance monitoring credentials.

This section contains the following:

- [Viewing Oracle Business Intelligence Component Failovers](#)

- [Editing Oracle Business Intelligence Monitoring Credentials](#)

13.5.2.1 Viewing Oracle Business Intelligence Component Failovers

To view the BI Instance component failovers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having a BI Instance target. Click the BI Instance name.
3. Select the **Availability** tab, then select **Failover**.

This page displays the risk levels of BI Instance component failure, the recommended backup actions to prevent component failures, and the backup or secondary hosts for components that have failovers configured. Administrators can use this information to plan failovers for BI Instance components that have a high risk of failure.

For more information on the recommended backup actions to avoid BI Instance component failures, refer to *Oracle Fusion Middleware System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

13.5.2.2 Editing Oracle Business Intelligence Monitoring Credentials

To edit the BI Instance monitoring credentials, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. From the navigation tree, select the Oracle Fusion Middleware farm having an BI Instance. Click the BI Instance name.
3. From the **Business Intelligence Instance** menu, select **Target Setup**, then select **Monitoring Credentials**.
4. Edit the required fields, then click **Save**.

This page enables you to specify and edit the credentials required to connect to the database which stores scheduling and usage tracking information. Without specifying the correct credentials on this page, you cannot access certain dashboard reports. Hence, ensure that you specify the appropriate credentials on this page before accessing the Dashboard Reports page.

[Table 13–13](#) describes the elements of the Monitoring Credentials page.

Table 13–13 Oracle Business Intelligence Instance Monitoring Credentials

Element	Description
Database Type	Type of the database.
Hostname	Name of the host on which the database is installed.
Port	Port used for communicating with the database.
Service Name	Name of the database service.
Username	User name used for database login.
Password	Password used for database login.

Part VI

Monitoring Application Performance

Monitoring distributed applications requires the use of several products, each of which examines a different aspect of application performance. The chapters in this part explain how you can use these products singly and together to monitor your application. It also provides a summary of the workflow required to install, configure, and work with these products. It includes the following chapters:

- [Chapter 14, "Monitoring Performance"](#) introduces the process of monitoring distributed applications. It describes RUEI, BTM, JVMD, and EM, which you use to monitor performance, it explains how you set up end-to-end monitoring, and it looks at how security schemes translate across different monitoring contexts.
- [Chapter 15, "Understanding the User Experience"](#) explains how you use Real User Experience Insight (RUEI) to understand how users are interacting with your product. Using the measurements that RUEI collects, you can assess the effectiveness of user interface design, the responsiveness of web servers and the internet, and the success of user operations.
- [Chapter 16, "Discovering Services and Working with Transactions"](#) describes how you use Business Transaction Management (BTM) to discover all the components that make up your application, and to select a subset of these for special attention. Monitoring this subset (transaction) allows you to identify and resolve issues related to performance, to profiling usage, and to finding the cause of failing components in a business process.
- [Chapter 17, "Getting Detailed Execution Information"](#) explains how you use Java Virtual Machine Diagnostics to look at the finest details of code execution and to identify problems like race conditions, blocked threads, and memory leaks.
- [Chapter 18, "Monitoring Business Applications"](#) describes how you create a Business Application, and how you use the Enterprise Manager (EM) console to get summary and detail information about the user experience and transaction performance related to that Business Application.
- [Chapter 19, "Monitoring End-to-end Performance"](#) provides an example that illustrates how you use RUEI, BTM, and JVMD together to troubleshoot an issue from the user experience to the finest machine-level details.

The chapters in this part are meant to be read sequentially, from beginning to end. If you are familiar with any of the individual components described, Oracle still recommends that you read those subsections that describe how you navigate from one component to others.

The information in this part is not exhaustive. It is a map rather than a compendium. The bulk of material describing how monitoring components work, is found in other documents. Cross references to additional material are provided for your convenience.

Monitoring Performance

Service-oriented, distributed applications, which are characterized by modular development and dynamic binding, have a critical need for a single point of management from where one can monitor the behavior of the application as a whole, identify actual or potential problems, and take corrective action.

This chapter introduces the issues and tasks involved in monitoring the performance of distributed applications. It includes the following sections:

- [Monitoring Views and Dimensions](#)
- [Using ECIDs to Track Requests](#)
- [Setting up End-to-end Monitoring](#)
- [User Roles and Privileges](#)

To monitor the performance of distributed applications, you must be able to do the following.

- Examine the user experience to assess the quality of service rendered and to understand use patterns.
- Discover the components that make up the application, identify request flows of interest, and determine where performance issues or errors occur in the flow.
- Find the root cause of poor performance and failure by looking at the infrastructure supporting the logical application, or by obtaining more detailed information.

Used together, the products described in this guide offer the functionality described above. You do not need to use all these to learn about your application's performance. For example, you could start by monitoring the end-user experience and then later, add transaction monitoring. The next section describes the different monitoring options that are available to you.

14.1 Monitoring Views and Dimensions

End-to-end performance monitoring requires multiple views and dimensions:

- A complete view of the topology of the logical application, including routing schemes and database access
- A complete view of the underlying infrastructure
- Varying detail about the distributed application components used
- For web-based applications, the ability to access html source for the web pages visited by users

- Access to machine-level execution detail for application components running in a Java Virtual Machine
- The ability to go from the logical to the physical view of the application

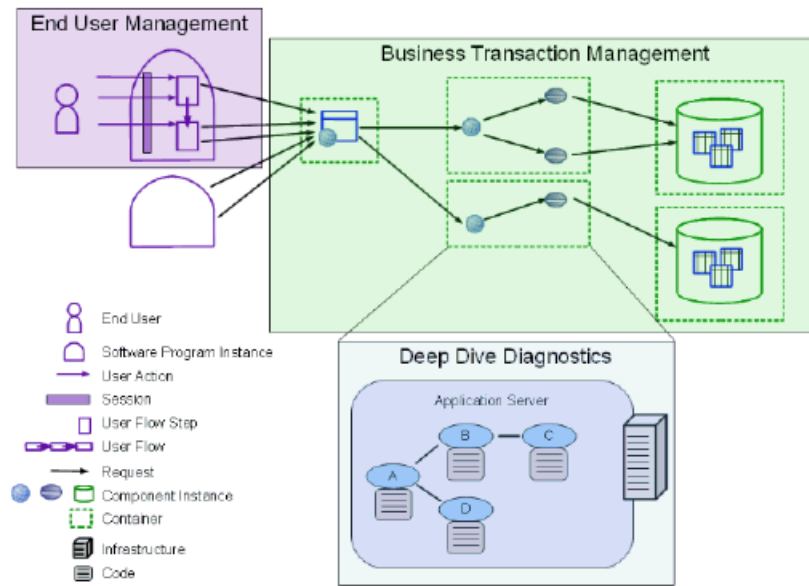
RUEI, BTM, JVMD, and Enterprise Manager provide the functionality required for end-to-end performance monitoring. As mentioned before, you do not need to install and configure all of these. You can use the piece that addresses your most immediate concerns and add more later.

- **Real User Experience Insight (RUEI)**
Helps you identify problems with user interfaces, evaluate the quality of service offered, and understand and anticipate use patterns.
- **Business Transaction Management (BTM)**
Discovers the components that make up your application and allows you to define transactions, which include operations that are of special interest. You can follow the work your application does as it crosses servers (tiers of execution) and also see the topology of your distributed application.
- **Java Virtual Machine Diagnostics (JVMD), Enterprise Manager**
Provides a server-level view of the request flow and of the internal workings of the application execution environment for those services that execute in a Java Virtual Machine.
- **Request Instance Diagnostics (RID), Enterprise Manager**
This JVMD view allows you to look at details of a single request, and query on things that touched a particular ECID.
- **Business Application Page, Enterprise Manager**
Allows you to define Business Applications, in which context you can view and analyze RUEI and BTM information, and to access more detailed monitoring information.

Figure 14-1 illustrates how these components work together, both in scope and in depth, to give you end-to-end performance monitoring.

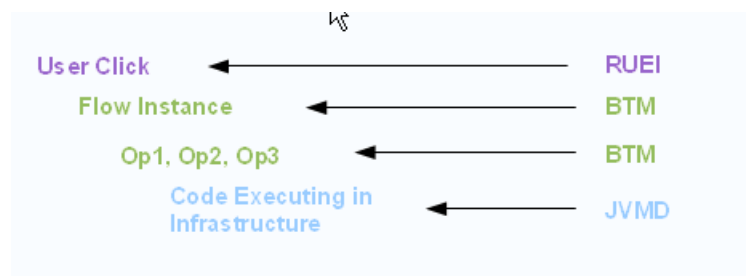
The End User Management pane illustrates RUEI monitoring. An end user completes a series of steps during a browsing session. RUEI monitors the actions of web users and can create reports, segmented in a variety of ways, that tell you who has requested a page, what pages were requested, which servers were affected, what the response time was, and what the throughput rate is for a given session or user flow.

By interacting with objects on web pages, users invoke request flows that are monitored by Business Transaction Management (BTM). BTM allows us to discover back-end application components and to define and monitor the request flows (transactions) that are critical to our understanding of application performance. For a given time period, we can determine the number of started and completed transactions, the throughput, and the average and maximum response times.

Figure 14–1 Monitoring Application Performance

Finally, in a request flow, for any given sequence of operations supported by a particular server, we can invoke deep dive diagnostics (shown in [Figure 14–1](#)) to determine whether slow or faulty service is due to low-level issues. Here we can view detailed information for the period within which a given operation executes. We can look at stack frames for executing threads, thread state information, aggregate information about the frequency and cost of method execution, information about database locks, and we can also look at objects in the Java heap.

Another way to break down the end-to-end picture is to look at the layers of execution underlying a user click and understand how RUEI, BTM, and JVMMD correspond to each layer. In the figure below we see that RUEI tells us about user clicks; that BTM tells us about instances of request flows and also about individual requests (or operations), and that JVMMD tells us about the code executing in the Java Virtual Machine.

Figure 14–2 Components and Execution Layers

In addition to using RUEI, BTM, and JVMMD to monitor end-to-end application performance, you can also use the Enterprise Manager (EM) console to monitor Business Applications that include RUEI applications and BTM transactions. For more information see [Chapter 18, "Monitoring Business Applications."](#)

14.2 Using ECIDs to Track Requests

Because RUEI, BTM, and JVMD have a different focus and level of granularity, it helps to have some shared identifier to help us realize that we are looking at a shared process or element.

An Execution Context ID (ECID) is an identifier for tracking a request for components in the Oracle technology stack. An ECID is usually generated by the outer-most Oracle component handling the request and may be propagated to the Oracle components handling that request, potentially crossing server boundaries.

The creation and propagation of ECIDs enable the sharing of context and of diagnostic data between components. Although ECIDs are not universally used, where they are used, they provide good support for end-to-end diagnostic work.

Several technologies generate ECIDs for message traffic; these include RMI, JAX-RPC, JAX-WS, EJB, JMS, JDBC, Servlets, and SOA. (In some cases, ECIDs are supported only when communication occurs between WebLogic servers.)

Where ECIDs are used, they can help the user determine whether they are indeed looking at the same object across execution contexts. For example, you can correlate error messages from different target components if they share the same ECID.

The components used in end-to-end performance monitoring all support the use of ECIDs.

- RUEI displays ECIDs assigned to page objects in the history shown for a particular page.
- If BTM observes an incoming message to have an ECID, it assigns the ECID as an intrinsic property of the message. Users can then search for messages with a particular ECID and determine, when looking at table views of operations, which operations have the same ECID. (Request and response messages for the same operation can have different ECIDs.)
- ECIDs are also used at the lowest level to further identify threads running in the Java Virtual Machine.
- ECIDs can also be used in the correlation of log entries for Oracle Fusion Middleware components that use the Oracle Diagnostic Logging (ODL) framework.

To have ECIDs generated by default by an HTTP server or Web Logic server, follow the instructions given in My Oracle Support Knowledge Document 1527091.1.

14.3 Setting up End-to-end Monitoring

To obtain end-to-end monitoring, you must install, configure, and connect the products described in [Section 14.1](#). You might not need to deploy all these pieces at once. You can start with the piece that gives you the functionality you need and add other pieces later.

This section describes the steps required to set up end-to-end application performance monitoring for each dimension of performance monitoring. The purpose of each step is explained, and references are given to the relevant documentation. This section includes the following:

- [Set up Enterprise Manager](#)
- [Set up Java Virtual Machine Diagnostics](#)
- [Set up Real User Experience Insight](#)

- Set up Business Transaction Management
- Create the Business Application

Before looking at the set-up instructions, take a moment to look over the following illustrations, which provide a topological view of the pieces that you can deploy to enable end-to-end monitoring.

Figure 14–3 shows how the RUEI collector, EM agents, BTM observers, and JVM D agents are deployed in a monitored environment.

- The RUEI collector must be deployed in front of the web server.
- The EM agent must be deployed on the machine hosting the application servers and database servers used by the distributed application.
- The BTM and JVM D agents must be deployed in the application servers where application components are deployed.

Of course, which of these you deploy, depends on the views you need. For example, if you are not interested in machine-level runtime information, you do not need to deploy the JVM D agent.

Figure 14–3 Agents and Observers in the Monitored Environment

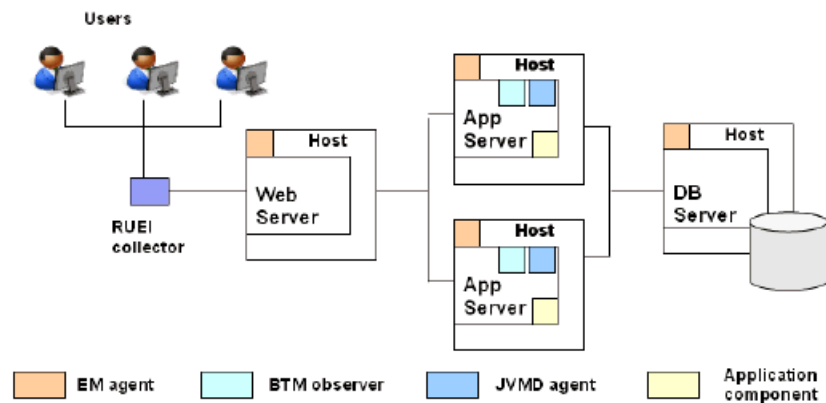
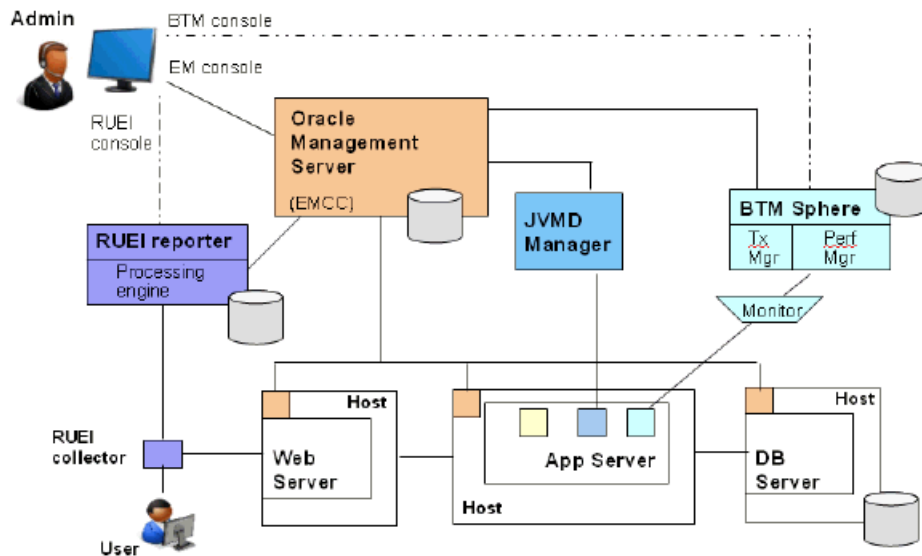


Figure 14–4 shows how RUEI, OMS, JVM D, and BTM are connected to one another and to their corresponding data collection points.

- It shows that each processing engine connects to its respective console, which allows the administrator to create and update monitored objects.
- It shows how RUEI, JVM D, and BTM are connected to the Oracle Management Server, which allows the sharing of data that enables the creation and monitoring of Business Applications.

A minimal user environment is shown below the administrative layer.

Figure 14–4 Processing Engines in the Monitored Environment

14.3.1 Set up Enterprise Manager

You need Enterprise Manager to create and monitor Business Applications. Enterprise Manager is also required if you want to do deep-dive diagnostics by looking at machine-level performance data. For more info on this option, see [Section 14.3.2, "Set up Java Virtual Machine Diagnostics."](#)

To set up Enterprise Manager:

1. **Install and configure Enterprise Manager.** See *Oracle Enterprise Manager Cloud Control Basic Installation Guide* at the following URL for more information.
http://docs.oracle.com/cd/E24628_01/install.121/e22624/toc.htm
2. **Install an Oracle management agent** on the hosts where targets and application components monitored by RUEI or BTM are running. See "Installing Oracle Management Agent" in *Oracle Enterprise Manager Cloud Control Basic Installation Guide* at the following URL.

http://docs.oracle.com/cd/E24628_01/install.121/e22624/install_agent.htm

3. **Launch Enterprise Manager** and use the **Enterprise Manager** console to create and monitor Business Applications. See "[Set up Business Transaction Management](#)" on page 14-7.

14.3.2 Set up Java Virtual Machine Diagnostics

To access machine-level performance data using the JVMMD or RID views, you must install the JVMMD manager and JVMMD agents. JVMMD is an integral part of Enterprise Manager, so the latter must be installed before you install JVMMD.

To set up Java Virtual Machine Diagnostics:

1. **Deploy the JVMMD Manager** (JVM Diagnostics Engine) in Enterprise Manager. You need this step to access JVM monitoring data. For information, see "Installing JVM Diagnostics" in *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

http://docs.oracle.com/cd/E24628_01/install.121/e22624/jvmd_installation.htm

2. **Install a JVM D agent** on all nodes where targets and services monitored by RUEI and BTM are running. You need this step to collect JVM data for a given server. For information, see "Installing JVM Diagnostics" in *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

14.3.3 Set up Real User Experience Insight

To obtain information about the user experience, you must install and configure RUEI, and then register it with Enterprise Manager.

To set up RUEI:

1. **Install and configure RUEI.** This step includes the following:
 - Install collectors, processor, and reporter in the monitored environment.
 - Install the reporter database.
 - Configure the RUEI reporter.

Configuration teaches RUEI to identify users, to specify the collection of pages that make up an application, to specify the scope of monitoring, to configure mail notification, and to provide security options. It is also at this time that you set up a connection to the Oracle Enterprise Manager. For information, see *Oracle Real User Experience Insight Installation Guide* from the appropriate RUEI documentation library:

<http://www.oracle.com/technetwork/documentation/realuserei-091455.html>

2. **Configure clickout functionality in RUEI.** You need this step to be able to click out to external tools. In this case, you will want to enable clickout to BTM and JVM D. For information, see "Configuring Clickouts to External Tools" in *Oracle Real User Experience Insight User's Guide*.
3. **Register RUEI with Enterprise Manager.** Specify the port where the Reporter system can be accessed and provide access credentials. You need this step to establish communication between RUEI and EM. For information, see [Chapter 18, "Monitoring Business Applications."](#)

14.3.4 Set up Business Transaction Management

To discover your application components, to define transactions, and to define monitoring options for these, you must use Business Transaction Management. In the context of monitoring Business Applications, BTM is used to monitor cross-tier transactions; it is not needed for single-tier applications.

To set up Business Transaction Management:

1. **Install and configure BTM.** This step includes the following:
 - Installation and configuration of central servers. (At this time, you can also configure the connection to the Oracle Enterprise Manager server.)
 - Installation and configuration of monitors, which defines communication between monitors and observers.
 - Installation of observers on every server hosting the services to be monitored.

For information, see *Oracle Business Transaction Management Installation Guide* at the following URL:

http://docs.oracle.com/cd/E24628_01/nav/assoproducts.htm

2. **Enable access to JVMD.** You need this step to access JVMD and RID views from BTM. For information, see "Enabling Access to the JVMD and RID Views" in *Oracle Business Transaction Management Online Help*.
http://docs.oracle.com/cd/E24628_01/nav/assoproducts.htm
3. **Wait for traffic, discover services, and define transactions in BTM.** Discovery in BTM is always dynamic. In a production environment, you must wait for traffic before you can discover application components. In a testing environment, you should run traffic to enable discovery. For more information, see *Oracle Business Transaction Management Online Help*.
4. **Register BTM with Enterprise Manager.** Specify the port where the Sphere can be accessed and provide access credentials. You need this step to establish communication between BTM and EM. For information, see [Chapter 18, "Monitoring Business Applications."](#)

14.3.5 Create the Business Application

For end-to-end monitoring, you want to create a Business Application that includes your RUEI applications, BTM transactions, and the system that supports these. You can build up your Business Application as you go along. You can start by including only the RUEI application, and then add any related transactions. You can even start by looking at the system that supports your distributed applications without including either a RUEI application or a BTM transaction.

To create a Business Application:

1. **Create a system in Enterprise Manager** that specifies the hosts and containers where monitored application components are running. These hosts and containers are the infrastructure of your distributed application. You need this step for Enterprise Manager to collect and return information about the health of the underlying infrastructure. For more information, see the online help for the Enterprise Manager Console.
2. **Create a Business Application** using the Enterprise Manager console. This step specifies the RUEI applications and BTM transactions to be included in a Business Application, and it specifies which system (Step 1) supports the Business Application. For information, see [Chapter 18, "Monitoring Business Applications."](#)
3. **Monitor the Business Application.** Use the Enterprise Manager Console to monitor the performance of your business application. For more information, see [Chapter 18, "Monitoring Business Applications."](#)
4. **Edit the RUEI application** if needed.

If you have defined a RUEI application and monitoring results in Enterprise Manager show that you need to change its definition to segment data differently or to re-set key performance indicators, you will need to use the RUEI console to change the application definition. For information, see *Oracle Real User Experience Insight User's Guide* at the following URL:

http://docs.oracle.com/cd/E48389_01/index.htm

Enterprise Manager is automatically updated with the new definitions.

5. **Edit the BTM transaction** if needed.

If you have defined a transaction and monitoring results suggest that you need to change the transaction definition to collect more or less data, to add properties or conditions, or to re-set key performance indicators, you will need to use the BTM

console to change the transaction definition. For more information, see *Oracle Business Management Online Help* at the following URL.

http://docs.oracle.com/cd/E24628_01/nav/assoproducts.htm

EM is automatically updated with the new definitions.

14.4 User Roles and Privileges

User roles and privileges define accessibility to component functions. The following guidelines apply as you work with components to monitor application performance.

- Overall, higher privileges are required to create entities in RUEI and BTM than to monitor them in EM.
- Clicking through from one component to another exposes you to each console's native authentication system. Make sure that you have the privileges required for each component to perform your work.
- With the exception of the `admin` and `superAdmin` rules, in EM roles are always associated with targets. What is visible to you in the EM console depends on your role with regard to a particular target.
- You need the `super admin` role to register a BTM or RUEI system with EM. Once the RUEI or BTM system is registered with EM, you don't need the `super admin` role to create a business application.
- You need `Create Any Target` privilege and `View Target` privilege on the RUEI or BTM system target to access the credentials used by EM to talk to RUEI and BTM.
- You need `Manage Business Application` and `Business Application Menu Item` `Application Performance Management` resource privileges.
- To view JVM Diagnostics data, you must have `JVM Diagnostics User` privileges.
- To manage JVM Diagnostics operations such as creating and analyzing heap and thread snapshots, tracing threads, and so on, you must have `JVM Diagnostics Administrator` privileges.

Understanding the User Experience

This chapter introduces the Real User Experience Insight (RUEI) stand-alone product. For information on using RUEI monitoring functions from the Enterprise Manager console, see [Chapter 18, "Monitoring Business Applications."](#)

RUEI allows you to monitor application performance. In particular, RUEI monitors the user's interaction with a web browser, usually the first step (application component) in your distributed application. This first step is a crucial one because it identifies those problems that are most visible to users and because it discovers use patterns that can help you improve the design and effectiveness of your user-facing services.

This section introduces the concepts and tasks involved in working with RUEI to understand the user experience. It includes the following topics:

- [What Does RUEI Discover?](#)
- [Viewing and Analyzing RUEI Data](#)
- [What Questions Can RUEI Answer?](#)
- [What Aspects of RUEI Can You Access from the EM Console?](#)
- [How Does RUEI Work with BTM and JVM Diagnostics?](#)

RUEI offers a rich set of features, for complete information about its use, see *Oracle Real User Experience Insight User Guide*.

With RUEI 12.1.0.6, and later, configurations other than network data collection are possible. These new configurations allow you to monitor performance without requiring access to the network infrastructure. This chapter assumes that network data collection is used, but the features described are available for the other non-network data collection configurations. Specifically, [Section 15.1, "What Does RUEI Discover?"](#) in this chapter mentions requirements, for example port configuration and network data collection, that are only required if you configure network data collection. For further information on non-network data collection see the RUEI documentation. To view a visual demonstration on how you can use RUEI, access the following URL and click Begin Video:

https://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5783,1

15.1 What Does RUEI Discover?

Users work with your application by interacting with a web page that contains one or more objects. Interacting with an object, for example clicking on a link, the user sets in train a sequence of calls that invoke the services that make up your distributed application. RUEI focuses on the initial interaction with one or more web pages;

Business Transaction Management (described in the next chapter) monitors the sequence of calls that follow from that interaction.

Typically, a single RUEI instance is installed to collect network data before the Web servers, behind a firewall in the DMZ. RUEI can monitor all users accessing a web page, and it does so without affecting server or network response time.

When you install and configure RUEI, you specify the following information:

- The ports that it should watch for traffic (scope of monitoring)
- How to identify users (using cookie information or log-in information)
- How to deal with security issues and how to monitor encrypted data
- How to identify pages that are associated with a RUEI application

A RUEI *application* is a collection of pages. In the configuration process, you teach RUEI which pages are associated with a given application.

Once RUEI begins to monitor traffic on the ports you have specified, it can identify and organize the information it discovers according to the scheme you have defined when you configured RUEI.

Figure 15–1 shows how RUEI collects data associated with a page request.

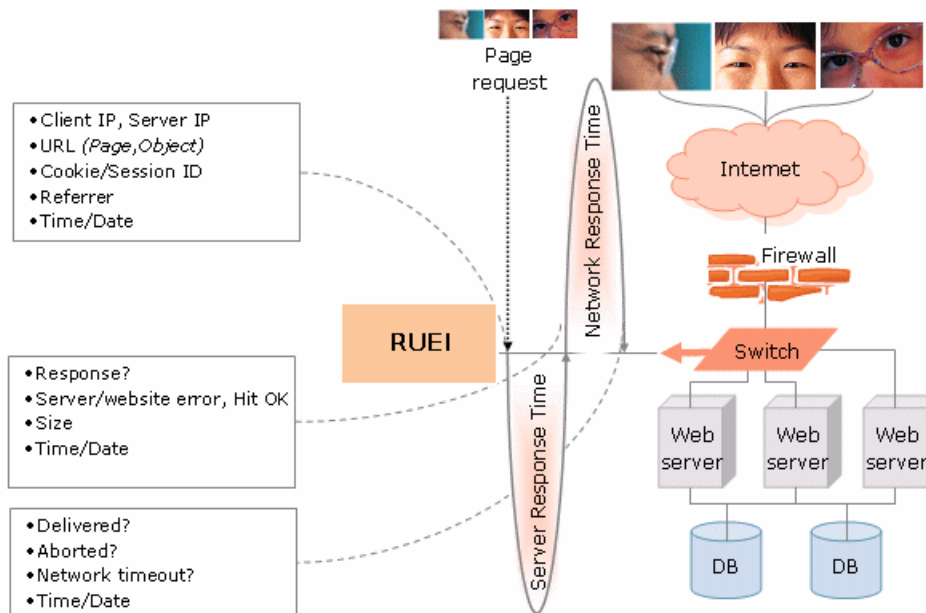
1. When the user performs an action on a monitored page, RUEI sees the request and starts measuring network timings and the time it takes the Web Server to present the visitor with the requested object.

At this point, RUEI knows who requested the page (IP client), which object was requested, and from which server the object was requested (IP server).

2. When the Web server responds and sends the object to the user, RUEI sees that response and stops timing the server response time.

At this point, RUEI can see whether there is a response from the server, whether this response is correct, how much time the Web server required to generate the requested object, and the size of the object.

RUEI can also see whether the object was completely received by the user or if the user aborted the download. Therefore RUEI can determine the time it took for the object to traverse the Internet to the visitor, and it can calculate the Internet throughput between the user and the server (connection speed).

Figure 15–1 How RUEI Monitors User Requests for Network Data Collection

Every time an object on a page associated with a RUEI application is accessed, RUEI gathers the following information:

- Who requested the page and what object they requested
- Which server hosted the page
- The response time and the correctness of the response
- The size of the object
- Whether the object was completely received or aborted
- The internet throughput for this request/response sequence

The next section explains the various ways in which you can view and analyze this data using RUEI.

15.2 Viewing and Analyzing RUEI Data

Using the information it collects while the user is interacting with your application, RUEI can present a number of views to help you understand performance issues and use patterns relating to the user experience.

In addition to monitoring data on an ongoing basis, you have the option of creating Service Level Agreements that specify the expected level of service. This agreement is expressed in terms of a number of Key Performance Indicators (KPI) that define benchmark values. For more information, see ["KPIs and Service Level Agreements"](#) on page 15-8.

Another aspect of evaluating performance is the monitoring of use patterns. You can define a *user flow* as a sequence of pages, and monitor whether the steps of the flow are completed. For more information, see ["User Flows"](#) on page 15-6.

Data reported is scoped either to active sessions (5 minute duration) or closed sessions which might stretch for several days.

This section introduces some of the most commonly used RUEI views and also describes some additional ways of analyzing the information it gathers. It includes the following sections:

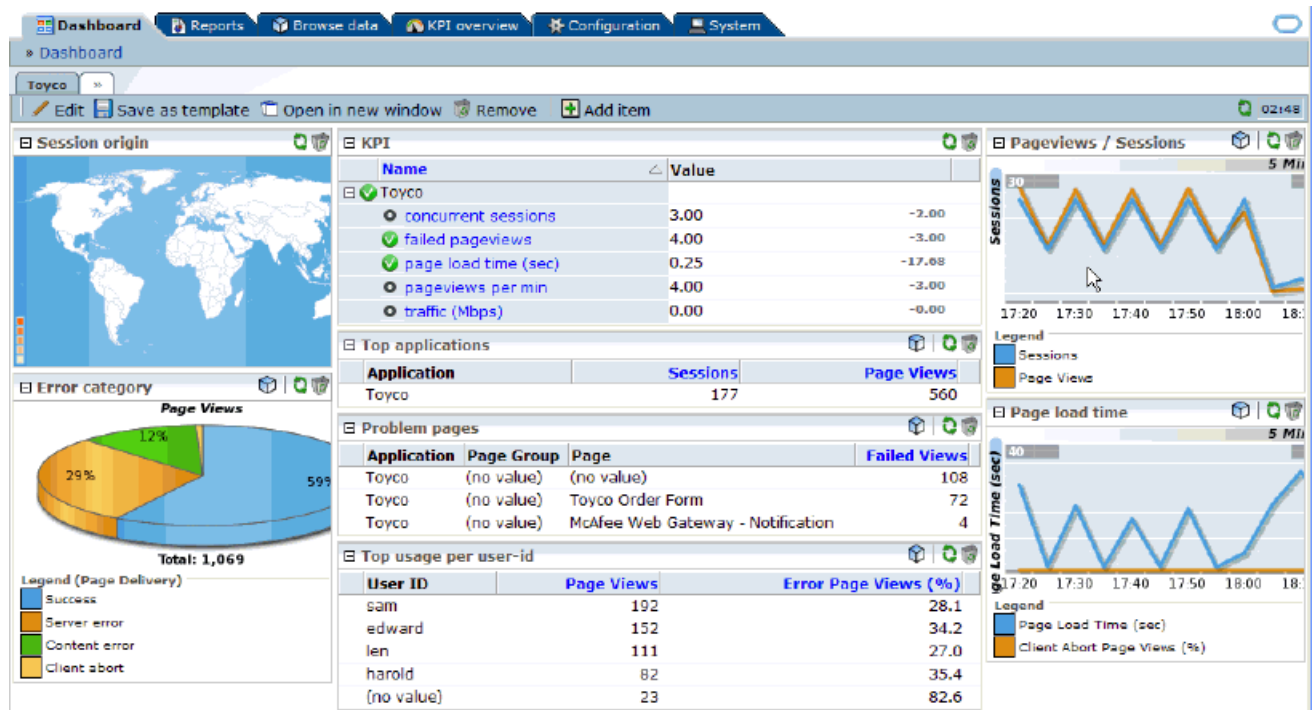
- [Dashboards](#)
- [Reports](#)
- [Session Diagnostics](#)
- [User Flows](#)
- [KPIs and Service Level Agreements](#)

15.2.1 Dashboards

The RUEI Dashboard offers the most comprehensive view of user activity. It provides the following views of activity over the last twenty four hours:

- A regional, map-based view of the current session activity
- The five most active applications by page view
- The five top problem pages
- The most recent alerts across all monitored applications
- The status of defined KPIs across all monitored applications, showing how much they have changed from the previously recorded value
- A chart showing the proportion of errors due to network errors, client aborts, server errors, website errors, and content errors
- Charts showing average page-load time, and the relationship of page views to sessions
- You can view data from more than one RUEI instance or view the data aggregated from all connected RUEI instances

Figure 15–2 RUEI Dashboard Tab



15.2.2 Reports

RUEI provides an extensive library of pre-defined reports that allow you to display collected user information in a standard way. You use controls in the **Reports** tab to generate and view reports.

You begin by using controls in the **Reports** tab to specify a time period and to select the report you want to generate. Reports are grouped by category, for example **Applications** or **Clients**. Each category offers a variety of reporting options. For example, the **Clients** category allows you to generate reports for Performance per country, Sessions per browser, Sessions per language, Sessions per OS, and so on.

Reports are displayed in table or graphic form and they can be saved as PDF files or exported to other tools.

You can customize reports, you can create new reports, you can create shortcuts to your favorite reports, and you can define filters to constrain reported findings.

15.2.3 Session Diagnostics

The session diagnostics facility allows you to perform root cause analysis of operational problems that have occurred in a given time period.

Diagnostics information is available in a variety of categories; for example, All sessions, failed URLs, slow URLs, Failed pages, and so on. The specific search criteria varies with each group. For example, in the Failed pages category, you can narrow the search by application name, Client IP address, and User ID. You can also use additional filters to limit results.

For some diagnostics categories, you can also specify a search order. For example you can search the most active sessions first.

To use the facility you specify a time period, search criteria (including filters), and search order. RUEI returns all user records that match your search criteria in the order you specified. You can then search further within the currently displayed user records to isolate specific sessions.

The user record that is returned to you includes the complete session page history for a five minute period. You can inspect each page to see its loading satisfaction level, whether it is a key page, and whether it contains an error. You can also select a page to display full page content and the underlying html code received by the server and the client.

In some cases, you can click the **Replay** icon beside a viewed page to replay the complete user session. This allows you to review each page viewed by the visitor during a session, together with any reported error messages.

You can also click out to external tools from the Session diagnostics facility from selected functional areas. For more information, see ["How Does RUEI Work with BTM and JVM Diagnostics?"](#) on page 15-10.

You can export complete session contents to external utilities for further analysis, to integrate with other data, or to create the basis for generating test scripts.

15.2.4 User Flows

You create a user flow to define a logical task. A user flow is a collection of web pages and actions. It contains a number of steps that need to be performed to complete the task. For example, a Purchase user flow might have the following defined steps:

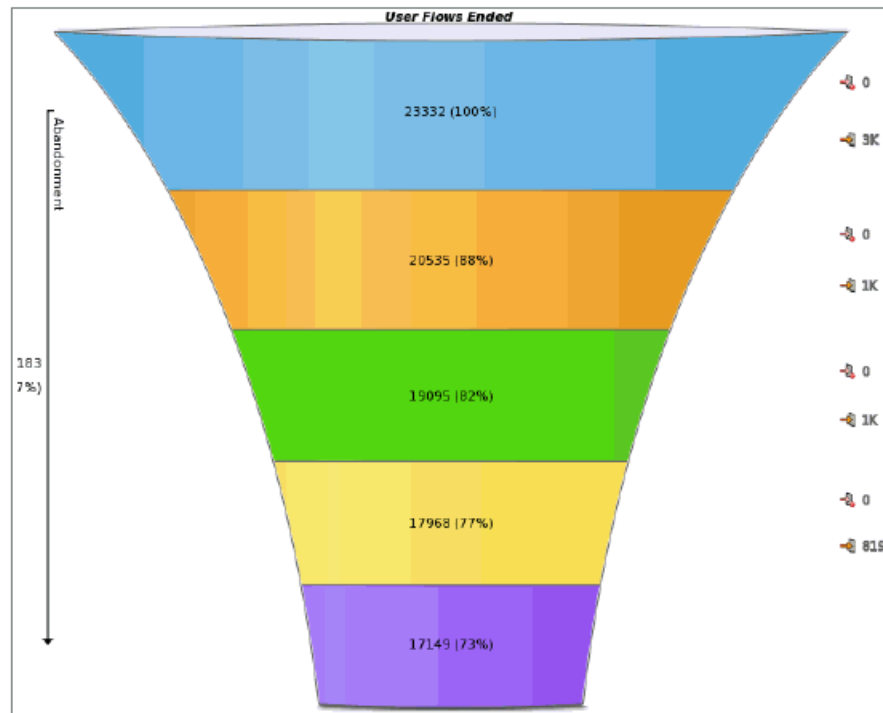
- Item selection
- Shipping information
- Billing information
- Confirmation

Each step can consist of multiple pages. For example, the Item selection step might include a number of pages from which items are selected.

User flow steps are defined in terms of conditions specifying the requirements that must be met for the step to be considered complete. For example, if the Billing information includes conditions relating to alternate methods of payment, only one of these conditions need be satisfied for the step to complete. Steps can be labeled as required or optional. Steps can also have an associated time period against which time-outs and the user experience can be evaluated.

User flows can be associated with a specific application or they can stand on their own.

User flow activity is reported at the most generic level using a funnel shape that illustrates the transition of the visitor through the flow steps for a given time period. The narrowing of the funnel represents visitors lost due to time-outs or visitor aborts. [Figure 15-3](#) shows a sample illustration of a user flow.

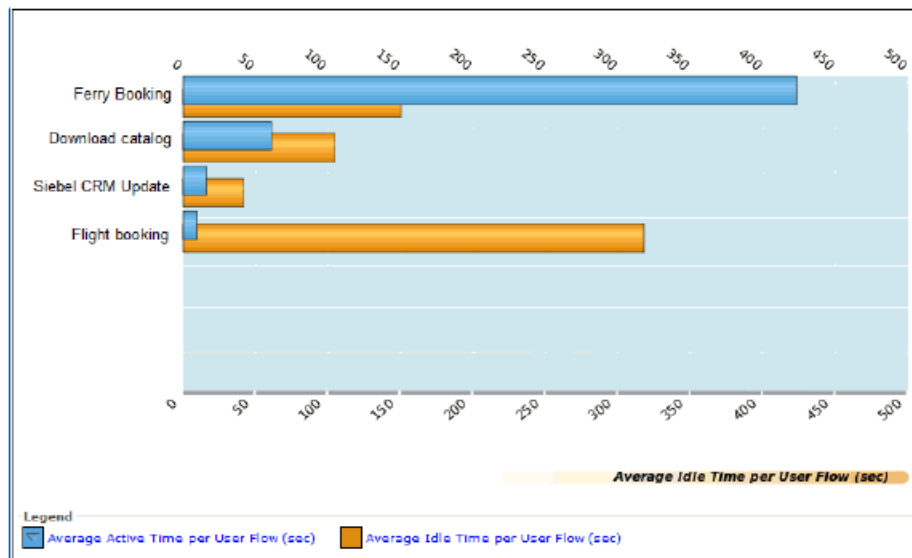
Figure 15–3 User Flow Illustration

The flow starts at the top and narrows as users drop off. Each step of the flow is shown in a different color. To the right of the figure are numbers showing how many users aborts and user time outs made up the loss of users for a given step. Following the funnel illustration is more detailed information (not shown in [Figure 15–3](#)) about the activity for each step.

RUEI provides further insight into user flow activity with a view that compares user active time with idle time for each flow. This kind of analysis might suggest which of your pages are most difficult for the user to complete. An example of this view is shown in [Figure 15–4](#):

Note the difference between the Ferry Booking and Flight Booking average idle time. Greater idle time might reflect poor web page design.

User flows provide an excellent means of finding trouble spots, identifying patterns of use, and improving the overall user experience.

Figure 15–4 Active Time vs Idle Time in User Flow Steps

15.2.5 KPIs and Service Level Agreements

In addition to the continuous, passive monitoring provided by RUEI, you can set up active monitoring using Key Performance Indicators (KPIs) to monitor specific aspects of performance, and you can define Service Level Agreements that alert you when the specified benchmarks are breached. You can review this data using dashboards and reports.

An SLA defines an expected level of service, typically expressed in terms of one or more Key Performance Indicators. For example a KPI might test whether a service is available 99% of the time, and an SLA might be defined to report when availability falls below this value.

KPIs are grouped into categories such as load times, sessions, throughput, and so on. You can define your own category; for example, user flow completion or website availability.

When you define a KPI you specify the following information:

- whether to associate it with data from a specific application or whether it will be generic
- what metric to apply
- whether filters are needed to further define the scope of the KPI. For example, if you selected the user-flow-load-time or Ended user flows metric, you need to specify the user flow to which it refers.
- whether the KPI has a minimum or maximum target range. Targets can be fixed or relative to historical performance.
- whether and how the KPI should be incorporated into an SLA
- whether an alert should be associated with the KPI

RUEI gives you very fine control over active monitoring. You can create service-level and alert schedules that are sensitive to normal periodic variation in target values, and you can define alert profiles and escalation procedures to specify who should be notified when an alert is triggered.

15.3 What Questions Can RUEI Answer?

RUEI can answer questions like the following about the user experience:

- *What time of the day are the greatest number of page hits?*
Look at the chart that relates page views to sessions on the Dashboard tab.
- *What regions in Europe are experiencing the greatest user activity.*
Look at the Session origin map for Europe, in the Dashboard tab.
- *What percentage of total errors is due to client aborts?*
Look at the Functional errors chart in the Dashboard tab.
- *What are my most problematic pages?*
Look at the Problem Pages listing in the Dashboard tab.
- *Which browser is most heavily used by clients in France?*
Select the **Sessions per browser** report from the **Clients** category in the **Reports** tab, and filter by client-location/country.
- *Show me user records for the Bookings application that have a specific ECID.*
Select the **Session diagnostics** group, and then specify the application name and the ECID of interest. For information about ECID, see [Section 14.2, "Using ECIDs to Track Requests."](#)
- *In what step of my Booking user flow am I losing the most customers?*
Look at the user flow funnel and status details.
- *How many users returned to a previous step in my user flow?*
Look at the Status Details for a user flow to see the number of users returning for each step. A high number of returning users might indicate the need to carry some status information forward into the following screen.
- *When has the availability of my creditCheck service fallen below 95%?*
Define a KPI for that metric, and define a Service Level Agreement that alerts you when the desired value is breached.

15.4 What Aspects of RUEI Can You Access from the EM Console?

You can access monitoring information about the user experience from the Enterprise Manager console. However you cannot define or edit user flows, KPIs, SLAs, or custom Reports in the Enterprise Manager console. All that needs to be done using the RUEI console.

What information is provided in the Enterprise Manager console depends on how you have defined your application and monitoring features in RUEI. Should you find that you need different information, you can use the RUEI console to edit the appropriate elements. Enterprise Manager will be automatically updated with the new definition, and it will display the information you need after you have run additional traffic.

Overall, the information you can access from the Enterprise Manager console includes the following for each RUEI application associated with the current business application:

- On the **Business Application Home** page, you can view the Key Performance Indicators (KPIs) defined for your application, their status, and their defined

thresholds. You can also view an overview of incidents and problems associated with the business application. Some of these might have been generated by RUEI.

- The alerts generated by KPIs defined for RUEI applications are reported as events in **Incident Manager**. To view these events select **Monitoring** and then **Incident Manager** from the **Enterprise** menu. Then open the **Events Without Incidents** predefined view. Click the event of interest to view more information.

To reach more detailed monitoring information for RUEI applications, select **Real User Experience (RUEI)** and then **Real User Experience (RUEI) Data** from the **Business Application** drop down. You will be able to see the following regions:

- **RUEI Key Performance Indicators** region, which gives more detailed information for defined KPIs
- **Top User and Application Violations** region, which allows you to examine the application pages with the highest number of violations
- **Top executed User Requests** region, where you can view the most frequent user requests and actions, and assess their impact on the business application
- **Top Users** region, where you can monitor the most active users of the targets associated with the business application

To perform root cause analysis of operational problems, you can use the **RUEI Session Diagnostics** facility. You access this facility by selecting **Real User Experience (RUEI)** and then **RUEI Session Diagnostics** from the **Business Application** drop down.

To view the **RUEI Metrics** page, select **Real User Experience (RUEI)** and then **RUEI Metrics** from the **Business Application** drop down.

For complete information about working with RUEI in the Enterprise Manager Console, see "[Monitoring Business Applications](#)" on page 18-1.

15.5 How Does RUEI Work with BTM and JVM Diagnostics?

RUEI can work seamlessly with BTM and JVMMD if you install and configure these as described in "[Setting up End-to-end Monitoring](#)" on page 14-4. Options include the following:

- You can click out to JVMMD to get activity information for the selected request based on its ECID. You can access the Request Instance Diagnostics page by a right-click on a record in a RUEI Session Diagnostics view.
- You can click out to Business Transaction Management to display information about a business transaction from the Session Diagnostics facility.
- You can click out the Business Transaction Management to provide aggregated information about the specific flow of work associated with the selected request. This option is available through the BTM service/operation dimension within the URL diagnostics group.
- You can click out to Business Transaction Management to provide aggregated information about the service deployed within your application environment associated with the selected request. This option is available through the BTM service dimension within the URL diagnostics group.

For additional information about how RUEI works with external tools, see "[Configuring Clickouts to External Tools](#)" in *Oracle RUEI User's Guide*.

Discovering Services and Working with Transactions

This chapter introduces the Business Transaction Management (BTM) stand-alone product. For information on using BTM monitoring functions from the Enterprise Manager console, see [Chapter 18, "Monitoring Business Applications."](#)

Monitoring the user experience treats the sequence of operations that follows a page hit as a black box. A user action triggers a request: the request goes out, a response is returned, and if the tardiness or absence of the reply is not directly related to the web page, it is impossible to determine its cause. (This series of actions is illustrated in [Figure 14–1.](#)) Business Transaction Management (BTM), another aspect of monitoring application performance, allows you to examine the sequence of operations that ensue from the original request. BTM focuses on the monitoring of transactions, a subset of these operations, to help you locate which operations in the sequence have performance issues and errors.

This section introduces the basic concepts and tasks involved in working with BTM. It includes the following topics:

- [What Does Business Transaction Management Discover?](#)
- [Defining Transactions](#)
- [Monitoring Transactions](#)
- [What Questions Can Business Transaction Management Answer?](#)
- [Accessing BTM from the Enterprise Manager Console](#)
- [How Does Business Transaction Management Work with RUEI and JVM Diagnostics?](#)

BTM offers a rich set of features that we cannot hope to describe in a single chapter. For complete information about its use, see *Oracle Business Transaction Manager Online Help*. To view a visual demonstration on how you can use BTM, access the following URL and click Begin Video:

https://apex.oracle.com/pls/apex/f?p=44785:24:539253248237801::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:6366,1

16.1 What Does Business Transaction Management Discover?

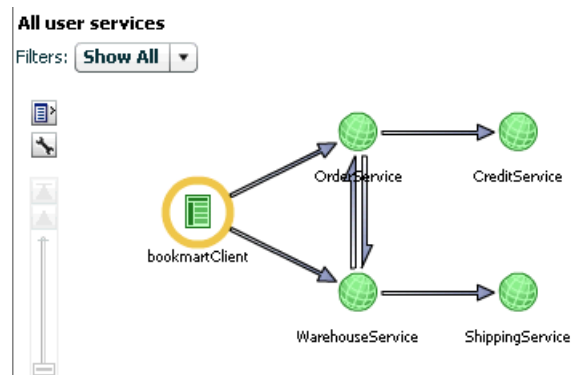
Business Transaction Management uses dynamic discovery, based on traffic flow, to discover the essential characteristics of a running application. These include the following elements:

- Application components: the logical service that designates a deployed component type, the endpoints (instances of that service), and the operations that can be invoked on an endpoint
- The dependencies among components
- The containers (application servers) where application components are running

After you run traffic, BTM can display the services and dependencies found in a dependency graph, like the one shown in [Figure 16–1](#).

Although BTM can discover a wide variety of components, it uses a web-service model to represent these components and their dependencies, no matter what their actual type. According to this model, services interact by sending request and response XML messages. For example, if you have a composite application consisting of a web service that calls an EJB that accesses a database via JDBC, it will be modeled as three services that communicate using XML messages. When you use the Business Transaction Management console to view discovered components, these are listed as services, and the messages they exchange are listed as operations belonging to these services. A message corresponds to either the request or response phase of an operation. The figure below shows how BTM represents related discovered services.

Figure 16–1 Service Dependency Graph

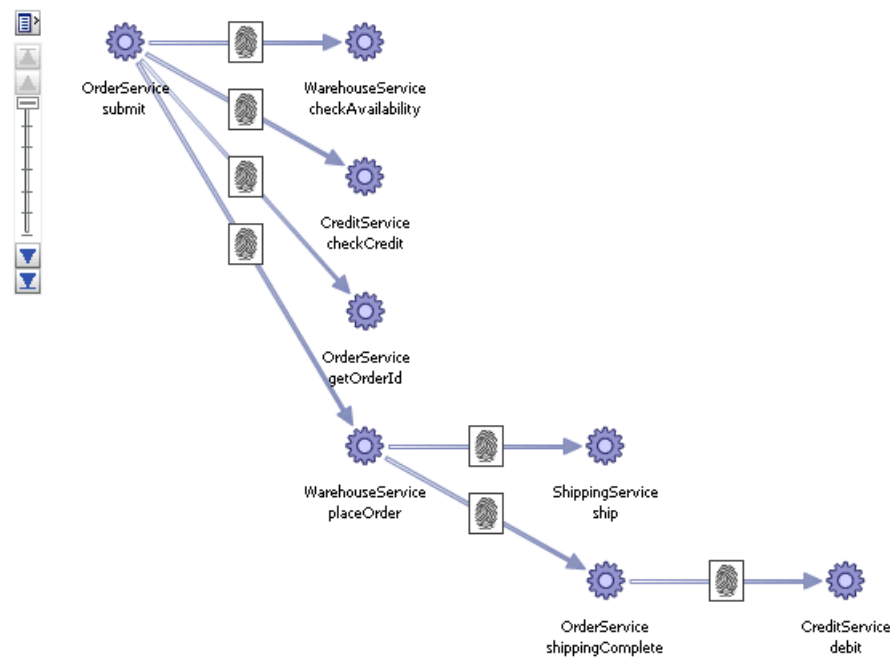


The figure shows five inter-related services and the flow of traffic between them. The circled service is the service initiating traffic. You can drill down further to show service operation dependencies, this view is the starting point for a transaction definition, which is described next.

16.2 Defining Transactions

Once you have run traffic and discovered the services that make up your application, you can define a transaction that includes some or all of those services in a flow. Normally, a transaction will be comprised of a subset of the flow of services that make up your application. You will use transactions to focus on an area of interest in order to get a better understanding of performance or to troubleshoot problems.

By default, a transaction begins with the operation you select as a starting operation and it ends with the response message of that operation. You can customize the definition by changing the operations that are included in the transaction definition and by including flows whose relevance cannot be automatically discovered. The figure below shows a graphical representation of a transaction definition based on the dependency graph shown in [Figure 16–1](#).

Figure 16–2 Transaction Graph

The figure shows the sequence of operations that follows the starting operation of the transaction, `OrderService:submit`. (The fingerprint icon shown on the arrows linking the operations means that these operations were automatically correlated using message fingerprints. If they had been manually correlated, a key icon would have been used instead.)

By default, monitoring is enabled for a transaction. BTM will capture basic measurements of transaction performance: average response time, started transactions, completed transactions, and maximum response time. You can increase the depth and extent of monitoring by specifying the following additional features:

- You can choose to segment transaction measurements based on host address and by individual consumer.
- You can enable instance logging to see a list of transaction instances recorded in a given time period. You can then assemble and inspect a given instance, view any property values for that instance, and create conditions based on these property values.
- You can enable message logging, which allows you to view message content for the operations you specify. You can also search for an operation based on the content of its request or response message.

Each of these features exact some cost on BTM performance and resources. For example, for applications that process large volumes of data, instance logging can take up a lot of database space. To help balance monitoring needs with performance, BTM allows you to define *properties* for a given operation to capture partial content of a message without having to log message content. You can also use properties to manually correlate messages, to search for specific transaction instances, and to define conditions.

The features you choose when you define a transaction govern the kind and extent of monitoring that follows. In addition to this type of monitoring, you can also configure

BTM to alert you about special situations by using conditions and service level agreements:

- Service level agreements (SLA) define standards of performance for your transactions based on aggregate measurements. Business Transaction Management then monitors deviations from those standards, and when deviations occur, an alert is issued and displayed in the Management Console. When you view BTM-related information in the Enterprise Manager console, events corresponding to these SLAs are shown in the **Events Without Incidents** view of the Incident Manager. To view these events on the Business Application page see [Section 16.2.1, "Promoting SLA Violations to the Business Application Page"](#).
- Conditions can alert you when an expected message does not arrive, when a specified message property value is encountered, or when a fault occurs. They are tools to help you detect issues in specific transaction instances. When the condition is triggered and satisfied, Business Transaction Management assembles the corresponding transaction instance, allowing you to view its content and perform whatever analysis is needed for troubleshooting or other performance evaluation. Note that evaluating conditions on each transaction instance requires instance logging to be enabled and can affect BTM performance.

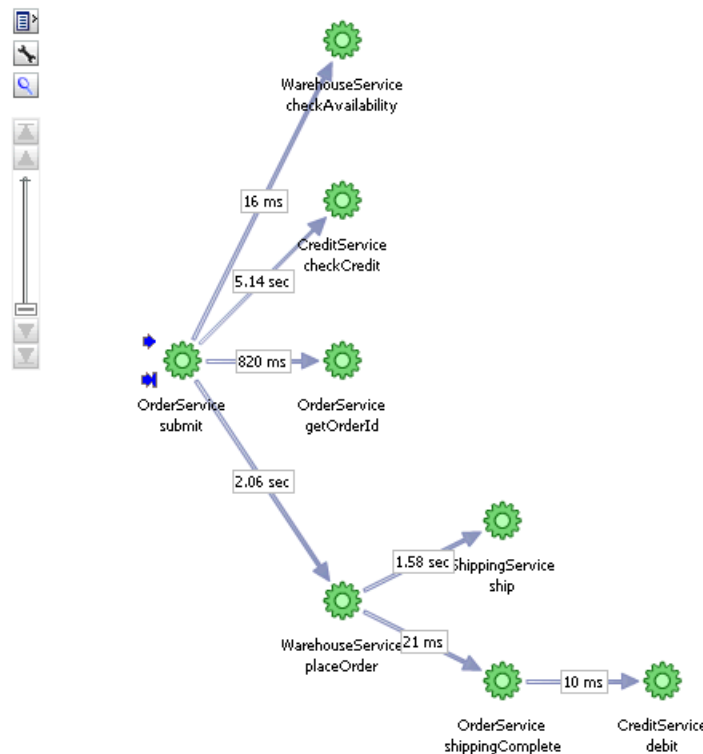
16.2.1 Promoting SLA Violations to the Business Application Page

By default SLA violation events are not promoted to incidents and will not appear in the Business Application page. To promote events to incidents, follow these steps:

1. From the **Setup** menu, select **Incidents**, then select **Incident Rules**.
2. Click **Create Rule Set**. In the Create Rule Set page, in the Targets region, select the **All Targets of types** option. Select the Business Application target type.
3. Click **Create** in the Rules region and in the Select Type of Rule to Create window, choose **Incoming events and updates to events** option and click **Continue**. The Create New Rule: Select Events page appears. In the Type drop down, select Application Performance Management KPI Alert.
4. Click **Add**. The **Add Actions** window appears. Select the **Always execute the actions** option and **Create Incident** option.
5. Click **Next**, review the rules, and click **Continue** to save the rule. All events that match the criteria will be promoted to incidents and will appear in the Business Application page.

16.3 Monitoring Transactions

How much information Business Transaction Management gathers for a given transaction depends on the transaction definition as explained above. At a minimum, if you have not enabled any features, BTM displays core measurements for the selected transaction in the Main area of the BTM console. This includes the number of started and completed transactions, the throughput, the average response time, the maximum response time, and the number of violation alerts. The figure below shows graphic monitoring information for the transaction whose definition is illustrated in [Figure 16-2](#). The numbers shown represent the average response time for a link. If you right-click on the link, a popup window displays the link throughput. In addition to the figure, BTM displays a grid view that lists the core measurements described above.

Figure 16-3 Transaction Monitoring

In the Tabs area of the display, BTM shows information about performance data segmented by consumer or client address, alerts, assembled transaction instances, logged message content, SLA compliance, and the transaction definition. How much of this data is available depends on the transaction definition. For example, if you have not enabled message logging, you will not be able to view message content.

In addition to the core instruments, you can enable additional instrumentation and monitoring both for transactions and for services and operations. For more information, see "About Instruments" in *Oracle Business Transaction Management Online Help*.

16.4 What Questions Can Business Transaction Management Answer?

Using transactions, properties, service level agreements, and conditions, Business Transaction Management can answer questions like the following about your application:

- *What is the logical structure of my application? What are the operations that make up my application components, and what are their call dependencies?*

Open the **Service Map** view to display currently active services and their dependencies.

- *Where can I look at my environment infrastructure and the dependencies between the elements of that infrastructure?*

Select the **Containers** view. From here you can see the application components hosted in a given container, and you can also see the operations that make up each component.

- *How can I get a quick overall sense of operational status?*
Select **Operational Health Summary** from the **Dashboards** view. This gives you current failure and warning counts, alerts, and admin status.
- *How are my transaction flows performing, and what is the volume of traffic?*
Select a transaction in the **Transaction** view and check monitoring data for a transaction for throughput and average response time numbers.
- *What parts of my application are most heavily used?*
Check the **Most Load** items in the **Top 10 Services** dashboard.
- *Which services are most error prone?*
Check the **Most Faults** items in the **Top 10 Services** dashboard.
- *Which are my slowest transactions?*
Check Slowest **Avg Response Time** table in the **Top 10 Transactions** dashboard.
- *How does current performance compare with historical norms?*
Define a baseline for the performance metric of interest and define warning and alert levels for an SLA on selected operations. Once the baseline is defined, it's displayed as a reference on the **Transaction Summary** page and **Analysis** tab. You can also receive alerts if you configure SLAs. View results in the **SLA Compliance** tab.
- *Which of my customers is getting the slowest service?*
Define consumer segmentation and view results in the **Analysis** tab.
- *Are there any bottlenecks in traffic flow? Do I need to add a load balancer.*
Look for unusually high throughput numbers and slow average response time on services.
- *How many orders exceeded \$10,000 in the last week?*
Define a property for the message element that specifies the invoice total. Then, define a condition that uses this property to alert you for the occurrence of any order that exceeds that amount. The count of the condition is tracked as an instrument that is displayed on the **Analysis** tab for the transaction.

16.5 Accessing BTM from the Enterprise Manager Console

You can access monitoring and definitional information about transactions from the Enterprise Manager Console. You cannot edit transactions, create properties, define conditions or set Service Level Agreements in the Enterprise Manager console. All that needs to be done in the Business Transaction Manager console.

Of course, as we explained in "[Defining Transactions](#)" on page 16-2, what information is provided depends on what features you have enabled when you defined the transaction. For example, if you don't enable instance logging, you will not be able to view information about individual transaction instances. Should you find that you need a different amount of information, you can use the Business Transaction Management console to edit the transaction definition. Enterprise Manager will be automatically updated with the new definition, and it will display the information you need after you have run additional traffic.

Overall, the information you can access from the Enterprise Manager console includes the following for each transaction associated with the current business application:

- On the Business Application page, you can view the list of all associated transactions, along with the selected transaction's current compliance status, the number of transaction instances started and completed during a given period, the average completion time, and the maximum completion time.
- On the Transaction Home page, which you can reach by clicking a transaction on the Business Application page, you can view SLA compliance and a tree table list of the transaction service operations with core measurements, with the breakdown of the performance measurements across service instances (endpoints) for cases where the service has replicates.
- Right clicking on an endpoint in the Transaction Home page gives you the option of launching the BTM UI to see the details for that operation or to launch JVMMD.

You can access more extensive and detailed information for a given transaction by clicking Launch BTM from the Transaction Home Page. This will open a new window which allows you to view Tab information from the Business Transaction Management console.

For complete information about working with BTM in the Enterprise Manager Console, see ["Monitoring Business Applications"](#) on page 18-1.

16.6 How Does Business Transaction Management Work with RUEI and JVM Diagnostics?

Business Transaction Management can work seamlessly with RUEI and JVMMD if you install and configure these as described in ["Setting up End-to-end Monitoring"](#) on page 14-4. Options include the following:

- You can access the Business Transaction Management from RUEI. For information, see ["Configuring Clickouts to External Tools"](#) in *Oracle Real User Experience Insight User's Guide*.
- You can access Java Virtual Machine Diagnostics (JVMMD) and the Request Instance Diagnostics (RID) view from the Business Transaction Management console.

You can access the JVMMD view by selecting an operation and selecting **Drilldown to JVMMD** from its drop list. You can then view details about an executing JVM process for the period within which the operation executes. You can see stack frames for executing threads, thread state information, aggregate information about the frequency and cost of method execution, and so on.

For a message that has been assigned an ECID, you can view information in the Request Instance Diagnostic view, which displays a list of the JVMs through which request steps with the specified ECID executed. You can access the RID view by selecting an operation and selecting **Request Instance Diagnostics** from its drop list.

For more information, see ["Accessing Other Diagnostic Tools"](#) in *Oracle Business Transaction Management Online Help*.

Getting Detailed Execution Information

There are times when the views offered by RUEI or BTM are not sufficient to understand performance issues. If the suspect services are executing in a Java Virtual Machine, it is possible to go deeper and get detailed execution information that helps you diagnose the root cause of such problems.

JVM Diagnostics is a tool that allows you to view the details of an executing JVM process. These details include the stack frames for executing threads, thread state information, aggregate information about the frequency and cost of method execution, information regarding the holding of Java and database locks, and details about the objects in the Java heap. Using this tool you can also access historical data for each JVM monitored.

This section explains how you use two Enterprise Manager JVM views to get detailed execution information about failing or problematic operations. It includes the following sections:

- [Using JVM Diagnostics](#)
- [Using Request Instance Diagnostics](#)

When you invoke one of these views from RUEI or BTM to further analyze performance, Enterprise Manager selects and displays data generated in the time interval for the selected RUEI page object or BTM operation instance. One additional piece of information that might be shown for the data displayed is its execution context ID (ECID).

An ECID is an identifier used to track a request, for components in the Oracle technology stack. The creation and propagation of ECIDs enable the sharing of context and of diagnostic data between components. ECIDs are also used to identify threads running in the Java Virtual Machine. Where ECIDs are available, they can help you correlate data shown in RUEI or BTM with data shown in the JVM Diagnostics view or Request Instance Diagnostics view. For additional information, see ["Using ECIDs to Track Requests"](#) on page 14-4.

To access JVM views from RUEI and Business Transaction Management, you must do some preliminary set-up work. For more information, see ["Setting up End-to-end Monitoring"](#) on page 14-4.

JVMD offers a rich set of features that we cannot hope to describe in a single chapter. For complete information about its use, see the chapters describing JVMD in this book.

17.1 Using JVM Diagnostics

Java Virtual Machine Diagnostics (JVMD) information is accessed from the Business Transaction Management console in one of the following ways:

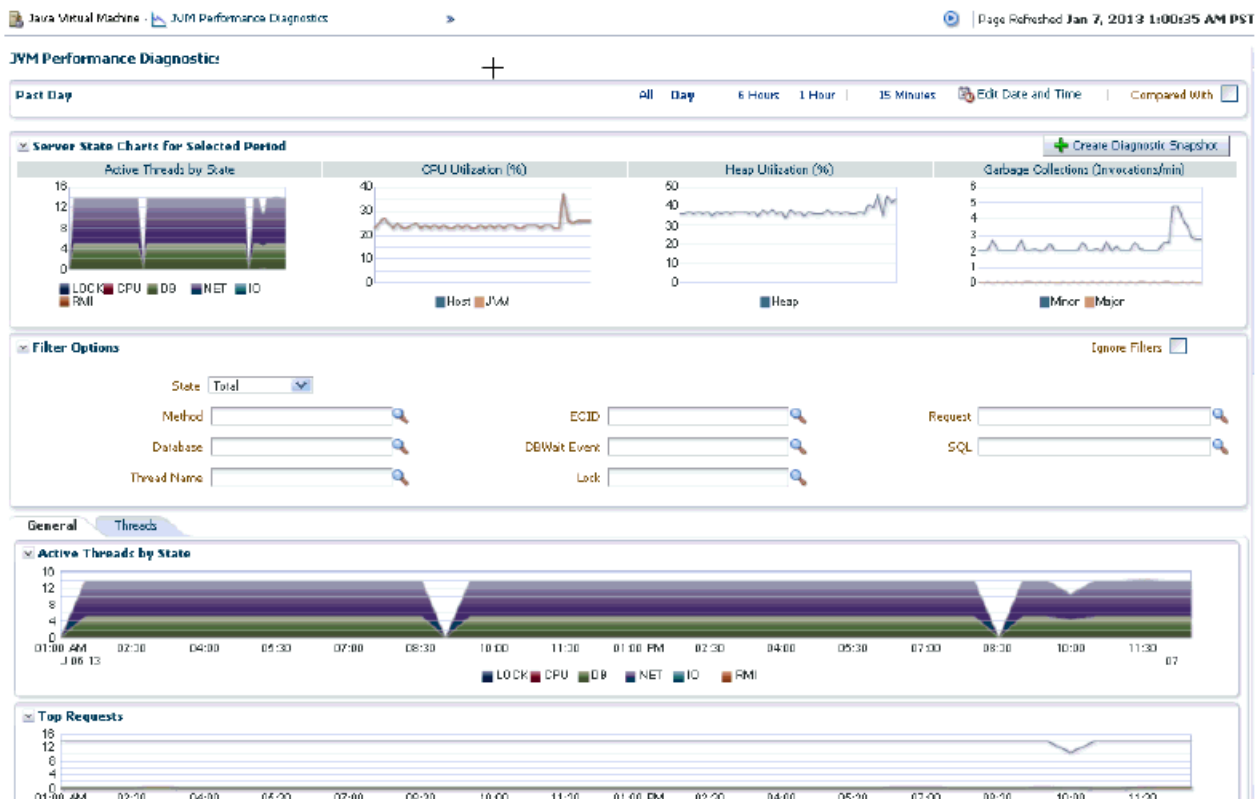
- In the **Message Log** tab for a service, endpoint, logical operation, physical operation, or transaction. Right-click on a row and select **Drilldown to JVM** from the context menu.
- In the **Transaction Instance Inspector**, right click on an operation (in either the graph or grid view), and select **Drilldown to JVM** from the context menu.
- In the **Message Search Log** tool, right click on a message row, and select **Drilldown to JVM** from the context menu.

In Enterprise Manager, you can access JVM information for a transaction operation by selecting a transaction in the Business Application and opening the transaction summary page. Then do one of the following:

- Right click one of the operation nodes in the topology diagram and select JVM diagnostics from the context menu.
- Right click one of the operation rows in the operations table and select JVM diagnostics from the context menu.

In each case, a new window is displayed showing the JVM Performance Diagnostic view. In the multi-VM case, JVM shows a VM group target and aggregate information for the group. [Figure 17-1](#) shows the JVM Performance Diagnostic view.

Figure 17-1 JVM Performance Diagnostic View



This view shows the summary details of the JVM in which the selected operation is running. It shows Server state charts, Active Threads by State, Top Methods, Top Requests, Top DBWait Events, TopSQLs, and Top Databases. You can filter the data that is displayed by specifying various criteria.

Click on the Threads tab to view the Thread State transition chart. This chart shows how the threads have transitioned from one state to another in the selected period. Click on a bar graph in the Thread State Transition chart to view the Sample Analyzer, which provides a detailed analysis on the thread of the thread.

Click the Live Thread Analysis control to see all threads running in the JVM. Click on a thread to view additional information about that thread.

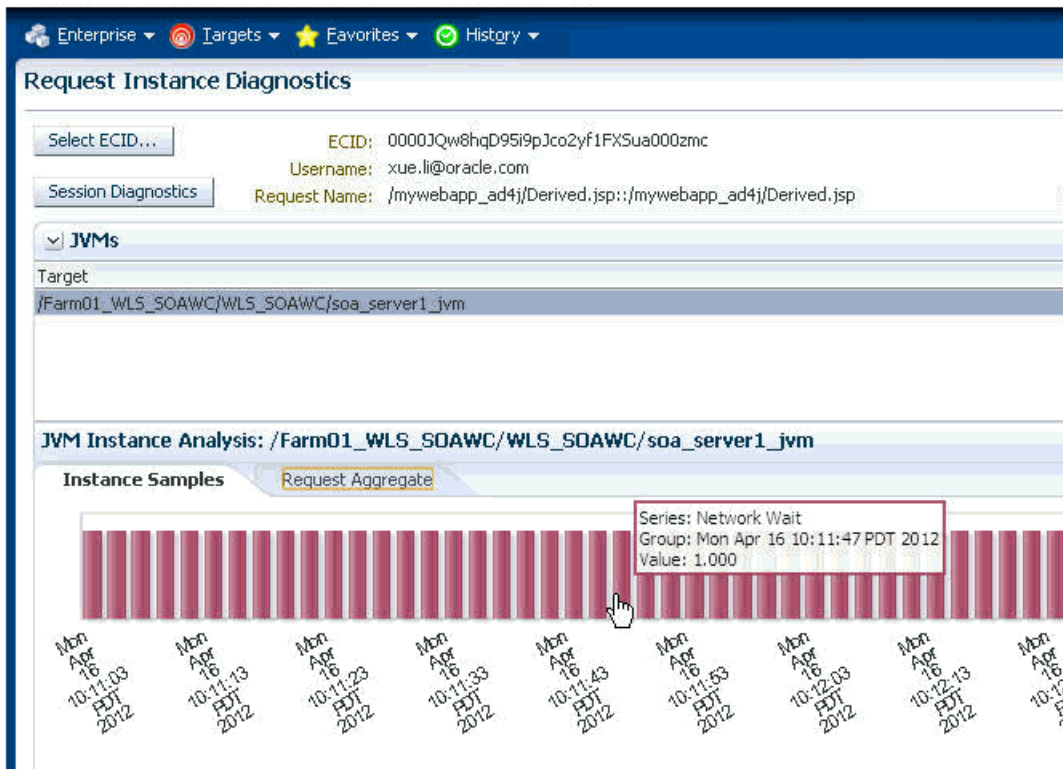
17.2 Using Request Instance Diagnostics

You can access the Request Instance Diagnostics (RID) view either from RUEI or from Business Transaction Management.

- From the RUEI stand-alone application, the ECID is used to correlate the data shown. You can access RID by a right-click on a record in a RUEI session diagnostics view.
- From a RUEI Session Diagnostics, object view in EM, you can access RID by a right-click on the Oracle logo icon. (The icon is displayed only if there's an ECID)
- If an operation in Business Transaction Management has an associated ECID, you can access the RID view in the same way you access the JVMD view except that you select RID from the context menu.

Note: Java Virtual Machine Diagnostics (JVMD) must be installed and active before you can access the Request Instance Diagnostics (RID) view.

Figure 17–2 shows part of the Request Instance Diagnostic view for a given ECID.

Figure 17–2 The Request Instance Diagnostics View

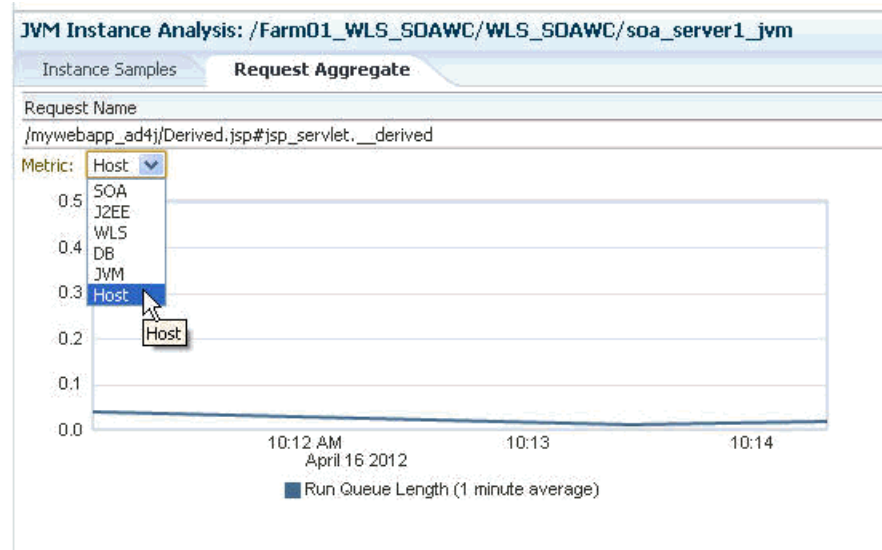
The JVMs panel lists all the JVMs through which the request was executed. Select a JVM to display the following information:

- RID: The Relationship ID, an ordered set of numbers describing the location of each task in the tree of tasks.
- The start time and the duration of the request.
- Step Name: The individual steps in the request. For example, the first step could be jsp, the second could be EJB, and the third could be DB.
- CPU utilization by the JVM
- GC Major/Minor indicates the number of objects added to the major and minor garbage collections.

If you select a JVM from the list, a bar graph is displayed in the **Instance Samples** tab of the JVM Instance Analysis panel. This graph shows the thread state in each JVM snapshot taken within the duration of the request. A color key, to the right of the display, indicates a different thread state; Runnable, Lock, IO wait, DB Wait, NW wait, and RMI Wait. Hover over the graph to get an in-depth view of the thread.

To view aggregate metrics collected for the selected JVM during the specified period, click on the **Request Aggregate** tab. [Figure 17–3](#) shows a sample tab.

To view measurements for a given metric type, select the desired type from the drop down Metric menu, as shown in the figure.

Figure 17-3 RID: Request Aggregate Tab.

Monitoring Business Applications

This chapter describes how you use Oracle Enterprise Manager to monitor Business Application performance.

A *Business Application* is an Enterprise Manager target that represents a logical application; for the user, it defines a unit of management. A Business Application is composed of RUEI applications and BTM transactions. Using the Enterprise Manager Console, you view a Business Application to access RUEI and BTM performance data as well as information about the application's supporting infrastructure: the hosts and servers where the application services are executing.

You cannot use Enterprise Manager to create RUEI applications and BTM transactions. That work must be done using the RUEI and BTM stand-alone products, which were introduced in previous chapters. You must complete the steps described in ["Setting up End-to-end Monitoring"](#) on page 14-4, to be able to set up Business Application monitoring. You must also complete the tasks described in [Section 18.2, "Prerequisites and Considerations."](#)

This chapter covers the following:

- [Introduction to Business Applications](#)
- [Prerequisites and Considerations](#)
- [Registering RUEI/BTM Systems](#)
- [Creating Business Applications](#)
- [Monitoring Business Applications](#)
- [Requirements for Using RUEI](#)
- [Monitoring KPI and SLA Alert Reporting](#)
- [Monitoring BTM Transactions in Enterprise Manager](#)
- [Working Within Business Transaction Manager](#)

18.1 Introduction to Business Applications

By using Oracle Enterprise Manager to monitor your Business Applications, you can make sure that your applications are performing at their peak and that end users are satisfied with their performance.

The use of Business Applications offers a number of significant advantages over traditional IT-centric approaches that only focus on system health issues. In particular, Business Applications:

- Allow you to manage your applications in their business context, measuring, and alerting on the basis of the end-users' experience.
- Provide customizable dashboards with complete visibility across multi-tier composite applications.
- Provide a visualization of all target relationships within a business service.

18.1.1 Systems, Services, Business Applications, and Key Components

Within Oracle Enterprise Manager, there are two types of targets: systems and services. A service target represents some functionality provided or supported by a system. A Business Application is a service target. Hence, when you create a business application, you must associate it with a system that represents the infrastructure that supports the service functionality.

Consider an example business application that contains an order entry application implemented by a collection of physical (system) resources. The application is deployed in a Web Logic domain modeled as a system target whose members are the individual managed servers. The Business Application could include transactions deployed in containers. Each of these containers is an application server, possibly within a single Web Logic domain. In this case, the Web Logic domain is the system target. (In the case that the transaction spans multiple domains, it is recommended that you create a composite application within Oracle Enterprise Manager.)

You specify which key components within the system target should be monitored to determine the business application's availability. For instance, for a transaction, the key components will be the servers where the services that comprise the transaction are running.

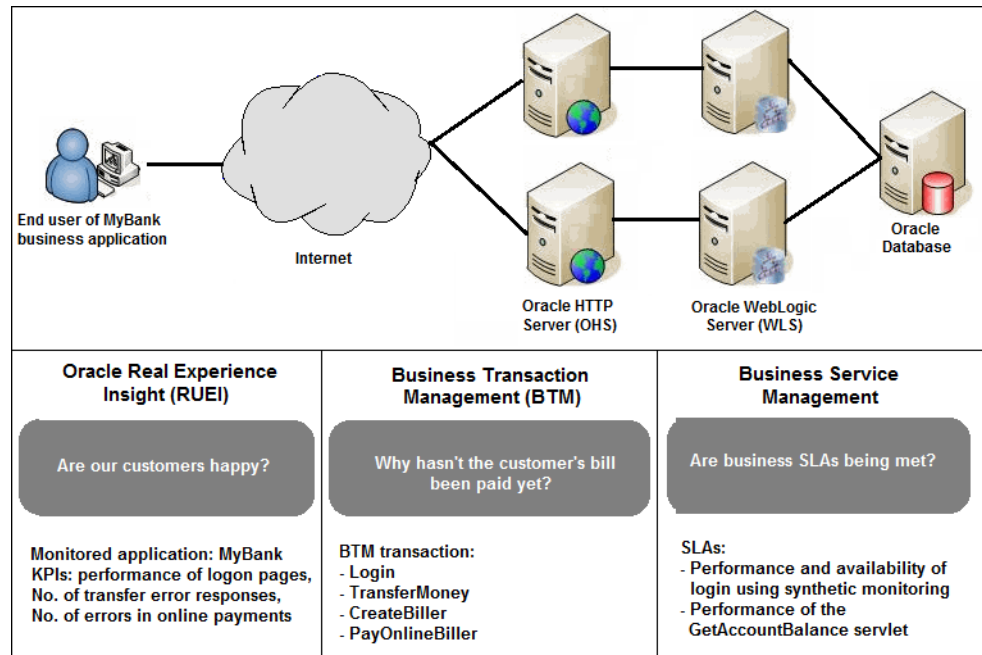
System monitoring provides insights into the behavior of the monitored application infrastructure. It collects metrics and reports on the health of all components from the hosts to the application servers and the deployed Java EE applications. It also provides deep-dive diagnostics tools for the application servers and the databases.

18.1.2 MyBank: An Example Business Application

To illustrate the nature of a Business Application, consider the situation in which end users access a banking application (MyBank) that allows them to perform such tasks as the payment of bills. This business application is delivered through the infrastructure shown in [Figure 18–1](#).

The end-user experience of the MyBank business application is monitored through RUEI, while Key Performance Indicators (KPIs) are used to monitor its key aspects, such as the availability and performance of the logon page, and the number of errors in transfer responses and online payments.

BTM monitors the performance of the services and transactions deployed within the application environment used to deliver the business application. This is done by tracking each transaction as its execution progresses through the different tiers of the application. This is complemented by the ability to perform root-cause analysis to locate bottlenecks, errors, and incomplete transaction instances.

Figure 18–1 The MyBank Business Application

Proactive application monitoring is achieved by defining business objectives that set acceptable levels of performance and availability. Within Oracle Enterprise Manager, these business objectives are referred to as *Service Level Agreements* (SLAs) and are composed of *Service Level Objectives* (SLOs) that measure specific metrics.

Insight into each of these key aspects of a business application's operation and delivery is available through a number of dedicated regions of the Oracle Enterprise Manager console.

18.2 Prerequisites and Considerations

This section describes the requirements that must be met and the issues that should be considered to use the Business Applications facility. It is strongly recommended that you carefully review this information before proceeding with the creation of business applications.

Important: It is recommended that you review the My Oracle Support website to obtain up-to-date information about the supported RUEI and BTM products, as well as patches, configurations, known issues, and workarounds.

This section covers the following:

- [Requirements for Using RUEI](#)
- [Requirements for Using BTM](#)

18.2.1 Requirements for Using RUEI

To use RUEI to monitor the performance of your Business Applications, you must ensure that the following requirements have been met:

- RUEI version 12.1.0.6 (or higher) has been installed and configured to monitor the required applications, suites, and services. Information about deployment options and requirements is available from the *Oracle Real User Experience Insight Installation Guide*.
- The Enterprise Manager for Oracle Fusion Middleware plug-in must be deployed to both Oracle Management Service (OMS) and to each Management Agent monitoring the business application targets.

For details on deploying the plug-in to OMS, see the "Deploying Plug-Ins to Oracle Management Service" chapter in the *Enterprise Manager Cloud Control Administrator's Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e24473/plugin_mgr.htm#CJGCDHFG

For details on deploying the plug-in to a Management Agent, see the "Deploying Plug-Ins on Oracle Management Agent" chapter in the *Enterprise Manager Cloud Control Administrator's Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e24473/plugin_mgr.htm#CJGBIAGJ

- The Reporter system must be accessible to Oracle Enterprise Manager via an HTTPS connection on port 443. Other component host systems (such as Collector, Processing Engine, and database servers) do not need to be accessible to Oracle Enterprise Manager unless you intend to make them managed targets (see [Section 18.3, "Registering RUEI/BTM Systems"](#)).
- The statistics data retention setting (which governs the availability of statistical information such as violation counters) has been configured to be consistent with your business application reporting requirements. The procedure to do this is described in the *Oracle Real User Experience Insight User's Guide*.
- If you intend to export session information from the Session Diagnostics facility, you should ensure that the exported session is not older than the period specified for the Full Session Replay (FSR) data retention setting. In addition, the URL prefix masking setting should be specified as "Complete logging". For more information, see the *Oracle Real User Experience Insight User's Guide*.

18.2.1.1 Registering RUEI Installations with Self-Signed Certificates

A RUEI installation can use a self-signed certificate. This is explained in the *Oracle Real User Experience Insight Installation Guide*. However, Oracle Enterprise Manager only accepts SSL certificates issued by a trusted Certificate Authority (CA), and that contain a valid Common Name (CN). Therefore, in order to be able to register a RUEI installation with Oracle Enterprise Manager, you need to do the following:

Note: All instructions on the Oracle Enterprise Manager system need to be carried out as the user running the oms and agent.

1. Verify that the certificate is valid. One way to do this is to attempt to access the Oracle Real User Experience Insight system through a browser via HTTPS and view the certificate details. You should ensure the certificate's date validity. If the certificate's date range does not include the period your Oracle Real User Experience system is running, you will not be able to use it.
2. Download the certificate to your Oracle Enterprise Manager system. Many browsers provide an option when creating a security exception for a self-signed

certificate to also save the certificate to a file. If you have already approved the security exception in your browser, the following example works in Mozilla Firefox:

- a. Click the security icon to the left of the hostname
- b. Click **More information**, then click **View certificate**
- c. Select the **Details** tab and click **Export**

The exported file should be copied to your system running Enterprise Manager. The examples below assume that you stored the file containing the certificate in ~/ruei.cert.

A more direct way to download the certificate to your Oracle Enterprise Manager system can be carried out on the system itself. Issue the following commands on the Oracle Enterprise Manager system:

```
openssl s_client -showcerts -connect <RUEI_REPORTER_HOST>:443 </dev/null \
| openssl x509 -inform PEM > ~/ruei.cert
```

3. Add the certificate to the keystore. Within Oracle Enterprise Manager, two components are used to communicate with a RUEI system via SSL: one for polling the status of RUEI, and one for the communication with RUEI. Both keystores need to contain the same certificate. Issue the following commands on the Oracle Enterprise Manager system:

Agent:

```
cd <agent instance home>/bin
./emctl secure add_trust_cert_to_jks \
[-password <keystore password, default "welcome">] \
-trust_certs_loc ~/ruei.cert -alias <unique alias>
```

OMS

```
<path_to_Oracle_WT>/jdk/bin/keytool -import \
-keystore <path_to_wlserver_10.3>/server/lib/DemoTrust.jks \
-file ~/ruei.cert -alias <unique alias> -storepass DemoTrustKeyStorePassPhrase
```

4. In order for Oracle Enterprise Manager to work with the new certificate, perform a bounce of the OMS and the AGENT. Issue the following commands:

```
<OMS oracle home>/bin/emctl stop oms -all
<OMS oracle home>/bin/emctl start oms
<AGENT oracle home>/bin/emctl stop agent
<AGENT oracle home>/bin/emctl start agent
```

18.2.2 Requirements for Using BTM

To use BTM to monitor the performance of your business applications, you must ensure that the following requirements have been met:

- BTM version 12.1.0.6 (or higher) has been installed and configured. Installation and configuration instructions are provided in the *Oracle Business Transaction Management Installation Guide*.
- The server where the central BTM server is deployed must be accessible to the Oracle Management Server (OMS) on the port where the BTM system's managed server is listening.

- The business transactions you intend to monitor via the Business Application facility have been defined using the BTM user interface. The procedure for doing this is described in the *Business Transaction Management Online Help*.

18.3 Registering RUEI/BTM Systems

Before you can create Business Applications based on RUEI-monitored applications and services, or BTM-monitored transactions, you must first register the appropriate RUEI or BTM system with Oracle Enterprise Manager.

Note: You must have Super Administrator privileges in order to access the Application Performance Management page.

Do the following:

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. The **Application Performance Management** page shown in [Figure 18–2](#) appears. The currently registered systems are listed.

Figure 18–2 Application Performance Management Agents

Application Performance Management Agents

JVM Agents Count: 0
ADP Agents Count: 0

Application Performance Management Engines

View

Name	Host	Port	SSL Port	Status	Availability (%)	Server	Version
▼ RUEI Systems (0)							
BTM Systems (0)							
JVM Diagnostics Engines (0)							
ADP Engines (0)							

2. Select **Real User Experience Insight System** or **Business Transaction Management System** from the **Add** drop down. A page similar to the one shown in [Figure 18–3](#) appears.

Figure 18–3 Discover RUEI System Page

Discover RUEI System: Find Targets

Enterprise Manager can be configured to manage a RUEI instance

☒ Use standard location
☐ Use custom location

* Host: myshop.us.com

* Port: 443

SSL: ☒

* Username: admin

* Password: *****

Unique Identifier:

Note: Release 12.1.0.6 of Oracle Fusion Middleware Management Plug-in allows you to register more than one RUEI system. Previous releases of Oracle Fusion Middleware Management Plug-in prompted you to remove the existing target if you attempted to register a second RUEI system.

3. Specify whether the RUEI or BTM system is running in a standard or custom location.
4. Specify the host system where the Reporter system or BTM Sphere is located. Click **Select Target**. A new window opens that allows you to view the available systems. You can use the **Target Type** menu to search for specific target types.
5. Specify the port number for communication with the RUEI Reporter or BTM Sphere, for example 443.
6. Specify a secure connection for communication with the RUEI Reporter or BTM Sphere. Only use an insecure connection for testing purposes.
7. Specify a valid user name and password combination. For a RUEI system, the specified user must have Oracle Enterprise Manager access permissions. Note that Oracle SSO authentication for this user is not supported. The Security Officer privilege is also recommended to allow downloading of sessions and the showing of replay details in the Enterprise Manager UI. With this in place, Enterprise Manager will be able to retrieve this data. Moreover, additional (per-end-user) Enterprise Manager roles will be applied to reveal session-zip download and content-download buttons.
8. Optionally, specify a string to be attached to the RUEI/BTM system name. For example, if "SanitySite" is specified, then each of the system's component names will be prefixed with "SanitySite_", creating system names such as "SanitySite_BTM_System".
9. In the case of a custom location, specify the full URL of the WSDL RUEI/BTM discovery service. In the case of a BTM system, this should be in the following form:

`http://host:port/btmcentral/sphere/discoveryService/?wsdl`

In the case of a RUEI instance, this should be in the following form:

`http://host:port/ruei/service.php?endPoint=uxDiscoveryService&wsdl`
10. Specify the URL of the Management Agent to be used to collect metric information about the system. If it is managed by Oracle Enterprise Manager, you can click **Select** to specify it.
11. Click **Test Connection** to verify whether a working connection to the RUEI/BTM system can be made.

Note: A secure connection to a RUEI installation fails if you have not completed the process described in ["Registering RUEI Installations with Self-Signed Certificates"](#) on page 18-4.

12. Click **Discover**. An overview of the components associated with the selected system is displayed. An example is shown in [Figure 18-4](#).

Figure 18–4 Discover RUEI Instance: View Targets Page

Application Performance Management Page Refreshed Jul 23, 2012 12:11:01 AM PDT

Discover RUEI System: Add Targets

Targets Found 2

Following are the discovered RUEI targets. Click Add Targets to have these targets monitored by Enterprise Manager.

Name	Type	Host
NY_Oracle_RUEI	RUEI System	myshop.us.com
	RUEI Reporter Engine	myshop.us.com

For RUEI systems, you also need to enter credentials to enable incident communication from RUEI in a section of the screen labelled **Edit Incident Alert Credential**:

- a. Confirm the connection information for the **EM Repository** connection information. By default, the credentials for the Enterprise Manager repository are entered into the appropriate fields.

Note: The RUEI system must have access to the port specified in this section to communicate with the Enterprise Manager repository.

- b. Enter the details for the **Oracle EM Repository Credentials**. In this section, enter the Super Administrator's username (typically `sysman`) and password.

Note: The **Test** button in this section only tests that you have entered a valid username/password. It does not test whether that user has the required privilege.

- c. Enter the values for the **Oracle RUEI Wallet Credentials**. After entering the password twice, save this credential with a meaningful name so that you can recognise it if you require it later. Note that the default value will not be accepted, because it contains the `<` and `>` characters.

13. Click **Add Targets** to have each of the system's components become a managed target within Oracle Enterprise Manager. Note that if you do so, each system must be accessible to a Management Agent. Further information about managed targets is available from the *Oracle Enterprise Manager Cloud Control Administrator's Guide*. If you need to edit any of the credentials you specified above, you can select the target and click the **Configure** button to display a screen that will allow you edit the values.

18.3.1 Setting Up a Connection Between RUEI and the Oracle Enterprise Manager Repository

The following procedure describes setting up a connection so that KPIs from RUEI can be monitored by one or more Oracle Enterprise Manager instances. This procedure can be used for the following situations:

- Initial setup of KPIs
- After a changing Enterprise Manager hostname
- After a changing the `sysman` user credentials

- After changing the TNS settings of the Enterprise Manager database
 - Correcting issues with initial KPI setup
1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. The **Application Performance Management** page shown in Figure 18–5 appears. The currently registered systems are listed.

Figure 18–5 Application Performance Management Engines

Application Performance Management Agents Manage Diagnostics Agents

JVMD Agents Count: 0
ADP Agents Count: 0

Application Performance Management Engines

View + Add Redeploy ✖ Remove ⚙ Configure

Name	Host	Port	SSL Port	Availability (%)	Status
RUEI Systems (1)					
RUEI_demo_Oracle Real User Experience Insight	ruei.myshop.com	9080	n/a	100	↑
BTM Systems (0)					
JVM Diagnostics Engines (0)					
ADP Engines (0)					

2. Select the RUEI system you would like to set up and click **Configure**. The RUEI Setup Page appears.
3. Select the **Edit credential** tab and click **edit**. The **RUEI Setup page** shown in Figure 18–6 appears. Enter the appropriate EM repository credentials. You also need to enter the RUEI wallet password, this is typically specified while setting up the RUEI repository.

Figure 18–6 RUEI Credentials

RUEI Setup page

Edit dimension listing Edit credential

EM Repository Save Remove Return

Clicking on Save will preserve the EM repository connection details on RUEI target. Please make sure to have the correct EM database password and RUEI wallet password available when trying to do update. You need to verify that the backlink does work as expected after update, even when the update was successful.

Database Target: Oemrep_Database ▼

* Host: em.myshop.com ⓘ

* Port: 15044

* SID: semgc

Credentials

This operation requires both EM repository and RUEI wallet credentials

Oracle EM Repository Credentials
Specify credentials for the selected database target

Select credential from one of the following options.

Credential: ☒ Preferred ☐ Named ☐ New

Preferred Credential Name: Normal Database Credentials ▼

Credential Details: -

Oracle RUEI Wallet Credentials
Specify oracle wallet password for RUEI system "RUEI_demo_Oracle Real User Experience Insight". Note that credential name can contain only letters, digits and @#-._

Select credential from one of the following options.

Credential: ☒ Preferred ☐ Named ☐ New

Preferred Credential Name: RUEI Preferred Wallet Credential ▼

Credential Details: -

4. On the RUEI host, configure RUEI to use the mkstore utility:
 - a. Determine the location of the mkstore utility. This utility is included with the Oracle Database and Oracle Client runtime. In both cases, it is located in `$ORACLE_HOME/bin`.
 - b. Edit the `/etc/ruei.conf` file and add the following line, where *mkstore_location* is the path determined in the step above:


```
export MKSTORE_BIN=mkstore_location
```
 - c. Restart RUEI by selecting **System**, then **Maintenance**, and then **System reset**. Select **Reapply latest configuration** option and click **Next** to apply the changes you have made.

Note: This step is valid for RUEI release 12.1.0.6. For other releases, check *Appendix D Setting up a Connection to the Enterprise Manager Repository of the Oracle Real User Experience Insight Installation Guide*.

18.4 Creating Business Applications

To create a Business Application, you need to specify the RUEI-monitored applications, suites, and services, and the BTM-monitored transactions upon which it is based. You are not required to include both RUEI applications and BTM transactions in a Business Application.

Do the following:

1. From the **Targets** menu, select **Business Applications**. The currently defined Business Applications are displayed. The page (partially) shown in [Figure 18–7](#) appears.

Figure 18–7 Business Application Page

Name	Status
Siebel CRM	↑
EMCC	↑
EBS Payments	↑
Download Datasheets	↑

2. Click **Create**. The page shown in [Figure 18–8](#) appears.

Figure 18–8 Create Business Application (Name) Page

Business Application

☒ **Name**
☐ RUEI Associations
 ☐ BTM Associations
 ☐ System
 ☐ Review

Create Business Application : Name Back Step 1 of 5 Next Cancel

Enter a unique name for the new Business Application. Use only letters, numbers and spaces in the name.

* Business Application Name

3. Specify a unique name for the new business application. It is recommended that you include an indication of the purpose and scope of the business application as

part of the name. Do not accept the default name, which is invalid if it contains either of the < or > characters. Note that business applications cannot be renamed later. When ready, click **Next**. The page shown in [Figure 18–9](#) appears.

Figure 18–9 Create Business Application (RUEI Associations) Page

Business Application

Name

RUEI Associations

BTM Associations

System

Review

Create Business Application : RUEI Associations

Back Step 2 of 5 Next Cancel

Use Add to associate one or more RUEI Applications, Suites and Services with the Business Application. Associating with RUEI Applications, Suites and Services is optional.

+ Add

✖ Remove

Name	Type
Cleaner	app
Shop	app

4. Click **Add**. A new window opens that allows you to select the RUEI-monitored applications, suites, and services upon which the business application should be based. You can use the **Type** menu to restrict the listing to specific types. You can multi-select from the list of all the applications, suites, and services associated with a selected RUEI system. When ready, click **Next**. The page shown in [Figure 18–10](#) appears.

Figure 18–10 Create Business Application (BTM Associations) Page

Business Application

Name

RUEI Associations

BTM Associations

System

Review

Create Business Application : BTM Associations

Back Step 3 of 5 Next Cancel

Use Add to associate one or more BTM Business Transactions with the Business Application. Associating with BTM Business Transactions is optional.

+ Add

✖ Remove

Name
Payment

5. Click **Add**. A new window opens that allows you to select the BTM-monitored transactions upon which the business application should be based. When ready, click **Next**. The page shown in [Figure 18–11](#) appears.

Figure 18–11 Create Business Application (System) Page

Business Application

Name RUEI Associations BTM Associations **System** Review

Create Business Application : System Back Step 4 of 5 Next Cancel

The Business Application must be associated with a System and at least one key component which will be used to calculate the Business Application's availability. Select the System that best reflects the Business Application. Then select one or more key components of the System and the method to calculate the Business Application availability.

* System myshop_server23_data_server Change System...

System Time Zone (UTC-08:00) US Pacific Time

Business Application Availability ☒ Available when all selected Key Components are up
☐ Available when at least one selected Key Component is up

Select Business Application Key Components

Component	Type	Key Component <input type="checkbox"/>
myshop_NY_reporter	RUEI Reporter Engine	<input checked="" type="checkbox"/>
MYSHOP/EMCC_DOMAIN	Application Deployment	<input checked="" type="checkbox"/>
MYSHOP_Database_sys41	Database System	<input checked="" type="checkbox"/>
MYSHOP/EMCC_DOMAIN	Oracle WebLogic Domain	<input checked="" type="checkbox"/>
myshop_ny_collector	RUEI Collector	<input checked="" type="checkbox"/>

- Click **Select System** and select the system that hosts the business application. This should be a system that encompasses the infrastructure that the business application runs on.

Use the **Key Component** check boxes to select the system members used in the calculation of the business application's availability. Two rules are available: either *all* specified key components for a business application must be up, or *at least one* of them must be up (the default). When ready, click **Next**. The page shown in Figure 18–12 appears.

Figure 18–12 Create Business Application (Review) Page

Business Application

Name RUEI Associations BTM Associations System **Review**

Create Business Application : Review Back Step 5 of 5 Next Create Business Application Cancel

This step shows the summary of all the previous steps. Clicking the Create Business Application button will create a business application with the data shown here.

☒ **Name**
 Business Application Name Siebel CRM

☒ **RUEI Associations**

Name	Type
Cleaner	app
Shop	app

☒ **BTM Associations**

Name
Payment

☒ **System**

System myshop_server23_data_center
 System Time Zone (UTC-08:00) US Pacific Time
 Business Application Time Zone Use System Time Zone
 Business Application Availability ☐ Available when all selected Key Components are up
☒ Available when at least one selected Key Component is up

Component	Type	Key Component <input type="checkbox"/>
myshop_NY_reporter	RUEI Reporter Engine	<input checked="" type="checkbox"/>
MYSHOP/EMCC_DOMAIN	Application Deployment	<input checked="" type="checkbox"/>
MYSHOP_Database_sys41	Database System	<input checked="" type="checkbox"/>
MYSHOP/EMCC_DOMAIN	Oracle WebLogic Domain	<input checked="" type="checkbox"/>
myshop_ny_collector	RUEI Collector	<input checked="" type="checkbox"/>

7. Review the new business application's properties before creating it. If necessary, use the **Back** and **Next** buttons to amend its properties. When ready, click **Create Business Application**. The newly created Business Application appears on the Business Application page (Figure 18-7).

18.5 Monitoring Business Applications

Once a Business Application has been created, you can use the **Business Application** home page to monitor its performance and availability, as well as the status of the systems (hosts, databases, and middleware components) that support it.

It is also from the **Business Application** home page that you can access more detailed information about RUEI components and Business Transactions:

- To get more information about RUEI components, select one of the RUEI related views from the **Business Application** drop down menu. See "[Monitoring RUEI Options](#)" on page 18-15.
- To get more information about Business Transactions, select one of the transactions listed in the **Business Transaction** region.
- If there are timeout issues associated with monitoring the Business Application, you can set the APM_WEBSERVICE_CREATE_TIMEOUT system property in the Enterprise Manager WebLogic configuration to a value appropriate to your network configuration, for example 60 seconds.

To view the **Business Application** home page, do the following:

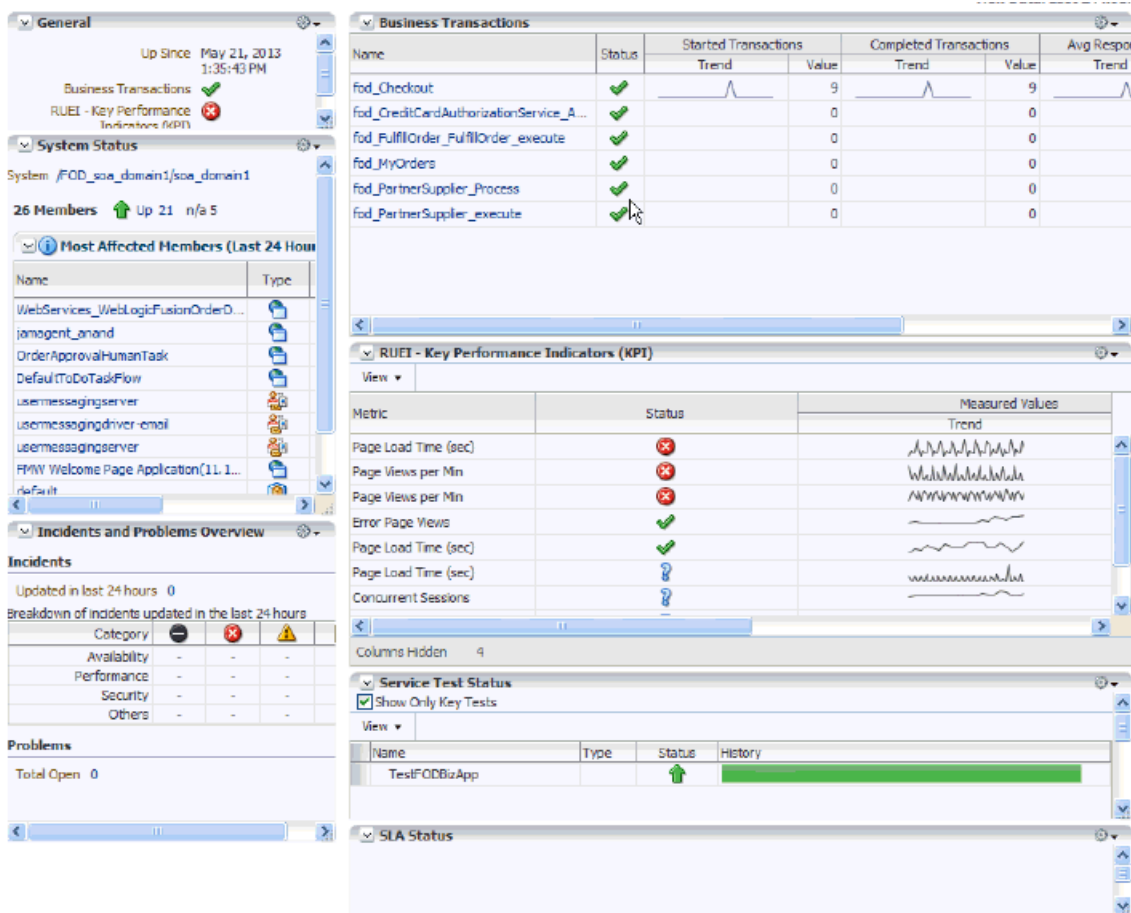
1. From the **Targets** menu, select **Business Applications**. The currently defined business applications are listed. An example is shown in [Figure 18-7](#).

In addition to the names of existing Business Applications, this page also provides summary information about status, system, RUEI metrics, and RUEI KPIs. Use the **View > Columns** menu option to add or delete columns to this display.

You can also click across to view information about system targets by clicking on one of the names listed in the System pane.

2. Click the Business Application of interest. The home page for the selected Business Application is displayed. An example is shown in [Figure 18-13](#).

Figure 18-13 Business Application Home Page



Each region provides specific information on the various operational aspects of the selected business application. By default, the following regions are available:

- **General:** indicates the business application's status and availability. Click the **Availability (%)** item to view a history of its status for the selected time period.
- **System Status:** indicates the system's availability over the last 24 hours. The **Most Affected Members** are shown next, with an indication whether the member has been defined as a key variable in determining availability.
- **Incidents and Problems Overview:** indicates the number of outstanding critical, warning, and error alerts associated with various aspects of the selected business application.
- **Business Transactions:** lists the business transactions included in the Business Application. The use of this region is explained in [Section 18.8, "Monitoring BTM Transactions in Enterprise Manager"](#).
- **RUEI - Key Performance Indicators (KPI):** indicates the status of the KPIs associated with the business application's targets.
- **Service Test Status:** indicates the status and history of Service Tests.
- **SLA Status:** indicates the Service Level Agreements defined for this Business Application. For more information about defining Service Level Agreements, see *Oracle® Enterprise Manager Cloud Control Administrator's Guide*.

18.6 Monitoring RUEI Options

The **Business Application** drop down menu, accessible from the Business Application home page, includes three options for the Real User Experience (RUEI) item:

- **Real User Experience (RUEI) data**, whose contents are described in ["Monitoring RUEI Data"](#) on page 18-15.
- **RUEI Session Diagnostics**, whose contents are described in ["Working With Session Diagnostics"](#) on page 18-18.
- **RUEI Metrics**, whose contents are described in ["Monitoring RUEI Metrics"](#) on page 18-24.

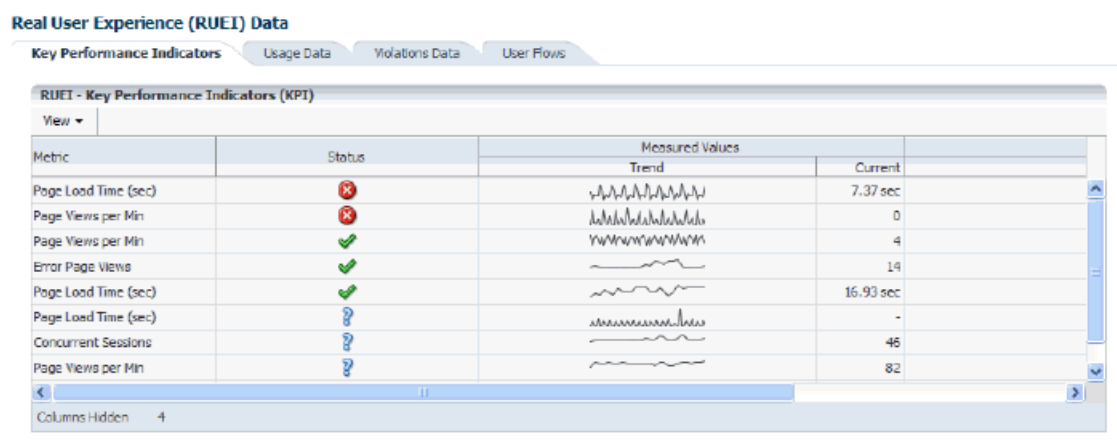
18.6.1 Monitoring RUEI Data

Selecting the RUEI Data option from the **Business Application > Real User Experience** menu, displays a region that includes four tabs. This section describes the contents of each tab.

18.6.1.1 RUEI Key Performance Indicators Tab

The **RUEI Key Performance Indicators** tab displays information about key aspects of the RUEI application, suite, or service upon which the business application is based. For example, you could have KPIs defined for such things as availability, performance, and visitor traffic. An example is shown in [Figure 18-14](#).

Figure 18-14 Key Performance Indicators Data



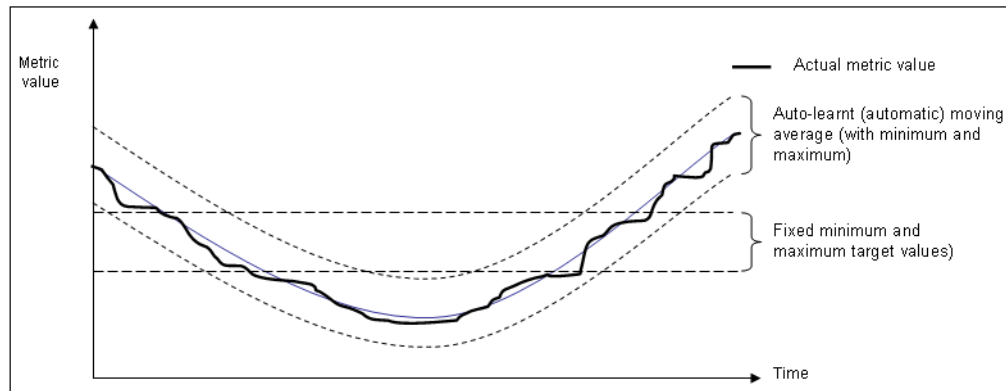
Understanding Report Metric Values

A KPI's metric value is always calculated over a 1-minute interval. That is, the metric's value is derived from its average value over that 1-minute period. Within the RUEI instance's configuration, The KPI calculation range specifies how many of these 1-minute period averages should be used when calculating the metric's reported value. By default, the calculation range is one minute. However, a longer calculation range can be specified if you want extreme values to be averaged out over a longer period. For example, if a calculation range of 10 minutes is specified, the metric's value over each reported 1-minute period is calculated based on the averages for the previous 10 1-minute periods. Similarly, a calculation range of 15 minutes would specify that the reported value should be derived from the averages for the last 15 1-minute periods.

Automatic and Fixed Targets

In addition to fixed targets, KPIs can be based on automatic (or auto-learned) targets. Because visitor traffic and usage patterns can differ widely during the course of a day, these auto-learned minimum and maximum targets are calculated as moving averages for the current 1-minute period, based on the measured metric value for that 1-minute period over the last 30 days. For example, when a KPI metric is measured at 10.45 AM, the average against which it is compared is calculated from the last 30 days of measurements at 10.45 AM. The minimum and maximum targets can be defined in terms of small, medium, or large deviations from these moving averages. In contrast, a fixed KPI target essentially represents a straight line, as either a minimum or maximum. This is shown in [Figure 18–15](#).

Figure 18–15 Automatic and Fixed KPI Targets Contrasted



Alert Handling

Optionally, KPIs can be configured within RUEI to generate alerts when they move outside their defined boundaries. If enabled, the configuration defines the duration the KPI must be down before an alert is generated, the severity of the reported incident, and whether an additional notification should be generated when the KPI has returned to its defined boundaries. The reporting of these alerts is described in [Section 18.7, "Monitoring KPI and SLA Alert Reporting"](#).

18.6.1.2 Usage Data Tab

The **Usage Data** tab displays information about the top executed user requests and about the top users.

The **Top Executed User Requests** display, is shown in the next figure. This region enables you to view the most frequent user requests and actions, and their impact on the business application. These actions can be specific page names, or combinations of suite-specific dimensions (such as Siebel screen, module, and view names).

Figure 18–16 Top Executed User Requests

RUEI - Top Executed User Requests					
View ▾ Show 10 rows ▾					
Actions		Page		Violations Percentage	
		Views	Total (%) ▾	User (%)	Application (%)
Toyco Order Form	Toyco	2216	49.00	0.00	49.00
logistics ManageCycleCounts	CountWorkArea no componentDisplayName in UserActivityInfo	958	100.00	0.00	100.00
crmCommon	mktImportWorkArea				
Columns Hidden 4					

The **Top Users** region enables you to monitor the most active users of the targets associated with the business application. This includes session and page view information, as well as user and application violation indicators. An example is shown in [Figure 18–17](#).

Use this region to verify the performance of the most popular user requests associated with a business application (such as downloads or payment handlings).

Figure 18–17 Top Users

User ID	Sessions	Page		Violations Percentage		
		Views	Avg Load Time (sec)	Total (%)	User (%)	Application (%)
Elain	25	3846	2.79	21.27	0.00	21.27
Sam	758	3434	8.79	12.58	0.00	12.58
edward	758	2282	4.48	35.10	0.00	35.10
BANDERS	49	2157	2.24	30.09	0.00	30.09
Ian	576	1687	12.17	22.64	0.00	22.64

Columns Hidden: 3

Selecting a user opens the RUEI Session Diagnostics facility and displays detailed information about the selected user. For more information, see [Section 18.6.2, "Working With Session Diagnostics"](#).

18.6.1.3 Violations Data Tab

The **Violations Data** tab enables you to examine the suite and application pages, as well as service functions, with the highest number of associated violations. An example is shown in [Figure 18–18](#).

Figure 18–18 Violations Data

Name	Trend	Violations		Page Views
		Total Count	Total (%)	
▽ Fusion Component (FusionReply)				
↳ no componentDisplayName in UserActivityInfo		145	100.00%	145
↳ Cancel		6	100.00%	6
↳ Next		6	100.00%	6
↳ Save and Close		6	100.00%	6
↳ 2065502 Receipts		4	100.00%	4
▽ Fusion Component Type (FusionReply)				
↳ Table		54	100.00%	54
↳ Query		44	100.00%	44
↳ Command Link		26	100.00%	26
↳ Command Button		22	100.00%	22
↳ Command Image Link		8	100.00%	8

The application violation counter reports the number of website, network, server and content errors, while the user violation counter reports the number of content notifications and client aborts. A *content notification* is the detection of a predefined string within a page (such as "Order processed successfully"); a *client abort* refers to a page view that was aborted by the client, possibly because the client closed the browser, or clicked reload, or clicked away, while the page was loading.

For each suite instance, total counters are also reported for each of its associated suite-specific data items (such as Oracle Fusion view ID). See the *Oracle Real User Experience Insight User's Guide* for further information on these items.

Note that the number of items (such as page names or suite-specific data items) listed for a category can be controlled via the **Show** menu. For example, list only the 5 or 10 items with the most violations. The **Minimum Violations** menu allows you to specify the threshold of violation incidents that needs to be met for a page before being reported.

Violation Reporting

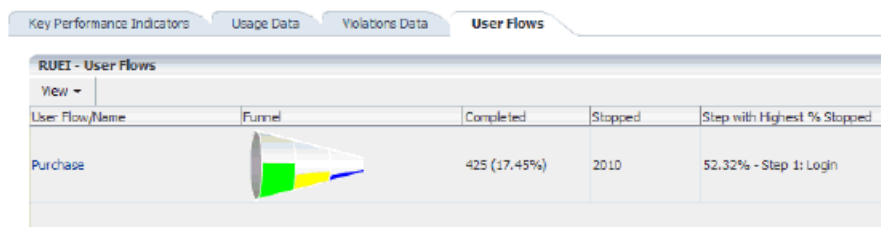
If a page or object experiences several types of errors (for example, both a network and a web service error), the page or object error is not recorded multiple times. Instead, it is reported according to the following order: website, server, network, and content. For example, if an object experiences both a website and a network error, the error is recorded as a website error.

The application violation counter reports the total number of website, network, server, and content errors. The user violation counter reports the total number of content notifications and client aborts. An example of the possible use of these counters would be the creation of dashboards to track the general health of specific applications. These counters are also available for use as KPI metrics.

18.6.1.4 User Flows Tab

The **User Flows** tab displays information about the user flows associated with the current Business Application. An example of the data displayed in this tab is shown in [Figure 18–19](#). The information shown includes a graphic representation of the loss of users through the defined steps, the number of steps completed and the number of steps stopped.

Figure 18–19 User Flows



18.6.2 Working With Session Diagnostics

The Session Diagnostics facility allows you to perform root-cause analysis of operational problems. It supports session performance breakdown, including the impact of failing pages and hits on sessions, the full content of each failed page, and the relationship between objects, page views, and sessions. Moreover, it offers the opportunity to track exactly what error messages visitors to the monitored website receive, and when. With this ability to recreate application failures, you can identify and eliminate annoying or problematic parts of your web pages.

This section explains the use of the Sessions Diagnostics facility. It covers the following topics:

- [Getting Started](#)
- [Customizing Session Diagnostics Reporting](#)
- [Exporting Full Session Information](#)
- [Exporting Session Pages to Microsoft Excel](#)

18.6.2.1 Getting Started

To locate the diagnostics information you require, do the following:

1. On the Business Application home page, from the **Business Application** drop down, select **Real User Experience (RUEI)** and then **RUEI Session Diagnostics**.
2. Use the **View Data** menu to select the required period. Note that the availability of session diagnostics information is determined by the Statistics and Session Diagnostics data retention policy settings specified for the associated RUEI instance. For more information, see the *Oracle Real User Experience Insight User's Guide*.
3. Specify the appropriate search criteria to locate the required user record(s). The available default search criteria are controlled by the RUEI instance configuration (described in [Section 18.6.2.2, "Customizing Session Diagnostics Reporting"](#)). You can click **Add Fields** to make additional search criteria available. Be aware that while the use of wildcard characters (*) is supported, all other search characters are treated as literals. Also, *all* criteria specified for the search must be met for matched user records to be reported.

You can specify multiple values for a single dimension by clicking **Add Fields**, and selecting the required dimension. In this case, only *one* of the specified values needs to be found in order for a match to be made.

After updating the appropriate search filters, you can save the search combination by clicking **Save**. Note that changes to saved searches can influence the available fields within the **Add Fields** facility. In addition, the predefined list of available dimensions is based on the business application definition. For example, only oracle Fusion-specific dimensions are available if the business application is defined as a Oracle Fusion suite.

When ready, click **Search**. The results of the search are shown in the lower part of the area. An example is shown in [Figure 18–20](#).






















If you specify an ECID as the search criteria and the ECID value refers to a spurious hit then no results are displayed if you also specify a filter relating to a page property, because there is not a page associated with the spurious hit.

Figure 18–20 Session Diagnostics Search Results

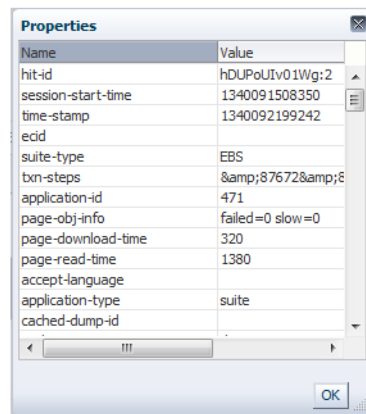
Period/Hour	User ID/ID	Client Location	Info
06/11 14:35 - 06/11 15:13	anonymous	Location/Country: Client Location/City: Beijing Client Location/IP: 122.119.90.108	Application Violation Page Views: 2 Frustrated Page Views: 2 Content Errors: 0 Network Errors: 0 Server Errors: 0 Website Errors: 0 User Violation Page Views: 0 Client Aborts: 0 Content Notifications: 0 Page Load Time (s): 3.85 Page Views: 20
06/11 15:00 - 06/11 15:09	anonymous	Location/Country: Client Location/City: Beijing Client Location/IP: 122.119.90.108	Application Violation Page Views: 2 Frustrated Page Views: 2 Content Errors: 0 Network Errors: 0 Server Errors: 0 Website Errors: 0 User Violation Page Views: 0 Client Aborts: 0 Content Notifications: 0 Page Load Time (s): 33.4 Page Views: 6
06/11 14:47 - 06/11 15:06	anonymous	Location/Country: Client Location/City: Beijing Client Location/IP: 122.119.90.108	Application Violation Page Views: 5 Frustrated Page Views: 3 Content Errors: 2 Network Errors: 0 Server Errors: 0 Website Errors: 0 User Violation Page Views: 0 Client Aborts: 0 Content Notifications: 0 Page Load Time (s): 14.8 Page Views: 8
06/11 15:02 - 06/11 15:03	anonymous	Location/Country: Client Location/City: Beijing Client Location/IP: 122.119.90.108	Application Violation Page Views: 0 Frustrated Page Views: 0 Content Errors: 0 Network Errors: 0 Server Errors: 0 Website Errors: 0 User Violation Page Views: 0 Client Aborts: 0 Content Notifications: 0 Page Load Time (s): 7.07 Page Views: 2
			Application Violation Page Views: 0 User Violation Page Views: 0

- Click the user record of interest from the displayed list. Information like the one shown in Figure 18–21 is displayed.

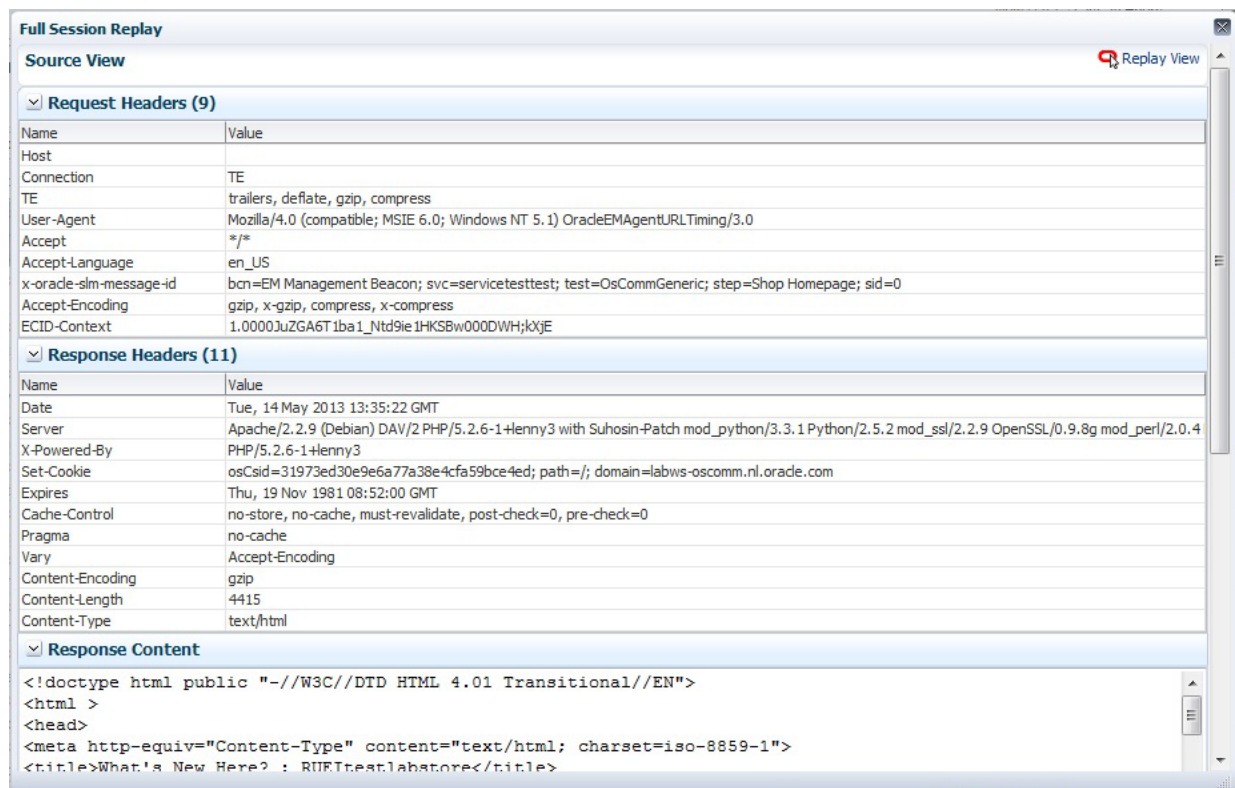
Figure 18–21 Example Session Activity Listing

<div>Return</div> <div> Search In Issue Type Value Search Previous (0) Next (0) Export as Zip Export as XLS </div>				
Session Activity	Page Load Time (s)	Info	Object End-to-end Time (ms)	Time
<div>full page refresh</div> <div>155.66.103.236</div>	0.0	  		06/24 23:58
/receivables/faces/index		  	126	06/24 23:58
/receivables/faces/index?_afLoop=36197175452000&_afWindowMode...		  	12	06/24 23:58
/receivables/faces/index?_afLoop=36198070542000&_afWindowMode...		  	138	06/24 23:58
<div>full page refresh</div> <div>155.66.103.236</div>	0.0	  		06/24 23:59
<div>ManageFCPaymentMethods</div> <div>155.66.103.236</div>	0.891	  		06/24 23:59
<div>ManageFCPaymentMethods</div> <div>155.66.103.236</div>	0.0	  		06/24 23:59
<div>06/24 23:35 0 15 20 25 06/25 00:00</div> <div>User ID anonymous Client IP 155.66.103.236</div>				

- The overview shows the pages and actions recorded within the selected user record. You can hover your mouse over an icon to see a tooltip. Icons indicate slow or failed objects, page-loading satisfaction, whether replay content is available, and whether clickout is available to JVM Diagnostics to provide activity information. (Clickout capability is shown by the Oracle icon.) The camera replay can show a pop-up with full contents of the hit. This allows access to the original html in full detail. The icon shown as item 1 in Figure 18–28 provides a link to associated logs to help debug an issue.
- You can click a page or object within the selected user session to open a window with detailed technical information about it. An example is shown in Figure 18–22.

Figure 18–22 Page Properties Window

When replay content is available an icon is displayed in the Session Activity Listing as shown in [Figure 18–21](#). You can click on the icon to open a pop up showing the Replay Content that was recorded. An example is shown [Figure 18–23](#).

Figure 18–23 Full Session Replay

Click the **Replay View** link in the upper right corner of the screen to be redirected to the RUEI server, where you see the browser view of the Session Replay Content. You might be required to log in to the RUEI server.

- The list of matched user sessions shown in [Figure 18–20](#) is based upon the period selected in the **View** menu. For example, if the period "Last hour" is selected, the list of matched user sessions is based on sessions that were active during that period. However, they may have started or finished outside this period. For this

reason, you can use the slider at the bottom of [Figure 18–21](#) to restrict the displayed page views and actions to a more specific period.

- Optionally, click **Export as Zip** to export the session's complete contents to external utilities for further analysis (described in [Section 18.6.2.3, "Exporting Full Session Information"](#)) or **Export as XLS** to export a summary of the pages within the session (described in [Section 18.6.2.4, "Exporting Session Pages to Microsoft Excel"](#)).

18.6.2.2 Customizing Session Diagnostics Reporting

You can control the specific dimensions reported in Session Activity part of the Session Diagnostics for applications, suites and services. To do so:

- From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. The currently registered RUEI instance is shown in the **RUEI Systems** row of the Application Performance Management page shown in [Figure 18–2](#).
- Select the required RUEI system. Click **Configure**. The **Edit Dimension Listing** page shown in [Figure 18–24](#) is displayed.

Figure 18–24 *Edit Dimension Listing Page*

- Use the **Application Type** menu to select whether you want to modify the dimension listings for generic applications (that is, applications that are not suite-based), services, or suites. If the latter, you will need to specify the suite type.
- Use **Move** and **Remove** to select the dimensions that should be listed. Once selected, you can control the order in which the item appears in the list. When ready, click **Save**.

18.6.2.3 Exporting Full Session Information

In addition to viewing session information, you can also export complete session contents to external utilities for further analysis or integration with other data. For example, you could use complete real-user sessions as the basis for test script generation. Test platforms, such as Oracle Application Testing Suite (ATS), can easily be configured to generate automated test scripts for an application's most common usage scenarios.

In addition, this facility can also be used to support root-cause analysis. Complete user session information can be provided to application or operations specialists to help identify unusual or difficult to isolate issues. Sensitive information within the exported data is masked according to the actions defined in the HTTP protocol item masking facility. This is described in the *Oracle Real User Experience Insight User's Guide*.

To export session information:

1. Locate the required session, and click **Export as Zip**.
2. Depending on how your browser is configured, you are either prompted to specify the location to which the zip file should be saved, or the session is immediately saved to the defined default location.

Important

In order for the session export files to be created correctly, you should do the following:

- Ensure that the requirements for exporting session information described in [Section 18.2, "Prerequisites and Considerations"](#) have been met.
- Verify the exported content files (described in the following section) are present before attempting to import an exported RUEI session into an external utility.

Understanding the Structure of the Exported Data

The exported session zip file contains the following files:

- `data.tab`: contains the direct (raw) hit information for the selected session extracted from the Collector log file.
- `page.tab`: contains the direct (raw) page information for the selected session extracted from the Collector log file.
- `content_hitno.tab`: contains the complete (raw) content information for the indicated hit. There is a file for each hit within the `data.tab` file that has content. For example, if the third and sixth hits had content available for them, two files would be created: `content_3.tab` and `content_6.tab`.

Viewable versions of the files cited in the hit file are also available under the `content_viewer` directory. This means that data transferred with chunked encoding can be immediately viewed. Note that the same *hitno* as in the `data.tab` file is used in their file naming.

- `index.html`: allows developers and other interested parties outside RUEI to view and analyze session details as they would appear within the Session Diagnostics facility, with access to source, page and object details, and element identification.

Note: The log files used as the basis for creating exported session files are also used internally by RUEI. The format and contents of these files is subject to change without notice.

18.6.2.4 Exporting Session Pages to Microsoft Excel

You can export a summary of the pages within the currently selected session to Microsoft Excel.

1. Locate the required session, and click **Export as XLS**. Depending on how your browser is configured, you are either prompted to specify the tool with which to

open the file directly (by default, Microsoft Excel), or the session is immediately saved to the defined default location.

2. Within Microsoft Excel, you can view and edit the generated file. The exported page view history and session summary can be used to compile sets of real-user sessions that could be used as the basis for testing or performance analysis.

Controlling Row Creation and Ordering

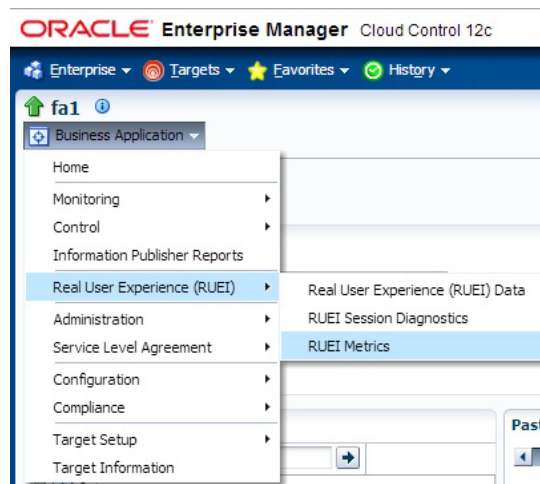
Be aware that the rows that appear in the Microsoft Excel export are based on the currently specified RUEI configuration. This is described in [Section 18.6.2.2, "Customizing Session Diagnostics Reporting"](#).

18.6.3 Monitoring RUEI Metrics

As part of Business Application monitoring, the RUEI Metrics page presents a useful overview of user-selectable metrics within a given timespan. These metrics can be counts (for example, page views) or aggregate values (such as, median page load time).

To view the RUEI Metrics page, select **Real User Experience (RUEI)** and then **RUEI Metrics** from the **Business Application** drop down, as shown in [Figure 18–25](#).

Figure 18–25 RUEI Metrics

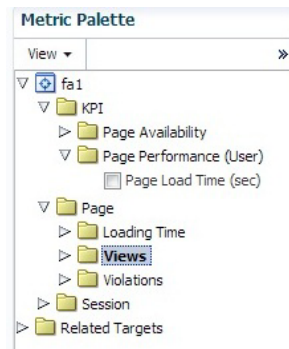


This page allows you to select performance metrics and view their associated average and median data graphically.

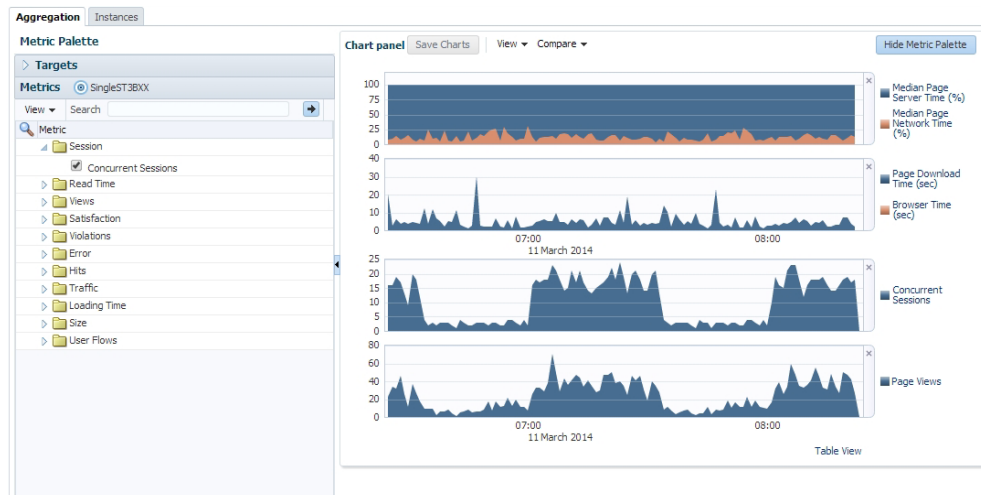
The time-period for the data can be set and search filters similar to those on the RUEI Session Diagnostics Page allow you to further refine the data returned. Filter settings can be saved for subsequent use. The metrics are displayed in two tabs, **Aggregation** shows the metric aggregated over time and **Instances** shows individual events.

Aggregation

On the **Aggregation** tab the selectable metrics are arranged in an hierarchical tree palette. The list displays a set of items that is appropriate for the configured business application type. This set can expand to include system metrics. For example, if the application associates to a WebLogic server, JVM metrics become available in addition to RUEI metrics. An example of a metrics palette is shown in [Figure 18–26](#).

Figure 18–26 Metric Palette

Note that the individual metrics graphs can be combined into one chart using the graph toolbar. Also some of the listed graphs show data from different parts of the metric palette combined into one chart. In [Figure 18–27](#), the top chart shows graphs for both **Median Page Server Time** and **Median Page Network Time**.

Figure 18–27 Sample Metrics Graph

Incident Manager allows you to navigate directly from a KPI event to the RUEI Metrics page. In this case, the RUEI Metrics page is populated with time and filter settings relevant to the context of the KPI event. Therefore, you can inspect relevant metrics around the offending event, be it in time-period or in filters broader than those that correspond to the original KPI event.

From the **RUEI Metrics** page there is a direct link to the session diagnostics facility. When you click this link, the search properties and time-span will be re-used to find sessions that match the active criteria.

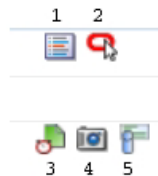
Note: Selecting median values over a large timespan can impact performance.

Instances

The instances tab displays events filtered using the criteria you set, for example Client Browser = Chrome. If you specify an ECID as the criteria and the ECID value refers to a spurious hit then no results are displayed, because there is not a page associated with the spurious hit. For each item in the results, you can:

- Review the Session Activity, timing and user information (if available). Where applicable, you can expand and collapse items to display further detail, for example specific URLs associated with the session activity, or page attributes.
- Display session information for the event, see ["Working With Session Diagnostics"](#) on page 18-18.
- Review the icons (numbered 1 to 5) for each item as shown in [Figure 18–29](#) where:
 Icon 1 provides a link to the log viewer, showing logs associated with the current item.
 Icon 2 provides a link to Request Instance Diagnostics, that is, JVM Diagnostics for the current item.
 Icon 3 indicates page loading satisfaction, a tooltip appears displaying the satisfaction level, for example **Satisfied**.
 Icon 4 provides a link to replay content (for example, the original html if available).
 Icon 5 provides a link to further session diagnostics, see ["Working With Session Diagnostics"](#) on page 18-18.
 Some of the icons shown are the same as those for Session Diagnostics, see [Figure 18–20, "Session Diagnostics Search Results"](#).

Figure 18–28 Incident Icons



18.7 Monitoring KPI and SLA Alert Reporting

This section explains the KPI-related information that is available for both RUEI applications and BTM Transactions.

Note: To monitor KPI and SLA alerts you must first complete all the steps described in ["Setting Up a Connection Between RUEI and the Oracle Enterprise Manager Repository"](#) on page 18-8.

The alerts generated by KPIs defined for the applications, suites, and services, as well as for the SLAs for the transactions that comprise your business applications are reported as events in **Incident Manager**. To view these events:

1. From the **Enterprise** menu, select **Monitoring**, and then **Incident Manager**.
2. Open the **Events Without Incidents** predefined view.
3. Click the event of interest to view more information about it.

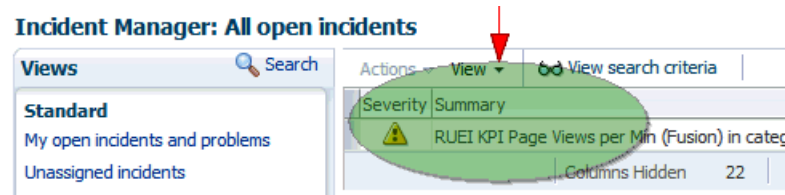
Event detail information varies depending on whether the event is based on a RUEI KPI or BTM SLA. Each is described in the following sections.

You can also access the **Events Without Incidents** view from the home page of a business application using the **Business Application** menu. Select **Monitoring**, then **Incident Manager**, and **Events without Incident**. This option shows events in the context of the selected Business Application.

RUEI Event Detail

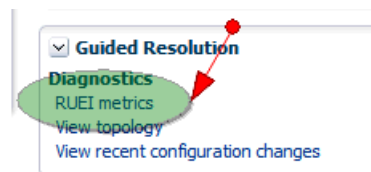
After accessing the **Events Without Incidents** view, you will see events listed as shown in [Figure 18–29](#).

Figure 18–29 Incident Manager



When you click on the RUEI event, you'll see event details at the bottom of the screen in the **Guided Resolution** region (as shown in [Figure 18–30](#)).

Figure 18–30 Accessing RUEI Metrics from Incident Manager



Select RUEI metrics to drill down to the **RUEI Metrics** page in context of the filters that were set up for the KPI as well as in the time frame of the KPI violation. The **RUEI Metrics** page will also show the metric that is the basis for the KPI definition.

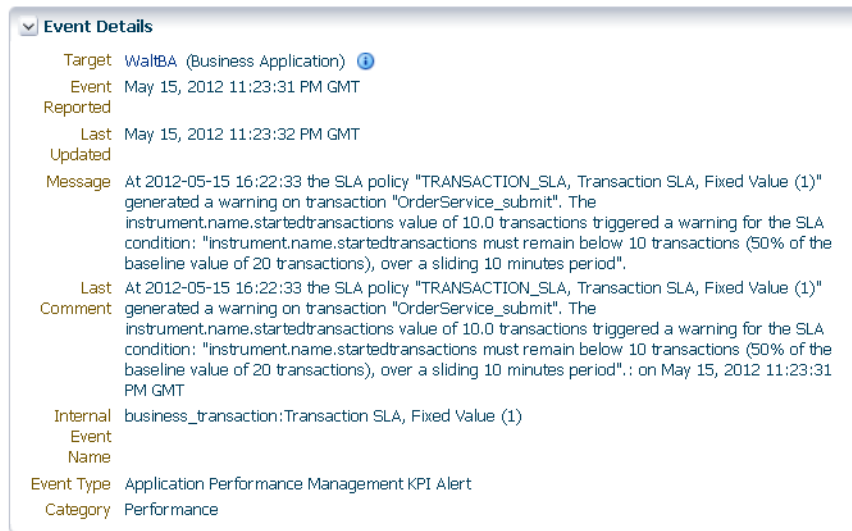
The status of the KPIs defined for the applications, suites, and services that comprise your business applications are reported in the RUEI - Key Performance Indicators (KPIs) tab (explained in [Section 18.6.1.1, "RUEI Key Performance Indicators Tab"](#)).

This provides information about the Business Application associated with the KPI, as well as the metric upon which the KPI is based. Note that for ease of management, KPIs within RUEI are grouped into categories that can be customized to contain related performance indicators. For example, separate categories could be defined for business and IT-related issues, such as user flow completion, visitor traffic, website availability, and so on.

Important: In order to view KPI alerts within Incident Manager, you will need to set up a connection between RUEI and the Oracle Enterprise Manager Repository. The procedure to do this is described in [Section 18.3.1, "Setting Up a Connection Between RUEI and the Oracle Enterprise Manager Repository"](#).

BTM Event Detail

Information about BTM SLA alerts is shown on the **Alerts** tab and on the **SLA Compliance** tab for BTM. Events corresponding to these alerts are also shown in the **Events Without Incidents** view of the Incident Manager. When you click the event of interest, information similar to that shown in [Figure 18–31](#) is displayed.

Figure 18–31 BTM SLA Alert Event Details

Information is provided about the following:

- **Target:** the business application containing the service or transaction for which the event was reported.
- **Event Reported:** the date and time when the event was reported.
- **Last Updated:** if the severity of the event has changed, this indicates the date and time when it has changed.
- **Message:** details about the event and the condition that triggered it.
- **Last Comment:** indicates comments manually added to events via the "Comments..." link in Incident Manager. If none have been added, then the original message is reported.
- **Internal Event Name:** a combination of the managed object type whose threshold was breached (business_transaction, service, or service_endpoint) and the original SLA policy name.
- **Event Type:** this is always "Application Performance Management KPI Alert" for BTM SLA alerts.
- **Category:** this is always "Performance" for BTM SLA alerts.

Important: In order for BTM Service Level Agreement alerts to be reported as events in Oracle Enterprise Manager, you must set up a connection between BTM and the EM repository. Please consult the *Business Transaction Management Installation Guide* for instructions on how to configure this connection.

18.8 Monitoring BTM Transactions in Enterprise Manager

The **Business Transactions** region shown on the Business Application home page (Figure 18–13) provides a high-level overview of each transaction within the selected business application. An example is shown in Figure 18–32.

Figure 18–32 Business Transactions Region

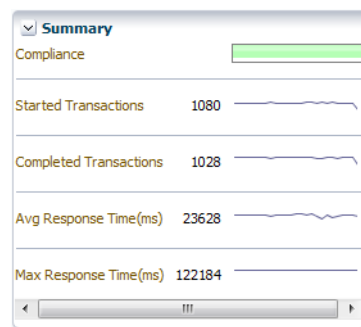
Business Transactions									
Name	Status	Completed Transactions		Started Transactions		Avg Response Time (ms)		Max Response Time (ms)	
		Trend	Value	Trend	Value	Trend	Value	Trend	Value
tc_Submit Order	✓		1014		1066		23629		122184

For each transaction, it indicates:

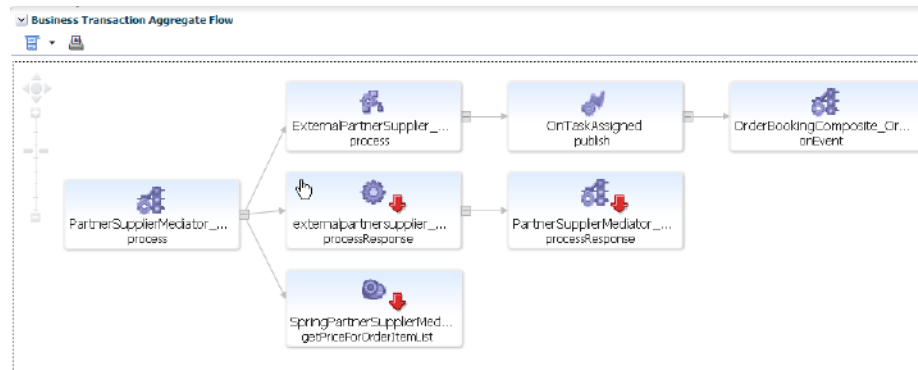
- The transaction's current compliance status.
- The number of transaction instances started during the period. A transaction instance starts when an instance of the primary operation flow is started.
- The number of transaction instances that completed during the period. An instance is considered to have completed when both its start and end messages have been observed, regardless of whether condition alerts occurred.
- The average amount of time a transaction requires to complete. For each transaction instance, this is calculated as the time from when the instance's start message is observed until its end message is observed.
- The maximum amount of time a transaction requires to complete. This is the single highest response time from all transaction instances observed during the period.

You can click a transaction to view more information about it. This opens the Transaction Home page, where you can view the following regions:

- **Summary:** provides a graphic rendering of the transactions' overall compliance and core metrics. An example is shown in [Figure 18–33](#).

Figure 18–33 Summary Region

- **Business Transaction Aggregate Flow:** provides a graphical rendering of the operations that make up the selected transaction and their status. An example is shown in [Figure 18–34](#).

Figure 18–34 Business Transaction Aggregate Flow Region

The aggregate flow region provides you with a complete picture of the transaction and helps you understand the flow of work through it. You can use it to identify and resolve issues related to performance, and to isolate the cause of failing components in a business process. Based on the dependencies revealed by discovery, the services that interact within the transaction are also revealed. Additional information is usually available if you move the cursor over the links that connect operations or the operation itself. This should allow you to identify bottlenecks, faulty components, slow components, and unusually light or heavy traffic.

- **Operations:** indicates all the logical operations associated with the transaction. An example is shown in [Figure 18–35](#).

Figure 18–35 Operations Region

Operations											
Name	Compliance	Uptime (%)	Violation Alerts	Avg Response Time (ms)		Max Response Time (ms)		Throughput (count)		Faults (count)	
				Trend	Value	Trend	Value	Trend	Value	Trend	Value
➤ CatalogService.getAllProducts	✓	100 ⇄	0		3		225		2591		0
➤ CatalogSessionService.retrieveCatalog	✓	100 ⇄	0						0		0
➤ ProductEntityService.getProduct	✓	100 ⇄	0						0		0
➤ PurchasingDB.executePrepStmt	✓	100 ⇄	0		1		182		6529		0
➤ PurchasingService.createNewOrder	✓	100 ⇄	0		10926		45633		590		486
➤ SubmitOrderQSService.submitOrder	✓	100 ⇄	0		10453		21281		590		486
➤ purchasingClient.orderApplication.jsp_action_Submit_Order	✓	100 ⇄	0		23680		122184		1024		52

You can expand an operation to view its corresponding endpoints. An operation might have several corresponding endpoints if it has been replicated or if different endpoints are used for secure/unsecure communication. For each endpoint, the host name and port for the container where the endpoint resides are also displayed, together with its status and performance data. If you right click an endpoint in the **Operations** or **Business Transaction Aggregate Flow** region, you can choose to display the tabs associated with the physical operation. The context menu that is displayed when you right-click an operation also provides the option to access the JVMMD view or the Request Instance Diagnostics view:

- The **JVM Diagnostics** view allows you to view the details of an executing Java Virtual Machine (JVM) process for the period within which a given operation executes. You can see stack frames for executing threads, thread state information, aggregate information about the frequency and cost of method execution, information regarding the holding of Java and DB locks, and details about the objects in the Java heap. JVMMD also stores historical data for each JVM it monitors so that you can view data relating to things that have happened in the past and get a sense for historical trends.

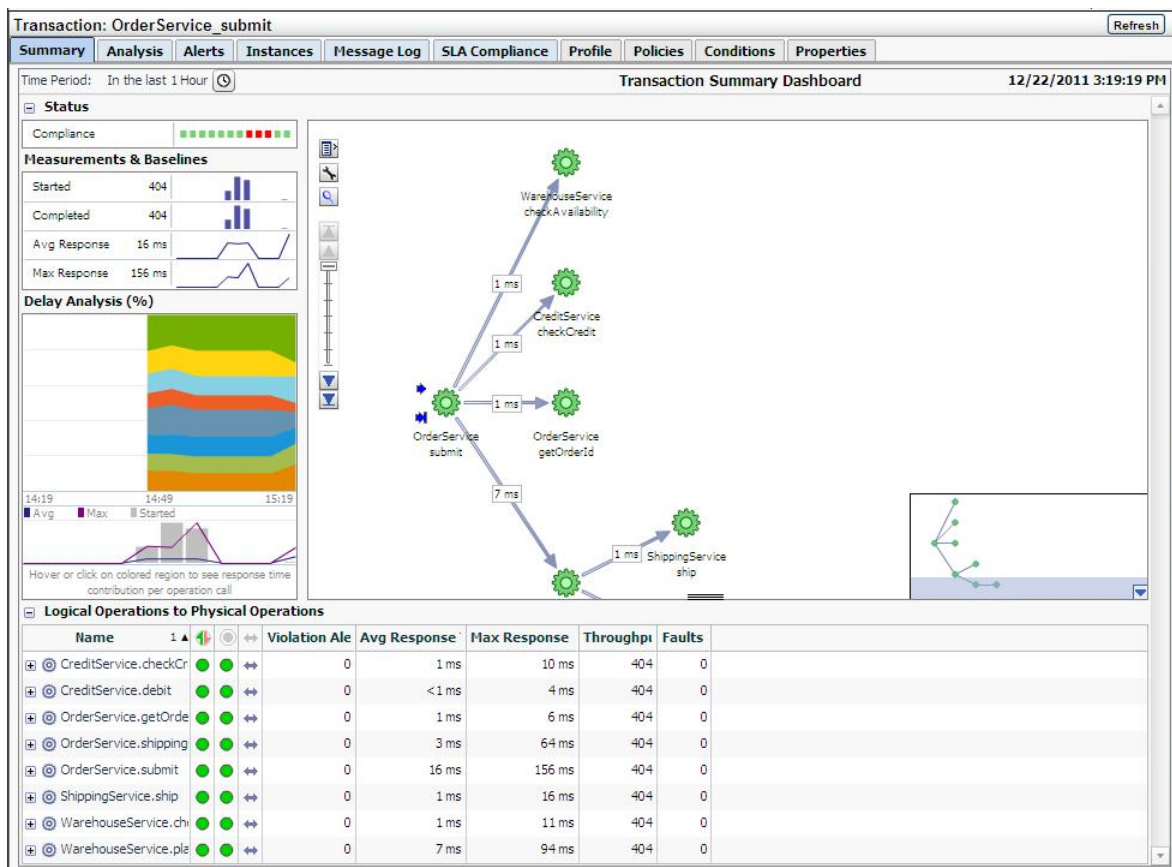
- The **Request Instance Diagnostics** view allows you to trace the path of a request in a WebLogic domain and to generate a report of all the metrics associated with a particular instance of the request.

Please see [Chapter 17, "Getting Detailed Execution Information,"](#) for additional information about these views.

18.9 Working Within Business Transaction Manager

Additional information about a selected transaction is available by clicking **Launch BTM** at the top-right hand of the Transaction Home page. This will open a new window with the Business Transaction Management console providing extended information about the selected transaction. The first time you open this window you will need to provide a valid BTM user name and password. An example is shown in [Figure 18–36](#).

Figure 18–36 Business Transaction Management Console



The following sections describe the Tabs display as they apply to a given transaction; similar information is displayed if you look at tabs for a physical operation. Additional information is available from the *Oracle Business Transaction Management Online Help*.

18.9.1 Summary Information

The **Summary** tab uses four panes and a grid view to present performance information in a **Transaction Summary Dashboard**. It contains the following elements:

- A **Status** pane indicating the overall compliance for the transaction.

- A **Measurement and Baselines** pane detailing the number of started and completed transactions, average response times, and maximum response times. If baselines have been defined for the transaction, these are shown as gray lines.
- A map of the transaction detailing average response times for each transaction link. Place the cursor over each service icon to obtain detailed performance information for that service. The thickness of the arrows indicates throughput.
- The **Delay analysis** pane, which you can use in conjunction with the map pane, provides a graphical rendering of the proportion of the overall response time that is spent in each hop (link) of the transaction.

Each colored area of the grid corresponds to a transaction link. Clicking within a colored region highlights its corresponding link in the map and displays the percentage of the response time taken up by that hop.

At the bottom of this pane, a graph shows the average and maximum response times, and the number of started transactions. Clicking within the pane displays a vertical red line that shows how the colored proportions correspond to message traffic flows.

- A grid view showing the logical and physical operations that make up the transaction, and the following instruments for each: violation alerts, average response time, maximum response time, throughput, and faults.

18.9.2 Analyzing Transaction Information

The **Analysis** tab displays detailed current performance and usage information for the selected transaction. It contains the panes described in [Table 18–1](#).

Table 18–1 *Panes Within Analysis Tab*

Pane	Description
Performance	Provides data about started transactions, completed transactions, condition alerts, average response time, and maximum response time. The data is displayed in graphic form as well as using a grid view.
Conditions	Provides information about condition alerts that have been triggered in a given time period: the name of the condition that was met, the endpoint where the condition alert was triggered, and the number of condition alerts triggered. Conditions must have been defined for this information to be collected and displayed.
Consumer Usage	Displays performance information segmented by consumer for the given time period: started transactions, completed transactions, average response time, and maximum response time. Consumers must have been defined and consumer segmentation enabled for this information to be collected and displayed.
Breakdown by Client Address	Displays performance information segmented by client IP address: started transactions, completed transactions, average response time, and maximum response time. The client address is the machine host name from which the request was sent. The table lists all client addresses that sent requests, and displays the aggregated performance measurements associated with each client address. Segmentation by client IP address must be enabled for this data to be collected and displayed.

Table 18–1 (Cont.) Panes Within Analysis Tab

Pane	Description
Violation Alerts	Displays information about service level agreement (SLA) violations. The display distinguishes between warning alerts and failure alerts. The graph shows aggregate measurements for violation alerts. The grid view lists more detailed information: showing alerts for each SLA policy. SLAs must have been created for this information to be collected and displayed.
Custom Charting	Lets you set up a customized chart and table similar to the Performance pane, but with instruments of your choosing. Click Choose Instruments , and select the instruments you want displayed in the chart and table. You can select multiple instruments. When you set up a custom chart/table for a transaction, it is available for any selected transaction.
Custom Breakdown	You can set up a custom table of numeric instruments segmented in various ways. Click Choose Instruments and select the instruments that you want displayed in the table. Click Choose Segments and select how you want to segment the measurements. You can select multiple segments.

18.9.3 Viewing Alerts

The **Alerts** tab shows information about all alerts occurring in the given time period. Business Transaction Management issues the following types of alerts:

- Service level agreement alerts issued when a deviation occurs from the standards of performance you have defined for a transaction.
- Condition alerts issued when a condition is satisfied. Conditions can test for faults, specific property values, or a missing message.
- System alerts issued to provide information about the health of the monitoring infrastructure.

The grid view shows the following information for each alert: time of occurrence, an icon denoting the severity of the alert, the source of the alert, the instrument measured, and for SLA alerts, the enforcement value. To obtain more information about a given alert, click the **Inspector** icon to open an inspector window.

Service level agreement alerts are also reported as events in Incident Manager. For more information on accessing these events, see [Section 18.7, "Monitoring KPI and SLA Alert Reporting"](#).

18.9.4 Viewing Transaction Instances

The **Instances** tab allows you to view captured transaction instances.

A transaction usually executes many times in a given period. If you have enabled transaction instance logging or if you have enabled fault monitoring, Business Transaction Management tracks the flow of messages included in the transaction and maps these to particular *transaction instances*. It assembles the messages for a transaction instance in the following cases:

- When an alert is generated as a result of a fault, or a condition being met.
- When you explicitly ask for assembly.

Once a transaction instance is assembled, you can use the **Instances** tab to access detailed performance information for that instance. You can also use the **Message Log** tab to search for messages containing particular property values.

Viewing Aggregate Information

In the **Instances** tab, The ID column of the table lists both instances that have been assembled (these have an ID value assigned) and instances that have not been

assembled (these are blank). Information for each instance shows when it was captured, what the overall response time for the transaction instance was, and values for properties if you have created these.

The **Show instances** filtering control allows you to list instances that have occurred in a set time period or to show only assembled instances.

Which instances you choose to assemble depends on what interests you. For example, you might want to assemble an instance with an unusually slow response time; or you might want to assemble an instance with an unexpected property value.

If you are capturing a very large set of messages, you might want to use the **Message Log** tab to search for a smaller set of messages, based on property values, and then assemble one or more of these.

Inspecting an Assembled Instance

You can assemble an instance by clicking the **Inspector** (magnifying glass icon) for the instance. This opens a **Transaction Instance Inspector**. It consists of three parts:

- The top part of the inspector shows the name of the transaction, the time the assembled instance started executing, its ID, the number of message exchanges, the total messages exchanged, and the response time between the starting and ending messages. Any warnings or faults are also shown.
- The instance map shows the entire transaction instance, with the response time given for each request/response link. Move the cursor over the operation name to view the service type, endpoint name, host name, and port. Right clicking an operation allows you to view JVM diagnostics.
- A grid view shows detailed information for each message included in the transaction instance. The view includes property values if these have been defined. Right clicking a row allows you to view JVM diagnostics.

Clicking the magnifying glass (tear-off control) for any operation, opens a **Message Content** inspector window, and displays the contents of the selected message if you have enabled message content logging for that operation.

18.9.5 Viewing Message Logs

You can use the **Message Log** tab to view the following information:

- If instance logging is enabled, you can view information about each message logged in a specified time period, as well as the value of any property associated with a message. You can also use the **Message Log Search** tool to search for a message or messages that contain property values of interest.
- If message content logging is enabled, you can view information about each message logged in a specified time period, as well as its content. In this case, in addition to searching for messages based on property values, you can also search based on the content of any message element (free text search).

Business Transaction Management logs message content or instance and property values only if you have done the following:

- Enabled monitoring for the transaction.
- Enabled the appropriate type of logging for the transaction (instance or message).
- Selected one or more operations for message logging.

Logged information is stored according to storage settings that you define when you create the transaction.

Viewing Message Content

The **Message Log** tab uses a grid view to display a list of messages, showing the arrival time of the request message, the service that includes the selected operation, the location of the endpoint that implements the service, the operation (message), and the type of operation. If there are any properties associated with the operation, their values are shown in additional columns whose title is the property name.

If you have message content logging enabled, double clicking on any message shows you the contents of the message. The set of messages shown in the grid varies depending on the setting of the filters shown at the top of the tab. These allow you to see the following:

- All operations or specific operations chosen from a drop down list.
- Any response, only successful operations, only failures.
- Messages that arrived within a time interval denoted by the last specified time period, since a certain time, or between two given times.

You can use these controls to narrow the selection of messages shown in the grid. After you change filter settings, click **Search** again to repopulate the grid. You can further restrict your search by using the **Message Search tool** accessed from the **Choose Content...** link. This allows you to search for messages based on their property values or, if message content is enabled, based on message content. This tool is described in the next section.

Searching for Messages

You can find messages belonging to the current transaction, by clicking the **Choose Content...** link from the **Message Log** tab. This brings up a dialog that includes three areas to use for specifying search criteria: an area labeled **Message property** search, an area labeled **ECID**, and one labeled **Free text** search. You use controls in these areas to search for a set of messages based on a property value, an ECID value, and/or on text content. As you enter property, ECID, and free-text values, a search expression is constructed in the text box at the top of the dialog. To clear the text box and start over, press **Clear**.

Additional information about using Oracle query language to construct your query is available at the following location:

http://download.oracle.com/docs/cd/B28359_01/text.111/b28304/cqoper.htm#BABBJGFJ

When you are done defining the expression to be used in the search, click **OK**. Then click **Search** to repopulate the grid according to your newly defined search criteria. For more information about the Message Log Search tool for searching for messages with a specific ECID, see the *Business Transaction Management Online Help*.

18.9.6 Viewing Service Level Agreement Compliance

The **SLA Compliance** tab displays the current state of Service Level Agreement (SLA) compliance for the selected transaction. These are specified during transaction creation. You use such agreements to set standards of performance for a business application. You can then monitor deviations from those standards. To view both condition alerts and SLA alerts, use the **Alerts** tab. The SLA Compliance tab has the following subtabs:

- The **Threshold Compliance** subtab provides real-time monitoring of the selected transaction. It uses a grid view. Each row represents one performance objective. The columns provide various types of static information that identify and define

the objectives. Also provided are the following dynamic columns with real-time monitoring values:

- The **Current Status** column can have three possible values: a green circle indicates that the transaction is in SLA compliance, a yellow triangle indicates that the warning threshold for the transaction is currently in violation, and a red diamond indicates that the failure threshold for the objective is currently in violation.
- The **Value** column displays the current value of the instrument on which the objective is based. Click the magnifying glass next to a value to pop up a chart showing the instrument's recent history.
- The **Baselines** subtab displays historical baseline values for the transaction that you can use as a reference point. Data is shown only if baselines for the selected object have been defined.

18.9.7 Viewing Policies Applied to Transactions

Use the **Policies** tab to view information about policies associated with a transaction. By default, the tab shows information about applied policies. You can use the filter control to view changed policies, disabled policies, pending policies, rejected policies, and unapplied policies. The name of the applied policy is shown in a tree view in the **Name** column. Expanding the policy node shows the following information:

- **Policy Status Details** lists any issues arising from the application of the policy.
- **Monitored Object Type** specifies the targets to which the policy is applied.
- **Location** specifies the address of a target endpoint.
- **Management Intermediary** specifies the Business Transaction Management agent that is applying the policy.

Double clicking the policy name in the **Policy** tab, opens a new window that you can use to view alert, profile, and target information for the selected policy.

18.9.8 Viewing Transaction Profile Information

Use the **Profile** tab to see a map of the transaction and to see its definition. It also provides the following information:

- The date the transaction definition was last modified.
- Any user attributes defined for the transaction.
- The transaction identifier, which is sometimes needed to identify the transaction in CLI commands.

18.9.9 Viewing Transaction Conditions

When you define a transaction, you can associate one or more conditions with the transaction. A *condition* is an expression that Business Transaction Management evaluates against each instance of the transaction. Conditions can test for faults, specific property values, or missing messages. Use the **Condition** tab to display the conditions defined for a transaction. This tab allows you to do the following:

- View the status of fault monitoring: enabled or disabled.
- View condition definitions and status.

Use the **Alerts** tab to see whether any of the conditions have been violated. You cannot change fault monitoring status or condition definitions from the Enterprise Management console.

18.9.10 Viewing Transaction Properties

Properties are variables that hold values associated with the request or response phase of an operation. Properties are commonly used to facilitate searches, to surface message elements without having to log message content, to define conditions, and to enable consumer segmentation. Use the **Properties** tab to display a list of all the properties defined for messages included in a transaction. In addition to listing the properties, the tab shows information about the following:

- The service and operation for which the property is defined.
- The phase (request/response) of the operation.
- The data type of the property value.
- Whether the value is deemed sensitive.
- Whether it is mapped to a consumer (denoted by a human icon on the left) and what consumer-mapped attribute it is associated with.
- A description if you have supplied one when you created the property.

You cannot modify a property value from the Enterprise Management console.

Monitoring End-to-end Performance

This chapter walks you through a demonstration of how you can use the application monitoring components described in the previous chapters to identify the underlying cause of poor user experience. It then poses a series of questions to test your understanding of end-to-end monitoring.

This chapter includes the following sections:

- [Troubleshooting: A Case Study](#)
- [Finding Solutions](#)

The demonstration uses the stand-alone versions of RUEI and BTM.

You can view a live demonstration of the case study described in this chapter by navigating to the following site:

http://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5781,1#prettyPhoto/0/

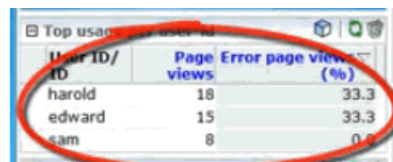
19.1 Troubleshooting: A Case Study

This demonstration aims to traverse all the functional layers of a distributed application. Only partial views of screens are shown.

Looking at the User Experience

Our investigation begins with the RUEI dashboard, the first place to review the overall user experience.

Looking at the **Top usage by User ID** panel, we note a very high percentage of Error page views for the users Harold and Edward:



User ID/ ID	Page views	Error page view (%)
harold	18	33.3
edward	15	33.3
sam	8	0.0

To get more details about this situation, we select to display browser data by clicking on the cube icon in the upper-right hand corner.

From the **Browser data** display, we select a user and select user diagnostics to get session diagnostics for the user, filtering on a specific application, in this case the Toyco application.

Filter on	Value
User ID/ID	harold
Application/Name	Toyco

Session diagnostics

Search user records for the specified period using the available criteria. All strings are regarded as literal properties.

Search

Search filters

Application/Name:

User ID/ID:

Client location/IP:

Add more filters

Dimension level:

Value: **Add**

Dimension level	Value
No filters	

Search result order

- ☒ Session start time
- ☐ Most active sessions
- ☐ Fastest sessions
- ☐ Slowest sessions
- ☐ Shortest sessions
- ☐ Longest sessions
- ☐ Most failure sessions

Next, we retrieve session information for the user for a given time period. The results are displayed in the **Session diagnostics** pane:

Session diagnostics

Search user records for the specified period using the available criteria. All strings are regarded as literal properties.

Order: Session start time ▾ Dimension level: « Select » ▾ Value: « Select »

Period/Hour	User ID/ID	Client network/IP
15:00 - 16:00	harold	144.25.146.189
15:00 - 16:00	harold	144.25.146.189
15:00 - 16:00	harold	144.25.146.189
15:00 - 16:00	harold	144.25.146.189
15:00 - 16:00	harold	144.25.146.189
15:00 - 16:00	harold	144.25.146.189
16:00 - 17:00	harold	144.25.146.189
16:00 - 17:00	harold	144.25.146.189
16:00 - 17:00	harold	144.25.146.189

We select one of the session listed in the grid view to find out more about the session. Information is displayed in the **Session activity** pane.

Session activity		Page load time (s)	Info
	Toyco » Toyco - Purchasing Client	2.7	
	Toyco » Toyco Order Form	120.2	
	Content error » error string: Purchase Failed		
	Toyco » Toyco - Purchasing Client	1.0	

We see that one of the load times is excessive and that there's an error listed as well.

We click on the page icon in the **Info** column to view the page as the user saw it. It is shown next. Indeed, at the bottom of the page is the error message "Purchase failed."

Customer: Hardware Hotel	
Address: 11 Houston St.	
City: Honolulu	State: HI
Country: USA	

ID	Product	Item Price	Quantity
1001	Call of Duty: Black Ops for Xbox 360	59.99	
1002	Star Wars: The Force Unleashed II for Xbox 360	58.50	
1003	Kinect Adventures for Xbox 360	69.99	
1004	FIFA Soccer 11 for PlayStation 3	59.95	
1005	Rubix Cube 2011	9.99	

Ship Using:		
Select	Carrier	JMS API Used
<input checked="" type="radio"/>	FedEx	TextMessage (SOAP)
<input type="radio"/>	UPS	TextMessage (non-SOAP)
<input type="radio"/>	DHL	ObjectMessage
<input type="radio"/>	USPS	MapMessage
<input type="radio"/>	SpeedPost	ByteMessage
<input type="radio"/>	Cargo	StreamMessage
<input type="radio"/>	Air	Message

Purchase Failed

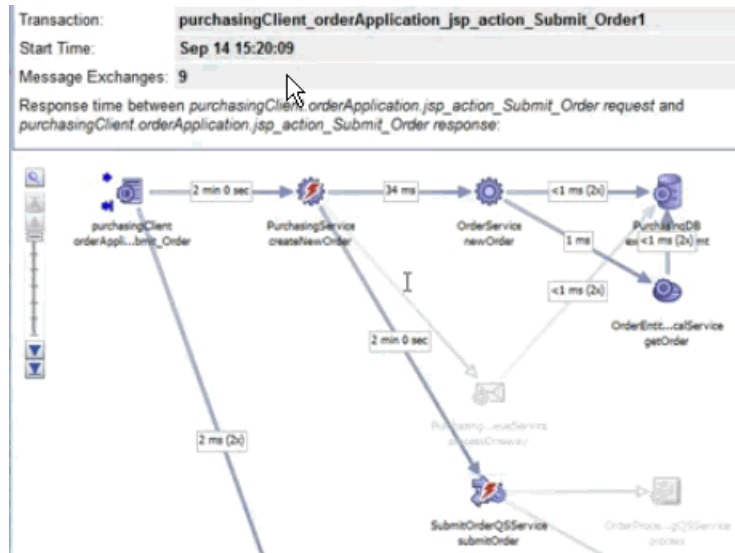
The error message in the user view suggests that this is a functional error.

Looking at Business Transactions

We return to the **Sessions diagnostics** page from which we can drill down to Business Transaction Management to see the flow of operations in the back-end that failed to fulfill this order.



Selecting the problematic application and selecting **Diagnose transaction** from the context menu displays the **Instance inspector** view in BTM.



The red thunderbolt icons identify the failing services.

Suspecting that the call to the database is the culprit, we take a look at the message content, which suggests that the trouble is in the message response.



Choosing to view the XML, we find ourselves in a Java stack trace, and we see a fault string:

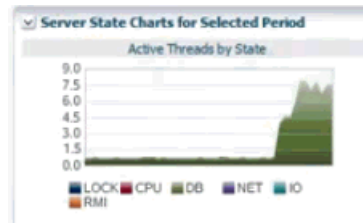
```
<soap:Envelope>
  <soap:Body>
    <soap:Fault>
      <faultcode>tns:BEA-382515</faultcode>
      <faultstring>
        Callout to java method "public static void com.oracle.callouts.CustomSocket.commitSocketOpen
        java.net.SocketTimeoutException: Read timed out at java.net.SocketInputStream.socketRead0(
        java.net.SocketInputStream.read(SocketInputStream.java:182) at com.oracle.callouts.CustomS
        com.oracle.callouts.CustomSocket.callSocket(CustomSocket.java:42) at com.oracle.callouts.Cu
        sun.reflect.GeneratedMethodAccessor1185.invoke(Unknown Source) at sun.reflect.DelegatingV
        java.lang.reflect.Method.invoke(Method.java:597) at stages.transform.runtime.JavaCalloutRuntin
        weblogic.security.acl.internal.AuthenticatedSubject.doAs(AuthenticatedSubject.java:363) at web
        weblogic.security.Security.runAs(Security.java:61) at stages.transform.runtime.JavaCalloutRuntin
        com.bea.wli.sb.pipeline.StatisticUpdaterRuntimeStep.processMessage(StatisticUpdaterRuntimeS
        com.bea.wli.sb.pipeline.debug.DebugRuntimeStep.processMessage(DebugRuntimeStep.ja
        com.bea.wli.sb.stages.StageMetadataImpl$WrapperRuntimeStep.processMessage(StageMetadi
```

We'll need to drill down to the **Java Virtual Machine Diagnostics** page.

We return to the transaction graph and right-click on the offending operation to get the JVM view.

Looking at Machine-Level Information

Looking at the **Active Threads by State** graph in the JVM view, it looks like we have a database problem.



Looking at the **Threads State Transition** display on the same page, we note that a number of threads are stuck.

Thread Name
[STUCK] ExecuteThread: '0' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '2' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '4' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '8' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '5' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '7' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '3' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '6' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '1' for queue: 'weblogic.kernel.Default (self-tuning)'
[STUCK] ExecuteThread: '9' for queue: 'weblogic.kernel.Default (self-tuning)'

Noting that this is a current problem, we select the **Live Thread Analysis** button to get more information.

In the **Live Thread Analysis** display, we see ten threads waiting for the database, with three of them locked.

CPU(%)	JVM CPU Usage(%)	OSR	Memory(%)	Runnable	DB Wait	Lock	Network Wait	IO Wait	RMI Wait	Object Wait	Sleep
0	0	1	34	1	1	3	0	0	0	26	2

We can drill down to the database by selecting the **State (DB Wait)** link. This shows us the SQL details.



The display confirms our suspicion that the trouble lies with database access.

This ends our troubleshooting session, which traversed all the layers of distributed application performance: from the user layer, to back-end supporting services, to the underlying infrastructure.

19.2 Finding Solutions

See if you can guess the answer to the following questions, which test your understanding of end-to-end performance monitoring.

Is the problem with my application?

The following problems relate either to the user experience or to back-end services.

- *Are some services especially slow?*
Look at the **Analysis** tab in BTM. Look at high values for average response time on individual links.
- *Are users unable to complete a task?*
Look at statistics for user flows in RUEI.
- *Are services failing?*
Look at the **Operational Health Summary** from the **Dashboards** view in BTM?
- *Do I have a memory leak?*
Look at heap analysis information in JVMD for a given time period.
- *Am I getting out-of-bounds values?*
Check SLA-based alerts defined for RUEI and BTM.
- *Are services miscommunicating? (missing messages)*
Check alerts related to missing message conditions in BTM.

Is the problem with deployment architecture?

- *Do I need to replicate and load-balance services?*
Check high throughput values for transaction links. These might indicate bottlenecks.
- *Do I need a failover scheme?*
Use the Enterprise Manager **Business Applications** page or the **Business Application** home page to check for servers that are often unavailable.

Is the problem with supporting infrastructure?

- *Is a server down or slow?*
Use the Enterprise Manager **Business Applications** page or the **Business Application** home page to check for servers that are often unavailable.

In BTM, check the **Uptime Issues** table in the **Top 10 Services** dashboard. Then check the **Services to Endpoints** view to find the address of the server associated with the service.
- *Is thread-lock causing services to fail?*
Use the JVM Diagnostics page in Enterprise Manager to get information about executing threads.
- *Is the network slow?*
Look at NetworkWait information in the JVM Diagnostics page in Enterprise Manager.
- *Are any of my routers down?*
If you have included your routers in the definition of your System for Enterprise Manager, you can get information about these in Enterprise Manager.

Part VII

Using JVM Diagnostics and MDA Advisor

The chapters in this part provide information regarding JVM Diagnostics and MDA Advisor.

The chapters are:

- [Chapter 20, "Introduction to JVM Diagnostics"](#)
- [Chapter 21, "Using JVM Diagnostics"](#)
- [Chapter 22, "Troubleshooting JVM Diagnostics"](#)
- [Chapter 23, "Using Middleware Diagnostics Advisor"](#)

Introduction to JVM Diagnostics

This chapter provides an overview of JVM Diagnostics. It contains the following sections:

- [Overview](#)
- [New Features in this Release](#)
- [Supported Platforms and JVMs](#)
- [User Roles](#)

20.1 Overview

Mission critical Java applications often suffer from availability and performance problems. Developers and IT administrators spend a lot of time diagnosing the root cause of these problems. Many times, the problems occurring in production environments either cannot be reproduced or may take too long to reproduce in other environments. This can cause severe impact on the business.

Oracle Enterprise Manager Cloud Control 12c's JVM Diagnostics enables administrators to diagnose performance problems in Java application in the production environment. By eliminating the need to reproduce problems, it reduces the time required to resolve these problems. This improves application availability and performance. Using JVM Diagnostics, administrators will be able identify the root cause of performance problems in the production environment without having to reproduce them in the test or development environment. It does not require complex instrumentation or restarting of the application to get in-depth application details. Application administrators will be able to identify Java problems or Database issues that are causing application downtime without any detailed application knowledge. The key features of JVM Diagnostics are:

- [Java Activity Monitoring and Diagnostics with Low Overhead](#)
- [In-depth Visibility of JVM Activity](#)
- [Real Time Transaction Tracing](#)
- [Cross-Tier Correlation with Oracle Databases](#)
- [Memory Leak Detection and Analysis](#)
- [JVM Pooling](#)
- [Real-time and Historical Diagnostics](#)

20.1.1 Java Activity Monitoring and Diagnostics with Low Overhead

JVM Diagnostics provides in-depth monitoring of Java applications without slowing them down. It helps you to identify the slowest requests, slowest methods, requests waiting on I/O, requests using a lot of CPU cycles, and requests waiting on database calls. It also identifies the end-user requests that have been impacted by resource bottlenecks. Application resources that are causing the performance bottleneck are also visible.

20.1.2 In-depth Visibility of JVM Activity

JVM Diagnostics provides immediate visibility into the Java stack. You can monitor thread states and Java method/line numbers in real time and you can proactively identify issues rather than diagnosing issues like application crashes, memory leaks, and application hangs after they occur.

20.1.3 Real Time Transaction Tracing

If a particular request is hanging or if the entire application is slow, administrators can perform a real-time transaction trace to view current Java application activity. You can see the offending threads and their execution call stacks. You can also analyze various bottleneck resources such as how much time a thread spent in waiting for a database lock. Complex problems such as activity in one thread (or request) affecting the activity in the other thread or rest of the JVM can be found very quickly.

Sometimes the monitoring interval (default 2 seconds) that is in use is too coarse grained. The Java thread of interest may be too short lived or the amount of monitoring data collected may be insufficient. In such cases, you can run a JVM Trace to get fine-grained details of the JVM activity. This feature allows you to monitor your Java application at a very high frequency (default frequency is once every 200ms) for a short period of time. This allows you to identify interdependency of threads, bottleneck resources (DB, I/O, CPU, Locks, Network) & top methods.

20.1.4 Cross-Tier Correlation with Oracle Databases

JVM Diagnostics facilitates tracing of Java requests to the associated database sessions and vice-versa enabling rapid resolution of problems that span different tiers. Administrators can drill down from a JVM Thread in a DB Wait State to the associated Oracle database session. Additionally, they can now drill up from the SQL query to the associated JVM and related WebLogic Server targets (this is applicable only if the database and JVM are being monitored by Enterprise Manager).

This feature highlights the slowest SQL queries and helps administrators to tune SQL and the database to improve application performance. This facilitates smooth communication between the database administrators and application administrators by isolating the problems to the database or the application tier.

20.1.5 Memory Leak Detection and Analysis

Memory leaks lead to application slowdowns and eventually cause applications to crash. JVM Diagnostics alerts administrators on abnormalities in Java memory consumption. Administrators can use JVM Diagnostics and take heap dumps in production applications without stopping the application. Additional heap analysis is provided with the Memory Leak Report, and the Anti-Pattern Report. Administrators can take multiple heap dumps over a period of time, analyze the differences between the heap dumps and identify the object causing the memory leak. Heap analysis can

be performed even across different application versions. Differential Heap Analysis with multiple heap dumps makes it easy to identify memory leaks.

20.1.6 JVM Pooling

JVM Diagnostics allows administrators to group sets of JVMs together into JVM pools. This provides the console user with a single view across all related JVMs. Hence all JVM's that make up a single application or a single cluster may be grouped together in an application. This allows administrators to visualize problems naturally and intuitively.

20.1.7 Real-time and Historical Diagnostics

With JVM Diagnostics, you can perform real-time and historical diagnostics on your Java applications. This provides you with detailed insight on the root causes of production problems without having to reproduce the same problem in a Test or QA environment. You can play back transactions interactively from the browser and view the time spent in the network and the server.

Apart from the real-time data, you can also analyze historical data to diagnose problems that occurred in the past. You can view historical data that shows the time taken by end-user requests and the breakdown by Servlet, JSP, EJB, JDBC, and SQL layers.

20.2 New Features in this Release

This section lists some of the new JVM Diagnostics features in Oracle Enterprise Manager Cloud Control 12c:

- Automated JVM Diagnostics Engine and Agent Deployment Procedure.
- Customer provisioning scripts for deploying the JVM Diagnostics Agent in production environments.
- New home pages available for JVM Pool and JVM targets.
- Top databases chart added to the JVM and JVM Pool target pages.
- Metric Palette for JVMs and JVM Pools is now available and associated with WebLogic Server targets.
- JVM Diagnostics integrated with the Middleware Diagnostics Advisor.
- Automatic correlation between JVM and WebLogic Server targets.
- JVM Diagnostics region is now available in the Business Application, Composite Application and Fusion Application Home pages.
- JVM threshold violations are now integrated with the Event subsystem.
- Heap snapshots can be taken in HPROF format for external analysis. Heap snapshots can now be imported.
- Performance Diagnostics and Live Thread Analysis pages can be directly accessed from the JVM target page.
- Bi-directional integration between JVM threads and database sessions through Live Thread Analysis.
- Thread State Transition charts and class histograms are now available.
- RMI Thread State is now supported.

- Wait Time on SQL (DB Wait), Thread Stack Local Objects Browser, Depth and number of locks are now displayed in the Live Thread Analysis page.
- Sample analyzer can be accessed from the Thread State Transition Chart.
- Windows 64, WLS Virtual Edition, Solaris x86-64 and AIX 64 platforms are now supported.
- JVM Diagnostics Engine is now supported for all OMS platforms.
- The DB Agent is not required for cross tier correlation if you are using Oracle Database 11gR2 or later versions.
- You can drill down to JVM Diagnostics from RUEI and ESS.
- Integration between JVM Diagnostics and Coherence, JVM Diagnostics and ECM is now available.
- The performance of the JVMTI engine has improved.
- Integration with Enterprise Manager Offline Diagnostics feature. You can now take snapshots of diagnostic data, export this data, or import diagnostic data for a particular collection.
- JVM targets can now be integrated with JBoss targets.
- You can save, compare, edit, and delete class histograms.
- The `emctl jvmd verb` can now be used to manage the JVM Diagnostics Engine. See [Section 21.12, "Using emctl to Manage the JVM Diagnostics Engine"](#) for details.

20.3 Supported Platforms and JVMs

The JVM Diagnostics Engine is supported on all platforms on which the Oracle Management Service has been certified.

For the latest certification information, refer to My Oracle Support Note 1415144.1. You can access My Oracle Support at the following URL:

<https://support.oracle.com/CSP/ui/flash.html>

20.4 User Roles

To use JVM Diagnostics, you must have either of the following JVM Diagnostics resource privileges:

- JVM Diagnostics User: Allows you to view JVM Diagnostics data.
- JVM Diagnostics Administrator: Allows you to manage JVM Diagnostics operations such as creating and analyzing heap and thread snapshots, tracing threads, and so on.

You can define these privileges in the Setup pages. For more details on defining these privileges, see the *Enterprise Manager Security* chapter in the Enterprise Manager Cloud Control Administrator's Guide.

Using JVM Diagnostics

This chapter describes the various tasks you can perform using JVM Diagnostics. In particular, it contains the following:

- [Installing JVM Diagnostics](#)
- [Setting Up JVM Diagnostics](#)
- [Accessing the JVM Diagnostics Pages](#)
- [Managing JVM Pools](#)
- [Managing JVMs](#)
- [Managing Thread Snapshots](#)
- [Analyzing Trace Diagnostic Images](#)
- [Viewing the Heap Snapshots and Class Histograms](#)
- [JVM Offline Diagnostics](#)
- [Viewing JVM Diagnostics Threshold Violations](#)
- [Viewing the Request Instance Diagnostics](#)
- [Using emctl to Manage the JVM Diagnostics Engine](#)

21.1 Installing JVM Diagnostics

The JVM Diagnostics Engine runs as an Enterprise JavaBeans (EJB) Technology on a WebLogic Server. The JVM Diagnostics Agent is deployed on the targeted JVM (the one running a production WebLogic Server). It collects real-time data and transmits it to the JVM Diagnostics Engine. This data is stored in the Management Repository, and the collected information is displayed on Enterprise Manager Cloud Control console for monitoring purposes. The communication between the JVM Diagnostics Engine and the JVM Diagnostics Agent can be a secure (SSL) or non-secure http connection.

The Application Performance Management Page is a GUI based screen that enables you to deploy and monitor the health of the JVM Diagnostics Engine in a reliable and an efficient manner. Using the Application Performance Management Page, you can achieve the following:

- [Deploy JVM Diagnostics Engine](#)
- [Monitor the availability of all the JVM Diagnostics Engines](#)
- [Access information about the JVM Diagnostics Engines like hosts to which the engines are deployed, the current status, the port on which they are running, version, and so on.](#)

For more details on installing JVM Diagnostics, see Enterprise Manager Cloud Control Basic Installation Guide.

21.1.1 Monitoring a Standalone JVM

If you need to monitor a standalone JVM, you can manually deploy the JVM Diagnostics Agent by following these steps:

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Check if the JVM Diagnostics Engine has been enabled. The JVM Diagnostics Engine is independent and will run in a WLS target in the same domain as the Cloud Control OMS server that is already running. This is essentially another WLS container in the same domain and is very lightweight, so it can run well on the same server as the Cloud Control OMS instances.
2. Select the JVM Diagnostics Engine row in the Application Performance Management Engines table and click **Configure**. In the JVM Diagnostics Setup page, click the **JVMs and Pools** tab and then click **Downloads** to download the `jamagent.war` file.

3. Add the `jamagent.war` to the CLASSPATH as follows:

```
CLASSPATH=$CLASSPATH:/scratch/ssmith/jvmd/jamagent.war
export CLASSPATH
```

4. Start JVM Diagnostics with the JVM Diagnostics Agent as follows:

```
$JAVA_HOME/bin/java -cp $CLASSPATH $JVM_OPT $SYS_OPT jamagent.jamrun
[$JAMAGENT_PARAMS_LIST] $TARGET_CLASS $TARGET_CLASS_PARAMS
```

where

- `[$JAMAGENT_PARAMS_LIST]` refers to the JVM Diagnostics Agent parameters such as `jamloglevel`, `jamconshost`, `jamconspport`, `jamconstretr`, `jamtimeout`, and so on.

Note: The `jamisdameon` option is always enabled for the JVM Diagnostics Agent in the standalone JVM mode. This ensures that the parent and native Java threads will run as daemons irrespective of what is specified on the command line.

- `$TARGET_CLASS` is the executable (Main) class of the application.
- `$TARGET_CLASS_PARAMS` are the program arguments that are to be passed to the executable (Main) class.

If these parameters are not specified, they are picked up from the `jamagent.war` file.

An example is given below:

```
CLASSPATH="$CLASSPATH:/scratch/ssmith/jamagent.war"
$JAVA_HOME/bin/java -cp $CLASSPATH $JVM_OPT $SYS_OPT jamagent.jamrun
jamconshost=10.229.187.109 jamconspport=3800
oracle.ad4j.groupidprop=MyJVMPool1/JVM50 mypackage.MyMainClass myarg1 myarg2
```

21.2 Setting Up JVM Diagnostics

Follow these steps to set up and configure JVM Diagnostics:

- From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. A list of Application Performance Management Engines are listed. Under the JVM Diagnostics Engines row, the following details are displayed when all the columns are selected:
 - Name:** The name assigned to the JVM Diagnostics Engine. This ID identifies the JVM Diagnostics Engine in all the processes.
 - Type:** The type of engine, in this case, JVM Diagnostics Engine.
 - Host:** The machine on which the JVM Diagnostics Engine has been deployed.
 - Port:** The port of the machine on which the JVM Diagnostics Engine has been deployed.
 - SSL Port:** The SSL Port of the machine on which the JVM Diagnostics Engine has been deployed.
 - Availability:** The availability, in percentage, of the JVM Diagnostics Engine.
 - Status:** The status of the JVM Diagnostics Engine (Active/Inactive).
 - Server:** The server on which the JVM Diagnostics Engine is located.
 - Version:** The build version of this JVM Diagnostics Engine.

Application Performance Management Engines									
View ▾	+	Add ▾	Redeploy	Remove	Configure				
Name	Type	Host	Port	SSL Port	Availability (%)	Status	Server	Version	
RUEI Systems (0)									
BTM Systems (0)									
JVM Diagnostics Engines (1)									
jammanagerEMGC_JVMDMANAGER1	JVM Diagnostics Engine	████████.us.oracle.com	3800	3801	100	↑	EMGC_JVMDMANAGER1	12.1.0.6-001	
ADP Engines (0)									

Select the JVM Diagnostics Engines row and click **Configure** to configure the JVM Diagnostics Engine parameters, JVMs and Pools, databases, and heap loader. The following tabs are displayed:

- Configuring the JVM Diagnostics Engine
- Configuring JVMs and Pools
- Register Databases
- Configuring the Heap Analysis Hosts

21.2.1 Configuring the JVM Diagnostics Engine

You can configure the JVM Diagnostics Engine and create new idle thread rules or delete existing ones.

- Click the **JVMD Configuration** tab. The following page appears.

Figure 21–1 JVM Configuration Page

The screenshot shows the 'JVM Diagnostics Setup' page with the 'JVM Configuration' tab selected. The 'JVM Engine Parameters' section is expanded, showing settings for log levels, timeouts, and monitoring. The 'Thread Rules' section is also expanded, showing a table of rules.

JVM Engine Parameters

JVM Engine Log Level: Info-3
Cross Tier Log Level: Info-3
Agent Request Timeout (secs): 30
Enable Monitoring: ☒

Advanced Settings

Monitoring Aggregation Interval (secs): 90
System Sample Interval (secs): 30
Purge Detail Data older than (hours): 120
Purge Aggregated Data Older than (days): 30
Thread Stack Repository Insertion Rate(%): 100
Retry changing threads: ☐

Thread Rules

Idle Thread Rules | System Call Rules

Adding a rule will make threads idle if they meet the rule.

New Rule Remove

Rule Id	Rule Type	Rule Value
1	Current Call	weblogic.socket.PosixSocketMuxer->processSockets
2	Current Call	weblogic.socket.PosixSocketMuxer->poll
3	Current Call	weblogic.socket.EPollSocketMuxer->processSockets
4	Current Call	weblogic.socket.NTSocketMuxer->getIoCompletionResult
5	Current Call	weblogic.socket.DevPollPosixSocketMuxer->processSockets

2. You can modify the following details in the JVM Engine Parameters region.
 - **JVMD Manager Log Level:** The log level for console diagnostics messages. Log levels 1 to 5 are supported where:
 - 1 = Error
 - 2 = Warning
 - 3 = Info
 - 4 = Debug
 - 5 = Trace

The default log level is 3.
 - **Cross Tier Log Level:** The log level for cross-tier diagnostic messages. Log levels 1 to 5 are supported where:
 - 1 = Error
 - 2 = Warning
 - 3 = Info
 - 4 = Debug
 - 5 = Trace

The default log level is 3.
 - **Agent Request Timeout:** The number of seconds that the JVM Diagnostics Engine waits for the JVM Diagnostics Agent to respond. You can increase this value if the monitored JVMs are extremely busy and the console times out and disconnects while waiting for a response.
 - **Monitoring Aggregation Interval:** The frequency at which the detailed monitoring samples should be aggregated into summary data.
 - **System Sample Interval:** The frequency at which system details (cumulative CPU counters, heap size, and number of GCs) should be collected in monitoring.

- **Purge Detail Data older than (hours):** The period for which the detailed monitoring samples should be retained.
- **Purge Aggregated Data older than (days):** The period for which the aggregated monitoring samples should be retained.
- **Enable Monitoring:** Select this check box to start or stop monitoring.
- **Thread Stack Repository Insertion Rate (%):** Enter a number between 1 and 100. The thread stacks will be stored in the repository at the specified rate.
- **Retry Changing Threads:** If a thread stack changes during a sample (this can happen when a thread is using CPU), JVM Diagnostics will skip that thread for that sample. If you find missing samples, use this feature to retrace the changed stacks. This will retry (up to 5 times) threads with changing stacks. It will also make system calls to get the stack if possible.

Note: This field is not applicable to the JVMTI (level 0) optimization.

Click **Save** to save the parameters.

3. In the Thread Rules region, you can define the following:

- **Idle Thread Rules:** Mark a thread as idle by adding it to an Idle Thread Rule. All threads that have been marked as idle will not be monitored. Click **New Rule** to create a new Idle Thread Rule. In the Add Idle Thread Rule window, enter the following details:
 - **Rule Type:** The Rule Type can be:
 - Monitor (Waiting on Lock):** Select this type if you want to ignore threads that are locked with a lock of the specified name.
 - Current Call:** Select this type if you want to ignore all threads that have the specified (class + method) as the current call of the stack. The Current call of the stack is the first frame of the stack, traversing from top to bottom, such that the (class + method) is not a System call. System calls are assumed to be the calls which are not relevant to the user application like `java.*` etc. You can specify a wild card here, for example, if you specify `weblogic.servlet.*`, all the threads that meet this criteria will be ignored.
 - Thread Name:** Select this type if you want to ignore all threads containing the specified thread name.
 - **Rule Value:** The Rule Value for Current Call should contain the fully qualified class name followed by the method name. An example of a Current Call is `weblogic.socket.PosixSocketMuxer->processSockets`. An example of a Monitor (Waiting on Lock) is `weblogic.socket.PosiSocketMuxer$1`.
 - **Global Rule:** Select this checkbox to apply the idle thread rule to all JVM Pool targets. If this box is unchecked, you must select one or more JVM Pools for which this rule will be applicable.

All threads that meet the criteria specified in the Idle Thread Rule will not appear in the View Active Threads screen.

- **System Call Rules:** Mark a method as a system call by adding it to the System Call Rules. System calls are assumed to be the calls which are not relevant to the user application like `java.*` etc. Click **New Rule** to create a new system call and specify the matching pattern such as `sun.*`, `java.*` and so on.

Select the **Global Rule** checkbox if this System Call Rule is to be applicable to all JVM Pool targets. If this box is unselected, select one or more JVM Pools for which this rule is to be applied.

All methods that match the rules listed in the System Call Rules table are identified as system calls.

21.2.2 Configuring JVMs and Pools

You can group sets of JVMs into JVM pools that provide monitoring information across all related JVMs in a single view. You can view all the JVM pools in the WebLogic Domain, create a new JVM pool, and edit existing JVM pools.

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Select the JVM Diagnostics Engine row in the Application Performance Management Engines table and click **Configure**.
2. Click the **JVMs and Pools** tab. The list of all available JVM pools is displayed. For each pool, you can set the Poll Enabled flag and specify the Poll Interval. If the **Polling Enabled** flag is set to **Y**, JVMs belonging to this pool will be polled for active requests periodically based on the Poll Interval.

Figure 21–2 Configure JVMs and Pools

JVM Diagnostics Setup Page Refreshed May 6, 2013 11:27:49 AM PDT

JVMD Configuration **JVMs and Pools** Register Databases Heap Analysis Hosts

JVMs and Pools

View

Name	Target Name	Type	Status	Member Status Summary	Ver
> Default	Default	Java Virtual Machine Pool	n/a	0 1 0 0	
> EMGC_DOMAIN_jvmpool	/EMGC_EMGC_DOMAIN/EMGC_DOMAIN_jvmpool	Java Virtual Machine Pool	n/a	0 1 0 0	
> EMGC_OMS1_jvm	/EMGC_EMGC_DOMAIN/EMGC_DOMAIN/EMGC_OMS1_jvm	Java Virtual Machine	↑	0 0 0 0	1.6

Columns Hidden 5

3. Click **Create Pool** to create a new pool.
 - a. In the Add JVM Pool Information page, enter the name and description of the JVM pool.
 - b. In the **Poll Interval** field, specify the sample interval for JVMs belonging to this pool when monitoring (polling) is enabled.
 - c. Check the **Poll Enabled** check box to poll the JVMs belonging to this pool.
 - d. Click **Save** to save the JVM Pool information.
4. To delete a pool, check the select check box and click the **Remove** icon.
5. Click **Downloads** to download JVM Diagnostics components. You can download the following components:
 - **JVMD Agent**: Contains JVM Diagnostics Agent binaries for all supported platforms.
 - **LoadHeap**: Contains scripts to upload heap snapshots to the repository.
 - **JVMD Agent with MDA (WebLogic only)**: Contains JVM Diagnostics and MDA Agents for the Weblogic server on supported platforms.

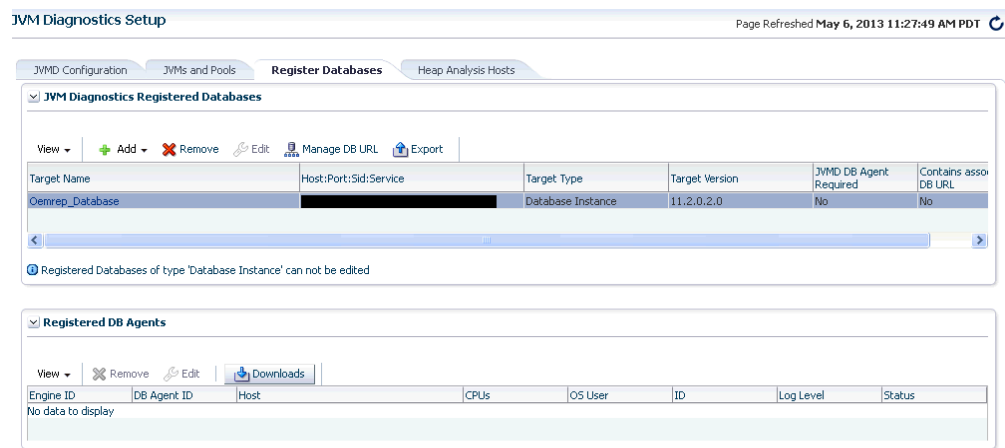
- **DB Agent:** Contains supported platforms executables for establishing cross tier analysis for legacy database versions.
 - **JVMD Engine:** Collects JVM metrics from JVM Diagnostics Agents for real time view and historical data.
6. Select a JVM Pool and click **Configure**. See [Section 21.4.4, "Configuring a JVM Pool"](#) for details.
 7. Select a JVM and click **Configure**. See [Section 21.5.10, "Configuring a JVM"](#) for details.

21.2.3 Register Databases

Follow these steps to register the database:

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Select the JVM Diagnostics Engine row in the Application Performance Management Engines table and click **Configure**.
2. Click the **Register Databases** tab. The JVM Diagnostics Registered Databases page appears.

Figure 21–3 Register Databases



3. The list of registered databases is displayed. The database name, host, Oracle SID for the monitored database, and listener port number is displayed. You will also see a flag indicating whether the database agent is required.
4. You can do the following:
 - **Add a Database Instance:** From the Add menu, select **Database Instance** to register a single instance or Oracle RAC database target.
 - **Add a Custom Database:** From the Add menu, select **Custom Database** to register an external database target. Specify the Name, Host, Port, SID, Instance ID, Username, and Password and click **Test Connection** to validate the database details. After the validation, click **OK** to register the database.
 - **Remove:** Select a database from list and click **Remove** to remove a registered database.

- **Manage DB URL:** Use this option to establish cross tier correlation between JVM Diagnostics and Database Diagnostics. Select a database and click **Manage DB URL**. In the **Associate / Disassociate a Registered Database**, select a Database URL and click **Add** and specify the URL of the database to be associated.
- **Edit:** You cannot edit a Database Instance. Only custom databases can be edited. Select a custom database from the list and click **Edit**.

Note: The DB User must have select privileges on the GV_\$SESSION, GV_\$SESSION_WAIT, GV_\$PROCESS, GV_\$SQLTEXT, GV_\$SQLAREA, GV_\$LOCK, and GV_\$LATCHNAME fixed views in the target database.

To grant select privileges to a user such as jvmdadmin, enter a command as follows:

```
SQL> grant select on SYS.GV_$LATCHNAME to jvmdadmin
```

5. After the database has been registered, the JVM Diagnostics Engine will start monitoring the cross-tier JVM calls between applications being monitored for a particular JVM and the underlying database.
6. In the Registered DB Agents region, the following details are displayed:
 - **Engine ID:** The ID of the Manager to which this DB Agent is connected.
 - **DB Agent ID:** This is a unique ID given to the DB Agent and is used to identify the DB Agent in all the processes.
 - **Host:** The host on which the DB Agent is running.
 - **CPUs:** The number of CPUs.
 - **OS User:** The user who started the DB Agent.
 - **ID:** The port on which the DB Agent is running (Default is 5555).
 - **Log Level:** The log level of the DB Agent.
 - **Status:** The status of the DB Agent (active or inactive)
7. Check the **Select** check box and click the **Edit** icon to edit the DB Agent.
8. Click **Downloads** to manually download the various binaries such as JVM Diagnostics Agent, JVM Diagnostics Engine, Database Agent, Load Heap, and deploy them. You can download the following:
 - **JVM Diagnostics Agent WAR File:** The JVM Diagnostics Agent Parameters web.xml parameters window is displayed. From the Available Managers drop-down, you can select entries that are in the format <host>:<port> - for normal communication, <host>:<port>(secure communication) for communication over the SSL Port or you can select Other. If you select Other, you need to specify the Manager IP Address and the Manager Port to which the JVM Diagnostics Agent is connecting to. While downloading the JVM Diagnostics Agent, you can modify the following parameters:
 - **Tuning Timeouts Parameters:** You can modify the Connection Retry Time, GC Wait Timeout, Long Request Timeout, and Idle Agent Timeout.
 - **Target Association Parameters:** If you select WebLogic Server, you can specify the Target Name, and Pool Name. If you select Other Server, you can specify the Group ID Property and Pool Name.

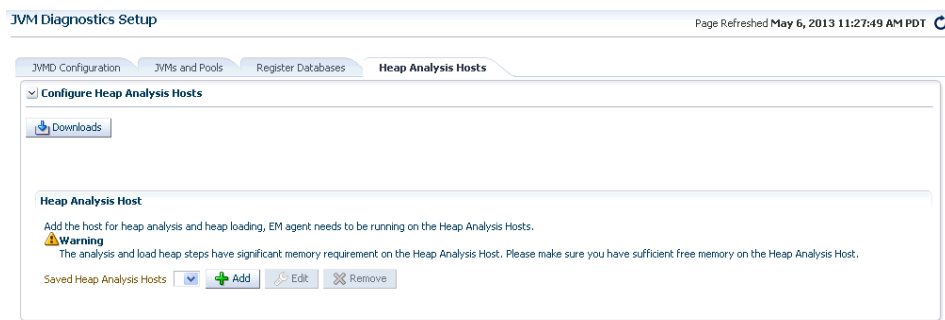
- **Logging Parameters:** You can modify the Agent Log Level.
- **Optimization Level:** You can modify the Optimization Level.
- **JVM Diagnostics Engine EAR File:** You can open the jammanager.ear file or save it to a specified location.
- **Load Heap:** The loadheap.zip is saved to a specified location.
- **DB Agent:** Specify the DB Agent parameters. In the Available Engines drop-down, you can select entries that are in the format <host>:<port> - for normal communication, <host>:<port>(secure communication) for communication over the SSL Port, or you can select Other. If you select Other, you need to specify the Manager IP Address and the Manager Port to which the JVM Diagnostics Agent is connecting to. Specify the Agent Log Level in the Logging Parameters region and click **Download**.

21.2.4 Configuring the Heap Analysis Hosts

To configure the heap analysis hosts, follow these steps:

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Select the JVM Diagnostics Engine row in the Application Performance Management Engines table and click **Configure**.
2. Click the **Heap Analysis Hosts** tab. The Configure Heap Analysis Hosts page appears.

Figure 21–4 Configuring the Heap Analysis Hosts



3. Click **Downloads** and select **Loadheap** to download the loadheap.zip file. This file contains scripts that can be used to upload heap snapshots to the JVM Diagnostics repository.
4. To configure a heap analysis host, click **Add** and enter the following details:
 - **Alias:** Enter an alias for the host.
 - **Heap Analysis Host:** The heap analysis host on which the Management Agent has been deployed.
5. Click **Save** to save the configuration.

21.2.5 Viewing Registered JVMs and Managers

Follow these steps to view a list of registered JVMs and JVM Managers:

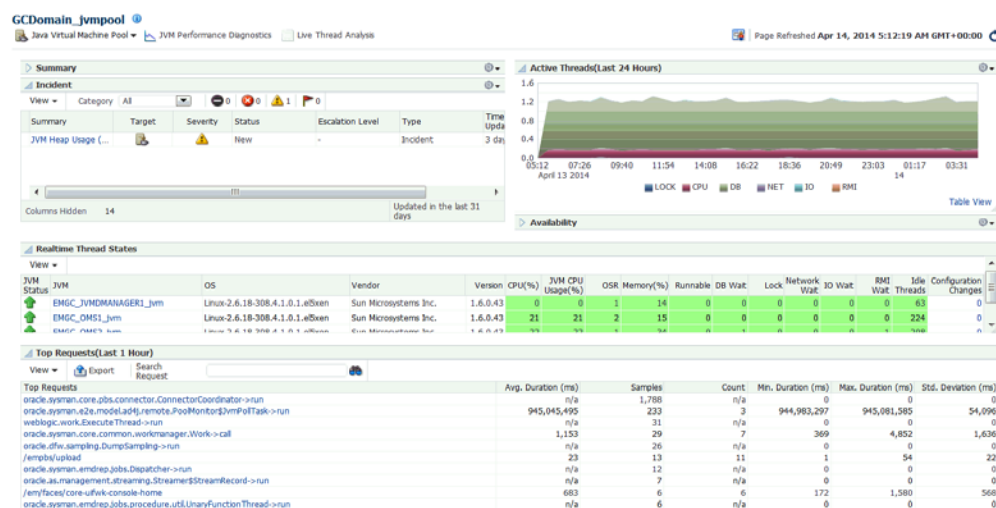
1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**.
2. The list of registered JVM Diagnostics Engines are displayed.
 - **Name:** The name assigned to the JVM Diagnostics Engine. This ID identifies the JVM Diagnostics Engine in all the processes.
 - **Type:** The type of engine, in this case, JVM Diagnostics Engine.
 - **Host:** The machine on which the JVM Diagnostics Engine has been deployed.
 - **Port:** The port of the machine on which the JVM Diagnostics Engine has been deployed.
 - **SSL Port:** The SSL Port of the machine on which the JVM Diagnostics Engine has been deployed.
 - **Availability (%):** The availability, in percentage, of the JVM Diagnostics Engine.
 - **Status:** The status of the JVM Diagnostics Engine (Active/Inactive)
 - **Server:** The server on which the JVM Diagnostics Engine is located.
 - **Version:** The build version of this JVM Diagnostics Engine.

Select the JVM Diagnostics Engines row and click **Configure** to configure the JVM Diagnostics Engine parameters, JVMs and Pools, databases, and heap loader.

21.3 Accessing the JVM Diagnostics Pages

After you have deployed the JVM Diagnostics Engine and configured JVM Diagnostics, you can start using the features. From the **Targets** menu, select **Middleware**, and click on a JVM Pool or Java Virtual Machine target. The Home page for the target is displayed.

Figure 21–5 JVM Pool Home Page



To start using JVM Diagnostics, select the appropriate option from the Java Virtual Machine Pool drop-down menu.

You can also access the JVM Diagnostics pages from the WebLogic Server, WebLogic Domain, JBoss Server, or Cluster target Home pages. To do so, click on a target to navigate to the Home page. From the **Target** menu, select **Diagnostics**, then select the appropriate JVM Diagnostics menu option.

21.4 Managing JVM Pools

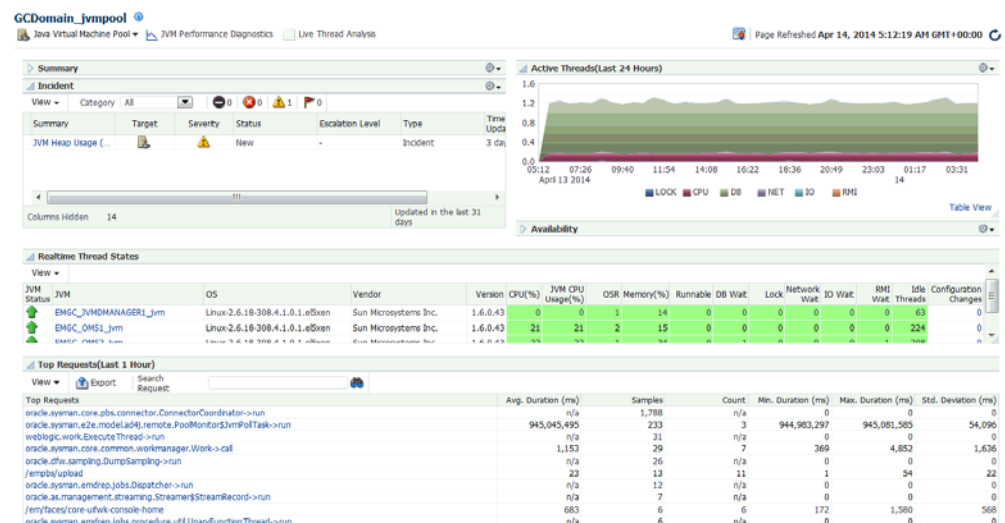
You can group sets of JVMs into JVM pools that provide monitoring information across all related JVMs in a single view. You can monitor all the JVMs in a pool, view historical and real time data for the JVM pool, manage threads and heap snapshots, create a new pool, and edit an existing JVM pool. JVMs and JVM Pools are now targets in Enterprise Manager. You can do the following:

- Viewing the JVM Pool Home Page
- Viewing the JVM Pool Performance Diagnostics Page
- Viewing the JVM Pool Live Thread Analysis Page
- Managing Thread Snapshots
- Analyzing Heap Snapshots
- Configuring a JVM Pool
- Removing a JVM Pool
- Add to Group

21.4.1 Viewing the JVM Pool Home Page

The JVM Pool Home page shows the details of all JVMs in the pool.

Figure 21–6 JVM Pool Home Page



It shows the following details:

- **Summary:** Shows whether polling is enabled and the Polling Interval.
- **Availability:** This region shows the availability status of the members in the JVM Pool. Click on a Member link to drill down JVM Home Page.

- **Incident:** This region shows any open incidents that have occurred, the type, and category of the incident. Click the Summary link to drill down to the Incident Details page. Incidents are displayed in this region only if JVM Diagnostics events have been promoted to incidents as described in [Section 21.4.1.1, "Promoting JVM Diagnostics Events to Incidents"](#).
- **Realtime Thread States:** This region shows the realtime thread status for each JVM in the pool. The current activity of the JVM including CPU usage, memory, number of threads waiting for a database response, number of threads waiting for synchronization lock, and other details are displayed. If JVMs displayed are present in different WebLogic domains, you can view the WebLogic Domain and the host on which the JVM is running. Click on the JVM link to drill down to the JVM Performance Diagnostics page.
- **Top Requests (Last 1 hour):** This region shows the top requests over the last 1 hour. The average duration of the request, number of monitoring samples, the arrival count, throughput or the number of requests completed per minute, the minimum and maximum duration required to complete the request, and the standard deviation taken for the request to be completed are displayed.

21.4.1.1 Promoting JVM Diagnostics Events to Incidents

An event is a notable occurrence detected by Enterprise Manager that is related to target, job, monitoring template at a particular point in time, which may indicate normal or problematic behavior. Example for events – database target going down, performance threshold violation based on metrics, unauthorized change in the application configuration file changes, failure in job execution, and so on.

An incident is an event or set of closely correlated events that represent an observed issue requiring resolution, through (manual or automated) immediate action or root-cause problem resolution.

By default JVM Diagnostics events are not promoted to incidents and will not appear in the JVM Pool or JVM Home page. To promote events to incidents, follow these steps:

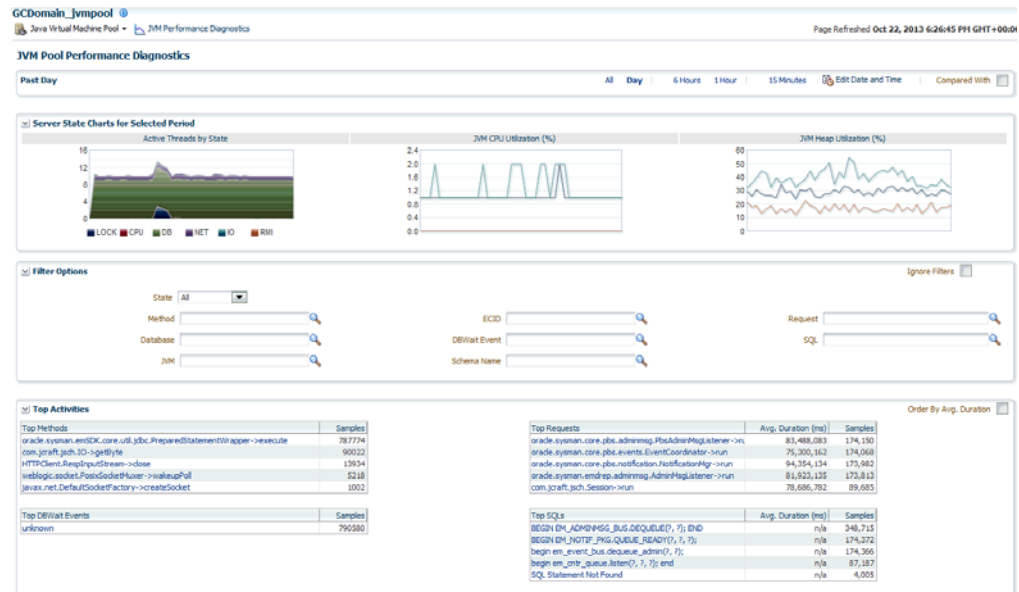
1. Log into Enterprise Manager.
2. From the **Setup** menu, select **Incidents**, then select **Incident Rules**.
3. Click **Create Rule Set**. In the Create Rule Set page, in the Targets region, select the **All Targets of types** option. Select Java Virtual Machine and Java Virtual Machine Pool target types.
4. Click **Create** in the Rules region and in the Select Type of Rule to Create window, choose **Incoming events and updates to events** option and click **Continue**. The Create New Rule: Select Events page appears. In the Type drop down, select JVM Diagnostics Threshold Violation.
5. Then select Specific events of type JVM Diagnostics Threshold Violation.
6. Click **Add**. The JVM Diagnostics Threshold Violation Rule window appears. Select the JVM Diagnostics metrics that will trigger threshold violation events. These events will be promoted to incidents. Click **Next**, review the rules, and click **Continue** to save the rule. All events that match the criteria will be promoted to incidents and will appear in the JVM Diagnostics Pool Home page.

21.4.2 Viewing the JVM Pool Performance Diagnostics Page

You can view the summary and detailed information of the selected JVM Pool on this page. You can also compare the JVM pool data across two specific time periods. To

view this page, select **Middleware** from the **Targets** menu and click on a JVM Pool target. Select the **JVM Performance Diagnostics** option from the **Java Virtual Machine Pool** menu or click on the **JVM Performance Diagnostics** link next to the Java Virtual Machine Pool menu.

Figure 21–7 JVM Pool Performance Diagnostics Page



This page shows the summary details of the JVM pools which include the Server State Charts, and a list of Top Methods and Top Requests. You can view the Server State Charts, list of Top Methods, Top Requests, Top DBStates, and Top SQLs.

You can filter the data that is displayed by specifying various criteria such as State, Method, Database, JVM, ECID, DBWait Event, Schema Name, Request, and SQL. If request names are not present, enter a '/' in the Request field. The Filter Menu for Request with a list of top requests is displayed. Select an entry from the table and click OK to set it as a filter.

You can also view server state charts for each JVM in the pool. Check the **Ignore Filters** checkbox if you want to ignore the specified filters.

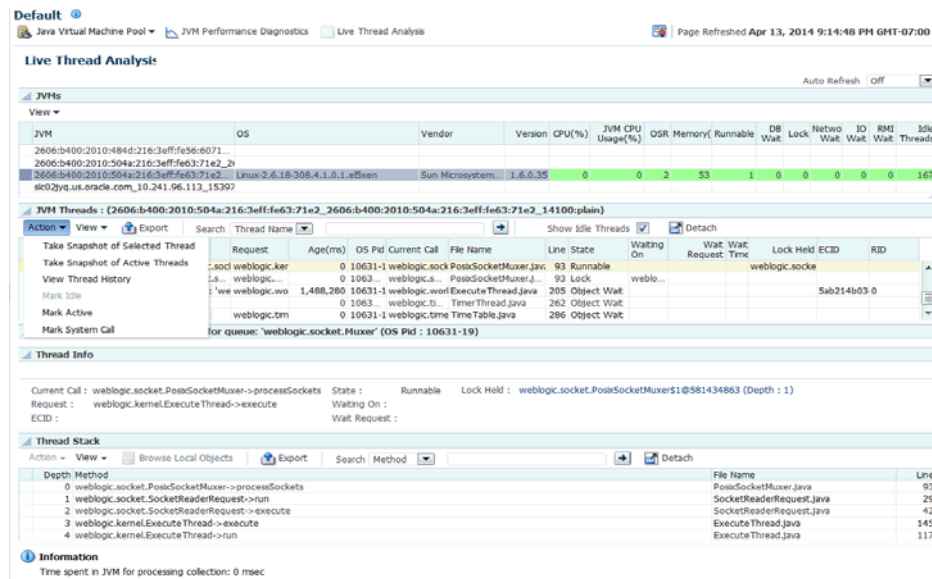
In the Top Activities region, you can see the top methods, top requests, top DBWait events, top SQLs, and top databases in the JVM Pool. You can click on the link to drill down to the Details page.

You can compare data between two periods. Select the **Compared With** checkbox and specify the comparison period to view the comparison data.

21.4.3 Viewing the JVM Pool Live Thread Analysis Page

This page shows the real-time data for all the JVMs in the selected pool. This data is useful in analyzing the various active and idle threads on the JVM. During analysis you can drill down from the thread level to methods used in the thread to local variables that are part of the method. From the **Targets** menu, select **Middleware**, and then click on a Java Virtual Machine Pool target. Select the **Live Thread Analysis** option from the **Java Virtual Machine Pool** menu. The JVM Pool Live Thread Analysis Page appears.

Figure 21–8 JVM Pool Live Thread Analysis Page



This page shows the following:

- **JVMs:** This table shows the list of JVMs and the current status of each JVM. The current activity of the JVM including CPU usage, memory, number of threads waiting for a database response, number of threads waiting for synchronization lock, and other details are displayed
- **JVM Threads:** This table shows a list of all the threads running in the selected JVM. For each thread, the following details are displayed:
 - Thread Name: Name of the thread. Click on the link to view the JVM Stack.
 - Request: Application request being processed by the thread.
 - OS PID: Operating system and Thread IDs for this thread.
 - Current Call: Current call of the thread.
 - File Name: Name of the file that contains the class and method for the current call.
 - Line: Line number in the method currently being executed.
 - State: The current state of the thread. This can be DB Wait, RMI Wait, or Network Wait. If the ADP, BTM, or DMS is configured, the Request Name and Request Age values are displayed. If a thread is in the **DB Wait State**, the Waiting On column displays the name of the database the thread is waiting on, and the time the thread has to wait is displayed in the Wait Time column.

Click on the link to view the database diagnostics details. See [Section 21.5.4.1, "Cross Tier Analysis"](#) for more details. You can track database issues and determine the application request responsible for the database activity. You can also view the complete call stack including the method and line number information.

Note: To view the database diagnostics details, ensure that:

- The JVM Diagnostics Agent is running on the JVM that initiated the request.
 - The monitored database must be registered by the JVM Diagnostics Engine.
-

You can do the following:

- **Export:** Select a thread and click Export to export the thread details along with thread stacks information to an Excel file.
- **Show Idle Threads:** Select this check box to list all the Idle Threads in the JVM Threads table.
- **Take Snapshot of Selected Thread:** Select a thread in the list, and from the **Action** menu, select **Take Snapshot of Selected Thread**. The Thread Snapshot page is displayed. You can configure the snapshot settings and click **Take Thread Snapshot**. A snapshot file with details of the selected thread is generated. From the **Java Virtual Machine Pool** menu, select **Thread Snapshots** to view additional details.
- **Take Snapshot of Active Threads:** This option allows you to take a snapshot of all the active threads. From the **Action** menu, select **Take Snapshot of Active Threads**, the Thread Snapshot page is displayed. You can configure the snapshot settings and click **Take Thread Snapshot**. A snapshot file with details of all the active threads is generated. From the **Java Virtual Machine Pool** menu, select **Thread Snapshots** to view additional details.
- **View Thread History:** Select a thread and from the **Action** menu, select **View Thread History**. The historical data for the thread for the last 30 minutes is displayed.
- **Mark Idle:** Select a thread and from the **Action** menu, select **Mark Idle**. The selected thread will be marked as Idle as a new Idle Thread Rule will be added with current call as the current call of this thread.
- **Mark Active:** Select an Idle thread and from the **Action** menu, select **Mark Active** to change the status to Active.
- **Mark System Call:** Apart from the threads defined as System Calls in the JVMD Configuration page (see [Section 21.2.1, "Configuring the JVM Diagnostics Engine"](#)), you can mark specific threads as system calls. Select a thread from the JVM Threads table. From the **Action** menu, select **Mark System Call** to mark this thread as a **System Call**. All user calls that are marked in this manner will now be treated as System Calls. If you selected a marked call and click **Unmark System Call**, the thread will now be treated as a User Call.
- **Thread Info:** This region shows the detailed information for a selected thread. Details of thread including Current Call, Request, ECID, State, Waiting On, and Wait Request are displayed. If the thread is in the DB Wait State, click on the link to drill down to the Database Home page
- **Thread Stack:** The Thread Stack table shows the details of the selected thread such as the depth of the thread, methods used in the thread, file where the method is used, and the line number. You can drill down from the method level to a lower level. Select a method from the table and click **Browse Local Objects**. A popup window is displayed which shows the local variables, objects, their classes, and

values. You can export these details to a file by clicking **Export**. You are prompted to specify the directory in which the file is to be stored. Enter the path and click **Save** to save file in .csv format.

You can refresh the data that is displayed by specifying the **Auto Refresh** period.

21.4.4 Configuring a JVM Pool

From the **Targets** menu, select **Middleware**, and then click on a Java Virtual Machine Pool target. Select the **Configure JVM Pool** option from the **Java Virtual Machine Pool** menu. You can do the following:

- Modify the JVM pool details. You can enable or disable monitoring of pools or change their polling intervals by updating the pool properties. Click **Save** to save the changes.
- Configure the JVM pool thresholds. See [Section 21.4.4.1, "Updating Pool Thresholds"](#).

21.4.4.1 Updating Pool Thresholds

Follow these steps to edit the pool thresholds on the Edit JVM Pool Information page ([Figure 21–9](#)):

Figure 21–9 Edit JVM Pool Threshold Values

The screenshot shows two panels from the Oracle Enterprise Manager Cloud Control interface. The top panel, titled 'Edit JVM Pool Information', shows details for a JVM pool named '/EMGC_EMGC_DOMAIN/EMGC_DOMAIN_jvmpool'. It includes fields for 'Description', 'Poll Interval (ms)' set to 2000, and a checked 'Poll Enabled' checkbox. The bottom panel, titled 'Edit JVM Pool threshold Values', displays a table of thresholds for various metrics.

Metric	Comparison Operator	Threshold	Trigger Samples	Corrective Actions
▼ /EMGC_EMGC_DOMAIN/EMGC_DOMAIN_jvmpool				
▼ Host CPU Usage (%)				
⚠ Critical	>=	90	50	<None> + Add
⚠ Warning	>=	70	50	<None> + Add
▼ DB Wait (thread count)				
⚠ Critical	>=	6	50	<None> + Add
⚠ Warning	>=	3	50	<None> + Add
▼ GC Overhead(%)				
⚠ Critical	>=	90	50	<None> + Add

1. In the Edit JVM Pool Threshold Values region, the following details are displayed:
 - **Level:** Thresholds violations can have a level of R (red) or Y (yellow).
 - **Metric:** The attribute or metric that is being monitored.
 - **Threshold:** The Critical and Warning threshold for the metric. A violation occurs when the threshold is exceeded after a minimum number of samples have been monitored.
2. Click **Add** to add a corrective action. Select a corrective action from the list and click **OK**. You can select:
 - **No Action:** No corrective is defined.

- **Trace Dump:** Select this option to trace a particular thread, or all active threads in response to a threshold violation. You can define the following parameters:
 - * Poll Interval: Interval after which snapshot should be repeated.
 - * Poll Duration: Duration for which the snapshot should be taken.
 - * Thread Details: You can specify if the thread details need be included in the snapshot.
 - * Try Changing Threads: Sometimes the stack associated with the thread may change rapidly which makes taking the snapshot difficult. If you select this parameter, you can suspend the thread and take the snapshot.
 - * Include Network Waits: Specify if network wait threads need to be included in the snapshot.
 - * All Threads: Specify if all threads (active and idle) must be included in the snapshot.
 - * Allow Trace Interrupt: Indicate whether the trace process can be interrupted.
- **Heap Dump:** Select this option to generate a heap dump in response to a threshold violation. The Heap Snapshot Type can be:
 - Txt: Text (txt) for analysis in JVM Diagnostics.
 - HPROF: Binary format for analysis with external tools.

If a corrective action (trace dump or heap dump) is generated due to a threshold violation, the trace or heap dump files are displayed in the Event Details page. See [Section 21.10, "Viewing JVM Diagnostics Threshold Violations"](#).

3. Click **Save** to save the threshold values.

21.4.5 Removing a JVM Pool

You will see a warning message if you select the **Remove Target** option from the JVM Pool menu. The message displays the name of the target being deleted and that when a pool is deleted, all the JVM targets in the pool are also displayed. Click **Yes** to delete the JVM Pool or **No** to return to the JVM Pool Home page.

21.4.6 Add to Group

Select this option to add the JVM Pool to one or more groups. A pop-up window appears with a list of groups on which you have Operator privileges. Select one or more groups and click **Add** to add the target to the group.

21.5 Managing JVMs

You can monitor a specific JVM in a pool, view historical and real time data, and so on. You can do the following:

- [Viewing the JVM Home Page](#)
- [Viewing the JVM Performance Diagnostics Page](#)
- [Viewing the JVM Diagnostics Performance Summary](#)
- [Viewing the JVM Live Thread Analysis Page](#)

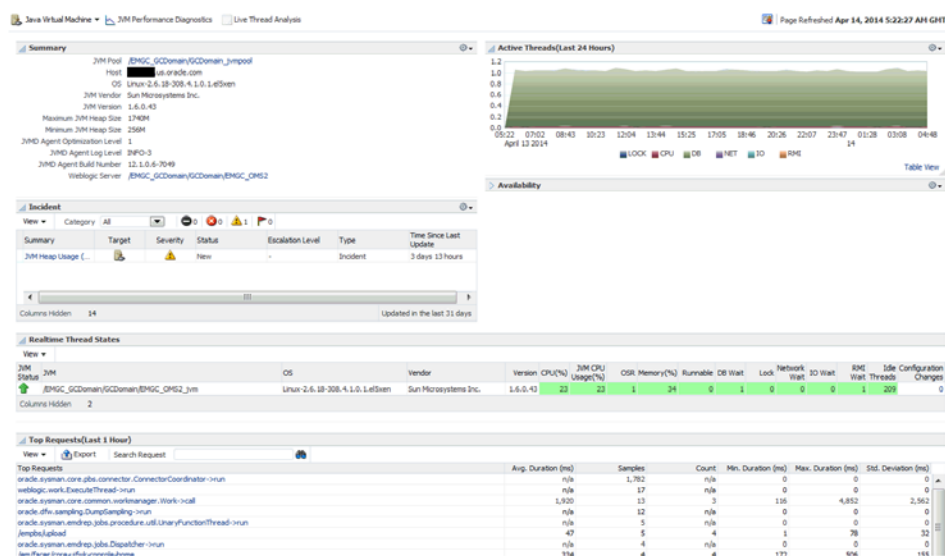
- Viewing the JVM Live Heap Analysis Page
- Managing Thread Snapshots
- Analyzing Heap Snapshots
- Managing JFR Snapshots
- Configuring a JVM
- Removing a JVM
- Add JVM to Group

21.5.1 Viewing the JVM Home Page

The JVM Home page shows the summary and configuration information of all the JVMs in the JVM pool. Follow these steps to view the JVM Home page:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target.

Figure 21–10 JVM Home Page



2. The JVM Home page with the following details is displayed.
 - **Summary:** Shows details of the JVM such as the JVM Pool it belongs to, the host, Agent Optimization Level, Agent Log Level, JVM Version, and vendor details.
 - **Incident:** This region shows any open incidents that have occurred, the type, and category of the incident. Click on the **Summary** link to drill down to the Incident Details page.
 - **Availability:** The availability status of the JVM. Click on a **Member** link to drill down JVM Home Page.
 - **Active Threads:** The chart shows the number of active threads in the JVM in the last 24 hours.
 - **Realtime Thread States:** Shows the state of the various threads in the JVM in the color coded columns. The current activity of the JVM including CPU

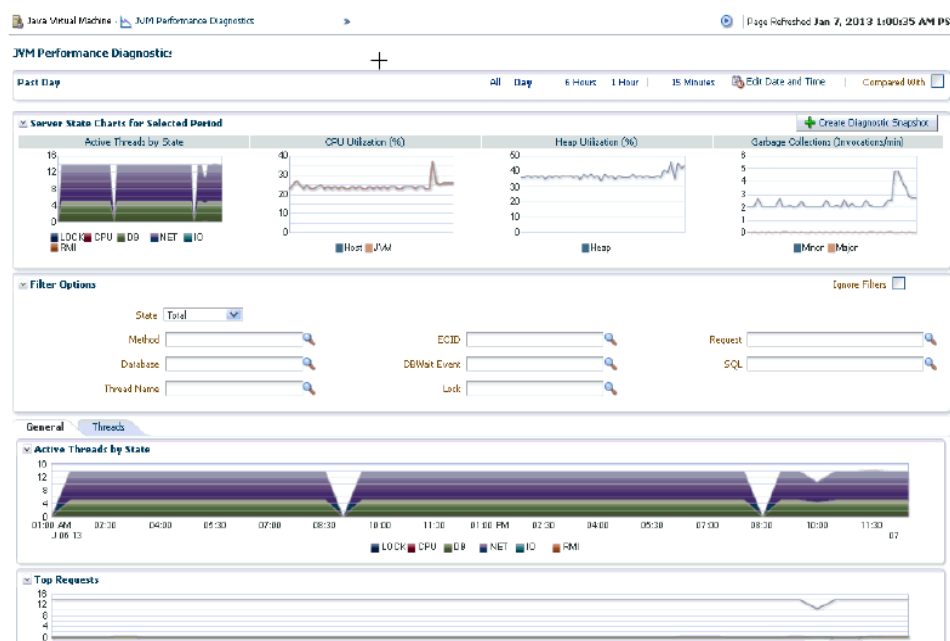
usage, memory, number of threads waiting for a database response, network response, or number of threads waiting for synchronization lock, idle threads, and configuration changes are displayed. Click on a JVM to view the list of threads in the JVM and the details of each thread.

- **Top Requests (Last 1 hour):** This region shows the top requests over the last 1 hour. The average duration of the request, number of monitoring samples, the arrival count, throughput or the number of requests completed per minute, the minimum and maximum duration required to complete the request, and the standard deviation taken for the request to be completed are displayed.

21.5.2 Viewing the JVM Performance Diagnostics Page

This page shows the summary and detailed information for a specific JVM. To view this page, select **Middleware** from the **Targets** menu and click on a Java Virtual Machine target. Select the **JVM Performance Diagnostics** option from the **Java Virtual Machine** menu.

Figure 21–11 JVM Performance Diagnostics Page



This page shows the summary details of the JVM which include the Server State Charts, Active Threads by State, Top Methods, Top Requests, Top DBWait Events, Top SQLs, and Top Databases. You can filter the data that is displayed by specifying various criteria such as State, Method, Database, Thread Name, ECID, DBWait Event, Schema Name, Request Name, SQL, and Lock. If request names are not present, enter a '/' in the Request field. The Filter Menu for Request with a list of top requests is displayed. Select an entry from the table and click **OK** to set it as a filter.

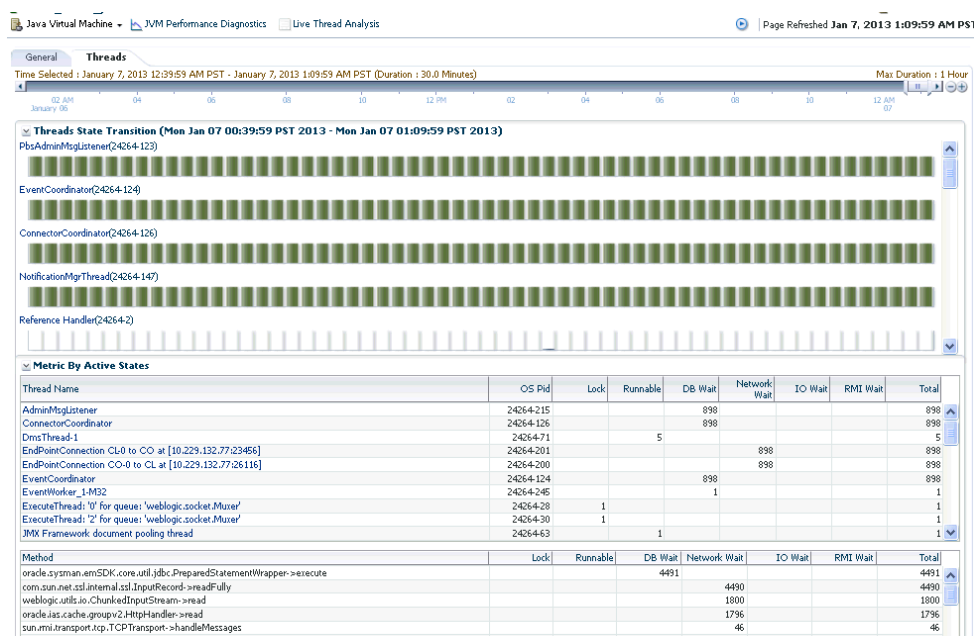
Check the **Ignore Filters** checkbox if you want to ignore the specified filters. Select the **Order by Duration** checkbox in the Top Activities table to see the top 5 requests and SQLs by average duration.

Note: If you choose to filter the data based on Schema Name, you must ensure that the target or custom database has been registered and database cross tier correlation has been established.

Click the **Threads** tab to view the Thread State Transition chart. This chart shows how the threads have transitioned from one state to the other in the selected period. You can change the time interval and move it to a different time period by using the quick time selection control at the top of the page. You can hover over the colored bars to see the transition changes from one state to the other, for example from **Runnable** to **Not Active** or to **Runnable**. The following server state charts are displayed:

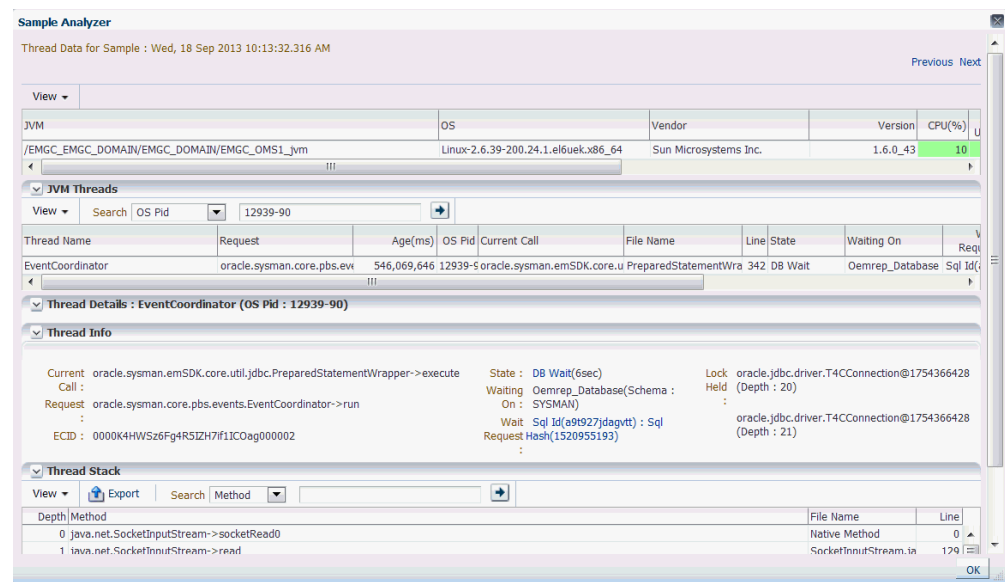
- **Active Threads:** This chart shows the status of all threads in the pool. The threads can be different states like RMI, IO, NET, DB, CPU and LOCK
- **CPU Utilization by JVM:** This chart shows the CPU utilization for the JVM.
- **Heap Utilization by JVM:** This chart shows the heap utilization for the JVM.
- **Garbage Collections:** This chart shows the major and minor garbage collections for the JVM.

Figure 21–12 Thread State Transition



Click on a bar graph in the **Thread State Transition** chart to view the Sample Analyzer which provides a detailed analysis on the state of the thread. This feature allows you to analyze each sample (JVM snapshot at a specific time) in the monitored data.

Figure 21–13 Sample Analyzer



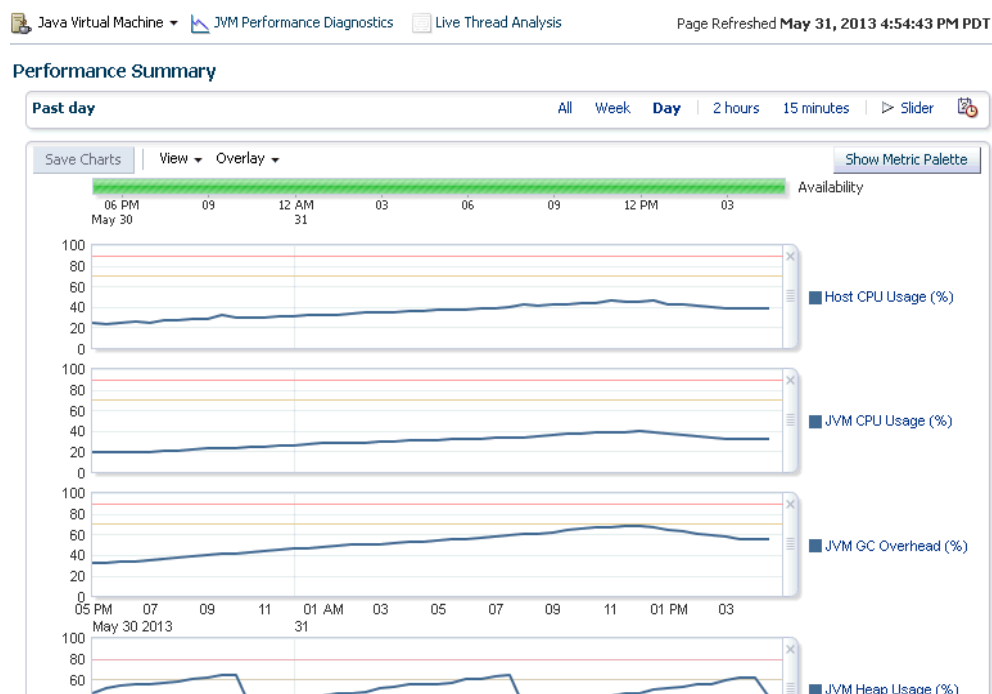
In the JVM Performance Diagnostics page (Figure 21–11), you can do the following:

- You can compare data between two periods. Select the **Compared With** checkbox and specify the comparison period. The data for the selected period and the current period is displayed.
- Click the **Create Diagnostics Snapshot** link to collect diagnostic data for the JVM target for a specific period and analyze this data in offline. For more details, see [Section 21.9, "JVM Offline Diagnostics"](#)

21.5.3 Viewing the JVM Diagnostics Performance Summary

You can view the performance metrics (system and active threads) for a JVM target on the Performance Summary page. A set of charts is displayed on this page for the JVM target. To view the JVM performance metrics, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target.
2. Select the **Performance Summary** option from the **Java Virtual Machine** menu. The following page appears:

Figure 21–14 Performance Summary Page

3. A set of default charts that show the values of the JVM performance metrics over a period of time is displayed. Review the metrics for any periods of time where the Warning or Critical Thresholds were reached.

If any of the metrics exceed the Warning Thresholds or Critical Thresholds, it could indicate memory is a factor in the JVM performance and availability. It could mean there is a memory leak or that the JVM heap configuration is too small for the application load. If the heap configuration is correct, you must review the real time heap data. See [Section 21.5.5, "Viewing the JVM Live Heap Analysis Page"](#) for details. You can then create a snapshot that can be examined for leaks. See [Section 21.5.7, "Taking a Heap Snapshot"](#) for details.

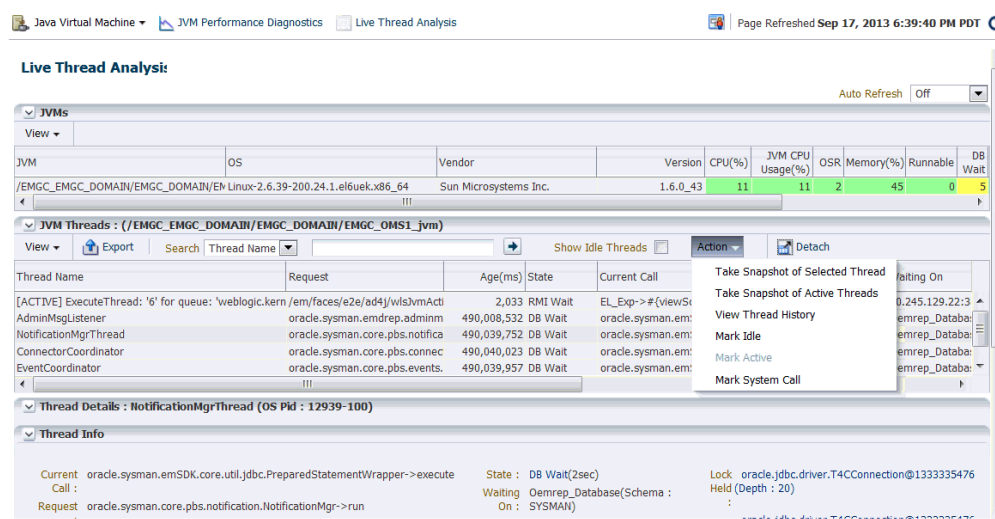
4. Click the **Show Metric Palette** button. The metric palette has a folder for the current target (JVM) and the related targets. You can add or remove metric charts. Leaf nodes act as check boxes. Clicking a leaf node on causes a chart to be added. Clicking it off removes the metric. Dragging a leaf node from the palette to a chart or legend adds the metric to that chart.

21.5.4 Viewing the JVM Live Thread Analysis Page

This page shows the real-time data for a selected JVM. This data is useful in analyzing the various active and idle threads on the JVM. During analysis you can drill down from the thread level to methods used in the thread, to local variables that are part of the method. To view this page, select **Middleware** from the **Targets** menu and click on a Java Virtual Machine target. Select the **Live Thread Analysis** option from the **Java Virtual Machine** menu.

You can also access this page by clicking the **Live Thread Analysis** link on top left corner of the page.

Figure 21–15 JVM Live Thread Analysis Page (I)



This page shows the following:

- **JVM Threads:** This table shows a list of all the threads running in the JVM. Click on a thread to view the thread details in the Thread Info table. For each thread, the Thread Name, Request, Age, OS PID, Current Call, File Name, Line, State, Waiting On, Wait Time, Lock Held, ECID.

If the ADP or BTM Agent is running, the Request Name and Request Age is displayed. If a thread is in the **DB Wait State**, the Waiting On column displays the name of the database the thread is waiting on, and the time the thread has to wait is displayed in the Wait Time column. You can click on the link in the DB Wait column to view the database diagnostics details. This is helpful in tracking database issues and determining the application request responsible for the database activity.

Note: You can view the database diagnostics details if:

- The JVM Diagnostics Agent is running on the JVM that initiated the request.
- The monitored database must be registered by the JVM Diagnostics Engine.

You can perform the following actions:

- **Take a Snapshot of a Selected Thread or Active Threads:** Select a thread from the list and choose the **Take Snapshot of a Selected Thread** option from the Actions menu. The Thread Snapshot page is displayed where you take a snapshot. If you select the **Take Snapshot of Active Threads** option, you can take a snapshot of all active threads running on this JVM. You can specify the following parameters for each snapshot:
 - * Poll Interval: Interval after which snapshot should be repeated.
 - * Poll Duration: Duration for which the snapshot should be taken.
 - * Thread Details: You can specify if the thread details need be included in the snapshot.

- * **Try Changing Threads:** Sometimes the stack associated with the thread may change rapidly which makes taking the snapshot difficult. If you select this parameter, you can suspend the thread and take the snapshot.
- * **Include Network Waits:** Specify if network wait threads need to be included in the snapshot.
- * **All Threads:** Specify if all threads (active and idle) must be included in the snapshot.
- * **Allow Trace Interrupt:** Indicate whether the trace process can be interrupted.

A snapshot file with details of the selected thread or active threads (depending on your selection) is generated. From the **Java Virtual Machine Pool** menu, select **Thread Snapshots** to view additional details.

- **Mark Idle:** Select a thread from the list and from the **Action** menu, select **Mark Idle** to mark a thread as idle.
- **Mark Active:** If you selected the Show Idle Threads check box, a list of idle threads is displayed. Select a thread and from the **Action** menu, select **Mark Active** to mark it as an active thread.
- **View Thread History:** Select a thread and from the Action menu, select **View Thread History**. The historical data for the thread for the last 30 minutes is displayed.
- **Mark System Call:** Apart from the threads defined as System Calls in the JVMMD Configuration page (see [Section 21.2.1, "Configuring the JVM Diagnostics Engine"](#)), you can mark specific threads as system calls. Select a thread from the JVM Threads table. From the **Action** menu, select **Mark System Call** to mark this thread as a **System Call**. All user calls that are marked in this manner will now be treated as System Calls. If you selected a marked call and click **Unmark System Call**, the thread will now be treated as a User Call.
- **Show Idle Threads:** Select this check box to list only the idle threads in the JVM Threads table.

Figure 21–16 JVM Live Thread Analysis Page (II)

The screenshot displays the 'JVM Live Thread Analysis Page (II)' in the Oracle Enterprise Manager Cloud Control interface. The page title is 'Java Virtual Machine - JVM Performance Diagnostics - Live Thread Analysis'. The page was refreshed on Sep 17, 2013 8:03:40 PM PDT.

The main table lists threads with columns: Thread Name, Request, Age(ms), State, Current Call, File Name, Line, and Waiting On. The first thread is '[ACTIVE] ExecuteThread: 'S' for queue: 'weblogic.kernel /em/faces/e2e/ad4j/jvmTarget' with an age of 1,134 ms and state 'RMI Wait'. Other threads include 'AdminMsgListener', 'NotificationMgrThread', 'ConnectorCoordinator', and 'EventCoordinator'.

Below the table, the 'Thread Details' section shows information for the selected thread '[ACTIVE] ExecuteThread: 'S' for queue: 'weblogic.kernel.Default (self-tuning)' (OS Pid : 12939-33642)'. The 'Thread Info' section displays the current call stack, including 'EL_Exp->#(viewScope,jvmThreadActivityManagedBean.selectedThread)' and 'Request : /em/faces/e2e/ad4j/jvmTargetHome'. The 'Thread Stack' section shows a list of frames with their depth, method, and line number.

The 'Thread Stack' table has columns: Depth, Method, File Name, and Line. The stack frames are:

Depth	Method	File Name	Line
0	java.lang.Object->wait	Native Method	
1	weblogic.rtm.ResponseImpl->waitForData	ResponseImpl.java	90
2	weblogic.rtm.ResponseImpl->getTxContext	ResponseImpl.java	130
3	weblogic.rtm.BasicOutboundRequest->sendReceive	BasicOutboundRequest.java	110
4	weblogic.rmi.cluster.ClusterableRemoteRef->invoke	ClusterableRemoteRef.java	345

The 'Information' section at the bottom shows 'Time spent in JVM for processing collection: 270.553 msec'.

- **Thread Info:** This section shows the detailed information for a selected thread. Details of thread including Current Call, Request, ECID, State, Waiting On, and Wait Request are displayed. If the thread is in the DB Wait State, click on the link to drill down to the Database Home page. See [Section 21.5.4.1, "Cross Tier Analysis"](#) for more details.
- **Thread Stack:** The Thread Stack table shows the details of the selected thread such as the depth of the thread, methods used in the thread, file where the method is used, and the line number. You can drill down from the method level to a lower level. You can do the following:
 - **Browse Local Objects:** Select a method from the table and click **Browse Local Objects**. A popup window is displayed which shows the local variables, objects, their classes, and values.
 - **Export:** You can export the details of a selected thread to a file by clicking **Export**. You are prompted to specify the directory in which the file is to be stored. Enter the path and click **Save** to save the file in .csv format.
 - **Mark / Unmark System Call:** You can mark a selected method as a system call. Select a method from the Thread Stack table and from the **Action** menu, select **Mark System Call**. All methods marked in this manner will be treated as system calls. If you select a marked call and click **Unmark System Call**, the method will now be treated as a user call.
- **Auto Refresh:** You can refresh the data that is displayed by specifying the Auto Refresh period.

21.5.4.1 Cross Tier Analysis

You can trace any JVM activity from the JVM thread to the database. You can view cross tier correlation for live threads and historical monitored data.

Before you establish cross tier correlation, ensure that the database is an Enterprise Manager target and has been registered with JVM Diagnostics. To register the database, select the **Application Performance Management** option from the **Setup** menu, then click **Setup JVM Diagnostics** in the Application Performance Management page. Click on the **Register Databases** tab. The list of registered database targets is displayed.

If the JVMD Agent Required field has a **No** value, you can proceed with the cross tier analysis. If the field has a **Yes** value, you must ensure that the root user or the same OS user who started the database must be running the JVM Diagnostics Database Agent on the target database machine. If the JVMD Agent Required field has a **Status Unavailable** value, you cannot perform cross tier analysis as the JDBC connection to the database cannot be established.

To view the cross tier correlation for live threads, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Thread Analysis** option from the **Java Virtual Machine** menu. See [Figure 21–8](#).
2. In the JVM Threads column, select a thread with a DB Wait State.
3. The thread details are displayed in the Thread Info section. If cross tier correlation has been established, you can see `SID=<value>"SERIALNUM=<value>"` when you hover over the State field. Click the **DB Wait** link.
4. The Database Details popup is displayed which shows the host, port, SID, user, and JDBC URL for the target database. Click the **Register All DB Targets** link to

register all database targets with JVM Diagnostics and refresh the Live Thread Analysis page.

Oracle Database 11g Release 2 supports special cross tier requirements for JVM Diagnostics and cross tier correlation is automatically established when you click the **Register All DB Targets** link. If you are using an earlier Oracle Database version, the registration process prompts you to run the JVM Diagnostics Agent on the host machine.

5. Click **View Register Databases** to navigate to the Registered Databases page where you can manually register the database target with JVM Diagnostics and check the value in the DB Agent Required column. Click **Add**, to add a database instance or a custom database. If you register a database as a custom database, the DB Name is displayed in the Waiting field in the Threads Info section but the cross tier correlation cannot be established.

To view the cross tier correlation for historical monitored data, follow these steps:

1. From the Targets menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **JVM Performance Diagnostics** option from the **Java Virtual Machine** menu.
2. The three tables Top Databases, Top SQLs, and Top DBWait Events related to the cross tier are displayed. The Top Databases table shows the top databases in which JVM or JVMs in the pool have activities. The Top DBWait Events table shows the top DB Wait events caused by the JVM threads in the database. The Top SQLs table shows the list of SQL calls sorted by the number of samples. Click a SQL call to view the charts for that call. Click the top field of a table to launch a popup which shows the names of the database on which activity was performed.
3. Click the Database Name link to drill down to the Database Diagnostics page which shows the corresponding database activity.
4. Click the Top SQLs and Top DBWait Events links to navigate to the SQL Details page and the ASH Viewer page of database diagnostics.

If cross tier correlation has been established, you can view JVM Diagnostics activities for a database (drilling up from Database Diagnostics to JVM Diagnostics). Click the JVM Diagnostics link in the Performance page to drill up to the JVM Performance Diagnostics page. Data relevant to the time interval, database and other filters is displayed.

21.5.4.2 JVM Diagnostics - Oracle Real Application Cluster Drill-Down

Oracle Real Application Cluster (Oracle RAC) databases have a complex configuration of database instances and listeners. User applications use Oracle RAC services to connect to the database instead of SIDs that are used for single instance databases. User applications can connect to Oracle RAC listeners that are listening on different machines than the actual database instances. For cross tier correlation to be established, all the listener and database instances must be discovered targets in Enterprise Manager. Cross tier correlation can be established by using either of the following options:

1. If all the database instances in the Oracle RAC have been discovered in Enterprise Manager, follow these steps to establish cross tier correlation:
 - For every database instance in the Oracle RAC, add details of all the listeners servicing that database instance by specifying the `jvmd_db_listeners_additional_info` property whose value must be in the format "`<listener name:listener host:listener IP:listener port,...`".

For instance, if the Oracle RAC has two database instances, I1 and I2 which are served by listeners L1 and L2 where L1 is listening on hostname H1, ip IP1 and port PORT1 and L2 is listening on hostname H2, ip IP2, and port PORT2, the value for the `jvmd_db_listeners_additional_info` property must be specified as 'L1:H1:IP1:PORT1,L2:H2:IP2:PORT2'. The `jvmd_db_listeners_additional_info` property is used to ensure that host name and port number used in the JDBC URL in the application running on the server monitored by JVM Diagnostics matches the right database instance.

For example, if the JDBC URL is

"jdbc:oracle:thin:@xxxx.oracle.com:1521:sid", the "`jvmd_db_listeners_additional_info`" property for all the database instances in the Oracle RAC, to which this URL is connecting must be "LISTENER:
xxxx.oracle.com:IP:1521"

- To add the `jvmd_db_listeners_additional_info` target property to the database instance, follow these steps for each database instance:
 - Enter the following command:


```
insert into mgmt_target_properties (TARGET_GUID, PROPERTY_NAME,
PROPERTY_VALUE) values ((select target_guid from mgmt_targets where
target_name='<DB Instance Name>' and target_type='<oracle_data-
base>'), 'jvmd_db_listeners_additional_info', LISTENER_
<host1>:<host2>:<IP_add1>:<Service1>, LISTENER_
<host3>:<host4>:<IP_add2>:<Service2>')
```
 - Restart the JVM Diagnostics Engine.
 - Remove (if already registered) and re-register the database instance target (member of Oracle RAC) with JVM Diagnostics.
 - Ensure that this database instance is not registered as a custom database with JVM Diagnostics.
- 2. If all the database instances in the Oracle RAC have not been discovered in Enterprise Manager:
 - Register the database instances with JVM Diagnostics as custom databases. To register the custom databases, use the same hostname, IP address, and port number, as specified in the JDBC URL (in the application running on the server monitored by JVM Diagnostics).

21.5.5 Viewing the JVM Live Heap Analysis Page

This page shows the real time organization of all objects in the JVM Heap. To view this page, select **Middleware** from the **Targets** menu and click on a JVM Pool target. Select the **Live Heap Analysis** option from the **Java Virtual Machine** menu.

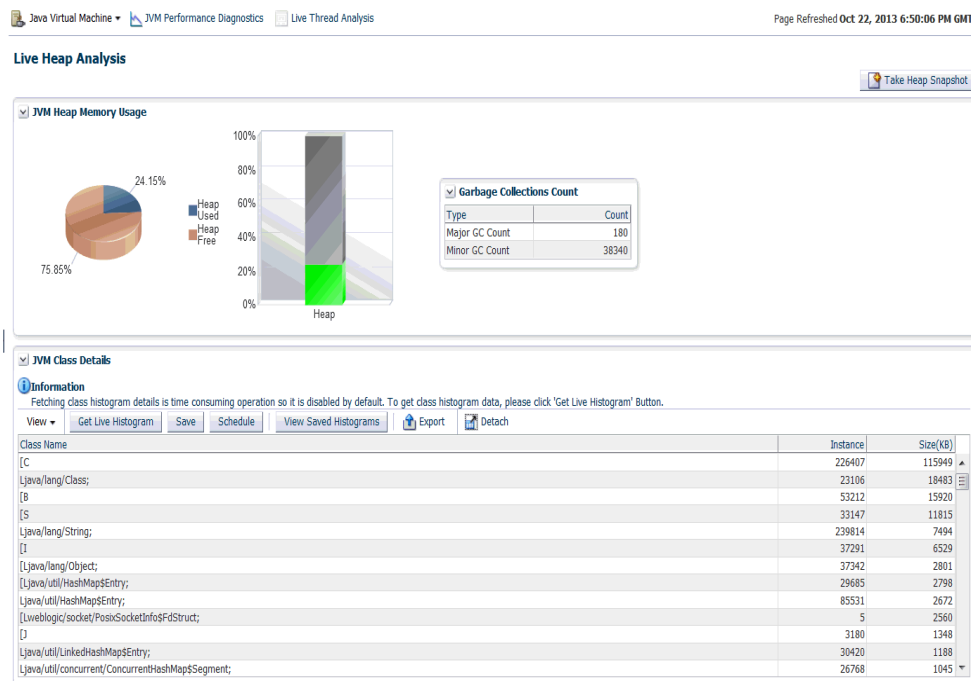
If the JVM is running at Optimization Level 0, the following details are displayed:

- Pie Charts and Bar Charts that show the percentage utilization of the entire heap (free versus used)
- Major and Minor Garbage Collections Count
- Options to take snapshots of active threads or a specific thread.
- JVM Class Details table that displays all the classes in the JVM Heap in decreasing order of their size (in KB). You can export this data to an .xls file using the **Export** option.

Note: For JVMs running at optimization level, the following details are displayed:

- JVM Heap Memory Usage table where the usage (in KB) in various heap spaces.
- JVM Heap Number of Objects table which displays the number of objects in various heap spaces.

Figure 21–17 JVM Live Heap Analysis Page



The following details are displayed:

- **Garbage Collections:** The number of objects that have been added to the garbage collection. The type of garbage collection i.e. minor or major, and the number of garbage collections of a particular type is displayed.
- **JVM Class Details:** A summary of the heap usage by different types of objects in the heap.
 - **Class Name:** The name of the space within the JVM heap.
 - **Instance:** The number of heap objects for number of instances of classes in a heap space.
 - **Size:** The size of the JVM heap.

You can do the following:

- **Take Heap Snapshot:** Click **Take Heap Snapshot** to take a heap snapshot. See [Section 21.5.7, "Taking a Heap Snapshot"](#) for details.
- **Manage Class Histograms:** A class histogram is displayed in the form of a table when the optimization level of the jamagent is 0. The histogram displays the top 300 data rows sorted by the size. You can perform several operations with

histograms. For more details, see [Section 21.5.6, "Working with Class Histograms"](#).

21.5.6 Working with Class Histograms

A class histogram is displayed in the form of a table when the optimization level of the JVM is 0. The histogram displays the top 300 data rows sorted by the size. You can perform various operations on class histograms. This section describes the following:

- [Saving a Class Histogram](#)
- [Viewing Saved Histograms](#)
- [Scheduling a Histogram Job](#)
- [Comparing Class Histograms](#)
- [Deleting Class Histograms](#)

21.5.6.1 Saving a Class Histogram

To save a class histogram, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Heap Analysis** option from the Java Virtual Machine menu.
2. In the Live Heap Analysis page, scroll down to the JVM Class Details table. Click **Save**.
3. In the Save Class Histogram window, enter a name for the snapshot and a description and click **OK**.

21.5.6.2 Viewing Saved Histograms

To view saved histograms, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Heap Analysis** option from the Java Virtual Machine menu.
2. In the Live Heap Analysis page, scroll down to the JVM Class Details table. Click **View Saved Histograms**. The Available Heap Snapshots page appears.
3. Scroll down to the Available Class Histograms table to view a list of saved class histograms.

21.5.6.3 Scheduling a Histogram Job

Scheduling will allow you to insert JVM Class Histogram data into the repository by running the job at the defined time. To schedule a class histogram job, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Heap Analysis** option from the Java Virtual Machine menu.
2. In the Live Heap Analysis page, scroll down to the JVM Class Details table. Click **Schedule**. The Schedule Settings job appears.
3. Enter a name and description for the job to be scheduled.
4. Specify the schedule as **Immediate** or **Later**. If you select **Later**, you can specify if the job needs to be run only once or repeated at specified intervals.
5. Select the frequency at which you want to repeat the job from the **Repeat** drop-down list.

6. Select the option for the Grace Period. If you select the grace period, the job will remain active and run within the specified grace period.
7. Click **OK** to schedule the histogram job. A confirmation window appears indicating that the job has successfully submitted.

To view the job status, from the Enterprise menu, select **Job**, then select **Activity**. Select the Job Type as **All**, and Target Type as **Targetless** to see the histogram job.

21.5.6.4 Comparing Class Histograms

The compare functionality allows you to compare any two class histogram snapshots listed in the table. To compare class histograms, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Heap Analysis** option from the Java Virtual Machine menu.
2. In the Live Heap Analysis page, scroll down to the JVM Class Details table. Click **View Saved Histograms**. The Available Heap Snapshots page appears.
3. Scroll down to the Available Class Histograms table to view a list of saved class histograms. Select any two class histograms and click **Compare**. The Compare Class Histograms page appears. The Class Name, Instance Size (size of each snapshot), and Number of Instances (for each snapshot) are displayed.

21.5.6.5 Deleting Class Histograms

To delete class histograms, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Heap Analysis** option from the Java Virtual Machine menu.
2. In the Live Heap Analysis page, scroll down to the JVM Class Details table. Click **View Saved Histograms**. The Available Heap Snapshots page appears.
3. Scroll down to the Available Class Histograms table to view a list of saved class histograms. Select the class histogram you want to delete and click **Remove**. A confirmation message is displayed. Click **OK** to delete the class histogram.

21.5.7 Taking a Heap Snapshot

A heap snapshot is a snapshot of JVM memory. It shows a view of all objects in the JVM along with the references between those objects. It can be used to study memory usage patterns and detect possible memory leaks. To take a heap snapshot, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a JVM target. The JVM Home page is displayed.
2. Select **Live Heap Analysis** from the **Java Virtual Machine** menu.
3. Click **Take Heap Snapshot**. The Load Heap Snapshot page appears.

Figure 21–18 Heap Snapshot Page

Java Virtual Machine ▾ JVM Performance Diagnostics ☐ Live Thread Analysis Page Refreshed May 6, 2013 7:23:55 PM PDT

Load Heap Snapshot Submit Cancel

Heap Snapshot Formats and Analysis Options

Heap Snapshot Type ☒ JVMD Format (txt) ☐ HPROF Format (binary)

Heap Analysis Options Load Heap Data to Repository ▾

Heap Snapshot Time

☒ Now ☐ Schedule 5/6/2013 7:23 PM

JVM Diagnostics Agent Host Credentials

Specify credentials for host where JVM Diagnostics Agent is running

Select credential from one of the following options.

Credential ☒ Preferred ☐ Named ☐ New

Preferred Credential Name Normal Host Credentials ▾

Credential Details Default preferred credentials are not set.

Heap Analysis Host

Add the host for heap analysis and heap loading. EM agent needs to be running on the Heap Analysis Hosts.

Warning
The analysis and load heap steps have significant memory requirement on the Heap Analysis Host. Please make sure you have sufficient free memory on the Heap Analysis Host.

Saved Heap Analysis Hosts test ▾

Heap Analysis Host Details

Attribute	Value
Alias	test
Host Name	sk03rdo.us.oracle.com

4. Specify the Heap Snapshot Type. This can be:
 - JVMD Format (txt) for analysis in JVM Diagnostics.
 - HPROF Format (binary) for analysis with external tools.
5. In the Heap Analysis Options field, select the required option from the drop down menu.
 - **Take a Heap Snapshot Only:** If you want to take a heap snapshot and load it to the repository at a later date, you must leave this field blank. Specify the schedule and click **Submit**. The heap snapshot is generated and the file name in which it is stored is displayed. You can upload the heap snapshot and analyze it using appropriate options from the Heap Snapshots menu.
 - **Load Heap Data to Repository:** Select this option to take a heap snapshot and automatically load it to the repository. If you select this option, you must ensure that the following prerequisites are met:
 - The Management Agent must be deployed on the host machine on which the JVM target is running.
 - The Heap Loader Host is a standalone machine (with high CPU and Memory) on which the Management Agent has been deployed.
 - DB Client Home which is the location of ORACLE_HOME where sqllldr & sqllplus are present.
 - There should be sufficient disk space in the system temp directory.
 - A JVM Diagnostics DB User must have been created using the create_jvm_diagnostic_db_user script.
 - **Generate Memory Leak Report:** Select this option to generate a memory leak report. The memory leak report tab shows the potential memory leak sources by identifying frequent patterns in the heap graph.

- **Generate Anti-pattern Report:** Select this option to generate an anti-pattern report. This report shows the summary or one kind of anti-pattern issue. This option is available only if the Heap Snapshot Type is HPROF (binary).
6. In the Heap Snapshot Time field, specify whether the heap snapshot is taken immediately or at a later date.
 7. Specify the credentials for the host on which the JVM Diagnostics Agent is running.
 8. If the Heap Loader Host has not been configured, click Add. Provide an Alias for the host and select the host (Heap Analysis Host) target on which the Management Agent is running. Click Save.
 9. If the Heap Loader Host has already been configured, the Available Heap Loaders are displayed. Select a heap loader from the list and enter the credentials for the Heap Loader host.

Note:

- If preferred credentials for JVM Target & Heap Loader host are set, then the Enter Credentials region will not be displayed.
 - If the Named Credentials for the JVM Diagnostics DB User is set, the Enter Credentials region will not be displayed.
-

10. Click **Submit** to submit the heap snapshot job. A confirmation message is displayed. Click **Yes** to continue. The job details are displayed in the Heap Analysis Job page. Click on the link to view the job status.

21.5.8 Analyzing Heap Snapshots

The JVM Diagnostics memory analysis feature allows you to not only find the objects responsible for the growth but also track their reachability from the root-set. With this feature, you can find the dangling reference responsible for memory leaks. To find a memory leak, you take snapshots of the JVM heap at different points in time. Between the snapshots, your JVM and Java applications continue running at full speed with zero overhead.

A heap snapshot is a snapshot of JVM memory. Each snapshot stores information about the objects in the heap, their relationships and root-set reachability. You can load the snapshots into the repository, and compare them to see where the memory growth has occurred. Click **Heap Snapshots and Class Histograms** from the menu in the JVM Pool or JVM Home page. The following page appears:

Figure 21–19 Available Heap Snapshots

The screenshot displays the 'Available Heap Snapshots' interface. At the top, there's a search bar labeled 'Snap Name'. Below it, a table lists available heap snapshots. The table has columns: Date, JVM, Vendor, Version, Heap Snap Name, Description, Size(MB), and Used(MB). One row is visible with the following data: Date: Feb 8, 2013 12:41:33 AM, JVM: /EMGC_EMGC_DOMAIN/EMGC, Vendor: (empty), Version: (empty), Heap Snap Name: heapdump_EMGC_EMGC, Description: This heap is not loaded, Size(MB): (empty), Used(MB): (empty). Below the table, there's a section for 'Available Class Histograms' with a table that has columns: Snap Date, Snap Id, JVM Name, JVM Version, Snap Name, and Snap Description. This section currently shows 'No Data to display'.

This page contains the following regions:

- **Available Heap Snapshots:** You can specify the Target Name and Target Type to filter the heap snapshots that are displayed. You can also specify the Heap ID in the Snap Name field to search for specific heap snapshots and display them. The following details is displayed:
 - **Heap ID:** The identification number for the heap snapshot.
 - **Date:** The date on which the heap snapshot was taken.
 - **JVM Name:** The server on which the JVM is running.
 - **Vendor:** The name of the JVM Vendor.
 - **Size:** The total size of the Java heap. An adequate heap size helps improve the performance of the application.
 - **Used:** The amount of heap that has already been used.

Note: If the heap snapshot was taken in HPROF format, the value in the Size and Used fields will be 0.

- **Used(%):** The percentage of heap used.

You can do the following:

- Click **Create** to take a heap snapshot. See Taking a Heap Snapshot.
- Select a heap snapshot and click the **Detail** link to drill down to the Roots page. See Viewing Heap Usage by Roots.
- Select a heap snapshot and click **Load** to load the heap snapshot to the repository. See Uploading Heap Snapshots.

- Select a heap snapshot and click **Reports** to download heap reports to the local host. These reports must have been generated and loaded to the repository for the selected heap snapshot. You can download the Memory Leak Report and the Antipattern Report.
- **Available Class Histograms:** The list of saved histograms with details such as date on which the snapshot was taken, Snap ID, Timestamp, JVM Name and Version, Description are displayed. See Section 15.5.6, "Working with Class Histograms" for more details.

21.5.8.1 Viewing Heap Usage by Roots

To view the heap usage by each class of root, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine or a Java Virtual Machine Pool target.
2. Select **Heap Snapshots and Class Histograms** from the Java Virtual Machine or Java Virtual Machine Pool target.
3. The list of available heaps is displayed. Select a heap snapshot and click **Details** to view the number of objects and memory reachable from each root. Click on the **Root** tab to view the objects directly reachable from the root. The following details are displayed:

Figure 21–20 Heap Roots

Heap Roots

Heaps > Heap 22 Detail

Roots				
Usage Dominator Roots Memory Leak Report Anti-Pattern Report				
View ▾	Compare with ...	Swap	Detach	
Root	slc03rdo.us.oracle.com:7021:ssl May 6, 2013 6:05:26 AM : 718/1015 MB Change Heap			
Root	Objects	Total Memory(KB)	Adjusted Memory(KB)	
System Classes	7387482	390,946	390,946	
JNI	5558906	284,959	1,938	
ThreadOther	5557931	283,175	11	
System Other	5553568	282,978	1	
ObjectMonitor	5553551	282,978	0	
Thread Handles	5553553	282,978	0	

Click on the **Root** link to view the objects directly reachable from the root. The following details are displayed:

- **Root:** The name of the root is displayed here. Click on the name to drill down to the Top 40 Objects page.
- **Object:** The total number of objects reachable from this root.
- **KB:** The total amount of memory reachable from this root.
- **Adj:** The adjusted memory reachable from this root. This parameter is useful in tracking the memory leak hot-spots.
- **Retained Memory:** The total size of all objects that would be removed when garbage collection is performed on this node.

Click **Compare with** to compare the heap snapshot with another one. See [Comparing Heap Snapshots](#) for details.

21.5.8.1.1 Top 40 Objects This page shows the top 40 objects reachable from a root. The objects are sorted in descending order by the ascending memory reachable from the object (or the difference of the adjusted memory reachable when comparing two heaps). This view provides a lot of rich detailed information like the amount of memory used by an object, amount of memory reachable by an object (total memory used by all the children), and number of objects reachable from a given object.

Figure 21–21 Top 40 Objects

Top 40 Objects in System Mirrors Page Refreshed Jul 31, 2011 9:10:17 PM PDT

Heaps > Roots > Heap Top

Signature	Root	Type	Field	Space	Bytes	Len	Children
java/lang/Class	C	Klass		Perm	424		13
NULL		Constant Pool	IFLD	Perm	3,856		2
S		Array	ITIF	Perm	408	196	1
NULL		Symbol	IIMP	Perm	176		1
java/lang/Class		Instance	JMR	Perm	96		2
S		Array	IINC	Perm	80	32	1
[I		Array	IMOR	Perm	32	4	1
[I		Array	ILIR	Perm	32	4	1
NULL		Symbol	NAM	Perm	32		1
[I		Array	IAKS	Perm	32	4	1
NULL		Symbol	ISFN	Perm	24		1
I		Array	IMET	Perm	16	0	1
sun/reflect/ReflectionFactory		Instance	quickCheckMemberAc Old		8		1
java/lang/reflect/AnnotatedElement		Klass	SKS	Perm	344		10
[I	C	Other		Perm	328		1
java/lang/String	C	Instance		Perm	24		1

The following details are displayed:

- **Signature:** The signature of the object. Click on the link to drill down to the Heap Object Information page.
- **Root:** The internal root identifier.
- **Type:** The type of the object which can be Klass, Instance, Method, and so on.
- **Space:** The heap space in which the object is present.
- **Bytes:** The amount of space used by the object.
- **Len:** If the object is an array, the length of the array is displayed here.
- **Children:** The number of descendants reachable from the object.
- **Adj:** Adjusted memory reachable from this object.
- **Retained Memory:** The total size of all objects that would be removed when garbage collection is performed on this node.
- **Depth:** Indicates how far this object is from the root.

21.5.8.1.2 Heap Object Information This page shows information about a specific object in the heap snapshot. The following details are displayed:

Figure 21–22 Heap Object Information

Heap Object Page Refreshed May 6, 2013 7:57:41 PM PDT

Heaps > Heap 22 Detail > Heap Object

May 6, 2013 6:05:26 AM : 718/1015 MB

▼ Heap Object Information

Gar	Space	Type	Signature	Bytes	Len	Children	Adj	Depth	Retained Objects	Retained Memory(bytes)
N	Midd	Instance	Loracle/jsp/runtimev2/jspTimeoutThread;	128	0	267,684	13,664,384	5	1,312	33

▼ Roots

Type	Field
ThreadOther	Thread-206_
JNI	
Thread Handles	

▼ Object Children

Gar	Space	Type	Signature	Field	Bytes	Len	Children	Adj	Depth
N	Midd	Instance	Loracle/jsp/runtimev2/jspPageTable;	PRECOMPILE_OF	144	0	267,651	13,663,072	6
N	Midd	Instance	Ljava/lang/ThreadLocal\$ThreadLocalMap;	NULL	24	0	29	1,064	6
N	Midd	Instance	Ljava/security/AccessControlContext;	NULL	32	0	2	72	6
N	Midd	Array	C	[C	48	16	1	48	6
N	Midd	Instance	Ljava/lang/ThreadGroup;	threads	48	0	318,213	19,151,256	3
N	Midd	Instance	Lweblogic/util/classloaders/ChangeAwareClassLoader;	NULL	104	0	185,231	12,351,344	3
N	Midd	Instance	Lweblogic/servlet/internal/WebAppServletContext;	versionId	208	0	771,704	39,872,044	2

▼ Object Parents

Gar	Space	Type	Signature	Field	Bytes	Len	Children	Adj	Depth
N	Midd	Array	Ljava/lang/Thread;		1,040	138	318,207	19,150,984	4
N	Midd	Instance	Loracle/jsp/runtimev2/jspPageTable;	NULL	144	0	267,651	13,663,072	6

- **Heap Object Information**
 - Gar: Indicates whether this object is garbage or reachable from the root.
 - Space: The heap space in which the object is present.
 - Type: The type of the object which can be Klass, Instance, Method, and so on.
 - Signature: The signature of the object.
 - Bytes: The amount of space used by the object.
 - Len: If the object is an array, the length of the array is displayed here.
 - Children: The number of descendants reachable from the object.
 - Adj: Adjusted memory reachable from this object.
 - Depth: Indicates how far this object is from the root.
- **Roots**
 - Type: The type of root which can be Klass, Instance, Method, and so on.
 - Field: If the root is a local thread, this field contains information about the thread and method.
- **Object Children**
 - Gar: Indicates whether this child is garbage or reachable from the root.
 - Space: The heap space in which the child is present.
 - Type: The type of the child which can be Klass, Instance, Method, and so on.
 - Signature: The signature of the child. Click on the link to drill down to the Details page.
 - Bytes: The amount of space used by the child.
 - Len: If the child is an array, the length of the array is displayed here.
 - Children: The number of descendants reachable from the child.
 - Adj: Adjusted memory reachable from this child.

- Depth: Indicates how far this child is from the root.
- Object Parents
 - Gar: Indicates whether this parent is garbage or reachable from the root.
 - Space: The heap space in which the parent is present.
 - Type: The type of the parent which can be Klass, Instance, Method, and so on.
 - Signature: The signature of the parent. Click on the link to drill down to the Details page.
 - Bytes: The amount of space used by the parent.
 - Len: If the parent is an array, the length of the array is displayed here.
 - Children: The number of descendants reachable from the parent.
 - Adj: Adjusted memory reachable from this parent.
 - Depth: How far this parent is from the root.

21.5.8.1.3 Comparing Heap Snapshots To find a memory leak, you can take snapshots of the JVM Heap at different points in time. Each snapshot stores information about the objects in the heap, their relationships and root-set reachability. You can compare two heap snapshots to see where the memory growth has occurred.

1. From the **Targets** menu, select **Middleware**, then click on a JVM or JVM Pool target.
2. Select **Heap Snapshots** option from the **Java Virtual Machine** or **Java Virtual Machine Pool** menu.
3. The list of available heaps is displayed. Click the **Compare Heaps** tab. The first heap in the list is selected for comparison and you are prompted to select the second heap.
4. The two heaps are compared and a comparison table is displayed in the Diff Heaps page. The details of each heap with the following details are displayed:
 - Objects: The total number of objects reachable from the root.
 - KB: The total amount of memory reachable from the root.
 - Adj: The adjusted memory reachable from this root. This parameter is useful in tracking the memory leak hot-spots. It provides a better representation of the memory used by an object by ignoring backwards pointing references from child objects to their respective parent object.
 - Delta: The difference in the total memory and adjusted reachable memory of the two heaps that are being compared.
5. Click on the root-set with the most growth to diagnose the memory leak.
6. Click the **View Summary** button to see a bottom up view of memory reachable by class of objects.

21.5.8.2 Viewing Heap Usage by Objects

Click the **Usage** tab to view the heap usage by objects. The following details are displayed:

- Object Type: The type of object, Instance, Array, Klass, and so on.
- Garbage: Indicates if this is garbage or reachable from root.

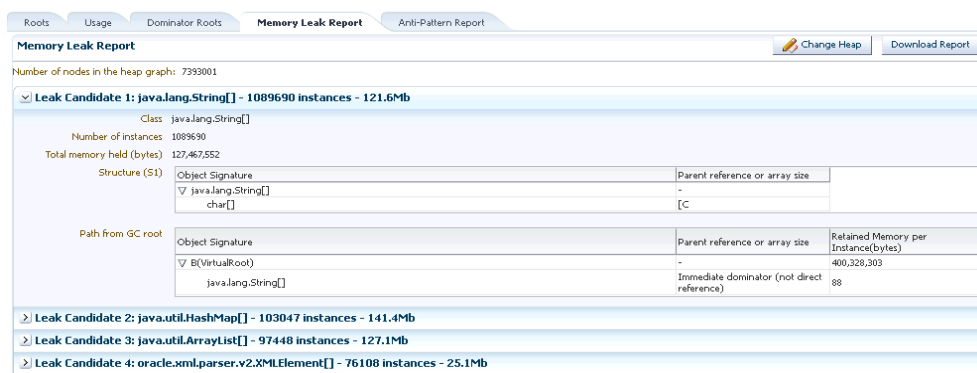
- **Objects:** The total number of objects.
- **Total Memory:** The total amount of memory reachable by root.

Click **Compare with** to compare the heap snapshot with another one. See [Comparing Heap Snapshots](#) for details.

21.5.8.3 Memory Leak Report

Click the **Memory Leak Report** tab to view the memory leak report.

Figure 21–23 Memory Leak Report



The memory leak report shows the potential memory leak sources by finding frequent patterns in the heap graph. This tab shows a list of memory leak candidates which contain the most frequent patterns in a heap and could represent potential memory leak sources. Click **Download Report** to download the memory leak report in .txt format.

21.5.8.4 Anti-Pattern Report

Click the **Anti-Pattern Report** tab. The Anti-Pattern report is divided to different sections. Each section either shows the summary or one kind of anti-pattern issue.

The first section contains a summary of the most acute problems detected by JOverflow. The second section contains the total number of Java classes and Java objects. It also contains a histogram for top memory usage objects grouped by the Class. The third section shows the reference chains for high memory consumers. Each anti-pattern section calculates the overhead that shows the amount of memory that could be saved if the problem is eliminated.

21.5.9 Managing JFR Snapshots

Note: This section assumes that Enterprise Manager is running on JRockit VM.

JRockit Flight Recorder (JFR) provides a wealth of information on the inner workings of the JVM as well as on the Java program running in the JVM. You can use this information for profiling and for root cause analysis of problems. Furthermore, JRockit Flight Recorder can be enabled at all times, without causing performance overhead—even in heavily loaded, live production environments.

You can create JFR snapshots that include thread samples, which show where the program spends its time, as well as lock profiles and garbage collection details. To create a JFR snapshot, follow these steps:

1. From the **Targets** menu, select **Middleware**, then click on a JVM target.
2. From the **Java Virtual Machine** menu, select **JFR Snapshots**.
3. Click **Create**. In the Create JFR Snapshot window, enter a description and click **Create**. The newly created snapshot appears in the JFR Snapshots page.

Downloading a JFR Snapshot

Select the JFR snapshot to be downloaded and click **Download**. You are prompted for the host credentials. Enter the credentials and click **Download** and specify the location on which the snapshot is to be saved. You can analyze this snapshot using JRockit Mission Control (JRMCI).

Note: You can download the JFR snapshot only if the JVM target is running on an Enterprise Manager monitored host.

21.5.10 Configuring a JVM

From the **Targets** menu, select **Middleware**, and then click on a Java Virtual Machine target. Select the **Configure JVM Target** option from the **Java Virtual Machine** menu. The Edit JVM Information page is displayed. You can change the JVM Pool, location of the Heap Dump Directory, and the Log Level. Click **Save** to save the changes.

21.5.11 Removing a JVM

You will see a warning message if you select the **Remove Target** option from the JVM menu. The message displays the name of the target being deleted. Click **Yes** to delete the JVM or **No** to return to the JVM Home page.

21.5.12 Add JVM to Group

Select this option to add the JVM to one or more groups. A pop-up window appears with a list of groups on which you have Operator privileges. Select one or more groups and click **Add** to add the target to the group.

21.6 Managing Thread Snapshots

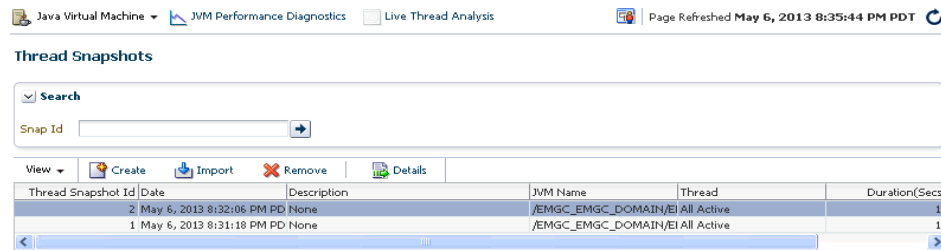
If a particular request is slow or hanging or if the entire application is slow, you can run the real-time transaction trace to view current Java application activity. You can look at the offending threads and their execution stack and analyze how much time a thread spent in waiting for DB wait or wait on a lock. Complex problems such as activity in one thread (or request) affecting the activity in the other thread or rest of the JVM can be found very quickly.

You can trace all active threads and generate a trace file that contains details such as resource usage, thread states, call stack information, and so on. During tracing, the state and stack of the target thread is sampled at set intervals for the desired duration. Follow these steps to trace active threads:

1. From the **Targets** menu, select **Middleware**, then select a Java Virtual Machine target.

2. Select the **Thread Snapshots** option from the Java Virtual Machine menu. The Thread Snapshots page appears.

Figure 21–24 Thread Snapshots Page



All the traces that have been loaded into the repository using the **Trace Active Threads** option are displayed here. For each thread, the Thread Snapshot ID, the date, JVM Name, Thread Name, Duration, and the number of samples taken during the trace is displayed. The Thread column indicates if all threads or only active threads have been traced.

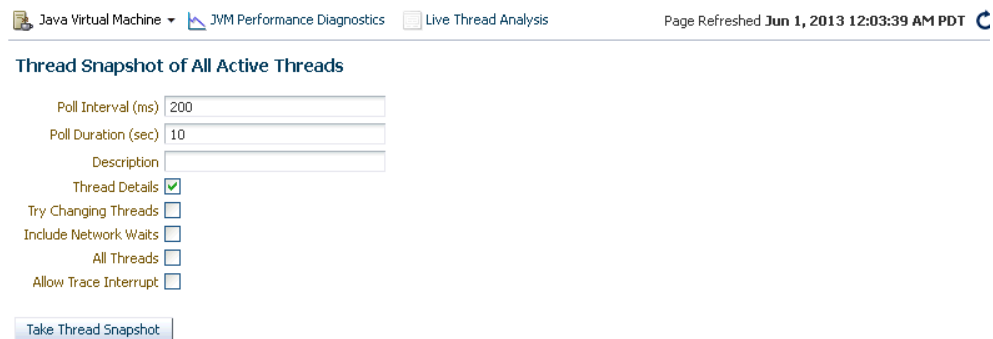
3. Click **Create** to take a thread snapshot of all active threads in the JVM. The Thread Snapshot of All Active Threads page appears where you can trace the active threads. See [Section 21.6.1, "Tracing Active Threads"](#) for details.
4. Select a thread and click the **Details** link to drill down to the Diagnostic Image Analysis page.
5. Select a thread snapshot and click **Import** to upload a thread snapshot from your local machine. The Import Thread Snapshot dialog box is displayed. Click **Browse** and select the thread snapshot to be imported and click **OK**.

21.6.1 Tracing Active Threads

To trace active threads, follow these steps:

1. Click **Create** in the Thread Snapshots page. The Thread Snapshot of All Active Threads page appears.

Figure 21–25 Tracking Active Threads



2. Specify the following details:

- Poll Interval (ms): The time interval between successive samples. The default value is 200 ms but can be changed.
 - Poll Duration (sec): The duration for which the thread snapshot should be taken.
 - Trace Thread Details: If this box is unchecked, only the last user call for the active thread will be stored. If the box is checked, all calls for the active thread will be stored, so you can view the call stack. Checking the box increases the overhead and space requirements
 - Try Changing Threads: If a thread stack changes during a sample (this can happen when a thread is using CPU), JVM Diagnostics will skip that thread for that sample. If you find missing samples, use this feature to retrace the changed stacks. This will retry (up to 5 times) threads with changing stacks. It will also make system calls to get the stack if possible.
 - Include Network Waits: Most JVMs have large number of idle threads waiting for network events. If you leave this check box unchecked, idle threads will not be included in the trace. Checking this box increases the overhead and space requirements.
 - Trace All Threads: Check this box if both idle and active threads will be included in the trace.
 - Allow Trace Interrupt: Allows you to interrupt the trace process.
3. Click **Take Thread Snapshot** and click **OK** to generate the trace file. When the trace has been completed successfully, click **here** link to view the trace data in the Diagnostics Image Analysis page.

21.7 Analyzing Trace Diagnostic Images

A trace diagnostic image contains details such as resource usage, thread states, call stack information etc. The trace diagnostic image captures thread data at short intervals. If an application is hanging or is slow, you can analyze these threads and find out the application tier that causing the delay.

On the Diagnostic Image Analysis page, you can:

- Click **Description** to view details of the thread snapshot being analyzed. The following Server State charts are displayed:
 - Active Threads by State: This chart shows the status of all threads in the JVM. The threads can be in different states like RMI, IO, NET, DB, CPU, and LOCK.
 - CPU Utilization by JVM: This chart shows the CPU utilization in the JVM.
 - Heap Utilization by JVM: This chart shows the heap utilization in the JVM.
- You can filter the data that is displayed by specifying various criteria such as Method Name, JVM Name, Thread State, DBState, and so on. Check the **Ignore Filters** check box if you want to ignore the specified filters. The Active Threads by State, Top Requests, Top Methods, Top SQLs, Top DBWait Events, and Top Databases charts are displayed.
- Click on the **Threads** tab to view the Thread State Transition, Metric By Active States, and Method data.

21.8 Viewing the Heap Snapshots and Class Histograms

The JVM Diagnostics memory analysis feature allows you to not only find the objects responsible for the growth but also track their reachability from the root-set. With this feature, you can find the dangling reference responsible for memory leaks. To find a memory leak, you take snapshots of the JVM heap at different points in time. Between the snapshots, your JVM and Java applications continue running at full speed with zero overhead.

To view and analyze the heap usage, select **Heap Snapshots and Class Histograms** from the Java Virtual Machine Pool or Java Virtual Machine menu. The following regions are displayed:

- **Available Heap Snapshots:** You can specify the Target Name and Target Type to filter the heap snapshots that are displayed. You can also specify the Heap ID in the Snap Name field to search for specific heap snapshots and display them. The following details is displayed:
 - **Heap ID:** The identification number for the heap snapshot.
 - **Date:** The date on which the heap snapshot was taken.
 - **JVM Name:** The server on which the JVM is running.
 - **Size:** The total size of the Java heap. An adequate heap size helps improve the performance of the application.
 - **Used:** The amount of heap that has already been used.
 - **Used(%):** The percentage of heap used.

You can do the following:

- Select a heap snapshot and click the **Detail** link to drill down to the Roots page. See [Section 21.5.8.1, "Viewing Heap Usage by Roots"](#).
- Select a heap snapshot and click **Load** to load the heap snapshot to the repository.
- Select a heap snapshot and click **Reports** to download heap reports to the local host. These reports must have been generated and loaded to the repository for the selected heap snapshot. You can download the Memory Leak Report and the Antipattern Report.
- **Available Class Histograms:** The list of saved histograms with details such as date on which the snapshot was taken, Snap ID, Timestamp, JVM Name and Version, Description are displayed. The following options are available:
 - **Details:** Click this option to drill down to a detailed view of the heap.
 - **Compare:** Select two rows and click **Compare**. The Class Name, Instance Size (size of each snapshot), and Number of Instances (for each snapshot) are displayed.

21.9 JVM Offline Diagnostics

Diagnostic data for one or more JVM targets can be collected for a specific period and analyzed in an offline mode. This section describes the various options that are available to collect live JVM data and analyze it in offline mode. It contains the following sections:

- [Creating a Diagnostic Snapshot](#)
- [Using the Diagnostic Snapshots Page](#)

- [Analyzing a Diagnostic Snapshot](#)
- [Viewing a Diagnostic Snapshot](#)

21.9.1 Creating a Diagnostic Snapshot

You can create diagnostic snapshots for one or more JVM targets for a specified period. To create a diagnostic snapshot, specify the following:

1. From the **Targets** menu, select **Middleware**.
2. Select the **Diagnostic Snapshots** option from the **Middleware Features** menu.
The Create Diagnostic Snapshot option is also available in the JVM Performance Diagnostics page. Navigate the Performance Diagnostics page for a JVM, specify the time range for which you want to create the collection and click **Create Diagnostic Snapshot**.
3. Click **Create** in the Diagnostic Snapshots page. You can navigate to this page by clicking **Offline Diagnostics** on the Diagnostic Image Analysis page.
4. Enter a name and description for the diagnostic snapshot.
5. Specify the duration for the diagnostic snapshot.
6. Click **Add**. Select one or more JVM targets for which the diagnostic data is to be collected.

Note: The JVM targets that you select must belong to the same JVM Pool.

7. Select the diagnostic types for the selected target and click **OK**. You will see a pop-up window that indicates that the diagnostic snapshot is being created. Click **Close** after the diagnostic snapshot has been created. You will return to the Diagnostic Snapshots page.

21.9.2 Using the Diagnostic Snapshots Page

You can collect diagnostic data for one or more JVM targets and analyze them in an offline mode. This page shows the list of diagnostic snapshots that have been created. You can specify search criteria to retrieve a specific snapshot. You can do the following:

- **Create:** Click **Create** to create diagnostic snapshots for one or more JVMs. The Create Diagnostic Snapshot page is displayed.
- **Export:** Select a file and click **Export** to export the diagnostic data to a file. Enter the location in which the file is to be stored. You can review and analyze the saved file in an offline mode on the same or a different host machine.
- **Import:** Click **Import** to import an exported file with diagnostic data for a particular collection object. Specify the name of the file and upload the file from your system. You can analyze the exported file and view a summary of the diagnostic snapshot.
- **Analyze:** Select a file and click **Analyze**. The Analyze Diagnostic Snapshot page is displayed.
- **Delete:** Select a diagnostic snapshot from the list and click **Delete**. A confirmation message is displayed. Click **OK** to delete the diagnostic snapshot.

- **View:** Select a file and click **View**. The View Diagnostic Snapshot page is displayed.

21.9.3 Analyzing a Diagnostic Snapshot

This page displays the summary details of the diagnostic snapshot and a summary of all the diagnostic types of the diagnostic snapshot. You can view the thread stack, thread states, CPU Utilization, Heap Utilization, Active Threads Graphs, and Garbage Collections.

To analyze a diagnostic snapshot, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. Select the **Manage Diagnostic Snapshots** option from the **Middleware Features** menu.
3. In the Diagnostic Snapshots page, select a snapshot from the list and click **Analyze**.
4. You can analyze details for each JVM for the specified time interval. Click **More Details** to view detailed diagnostics information for the JVM. The Diagnostic Image Analysis page is displayed.

21.9.4 Viewing a Diagnostic Snapshot

This page displays the summary of the targets, target types and the diagnostic information collected.

1. From the **Targets** menu, select **Middleware**.
2. Select the **Manage Diagnostic Snapshots** option from the **Middleware Features** menu.
3. In the Diagnostic Snapshots page, select a snapshot from the list and click **View**.
4. The summary details for the selected JVM target, target types, and the diagnostic information collected for the JVM is displayed.

21.10 Viewing JVM Diagnostics Threshold Violations

An event is a discrete occurrence detected by Enterprise Manager related to one or more managed entities at a particular point in time which may indicate normal or problematic behavior. Examples of events include: a database target going down, performance threshold violation, change in application configuration files, successful completion of job, or job failure.

JVM Diagnostics threshold violations are now integrated with the Enterprise Manager Event subsystem. When a threshold violation occurs, an Enterprise Manager event is generated. To view the event, follow these steps:

1. From the **Enterprise** menu, select **Monitoring**, then select **Incident Manager**.
2. In the View panel, click **Events without Incidents**. The JVM Diagnostics events are displayed if there are any outstanding JVMD threshold violations.

Getting Started

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[illegible]

1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.

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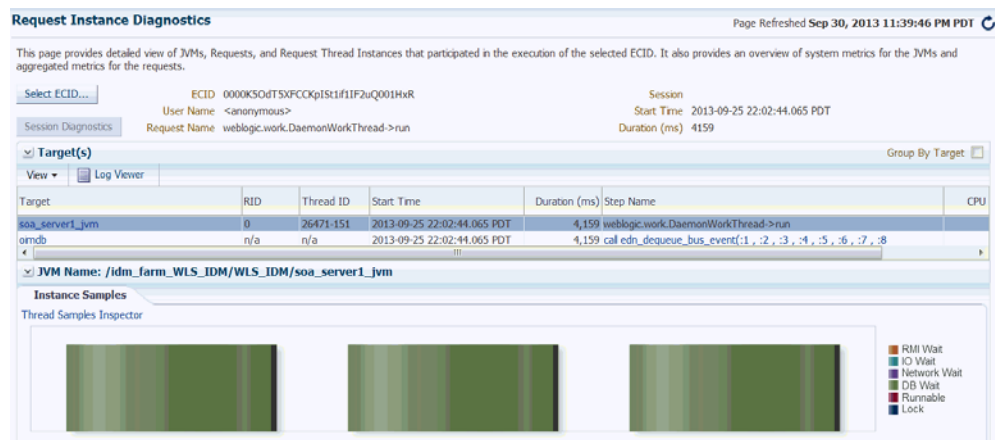
- **ECID:** The Execution Context ID (ECID) is a unique identifier for each root task and is shared across the tree of tasks associated with the root task.
- **User Name:** The user who initiated the request.
- **Request Name:** The request that is being executed.
- **Start and End Time:** The start and end time for the request.
- **Session:** The Session ID of the request.
- **Duration:** The duration of the request.

Note:

- If you have upgraded the JVM Diagnostics Engine to 12.1.0.4, the JVM Diagnostics Agent must also be upgraded to ensure that the Start Time and Duration is displayed correctly.
 - If you are using JVM Diagnostics with BTM/ADP integration where the JVM Diagnostics Engine is 12.1.0.4 and the JVM Diagnostics Agent is an earlier version, the Start Time and Duration will be displayed incorrectly. To view the correct date and duration, you must upgrade the JVM Diagnostics Agent to 12.1.0.4.
-

5. A list of ECIDs that meet the search criteria is displayed. Select an ECID from the list and click **Select**. You will return to the Request Instance Diagnostics page.

Figure 21–28 Request Instance Diagnostics (II)



6. In the Targets section, you can see a list of targets that match the search criteria. You can choose to view the details of each target or an aggregate view of each target type by selecting / unselecting the **Group By Target** checkbox.
7. If the **Group By Target** checkbox is unselected, you will see the instance level details for each target. For each JVM instance, you will see the following details:
 - **Target:** The JVM instance on which the request was executed.
 - **RID:** The Relationship ID (RID) is an ordered set of numbers that describes the location of each task in the tree of tasks. The leading number is usually a zero. A leading number of 1 indicates that it has not been possible to track the location of the sub-task within the overall sub-task tree.

- Start Time: The start time for the request.
- Duration: The duration of the request.
- Step Name: The individual steps in the request. For example, the first step could be jsp and the second one could be EJB and third could be DB.
- CPU: The CPU utilization on the JVM instance.
- Memory: The memory utilized by the JVM instance.
- GC Major / Minor: The number of objects added to the major and minor garbage collections.

You can do the following:

- Select a JVM from the list. A bar graph is displayed in the Instance Samples section. This bar graph shows the thread state in each JVM snapshot taken within the duration of the request. Each color represents different thread state like Runnable, Lock, IO wait, DB Wait, NW wait and RMI Wait. You can hover over the graph to get an in-depth view of the thread or click on a sample to analyze the details of the sample in the Sample Analyzer.
 - Click on a JVM target to drill down to the Performance Diagnostics page.
 - Click on the Thread Samples Inspector link to drill down to the Details page which shows the thread data for the selected sample.
8. If you select the Group By Target checkbox, an aggregate view of each target type is displayed. The aggregate view helps identify the target causing the delay while executing the selected ECID. For each JVM target, the following details are displayed.
- Target: The JVM target on which the request was executed.
 - Total Steps: The total number of steps involved in the request.
 - DB Wait Duration: The amount of time spent in the DB Wait status.
 - Network Wait Duration: The amount of time spent in the Network Wait status.
 - Lock Duration: The amount of time spent waiting for lock.
 - RMI Wait Duration: The amount of time spent in the RMI Wait status.
 - Duration in IO: The amount of time spent in IO operations.
 - Duration in CPU: The amount of CPU processing time.
 - Exclusive Duration: The amount of time spent in Runnable, IO and Lock state. Click on the link to see the aggregated stack for all the samples in exclusive state.
 - Total Duration: The total amount of time spent on the request.

Select a JVM target. The aggregate JVM Metrics and Application Metrics charts for the target are displayed in the bottom region.

21.12 Using emctl to Manage the JVM Diagnostics Engine

You can use emctl commands to start, stop, and list the JVM Diagnostics Engines. The details and usage patterns of these commands are explained in the table below.

Note: To run the emctl commands, you must navigate to the ORACLE_HOME/bin directory of the OMS.

Table 21–1 Extended JVMD emctl Commands

Command	Description
emctl extended oms jvmd list	Queries and lists all the JVM Diagnostics Managed servers from the Repository.
emctl extended oms jvmd start -server=<server_name1>,<server_name2>... For example: emctl extended oms jvmd start -server=EMJVMDMANAGER,MYJVMDMGR	Starts the JVM Diagnostics Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
emctl extended oms jvmd start -all	Starts all JVM Diagnostics Managed servers on the same local host on which the OMS is running.
emctl extended oms jvmd start -global	Starts all JVM Diagnostics Managed servers, even if they are running on remote hosts (remote to this OMS host).
emctl extended oms jvmd stop -server=<server_name1>,<server_name2>... For example: emctl extended oms jvmd stop -server=EMJVMDMANAGER,MYJVMDMGR	Stops the JVM Diagnostics Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
emctl extended oms jvmd stop -all	Stops all JVM Diagnostics Managed servers that are running on the same local host on which the OMS is running.
emctl extended jvmd stop -global	Stop all JVM Diagnostics Managed servers, even if they are running on remote hosts (remote to this OMS host).
emctl extended oms jvmd status -server=<server_name1>,<server_name2>... For example: emctl extended oms jvmd stop -server=EMJVMDMANAGER,MYJVMDMGR	Shows the status of the JVM Diagnostics Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
emctl extended oms jvmd status -all	Status of all the JVM Diagnostics Engines in this domain
emctl extended oms jvmd -help	Shows the online help for the JVM Diagnostics commands.

Troubleshooting JVM Diagnostics

This chapter describes the errors you may encounter while deploying and using JVM Diagnostics and the workaround steps you can follow to resolve each of them. It contains the following sections:

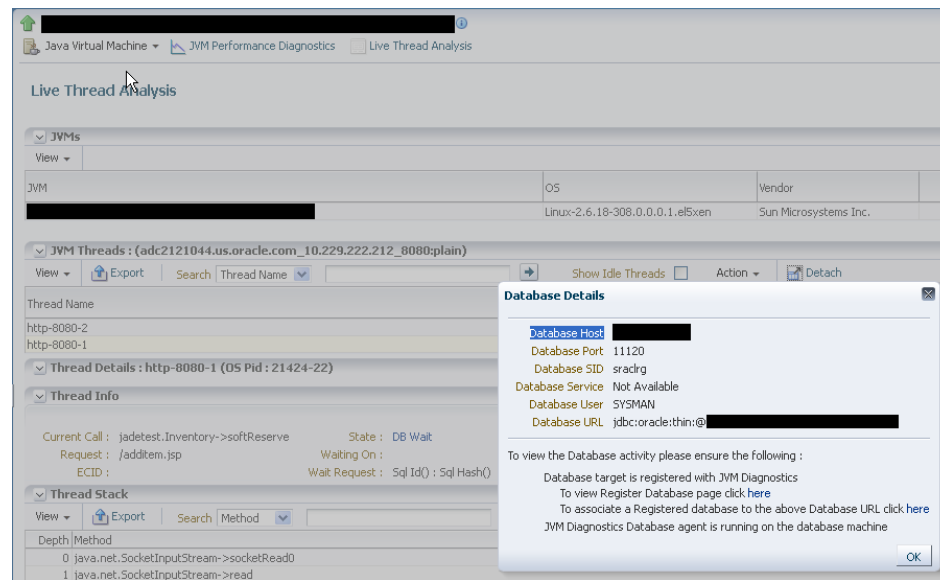
- [Cross Tier Functionality Errors](#)
- [Trace Errors](#)
- [Deployment Execution Errors](#)
- [LoadHeap Errors](#)
- [Heap Dump Errors on AIX 64 and AIX 32 bit for IBM JDK 1.6](#)
- [Errors on JVM Diagnostics UI Pages](#)
- [Frequently Asked Questions](#)

22.1 Cross Tier Functionality Errors

This section lists the errors that show the status of the JVM Diagnostics Engine. Cross tier functionality errors may occur due to the following:

- Mismatched database connection information
- Insufficient user privileges
- Database Agent Errors

In the Performance Diagnostics page, if the Top SQLs / Top DBWait Events graph contains **Unknown** entries and the Top Databases graph contains **Non-Defined** entries, and the Database Details popup window appears when you click the **DB Wait** link in the Live Thread Analysis page, cross tier correlation cannot be established.

Figure 22–1 Live Thread Analysis (Cross Tier)

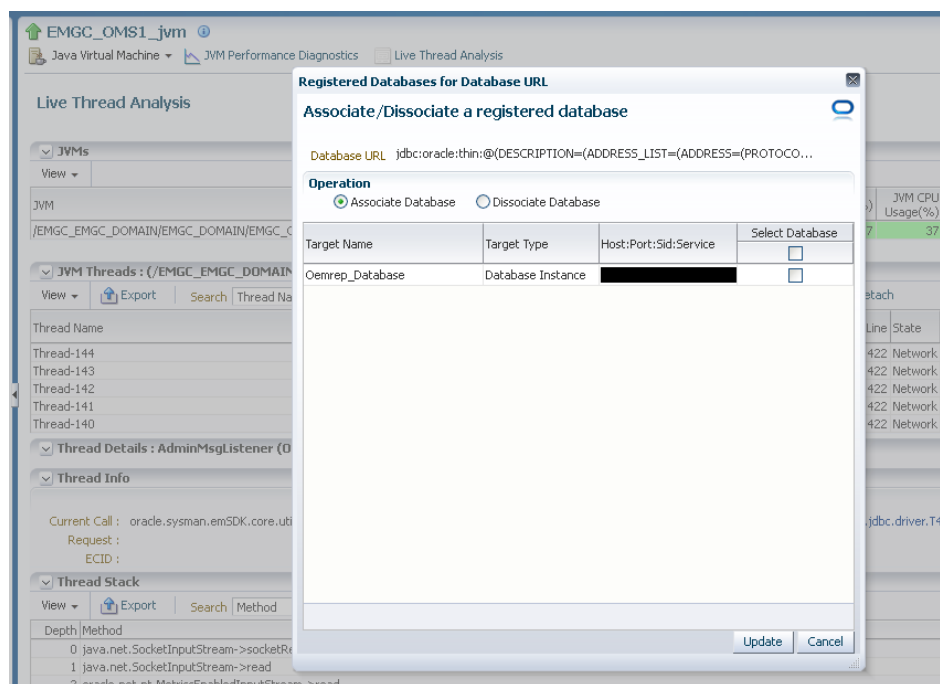
Note: If cross tier correlation is successful, when you click on the **DB Wait** link in the Live Thread Analysis page, the Database Diagnostics page for the database instance is displayed. In this case, the Top SQLs / Top DBWait Events and Top Databases graphs in the JVM Performance Diagnostics page will not contain **Unknown** and **Not Defined** entries respectively. For custom databases, the DB Wait link is not enabled.

Solution:

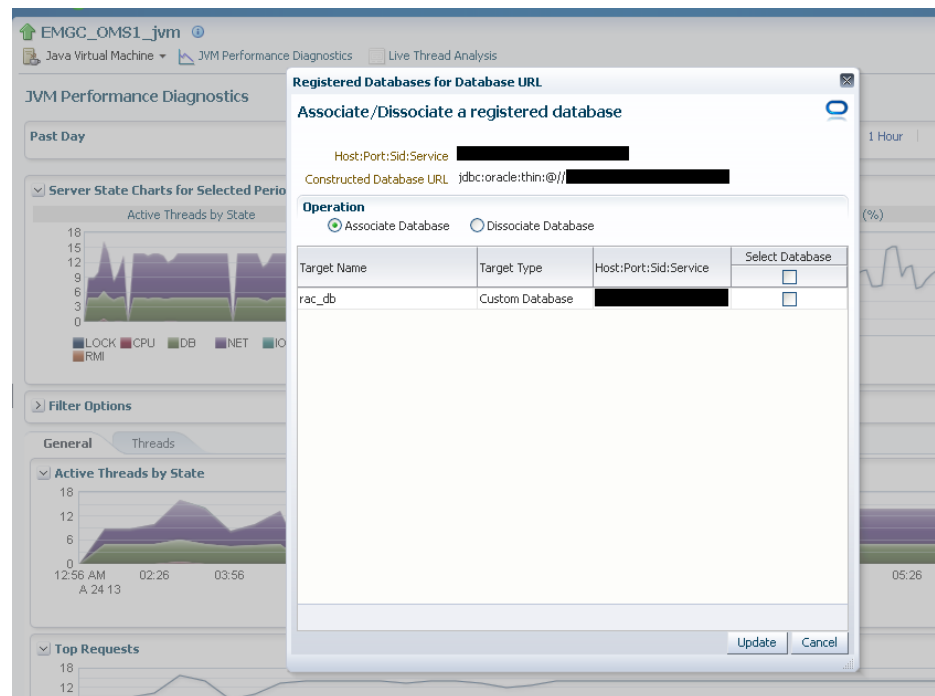
- If cross tier correlation cannot be established due to database mismatch, check if the database has been registered. From the **Setup** menu, select **Middleware Management**, then **Application Performance Management**. Select a JVM Diagnostics Engine and click **Configure**. Click the **Register Databases** tab and check whether the database has been registered. If the database has not been registered, click the **DBWait** link to examine the JDBC connection string and verify if it matches the database registered with JVM Diagnostics. For example, if the JDBC connection string contains SID, the database registered needs to have SID. Similarly, the service name, and the hostname of the database in the JDBC connection string must match that of the registered database. Another example of such information that requires matching is the hostname of the database
- If it is a custom database, the user may have insufficient privileges. In this case, check whether the user has permissions on the `v$active_services`, `v$instance`, `v$session`, `v$sqltext`, `v$process`, and `v$session_wait` tables.
- From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Select a JVM Diagnostics Engine and click **Configure**. Click the **Register Databases** tab and check whether a JVM Diagnostics DB Agent is required for the registered database. If yes, then ensure that the database agent is running on a machine on which the database is installed with the correct IP address and port number.

- If JDBC URL returned by JVM Diagnostics Agent is for one of registered databases, but cross tier correlation cannot be established due to database mismatch, wrong host name, and so on, the JDBC URL must be associated with a registered database(s). You can associate a JDBC URL with a database from the following pages:
 - **Live Thread Analysis Page:** From the **Java Virtual Machine** menu, select **Live Thread Analysis**. In the JVM Threads table, select a thread that is in the DB Wait state and click **Manage DB URL**. In the **Associate / Disassociate a Registered Database**, select a JDBC URL and click **Add** and specify the URL of the registered database with which is to be associated.

Figure 22–2 Live Thread Analysis: Associate / Disassociate a Registered Database

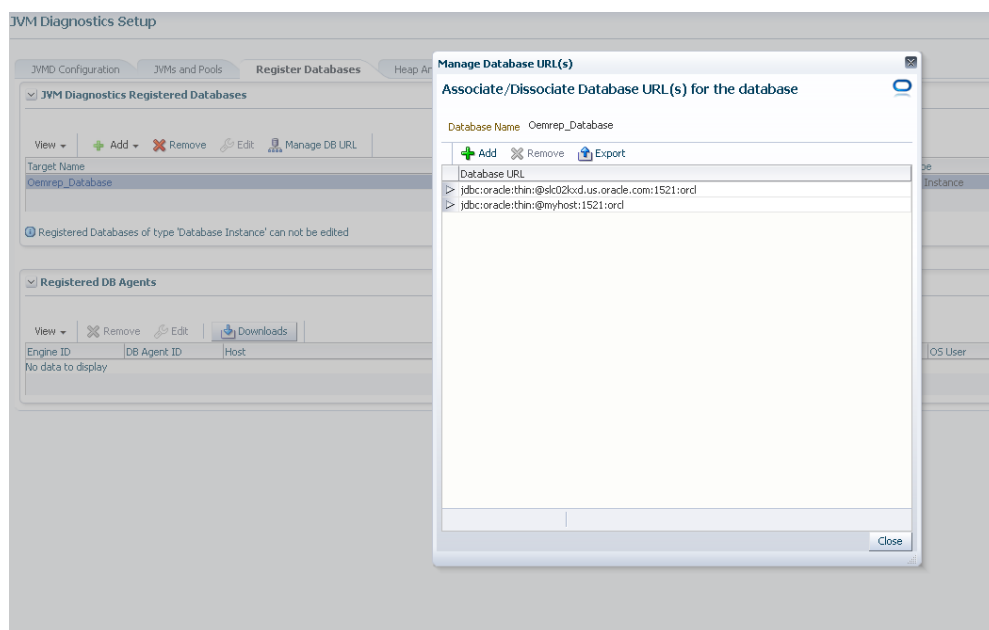


- **JVM Performance Diagnostics Page:** From the **Java Virtual Machine** menu, select **Performance Diagnostics**. In the JVM Threads table, select a thread that is in the DB Wait state and click **Manage DB URL**. In the **Associate / Disassociate a Registered Database**, select a JDBC URL and click **Add** and specify the URL of the registered database with which is to be associated.

Figure 22–3 Performance Diagnostics: Associate / Disassociate a Registered Database

- **Registered Databases Page:** From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**. Select the JVM Diagnostics Engine row in the Application Performance Management Engines table and click **Configure**.

Click the **Register Databases** tab. The JVM Diagnostics Registered Databases page appears. The list of registered databases is displayed. Select a database and click **Manage DB URL**. In the Associate / Disassociate a Registered Database, select a Database URL and click **Add** and specify the URL of the database to be associated.

Figure 22–4 Setup: Associate / Disassociate a Registered Database

- If cross tier correlation cannot be established due to mismatch of the JVM Diagnostics Agent host name with the machine name stored in `V$SESSION` table of the database (for instance, inconsistent logical naming of machine), do the following:
 - Update the `v$SESS_MACHINE` column of the `jam_jvm` table in the Enterprise Manager repository (for example, update `jam_jvm` set `V$SESS_MACHINE = 'JVMD Agent Machine name'` where `jam_jvm_id = 'jam_jvm_id'`) with the right value as specified in the `V$SESSION` of the database)
- If cross tier correlation cannot be established as the database is inaccessible to the JVM Diagnostics Manager, check the database name in the log file and check if the database is down or inactive, the Listener is down. If this is the case, the JVM Diagnostics Manager cannot connect to the database to establish the cross tier correlation.

If, after following all the above steps, cross tier correlation still cannot be established, you need to purge the JVMD Manager log file (*.out). From the **Setup** menu, select **Middleware Diagnostics** and then select **Application Performance Management**. Select a JVM Diagnostics Engine and click **Configure** and temporarily set the JVMD Engine Log Level and Cross Tier Log Level to Trace.

Turn the monitoring off temporarily (if possible) and navigate to the Live Thread Analysis page when the application is making DB calls (There should be at least on Thread in Db wait) and send the JVMD Manager logs to report the issue. Return to the previous log level and turn monitoring on again.

22.2 Trace Errors

This section lists errors that occur during tracing. The following error occurs if the Poll Duration has a large value and causes a timeout.

Error: `weblogic.transaction.internal.TimedOutException: Transaction timed out after 30 seconds.`

Solution: This error does not affect the Trace functionality and can be ignored.

22.3 Deployment Execution Errors

This section lists the errors that occur when you run the deployment script.

- **Error:** Script Exception: Error occurred while performing deploy: The action you performed timed out after 600,000 milliseconds.
Solution: To resolve this issue, check if the lock for the target WebLogic domain Administration Console has already been acquired. If it has been acquired, release it and run the script again by following these steps:
 - Login to the WebLogic Administration Console: *http://<machine address>:<weblogic port>/console*.
 - Check if there are any pending changes. If any changes are pending, activate or undo these changes as appropriate and run the script again.
- **Error:** If the user name and password for the WebLogic Administration Server are incorrect, you may see the following error:

Caused by: java.lang.SecurityException: User: <username>, failed to be authenticated.

This message is typically embedded in a long error message trail.

You may also see the following exception:

```
javax.naming.AuthenticationException [Root exception is
java.lang.SecurityException: User: weblogic, failed to be authenticated.]
at
weblogic.jndi.internal.ExceptionTranslator.toNamingException(ExceptionTranslator.java:42)
at
weblogic.jndi.WLInitialContextFactoryDelegate.toNamingException(WLInitialContextFactoryDelegate.java:788)
at
weblogic.jndi.WLInitialContextFactoryDelegate.pushSubject(WLInitialContextFactoryDelegate.java:682)
at
weblogic.jndi.WLInitialContextFactoryDelegate.newContext(WLInitialContextFactoryDelegate.java:469)
at
weblogic.jndi.WLInitialContextFactoryDelegate.getInitialContext(WLInitialContextFactoryDelegate.java:376)
at weblogic.jndi.Environment.getContext(Environment.java:315)
at weblogic.jndi.Environment.getContext(Environment.java:285)
at
weblogic.jndi.WLInitialContextFactory.getInitialContext(WLInitialContextFactory.java:117)
at javax.naming.spi.NamingManager.getInitialContext(NamingManager.java:235)
at
javax.naming.InitialContext.initializeDefaultInitCtx(InitialContext.java:318)
at javax.naming.InitialContext.getDefaultInitCtx(InitialContext.java:348)
at javax.naming.InitialContext.internalInit(InitialContext.java:286)
at javax.naming.InitialContext.<init>(InitialContext.java:211)
```

Solution: Enter the correct user name and password for the WebLogic Administration Server and run the script again.

- **Error:** This exception may occur, either if the path to the `weblogic.jar` is invalid, or the user does not have read permissions on the `weblogic.jar` file.

```
Exception in thread "main" java.lang.NoClassDefFoundError:
javax/enterprise/deploy/spi/exceptions/TargetException
Caused by: java.lang.ClassNotFoundException:
javax.enterprise.deploy.spi.exceptions.TargetException
at java.net.URLClassLoader$1.run(URLClassLoader.java:200)
at java.security.AccessController.doPrivileged(Native Method)
at java.net.URLClassLoader.findClass(URLClassLoader.java:188)
at java.lang.ClassLoader.loadClass(ClassLoader.java:307)
at sun.misc.Launcher$AppClassLoader.loadClass(Launcher.java:301)
at java.lang.ClassLoader.loadClass(ClassLoader.java:252)
at java.lang.ClassLoader.loadClassInternal(ClassLoader.java:320)
```

Solution: Ensure that the correct path is provided or the user credentials allow read access to the jar file.

- **Error:** If the WebLogic Administration Console is locked, the agent deployment job may not work as expected. You will see a message that the `agent.log` files cannot be deployment since the WebLogic Domain is locked.

Solution: JVM Diagnostics Agents are deployed by using t3/t3s protocols. Make sure the t3/t3s ports are open.

- **Error:** If you are deploying to an SSL enabled WebLogic Domain using the demo certificate, you may see an error if the WebLogic Server demo certificate has not been imported to the keystore.

Solution: You must import the WebLogic Server demo certificate to the keystore of the Management Agent that is monitoring the WebLogic Server target.

- **Error:** While copying the `deployer.zip` or `javadiagnosticagent.ear` files, errors like broken pipe appear.

Solution: The Oracle Management Service and the Management Agent must be installed by the same user or users belonging to the same group.

- **Error:** JVM D AGENT DEPLOYMENT FAILED FOR WEBLOGIC 9.2 TARGET.

The following exception occurs:

```
EM Agent home : /scratch/aime/agsh_0819/core/12.1.0.2.0
MIDDLEWARE_HOME : /scratch/aime/mw923
IS_WEBLOGIC9 : true
em agent state dir : /scratch/aime/agsh_0819/agent_inst
acsera home : /tmp/ad4j_1345730608009/4910760210525348050
wls admin url : t3://emHost.example.com:7001
wls username : weblogic
target : AdminServer?
weblogic jar path :
/scratch/aime/mw923/weblogic92/server/lib/weblogic.jar&&ls
/scratch/aime/mw923/weblogic92/server/lib/wljmxclient.jar&&ls
/scratch/aime/mw923/weblogic92/server/lib/wlcipher.jar
application name : HttpDeployer?
agent keystore location :
/scratch/aime/agsh_0819/agent_inst/sysman/config/montrust/AgentTrust.jks
Command used for deployment:
/scratch/aime/agsh_0819/core/12.1.0.2.0/jdk/bin/java -cp
/tmp/ad4j_1345730608009/4910760210525348050/ADPAgent/lib/mips.jar:/scratch/aim
e/mw923/weblogic92/server/lib/weblogic.jar&&ls
/scratch/aime/mw923/weblogic92/server/lib/wljmxclient.jar&&ls
/scratch/aime/mw923/weblogic92/server/lib/wlcipher.jar
```

```
-Dweblogic.security.SSL.ignoreHostnameVerify=true
-Djava.security.egd=file:/dev/./urandom
-Dweblogic.security.SSL.trustedCAKeyStore=/scratch/aime/agsh_0819/agent_inst/
sysman/config/montrust/AgentTrust.jks-Dsun.lang.ClassLoader.allowArraySyntax=
true -Dbea.home=/scratch/aime/mw923
com.acsera.ejb.Deployer.RemoteHttpDeployerShell -deploy -adminurl
t3://emHost.example.com:7001 -upload -source
/tmp/ad4j_1345730608009/4910760210525348050/ADPAgent/deploy/HttpDeployer.ear
-targets AdminServer? -username weblogic -name HttpDeployer?
-usenonexclusivelock
```

The application will be first undeployed on the targeted server

Usage: java [-options] class [args...]

(to execute a class)

or java [-options] -jar jarfile

(to execute a jar file)

where options include:

d32 use a 32-bit data model if available

```
-d64 use a 64-bit data model if available
-client to select the "client" VM
-server to select the "server" VM
-hotspot is a synonym for the "client" VM [deprecated]
The default VM is server,
because you are running on a server-class machine.
-cp <class search path of directories and zip/jar files>
-classpath <class search path of directories and zip/jar files>
A : separated list of directories, JAR archives,
and ZIP archives to search for class files.
-D<name>=<value>
set a system property
-verbose[:class|gc|jni]
enable verbose output
-version print product version and exit
-version:<value>
require the specified version to run
-showversion print product version and continue
-jre-restrict-search | -jre-no-restrict-search
include/exclude user private JREs in the version search
-? -help print this help message
-X print help on non-standard options
-ea[:<packagename>...|:<classname>]
-enableassertions[:<packagename>...|:<classname>]
enable assertions
-da[:<packagename>...|:<classname>]
-disableassertions[:<packagename>...|:<classname>]
disable assertions
-esa | -enablesystemassertions
enable system assertions
-dsa | -disablesystemassertions
disable system assertions
-agentlib:<libname>[=<options>]
load native agent library <libname>, e.g. -agentlib:hprof
see also, -agentlib:jdwp=help and -agentlib:hprof=help
-agentpath:<pathname>[=<options>]
load native agent library by full pathname
-javaagent:<jarpath>[=<options>]
```



```

load Java programming language agent, see
java.lang.instrument
-splash:<imagepath>
show splash screen with specified image
/scratch/aime/mw923/weblogic92/server/lib/wljmxclient.jar
ls: invalid line width: eblogic.security.SSL.ignoreHostnameVerify=true
Status returned from the java process is 512

```

22.4 LoadHeap Errors

This section lists loadheap errors.

- **Error:** The following error occurs during the heapdump operation.

```

glibc detected * free(): invalid next size (fast): 0x0965d090" ./loadheap.sh:
line 237: 32357 Aborted ./bin/${bindir}/processlog in=$infile hdr=${sumdata}
obj=${objdata} rel=${reldata} root=${rootdata} osum=${objsumdata}
rrel=${rootrel} heap=${heap_id} skip=$skipgarbage db=$dbtype $* Error
processing file /tmp/heapdump6.txt

```

Solution: Check if the heapdump operation has been successfully completed. Open the heapdump6.txt file and check if there is a heapdump finished string at the end of the file. If you see this string, load the finished dump file.

- **Error:** Heapdump already in progress, cannot take another heapdump.

Solution: Check if the heapdump operation has been successfully completed. Open the heapdump6.txt file and check if there is a heapdump finished string at the end of the file.

- **Error:** loadheap.sh created unusable unique indexes.

Solution: Run the loadheap/sql/cleanup.sql shipped with loadheap.zip to fix the unique indexes.

22.5 Heap Dump Errors on AIX 64 and AIX 32 bit for IBM JDK 1.6

The following error occurs when you try to deploy the JVM Diagnostics Agent on IBM JDK 1.6:

Error: The following can occur when the JVM Diagnostics Agent is deployed on JDK 1.6.

```

Jam Agent : can_tag_objects capability is not set. Copy /tmp/libjamcapability.so
to another directory and restart Java with argument -agentpath: <Absolute path of
libjamcapability.so>

```

Solution: Deploy the latest jamagent.war and add -agentpath:<Absolute path of libjamcapability.so after copying to another directory> to the java arguments.

- This message appears only after the JVM Diagnostics Agent has connected to JVM Diagnostics Engine. Secondly, this argument should be a JVM argument (and not a program argument)
- If the server is started using the WebLogic Administration Console (through nodemanager). these arguments can be specified in the Administration Console under **Server Start**. If the server is started from the command line (startWeblogic.sh or startManagedServer.sh), these arguments have to be specified in the startWeblogic.sh. If there are multiple servers, make sure a check

for the server name is present in the `startWeblogic.sh` to ensure that the path for the `libjamcapability.so` is separate for each server.

- A sample entry to be made in `startWeblogic.sh` is below:

```
if [ "${SERVER_NAME}" = "AdminServer" ] ; then
echo "***** MODIFIED ADMIN SERVER"
JAVA_OPTIONS="${JAVA_OPTIONS} -agentpath:<Absolute path of
libjamcapability.so.X after copying to another directory>
export JAVA_OPTIONS
fi
```
- The message "Capabilities Added by libjamcapability.so" during server startup (before the jamagent logs appear) confirms that libjamcapability.so was loaded fine.

22.6 Errors on JVM Diagnostics UI Pages

This section lists the user interface errors.

- **Error:** This is an Agent timeout error:

```
JAM Console:Socket timed out after recv -- client emHost.example.com:7001
is not Active [0] secs
JAM Console jamlooptimeout=[3]
JAM CONSOLE: JVM 1 is not active
JAM Cons ErrProcessing Request:128 JVM 1 is not active jamDAL: jamreq returned
128 return status < 0 from jamDalInst.processRequest
```

Solution: To resolve this error, increase the Agent Request Timeout (secs) and Agent Loop Request Timeout (secs).
- **Error:** The JVM Diagnostics Agent is up and running but is not displayed in the real time pages.

Solution: If the log file shows JAMMANAGER: OLD AGENT or NULL POOL or wrong optimization level, this indicates that the old JVM Diagnostics Agent or Dbagent is being used. To resolve this issue, follow these steps:

 1. From the **Setup** menu, select **Application Performance Management**.
The list of Application Performance Management Engines is displayed.
 2. Select the JVM Diagnostics Engine row, click **Configure** then click the **Register Databases** tab.
 3. Click the **Downloads** button in the Registered DB Agents region, and select JVMD Agent from the JVMD Component list. Specify the JVM Diagnostics Agent web.xml parameters, click **Download**, then click **OK** to download the jamagent.war.
- **Error:** You do not have the necessary privileges to view this page.

Solution: Ensure that you have the required JVM Diagnostics Administrator or User privileges to view the JVM Diagnostics data.

22.7 JVM Diagnostics Engine Deployment Errors

This section lists the errors that may occur when the JVM Diagnostics Engine is deployed.

Error: JVMD DEPLOYMENT FAILS, WHEN THE JVMD MANGED SERVER FAILS TO START

Server with name <domain_JVMDMANAGER> failed to be started. The failed step has logs pointing to failure to connect with the Node Manager like below connection refused. Could not connect to NodeManager.

Solution: To resolve this issue, follow these steps:

- Ensure that you have started the machine associated with the OMS server on which the JVM Diagnostics Engine is being deployed.
- Start the JVM Diagnostics Engine just deployed using the WebLogic Administration Console.
- Refresh the WebLogic Domain from the Enterprise Manager Console.

22.8 Frequently Asked Questions

This section lists some of the questions you may have while using JVM Diagnostics. It includes the following:

- [Location of the JVM Diagnostics Logs](#)
- [JVM Diagnostics Engine Status](#)
- [JVM Diagnostics Agent Status](#)
- [Monitoring Status](#)
- [Running the create_jvm_diagnostic_db_user.sh Script](#)
- [Usage of the Try Changing Threads Parameter](#)
- [Significance of Optimization Levels](#)
- [Custom Provisioning Agent Deployment](#)
- [Log Manager Level](#)
- [Repository Space Requirements](#)

22.8.1 Location of the JVM Diagnostics Logs

You can find the JVM Diagnostics logs in the following locations:

- The JVM Diagnostics Engine Log file is located at \$EMGC_JVMDMANAGER1/logs/EMGC_JVMDMANAGER1.out
- UI related errors are logged in:
 - \$T_WORK/gc_inst/user_projects/domains/GCDomain/servers/EMGC_OMS1/logs/EMGC_OMS1.out
 - \$T_WORK/gc_inst/user_projects/domains/GCDomain/servers/EMGC_OMS1/logs/EMGC_OMS1.log
- Communication errors between the JVM Diagnostics Engine and the Console are logged in \$T_WORK/gc_inst/em/EMGC_OMS1/sysman/log/emoms.log

22.8.2 JVM Diagnostics Engine Status

To check the status of the JVM Diagnostics Engine, follow these steps:

- From the **Setup** menu, select **Middleware Diagnostics**, then click **Setup JVM Diagnostics**.

- Check the JVM Diagnostics Agent log file to verify the connection between Agent and the Manager. If you see an error - JAM Agent ERROR: Cannot connect to Console:Connection refused, this indicates that the JVM Diagnostics Engine is not running.
- Check if the message JAM Console: Agent connection from:[Hostname] is present in the JVM Diagnostics Engine log file. If this message appears, it indicates that the JVM Diagnostics Engine is running and is connected to the Agent.

22.8.3 JVM Diagnostics Agent Status

To check the status of the JVM Diagnostics Agent:

- From the **Targets** menu, select **Middleware**, then click on a Java Virtual Machine target. Select the **Live Thread Analysis** option from the Java Virtual Machine menu. Check the JVM Status in the Connected JVMs table.
 - If the status is **Not Active**, this indicates that the Agent is not connected to the Manager. Check the agent logs to verify if it is running and the IP address and port number of the Manager is correct.
 - If the status is **No JVMD Agent Deployed**, the JVM Diagnostics Agent must be deployed on that JVM.
- If the JVM Diagnostics Agent is running, the active threads data must be visible. If the JVM Diagnostics Agent is not running, you will see a message - JVM is inactive, Please try again after some time.

22.8.4 Monitoring Status

To verify if the JVM Diagnostics Engine is monitoring the data:

1. From the **Setup** menu, select **Middleware Diagnostics**, then click **Setup JVM Diagnostics** in the Middleware Diagnostics page. In the JVMD Configuration page, verify that the **Enable Monitoring** check box is checked.
2. Navigate to the Monitoring page under Setup and check if monitoring status is **On** for the Pool to which the JVM being monitored belongs.
3. Navigate to the JVM Pools page under Setup and verify if the **Poll Enabled** check box has been checked for the Pool to which the JVM being monitored belongs. Monitoring should now be enabled.

22.8.5 Running the create_jvm_diagnostic_db_user.sh Script

You can run the `create_jvm_diagnostic_db_user.sh` script if you want to create less privileged users who can only load heaps using the `loadHeap` script.

22.8.6 Usage of the Try Changing Threads Parameter

This parameter should be used only when the JVM is highly active.

22.8.7 Significance of Optimization Levels

The JVM Diagnostics Agent supports three optimization levels:

- Level 0 indicates that the JVM Diagnostics Agent is using a JVMTI based engine. This level is supported for JDK 6 series on almost all supported platforms.

- Level 1 is a hybrid between level 0 and level 2. It is supported only for very few JDKs on selected platforms.
- Level 2 uses Runtime Object Analysis technique for monitoring as it is efficient at run time.

22.8.8 Custom Provisioning Agent Deployment

You can customize the JVMMD Agent deployment in the production environment by running custom provisioning scripts.

After the OMS has been installed, the `jvmd.zip` file can be found in the `plugins/oracle.sysman.emas.oms.plugin_12.1.0.0.0` directory in the Middleware installation directory. The zip file contains a set of scripts in the `customprov` directory. Details on using these scripts are described in the `README.TXT` present in the same directory. To use the custom provisioning scripts, follow these steps:

1. From the **Setup** menu, select **Middleware Diagnostics**, then click the **Setup JVM Diagnostics** in the Middleware Diagnostics page. Click the **Register Databases** tab and download the `jamagent.war` file
2. Make a copy of the deployment profile that includes the location of the downloaded `jamagent.war`, domains, and server details.
3. Run the `Perl` script on the deployment profile which will deploy the JVMMD Agent to all the specified servers.

22.8.9 Log Manager Level

The default log manager level is 3. You can temporarily increase this to a higher level if you encounter some issues. Log levels 1 to 5 are supported where:

- 1 - Error
- 2 - Warning
- 3 - Info
- 4 - Debug
- 5 - Trace

22.8.10 Repository Space Requirements

For monitoring data, Oracle recommends 50 MB per JVM per day with the default setting of a 24 hour purge interval. This amount can vary based upon runtime factors (e.g depth of call stacks, etc.) within your environment. Hence, you must check the tablespace growth periodically and if required, you may need to change the space requirements. This will ensure that database growth due to standard monitoring will occur smoothly without sudden spikes. Tablespace sizing can be affected by the following:

- **Heap Dumps:** Analyzing heaps requires a large amount of tablespace. As a standard practice, we recommend that you must have 5 times the size of heap dump file being loaded in your tablespace. Since you know the size of your dump file, make sure that there is adequate space to accommodate the dump file before it is loaded into the database.
- **Thread Traces:** While these are smaller than heaps, they are loaded into the database automatically when a user initiates a trace at the console. The size of these threads can vary dramatically depending on the number of active threads

during the trace, the duration of the trace, and the sample interval of the trace. This should usually be under 100MB but if several thread traces have been initiated, it could fill up the database quickly. Before initiating the traces, you must ensure that there is adequate space in the database.

Using Middleware Diagnostics Advisor

The Middleware Diagnostics Advisor analyzes the entire stack and provides diagnostic findings by identifying the root cause of a problem. It correlates and analyzes the input and offers advice on how to resolve the problem. For example, it can help you identify that slow SQL statements or a JDBC connection pool is causing a performance bottleneck.

You can view the diagnostic findings for one or more servers in a WebLogic Domain if the Middleware Diagnostics Advisor has been enabled.

This section covers the following:

- [Diagnosing Performance Issues with Oracle WebLogic Server](#)
- [Diagnosing Performance Issues Using Middleware Diagnostics Advisor](#)
- [Functioning of Middleware Diagnostics Advisor](#)
- [Limiting the Scope of Middleware Diagnostics Advisor](#)
- [Prerequisites](#)
- [Enabling Middleware Diagnostics Advisor](#)
- [Setting Up Middleware Diagnostics Advisor \(MDA\)](#)
- [Enabling JMS Destination Metrics](#)
- [Using Middleware Diagnostics Advisor to View and Diagnose Performance Issues](#)
- [Troubleshooting Issues Related to Middleware Diagnostics Advisor](#)

23.1 Diagnosing Performance Issues with Oracle WebLogic Server

Oracle WebLogic Server (WLS) is an application server that provides high performance and scalability. WebLogic Server also simplifies deployment and management, and accelerates time to market with a modern, lightweight development platform.

In order to keep up the performance, and scalability of WLS, it is best to detect violations and provide insight to the cause of the violation, thus enabling faster remedial action. Performance related issues are detected based on the configuration and load of the server. The most common performance issues include slow response times, and application crashes. Using Middleware Diagnostics Advisor (MDA) adds value to the WebLogic Management Pack. To find out more about using MDA for WebLogic Servers, refer [Section 23.2](#).

23.2 Diagnosing Performance Issues Using Middleware Diagnostics Advisor

Middleware Diagnostics Advisor or MDA is a diagnostic module integrated within Enterprise Manager Cloud Control for diagnosing performance issues with targets monitored in Enterprise Manager Cloud Control. Currently, MDA is supported for Oracle WebLogic Server 10g Release 3 (10.3) and higher. MDA monitors JDBC DataSources, EJBs, and JMS Queues.

MDA enables you to easily identify the underlying states in the application server environment that are that cause degradation in performance. These underlying states can manifest themselves as degradation in performance such as slow response for request, hung server, slow server, high memory utilization and high Disk I/O, and so on.

MDA analyses the overall performance of an aspect in a runtime environment. When the overall performance of the aspect degrades beyond a certain limit, MDA diagnoses the issue to find the underlying cause. However, individual one off issues, which do not affect the overall performance, are not isolated by MDA.

MDA diagnoses performances issues in the following areas:

- JDBC findings:
 - Checks if the SQL execution takes a long time.
 - Checks if the JDBC Pool size is small, and if the wait time for connections is high.
 - Checks if reclaimed connections are found for data source, and if the effective pool size is small.
- JMS findings:
 - Checks if the message processing is slow.
 - Checks if the number of messages reprocessed due to transaction timeout is high.
 - Checks if the number of messages reprocessed due to transaction rollback is high
 - Checks if the message delivery is delayed.
 - Checks if the queue slowed down due to large number of messages.
 - Checks if the queue slowed down due to large size of messages.
- EJB findings:
 - Checks if the remote call made by the EJB takes too long to return.
 - Checks if the EJB takes too long to execute.
- Thread findings:
 - Checks if there are locks that are being waited on by other threads.

Note: To view a visual demonstration on how you can use the Middleware Diagnostics Advisor to accurately size the JDBC Connection Pool, access the following URL and click **Begin Video**.

https://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5462,1

23.3 Functioning of Middleware Diagnostics Advisor

Middleware Diagnostics Advisor functions in the following way:

1. Data Collector, located on the target server, collects data at a high frequency. The collected data is then aggregated every 5 minutes.
2. Oracle Management Agent uploads the aggregated data to the Oracle Management Repository periodically.
3. On the OMS, an MDA analysis job runs every 15 minutes, and analyzes the data uploaded to Oracle Management Repository.
4. An analysis is performed every hour. If the analysis is begun at the middle of an hour, it will still be performed for the entire hour. For example, if the analysis is begun at 2:15 PM, the analysis will be performed from 2:00 PM to 3:00 PM.

At the end of the analysis hour, rules are applied to see if there are issues. There are rules which also determine the cause of the problem.

23.4 Limiting the Scope of Middleware Diagnostics Advisor

Using `emctl`, you can disable certain checks performed on targets by MDA. The following table provides the name of the check, the command, and the description.

Check	Command	Description
Thread Analysis	<code>emctl set property -sysman_pwd <sysman password> -name oracle.sysman.emas.mda.disable ThreadAnalysis -value true</code>	Disables Thread Analysis check for targets. Global setting, so cannot be used for individual targets.
EJB Analysis	<code>emctl set property -sysman_pwd <sysman password> -name oracle.sysman.emas.mda.disable EJBAnalysis -value true</code>	Disables EJB Analysis check for targets. Global setting, so cannot be used for individual targets.
JDBC Analysis	<code>emctl set property -sysman_pwd <sysman password> -name oracle.sysman.emas.mda.disable JdbcAnalysisForTargets -value <comma-separated-target-names all></code>	Disables JDBC Analysis check for targets. Enter individual targets in a comma separated list. If disabling for all targets, enter <code>all</code> .
JMS Analysis	<code>emctl set property -sysman_pwd <sysman password> -name oracle.sysman.emas.mda.disable JmsAnalysisForTargets -value <comma-separated-target-names all></code>	Disables JMS Analysis check for targets. Enter individual targets in a comma separated list. If disabling for all targets, enter <code>all</code> .

23.5 Prerequisites

Before you begin using MDA for diagnosing performance issues, meet the following prerequisites.

- Enterprise Manager has discovered the WebLogic Server as a target.
- Before enabling MDA on a target, force the configuration collection for the target.
- The JVM D Manager is configured, and the JVM D Agent is deployed on the target server.

- Ensure that you have already added preferred credentials for the host, and administrator credentials for WebLogic.
- Ensure that you have already enabled JVMD.

Note: If the JVMD Agent war file is deployed manually to Oracle WebLogic Server, follow these steps:

1. Copy <MWHOME>/plugins/oracle.sysman.emas.oms.plugin_<pluginversion>/archives/jvmd/javadiagnosticagent.ear to a temporary directory.
 2. Change to the temporary directory.
`cd/scratch/temp`
 3. Extract the files from the .ear file using the following command.
`jar -xvf javadiagnosticagent.ear`
 4. Copy the jamagent.war file that was used to deploy the JVMD agent to this directory.
 5. Create .ear file using the following command.
`jar -cvf javadiagnosticagent.ear *`
 6. Deploy javadiagnosticagent.ear manually, and enable MDA.
-

23.6 Enabling Middleware Diagnostics Advisor

MDA is enabled as soon as the JVMD Agent is deployed. To manually enable or disable MDA, follow these steps:

1. From the **WebLogic Domain** menu, select **Diagnostics**, then select **Middleware Diagnostics Advisor Configuration**.
2. On the Middleware Diagnostics Advisor Configuration page, select the target that you want to enable MDA for, and click **Enable**. (See [Figure 23–1](#).)

Note: To enable targets to be monitored by MDA, the host and domain credentials have to be provided. If you have already set up the credentials, select the required credentials in the **Host Credentials** and **Domain Credentials** tabs.

If you have not set up the credentials, provide them in the host and domain credentials tabs and proceed with the enabling of targets.

Figure 23–1 Middleware Diagnostics Advisor Configuration Page

WebLogic Domain ▾ Page Refreshed Jun 19, 2013 9:11:53 AM PDT

Middleware Diagnostics Advisor Configuration

Use this page to enable or disable analysis of Middleware Diagnostics Advisor for targets under this Oracle WebLogic Domain. A prerequisite to enable or disable a server for analysis is to have the JVMD agent deployed.¹

To configure a server for analysis, select the corresponding row in the table below and click the Enable or the Disable button.

☒ Credentials for Host and Oracle WebLogic Domain needs to be set prior to enable / disable options.

View ▾ All ▾ Enable Disable

Target Name	Type	Status
▼ /mda_sql_conn_g3_wl1034Domain/wl1034Domain	Oracle WebLogic Domain	Enabled
/mda_sql_conn_g3_wl1034Domain/wl1034Domain/AdminServer	Oracle WebLogic Server	Disabled
/mda_sql_conn_g3_wl1034Domain/wl1034Domain/ManagedServer3	Oracle WebLogic Server	Enabled
/mda_sql_conn_g3_wl1034Domain/wl1034Domain/ManagedServer4	Oracle WebLogic Server	Enabled

23.7 Setting Up Middleware Diagnostics Advisor (MDA)

MDA can be set according to your preference. To set up MDA, follow these steps:

1. From the **Setup** menu, select **Middleware Management**, and then select **Middleware Diagnostics Advisor**.
2. On the Middleware Diagnostics Advisor Setup page, you can do the following:
 - In the Analysis Job Configuration section, select **Skip Analysis Runs for all MDA-Enabled Servers**, if you want to skip all MDA analysis jobs.

Note: Selecting this option does not stop the MDA Data Collector from functioning on the target managed server.

- There is an MDA job that runs every 24 hours which purges data from the repository. The job is enabled by default and it deletes any data older than 31 days.

To set your preferred frequency, in the Purge Policy section, you can select the **Purge Data Older Than** option, and enter the preferred number of days for which the data should be retained.

Note: This is a global setting and will be applied for all targets, and all users.

- In the Finding Threshold Configuration section, set the threshold or limit (in percentage) beyond which violations should result in a finding, by adjusting the **Violations Percentage**. The default value is 10%.

Note: This is a global setting and will be applied for all findings.

- To set the wait time period (in minutes) beyond which any messages picked up will be considered as violations, adjust the **JMS Wait Time**. The default value is 5 minutes.

Note: This setting is applicable only to JMS wait time findings.

3. Click **Apply**.

23.8 Enabling JMS Destination Metrics

If Middleware Diagnostics Advisor is being enabled for the first time, it is recommended that you enable JMS Destination Metrics. However, in order to analyze JMS Queues, it is required to enable the metrics.

There are two methods that you can use to enable JMS Destination Metrics.

1. First method of enabling JMS Destination Metrics:
 - a. From the **Enterprise** menu, select **Monitoring**, and then select **Monitoring Templates**.

- b. From the search options, select **Oracle WebLogic Server** from the **Target Type** menu, and select the **Display Oracle Certified Templates** check box.
 - c. Select the **Oracle Certified MDA Template for WebLogic Server** radio button, and click **Apply**.
 - d. On the following page, select the **Template will only override metrics that are common to both template and target** radio button. This option is selected by default.
 - e. From Destination Targets, click **Add**.
 - f. From the Search and Select: Targets dialog box, select the WebLogic server on which to enable JMS Destination Metric, and click **Select**.
 - g. Click **Ok** to apply the template on the selected targets.
2. Second method of enabling JMS Destination Metrics:
 - a. From the **WebLogic Server** menu, select **Monitoring**, and select **Metric and Collection Settings**.
 - b. From the **View** menu, select **All Metrics**, and scroll down the column to find **JMS Destination Metrics**.
 - c. Click **Disabled** from the column.
 - d. On the following page, click **Enable**. Once you click Enable, enter the preferred frequency, and click **Continue**.
 - e. On the following page, click **OK**.

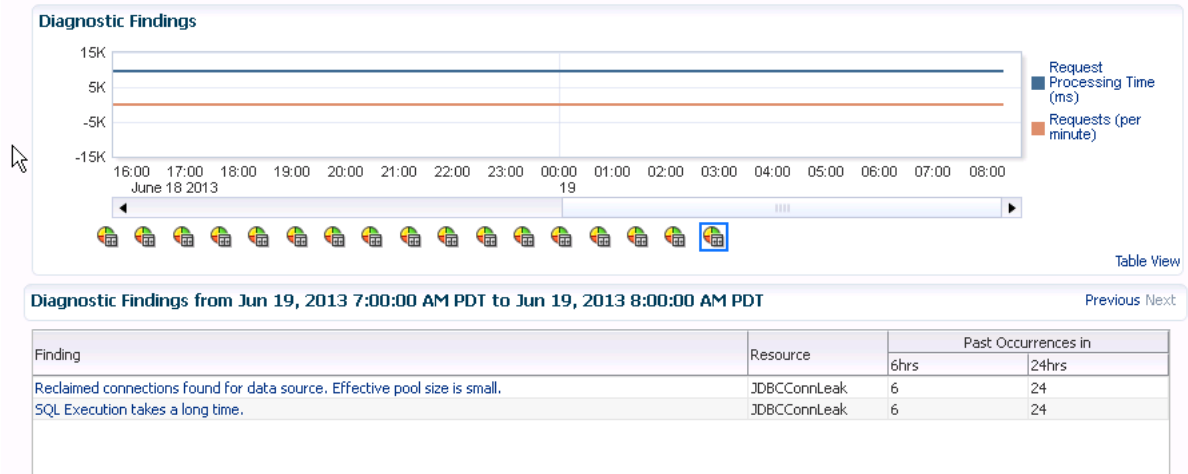
23.9 Using Middleware Diagnostics Advisor to View and Diagnose Performance Issues

To use MDA to view and diagnose performance issues, follow these steps:

1. Navigate to the target home page. From the target specific menu, select **Diagnostics**, then select **Middleware Diagnostics Advisor**.
2. On the Middleware Diagnostics Advisor page, view the graphs for the Request Processing Time, and the Requests per minute.
3. To know more about findings, if any, click on the icon below the graphs. The icons indicating each finding will be displayed below the graph indicating the time frame of the findings.
4. Once you click the findings icon, the messages appear at the bottom of the screen in the Findings tab. See [Figure 23–2](#) for an example of the Diagnostic Findings page.

Figure 23–2 Diagnostic Findings**Middleware Diagnostics Advisor**

This page displays the diagnostic findings for the WebLogic Server. The diagnostic findings are generated (if any) on an hourly basis and are represented using icons on the chart below. Selecting an icon will list all the findings for that time period in the diagnostic findings table available below the chart.



- To view more details on the findings, expand the finding in the Finding column, and then click on the link of the finding that you want to view in detail. This will take you to the **Finding Details** page.

Alternatively, you can navigate to the Finding Details page by clicking on the **Diagnostic Findings** link in the Monitoring and Diagnostics section, on the target home page.

- The Finding Details page displays the following for each finding:

- Resource**

The resource name for JMS Resource, EMS Resource, or JDBC Datasource.

- Finding**

The diagnostic finding for the Middleware domain.

For example: High number of messages reprocessed due to Transaction timeout.

- Description**

The description and reason for the diagnostic finding.

- Recommendation**

A solution or tip for the problem found.

- Thresholds**

The Thresholds section displays the threshold or limit (in percentage) beyond which violations should result in a finding. The threshold value displayed is the one last set. If you want to change the value, click the **Click Here to Configure Finding Thresholds** link. This takes you to the Middleware Diagnostics Advisor setup page, on which you can adjust the threshold value according to your preference.

- Charts**

The Charts section contains graphs pertaining to the finding. It displays graphs for messages stored, Weblogic load and response, active threads by state, and the like.

■ Additional Analysis Information

The additional analysis information for the diagnostic finding.

■ Configuration Parameters

The configuration parameters of the diagnostic finding during the time of the analysis.

■ Top Methods

The top method names for an EJB diagnostic finding. Top methods are fetched from JVM Diagnostics data.

See [Figure 23–3](#) and [Figure 23–4](#) for examples of the Finding Details page.

Figure 23–3 Finding Details page for JMS Transaction Timeout

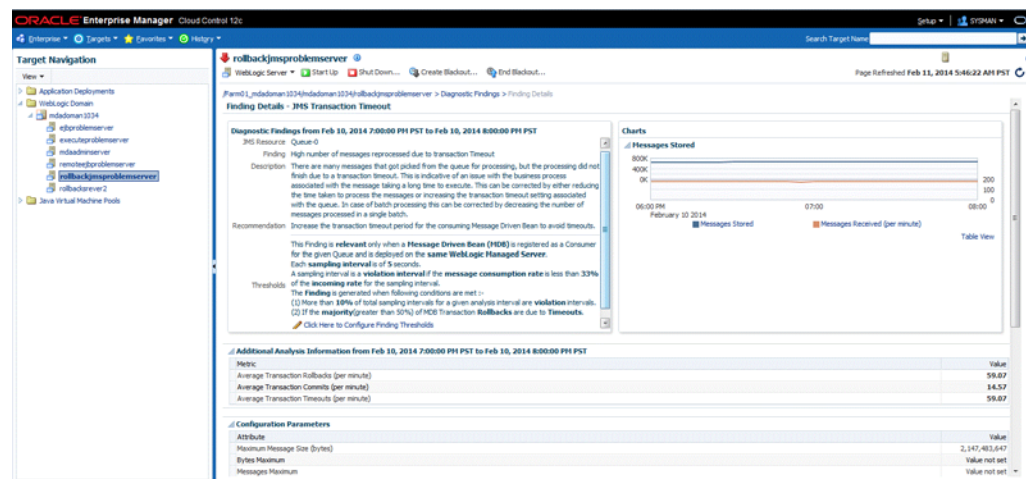
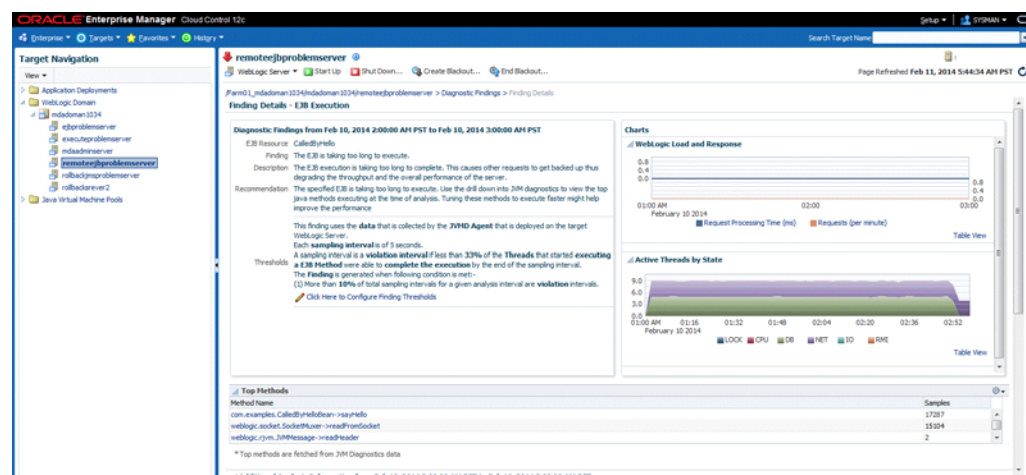


Figure 23–4 Finding Details page for EJB Execution



23.10 Troubleshooting Issues Related to Middleware Diagnostics Advisor

To troubleshoot issues related to MDA, follow the steps mentioned in the following table.

Tip	How to
Ensure that MDA is enabled on the target.	<ol style="list-style-type: none"> 1. From the Diagnostics menu, select Middleware Diagnostics Advisor Configuration. 2. Verify whether the status column displays enabled for the target. <p>If the status is disabled, enable MDA for the target.</p>
Ensure that MDA Analysis job is running properly.	<ol style="list-style-type: none"> 1. From the Enterprise menu, select Job Activity. 2. Click Advanced Search. 3. In the Name field, enter MDAANALYSISJOB%. 4. In the Target Type field, enter Targetless. 5. From the Status column, select All. 6. Click Go to check the status of the job. <p>If there are no skipped or failed jobs, the Analysis job is running properly.</p>
Ensure that the mda_dc_collection metric is getting collected from the EMD browser.	<ol style="list-style-type: none"> 1. Enable the EMD browser on the Enterprise Manager Agent which is monitoring the target. 2. Check the mda_dc_collection metric for WebLogic Server targets. 3. Refresh the page after 5 minutes. <p>Once you refresh the page, the data should be updated.</p>
Ensure that the MDA data collector status check job is running properly, and there is no error in the job output.	<ol style="list-style-type: none"> 1. From the Enterprise menu, select Job Activity. 2. Click Advanced Search. 3. On the Advanced Search page, enter MDADCSTATUSJOB as the Name, Targetless as the Target Type, and select All from the Status Column. 4. Click Go. 5. Click the MDADCSTATUSJOB link. 6. Click Show Link to see the job output.
The top SQLs are not displayed in a SQL execution finding	<p>In a SQL execution finding, if the top SQLs are not displayed, ensure that the Database is registered with JVMD. To do so, follow these steps:</p> <ol style="list-style-type: none"> 1. From the Setup menu, select Middleware Management, and then select Application Performance Management. 2. Click the JVM Diagnostics Engines(..) row, and then click Configure. 3. From the Register Databases tab, click Add, and then select Database Instance. 4. From the Search and Select: Targets dialog box, select the database that you want to register, and click Select.

Part VIII

Managing Oracle Coherence

The chapters in this part contain information on discovering and monitoring a Coherence cluster.

The chapters are:

- [Chapter 24, "Getting Started with Management Pack for Oracle Coherence"](#)
- [Chapter 25, "Monitoring a Coherence Cluster"](#)
- [Chapter 26, "Administering a Coherence Cluster"](#)
- [Chapter 27, "Troubleshooting and Best Practices"](#)
- [Chapter 28, "Coherence Integration with JVM Diagnostics"](#)

Getting Started with Management Pack for Oracle Coherence

This chapter describes the procedure to discover and monitor a Coherence cluster using Oracle Enterprise Manager Cloud Control 12c. The following sections are covered in this chapter:

- [About Coherence Management](#)
- [New Features](#)
- [Configuring a Coherence Cluster for Monitoring](#)
- [Discovering Coherence Targets](#)
- [Enabling the Management Pack](#)

24.1 About Coherence Management

Oracle Coherence is an in-memory data-grid and distributed caching solution. It is composed of many individual nodes or java processes which work together to provide highly reliable and high speed virtual caching.

Enterprise Manager provides deep visibility into performance of all the artifacts such as caches, nodes, and services. The Cluster Home page displays an overview of the performance hotspots such as nodes with minimum available memory, publisher and receiver success rate, and nodes with maximum send queue size. The Cluster Home page provides immediate visibility into the worst caches in the system based on hits-to-gets ratio which is an overall health indicator for the cluster.

Nodes and caches can be proactively monitored by the Incident Management feature. You can create a monitoring template by pre-populating the monitoring template with metrics for a Coherence target. You can export and import monitoring templates to share monitoring settings between different Enterprise Manager deployments.

Metric Extensions are the next generation of User-Defined Metrics, which enable you to extend Enterprise Manager to monitor conditions specific to the enterprise's environment by creating new metrics for any target type. By including metric extensions in export or imported monitoring templates, multiple metric extensions can be easily shared at the same time between Enterprise Manager deployments.

You can correlate cluster nodes with the underlying hosts to determine CPU and memory utilization on those hosts in order to make better decisions for scaling your clusters. You can see the association of the caches, nodes, hosts and also Oracle WebLogic targets using Coherence*Web applications.

Highly customizable performance views for monitoring performance charts and trends are available. You can overlay metrics for multiple nodes or caches in the same or different cluster for detail analysis to provide detailed visibility at the desired level. The drill down views allows you to determine the root cause of performance problems or simply identify performance trends in the Coherence Cluster.

Enterprise Manager provides a centralized cache data management feature that allows you to perform various cache operations such as add/remove index, view cache data, view query explain plan, and so on.

Enterprise Manager monitors the changing configuration of the nodes over a period of time. You can compare configurations of multiple nodes which helps identify performance bottlenecks caused by configuration changes. The Topology Viewer provides a high level topology of the entire cluster and shows the relation between caches, nodes and hosts. You can customize topology view to show some key performance metrics as well.

All of the Coherence Management features are integrated with JVM Diagnostics and provide real-time visibility into the node JVMs. You can drill down to a Coherence node's JVM from within the context of a cache and a cluster to identify the method or thread that is causing a delay. The JVM Diagnostics feature is part of the WLS Management Pack EE and Management Pack for NonOracle Middleware.

Enterprise Manager provides a complete provisioning solution. You can maintain an Oracle Coherence setup image or gold image in the Software Library and deploy it throughout the infrastructure to create completely new clusters or add nodes an existing cluster. You can use the same deployment procedure to updates nodes as well.

24.2 New Features

This section lists the new features in Oracle Enterprise Manager Cloud Control 12c. The new features are:

- **User Interface Enhancements:** Several enhancements have been made to the page layout and format of all the pages. Some of the changes made are:
 - **Navigation Tree:** The navigation tree makes it easier to navigate to any node or cache from any page. Nodes are grouped based on the hosts on which they are running, and caches are grouped based on services.
 - **Personalization:** The personalization feature allows users to customize any of the pages by adding or deleting regions, changing the page layout, adding or deleting metrics, and so on.
 - **Master-Detail View:** In the Detailed pages, a context sensitive list of nodes, caches, services, and applications is displayed in a master-detail view. When a row is selected (node, cache, service, or application), corresponding charts for the key metrics are shown in the bottom part of the page.
- **Home Page Changes:**
 - **Summary:** This region shows the overall cluster availability and configuration. Nodes are divided in two categories, storage and non-storage, you can check the status of each type of nodes. Together with number of caches and total objects gives overall cluster capacity.
 - **Incidents:** This region indicates the proactive alerts that are generated by Enterprise Manager based on the configured threshold. You can configure warning and critical threshold levels to indicate the severity of the alerts. It also shows the incidents for all the child nodes and caches.

- **Key Indicators:** This region shows the network performance and memory utilization aggregated across all the nodes in the cluster. Send/Receive success below 95% over prolonged period is a warning sign and should draw the administrator's attention, anything below 90% can lead to critical errors in the cluster, including unstable cluster and dropping of the nodes.
- **Top Components:** This region provides insight into the top 10 components for a given metric. It provides quick visibility into the performance hotspots in large data grids.
- **Charts:** The charts show the trends of the important cache metrics. These are aggregated across all the nodes where the cache is running.

24.3 Configuring a Coherence Cluster for Monitoring

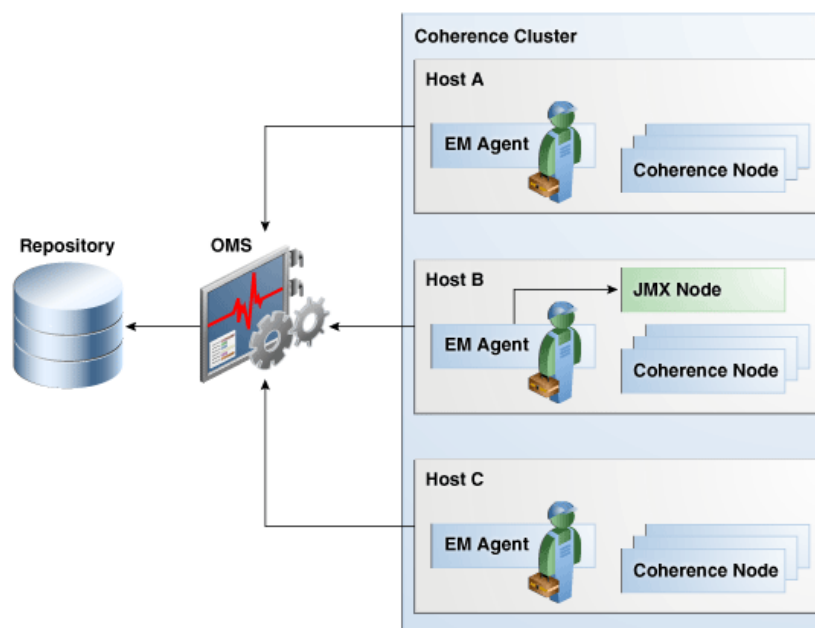
You need configure a Coherence cluster before it can be monitored in Enterprise Manager. You can:

- Configure a Standalone Coherence Cluster
- Configure a Managed Coherence Cluster

24.3.1 Configuring a Standalone Coherence Cluster

Oracle Coherence standalone deployments can be monitored using Enterprise Manager by configuring the Coherence nodes with a set of Coherence and JMX system properties (start arguments). In addition, one of the nodes will have to be configured as a central JMX management node. This JMX management node must expose all Coherence MBeans and attributes. See [Section 24.3.1.1, "Creating and Starting a JMX Management Node"](#) for details. In addition to configuring the JMX management node, the Management Agent must also be installed and configured on the same host as JMX management node. This is required to discover and monitor the Coherence cluster in Enterprise Manager.

[Figure 24–1](#) shows the configuration for monitoring standalone Coherence clusters using Enterprise Manager.

Figure 24–1 Coherence Cluster Configuration (Standalone Coherence Cluster)

As shown in the figure, Coherence Management (JMX) node's MBean server will expose MBeans for entire Coherence cluster. Enterprise Manager will connect to this management node to discover and monitor Coherence cluster.

24.3.1.1 Creating and Starting a JMX Management Node

The Management Agent uses the JMX management node (centralized MBean server) to discover and monitor the entire Coherence cluster, including the nodes and caches. As a best practice, it is recommended that the Management Agent be present on the same host as the JMX management node that is used to discover and monitor the Coherence cluster. The Management Agent must be setup on all the machines on which the Coherence nodes are running to monitor and provision the cluster. See the *Using JMX to Manage Coherence* chapter in the *Oracle Coherence Management Guide* for more details on using JMX to manage Oracle Coherence. To configure the JMX management node, you must:

- Specify Additional System Properties
- Include Additional Class Path
- Use the Enterprise Manager Custom Start Class

24.3.1.1.1 Specifying Additional System Properties

Note: Oracle recommends that the management node is configured as a storage disabled node to ensure minimal performance impact on any Coherence caches.

The following start arguments must be added to one of the Coherence nodes to configure it as the JMX central management node.

- `-Dtangosol.coherence.management.extendedmbeaname=true` (allows any restarted node to be automatically detected by Enterprise Manager. This parameter is available in Coherence 3.7.1.9 and later versions)
 - If set to true, the status of the node is automatically refreshed when a node is restarted.
 - If this property is not set, you must use the Refresh Cluster option to update the status of a node when it is restarted.
 - If you start a node after setting this property to true, all nodes in the cluster must be started after the `extendedmbeaname` property is set to true.
- `-Dtangosol.coherence.management=all` (enables monitoring for all nodes)
- `-Dcom.sun.management.jmxremote.port=<port number>` (required for remote connection)
- `-Dtangosol.coherence.distributed.localstorage=false` (disables caching and ensures that the node is a dedicated monitoring node)
- `-Doracle.coherence.home=<coherence home>`
- `-Dtangosol.coherence.member=<member name>` (required for target name)
- `-Doracle.coherence.machine=<fully qualified hostname>` (must match the name of the host discovered in Enterprise Manager)

Note: If you are using JMX credentials, you must set the following additional start arguments.

- `-Dcom.sun.management.jmxremote.ssl=true`
- `-Dcom.sun.management.jmxremote.authenticate=true`

If no JMX credentials are used, you must set these arguments to **false**.

24.3.1.1.2 Including the Additional Class Path

You must include the path to the Enterprise Manager custom jar files, `coherenceEMIntg.jar` and `bulkoperationsmbean.jar`. These jar files are available in `<OEM_Agent_Home>/<PLUGIN_HOME>/<MIDDLEWARE_MONITORING_PLUGIN_DIR>/archives/coherence` directory.

Note: The location of the .jar files may change based on the plugin version.

24.3.1.1.3 Using the Custom Start Class

In addition to configuring the system properties and the class path when starting Coherence management node, it is also required that you use the Enterprise Manager `EMIntegrationServer` class as the start class. This class allows you to register the custom MBeans required for the Cache Data Management feature of Management Pack for Oracle Coherence.

24.3.1.1.4 Example Start Script for the Coherence Management Node

An example start script for the management node is given below:

```
#
#!/bin/sh
```

```
CP=$CP:<EM_CC_Agent_Home>/plugins/oracle.sysman.emas.agent.plugin_
12.1.0.6.0/archives/coherence/coherenceEMIntg.jar:
<EM_CC_Agent_Home>/plugins/oracle.sysman.emas.agent.plugin_
12.1.0.6.0/archives/coherence/bulkoperationsmbean.jar
COH_OPTS="$COH_OPTS -cp $CP"
$JAVA_HOME/bin/java $COH_OPTS
-Dtangosol.coherence.management.extendedmbeaname=true
-Dcom.sun.management.jmxremote.authenticate=false
-Dcom.sun.management.jmxremote
-Dcom.sun.management.jmxremote.ssl=false
-Dtangosol.coherence.management=all
-Dtangosol.coherence.member=<unique member name>
-Doracle.coherence.machine=<hostname_as_discovered_in_EM>
-Dcom.sun.management.jmxremote.port=<OpenTCP_Port>
-Doracle.coherence.home=$COHERENCE_HOME
-Dtangosol.coherence.distributed.localstorage=false
-Dtangosol.coherence.management.refresh.expiry=1m
-server
-Xms2048m -Xmx2048m
oracle.sysman.integration.coherence.EMIntegrationServer
```

24.3.1.2 Configuring All Other Nodes

In addition to configuring the Coherence JMX management node, you must configure all other Coherence cluster nodes with additional Coherence specific system properties (start arguments) used by Enterprise Manager.

24.3.1.2.1 Additional System Properties for All Other Coherence Nodes

The following system properties must be added to all other Coherence nodes.

```
-Dtangosol.coherence.management.extendedmbeaname=true
-Dtangosol.coherence.management.remote=true -Dtangosol.coherence.member=<unique
member name> -Doracle.coherence.home=<coherence home>
-Doracle.coherence.machine=<machine name> should be the same as the name of the
host discovered in Enterprise Manager.
```

Note: If you are using JMX credentials, you must set the following additional start arguments.

- -Dcom.sun.management.jmxremote.ssl=true
- -Dcom.sun.management.jmxremote.authenticate=true

If no JMX credentials are used, you must set these arguments to **false**.

24.3.1.2.2 Example Start Script for All Other Coherence Nodes

An example start script for all other Coherence nodes is given below:

```
#!/bin/sh

COH_OPTS="$COH_OPTS -cp $CP"
$JAVA_HOME/bin/java $COH_OPTS
-Dtangosol.coherence.management.extendedmbeaname=true
-Dtangosol.coherence.management.remote=true
-Dcom.sun.management.jmxremote.authenticate=false
-Dcom.sun.management.jmxremote.ssl=false
-Doracle.coherence.home=<coherence home>
-Dtangosol.coherence.member=<unique member name>
```



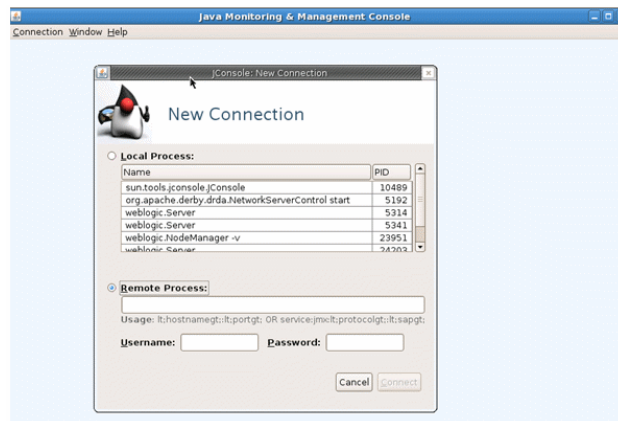
```
-Doracle.coherence.machine=<hostname>
-Dcom.tangosol.net.DefaultCacheServer
```

24.3.1.3 Testing the Configuration

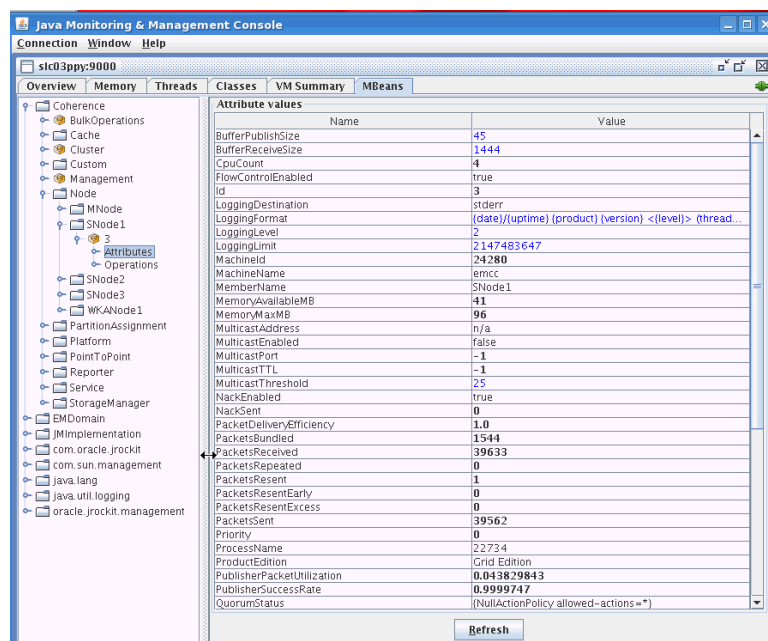
To test the Coherence cluster configuration for use in Enterprise Manager, you must verify that the central management (JMX) node has information regarding the managed objects of all other Coherence cluster nodes, caches, services, and so on. Additionally, you must verify that the central management node is accessible remotely, either through `<hostname> : <port>` OR the JMX Service URL. If JMX credentials are used, they should also be specified.

24.3.1.3.1 Verifying Remote Access for the MBean Objects Using JConsole JConsole is a Java tool available through JDK. You can use this to verify remote access to the MBean objects of entire Coherence cluster nodes, caches, services, and so on.

Figure 24–2 JConsole



To verify remote access, open JConsole and select "New Connection". In New Connection page, select **Remote Process** and provide connection details where `<hostname>` is the name of the machine where central management node is running, `<port>` is what you have specified in the `-Dcom.sun.management.jmxremote.port` parameter while starting the management node. If successful, you will see the MBean object tree.

Figure 24–3 MBean Object Tree

If you see MBeans for all Coherence nodes in the System MBean Browser or JConsole, you can now discover and monitor the Coherence cluster and its associated elements in Enterprise Manager.

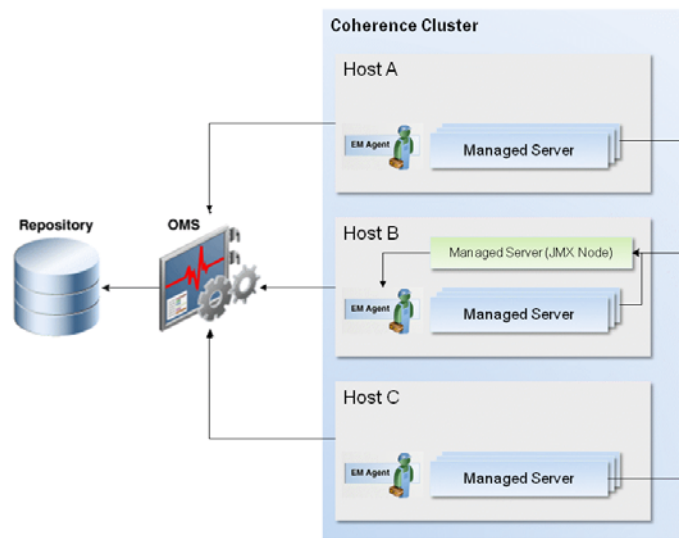
24.3.2 Configuring a Managed Coherence Cluster

To monitor a Weblogic-Coherence 12.1.2 cluster using Oracle Enterprise Manager FMW Plug-in 12.1.0.6.0, you must:

- Configure the Coherence managed servers with a set of Coherence and JMX system properties (start arguments).
- Configure one of the managed servers as a central JMX management node.

Note: This configuration is supported only with Coherence 12.1.2.

Fig [Figure 24–4](#) shows the configuration required to monitor a managed Coherence cluster.

Figure 24–4 Managed Coherence Cluster Configuration

24.3.2.1 Configuring the Central Management Node

To monitor WebLogic - Coherence clusters, you must configure one of the managed servers as a central JMX management node by adding the server startup arguments and the class path.

Note: Cluster management operations such as Stop/Start Nodes, Stop/Start Cluster, and provisioning of new nodes or Coherence managed servers and clusters are not applicable for managed Coherence servers since these are done through the Weblogic domain and its components.

24.3.2.1.1 Adding the Server Start Arguments The following start arguments must be added to one of the managed servers to configure it as the central management node.

```
-Dtangosol.coherence.management.extendedmbeanname=true
-Dcom.sun.management.jmxremote
-Dtangosol.coherence.management=all
-Dcom.sun.management.jmxremote.port=<port number>
-Dtangosol.coherence.distributed.localstorage=false
-Dtangosol.coherence.mbeans=<em-mbeans.xml>
-Doracle.coherence.machine=<machine name> - the machine name and the name of
the discovered host must be the same.
-Djavax.management.builder.initial=weblogic.management.jmx.mbeanserver.WLS
MBeaServerBuilder
```

Note: If you are using JMX credentials, you need to add the following additional start arguments.

`-Dcom.sun.management.jmxremote.ssl=true`

`-Dcom.sun.management.jmxremote.authenticate=true`

If no JMX credentials are used, these parameters must be set to **False**.

24.3.2.1.2 Additional Class Path The following additional paths must be included in the managed server class path:

- Path to the Enterprise Manager custom jars, `coherenceEMIntg.jar` and the `bulkoperationsmbean.jar`. These jars are available in `<OEM agent PLUGIN_HOME>/<MIDDLEWARE_MONITORING_PLUGIN_DIR>/archives/coherence` directory.
- Path to the Coherence custom MBean configuration. If you already have a custom MBean configuration, then you will have to add the custom MBeans to this configuration file. If a custom MBean configuration is not present, you must create a new custom MBean configuration file and add the custom MBeans.

24.3.2.1.3 Enterprise Manager Custom MBeans

The custom MBean configuration must be specified in a configuration file by using the `-Dtangosol.coherence.mbeans` start parameter. For instance, if the name of the custom MBean configuration file is `em-custom-mbeans.xml`, the start parameter must be specified as `-Dtangosol.coherence.mbeans=em-custom-mbeans.xml`.

If you already have a custom MBean configuration definition, you can add the following MBean configuration to that definition.

```
<mbeans>
<mbean id="100">
<mbean-class>oracle.sysman.integration.coherence.CacheDataManager
  </mbean-class>
<mbean-name>type=Custom,name=CacheDataManager
  </mbean-name>
<enabled>true</enabled>
</mbean>
<mbean id="110">
<mbean-class>oracle.as.jmx.framework.bulkoperations.BulkOperationsMBeanImpl
  </mbean-class>
<mbean-name>type=BulkOperations
</mbean-name>
<enabled>true</enabled>
</mbean>
</mbeans>
```

24.3.2.1.4 Example Class Path

For example, if the custom MBeans and custom jar files are present in the `"/opt/oracle/middleware/user_projects/domains/base_domain/config/coherence"` directory, you must add the following to the managed server class path:

```
/opt/oracle/middleware/user_projects/domains/base_
domain/config/coherence:/opt/oracle/middleware/user_projects/domains/base_
domain/config/coherence/coherenceEMIntg.jar:/opt/oracle/middleware/user_
projects/domains/base_domain/config/coherence/bulkoperationsmbean.jar
```

24.3.2.2 Configuring All Other Managed Servers

Apart from configuring one of the managed servers as a central management node, you also need to configure all Coherence managed servers with additional Coherence specific system properties (start arguments).

24.3.2.2.1 Additional Server Start Arguments

The following start arguments must be added to the entire Coherence cluster.

```
-Dtangosol.coherence.management.extendedmbeanname=true
```

```
-Dtangosol.coherence.management.remote=true
```

```
-Doracle.coherence.machine==<machine name> - the machine name and the name of the discovered host must be the same.
```

Note: If you are using JMX credentials, you need to add additional start arguments (where are these described?). If no JMX credentials are used, it is recommended that you set the following parameters:

```
-Dcom.sun.management.jmxremote.ssl=false
```

```
-Dcom.sun.management.jmxremote.authenticate=false
```

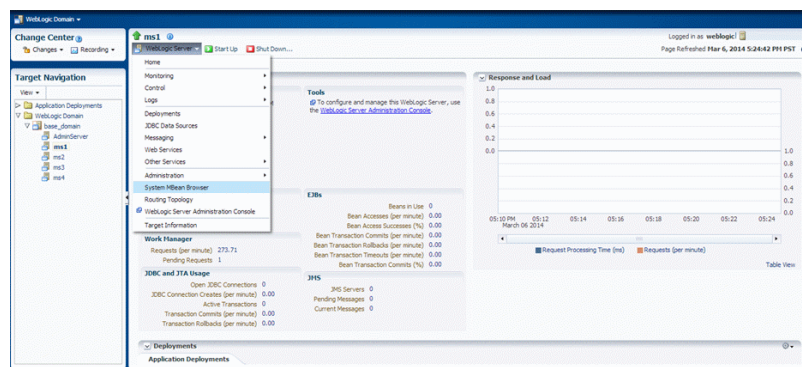
24.3.2.3 Testing the Configuration

In order to test Weblogic-Coherence cluster configuration for use in OEM, you will have to verify that central management (JMX) node has information regarding managed objects of all other Coherence cluster nodes, caches, services, etc. Additionally, you should verify that the central management node is accessible remotely, either using <hostname>:<port> OR JMX Service URL. If JMX credentials are used they should also be specified.

To test if the Weblogic-Coherence cluster configuration can be monitored in Enterprise Manager, you must verify that the central management (JMX) node has information regarding managed objects of all other Coherence cluster nodes, caches, services, and so on. Additionally, you must verify if the central management node is accessible remotely, either using <hostname>:<port> or JMX Service URL. If JMX credentials are used, they must also be specified.

24.3.2.3.1 Verifying Coherence Cluster MBean Objects Using Fusion Middleware Control You can verify that the central management (JMX) node has information regarding managed objects of entire Coherence cluster nodes, caches, services, and so on through the FMW Control System MBean Browser.

To do so, login to FMW Control and navigate to the Home page of the Weblogic managed server configured as central management (JMX) node. From the WebLogic Server menu, select System MBean Browser.

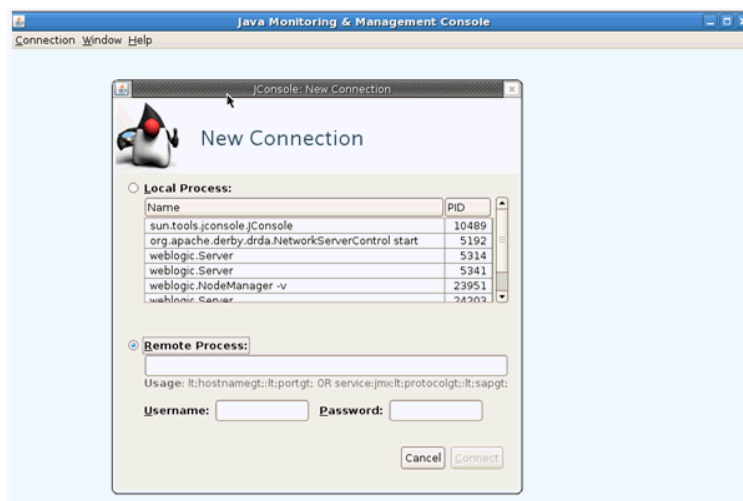
Figure 24–5 System MBean Browser

In the System MBean Browser, expand Application Defined MBeans. This shows the MBean objects for the entire Coherence cluster. All other managed servers that are participating in Coherence cluster will have MBean objects pertaining to it.

24.3.2.3.2 Verifying Coherence Cluster MBean Objects Remote Access Using JConsole

JConsole is a Java tool available through JDK. You can use this tool to verify remote access to the MBean objects of entire Coherence cluster nodes, caches, services, and so on.

Open JConsole and select New Connection. In New Connection page, select Remote Process and provide connection details. <hostname> is the name of the machine where the central management (JMX) node is running. <port> is what you have specified in the -Dcom.sun.management.jmxremote.port argument while starting the management node.

Figure 24–6 JConsole: New Connection

If the new connection is successfully started, you will see the MBean Object tree. If you see MBeans for all Coherence managed servers in System MBean Browser or JConsole, you are ready to perform discovery in Enterprise Manager. Once discovered, you can use Enterprise Manager to monitor Coherence cluster.

Figure 24–7 MBean Object Tree

Name	Value
BufferPublishSize	45
BufferReceiveSize	1444
CpuCount	4
FlowControlEnabled	true
Id	3
LoggingDestination	jdk
LoggingFormat	{date}/{uptime} {product} {version} <{level}>...
LoggingLevel	5
LoggingLimit	2147483647
MachineId	29706
MachineName	ms1
MemberName	Machine-0
MemoryAvailableMB	304
MemoryMaxMB	455
MulticastAddress	n/a
MulticastEnabled	false
MulticastPort	-1
MulticastTTL	-1
MulticastThreshold	25
NackEnabled	true
NackSent	1
PacketDeliveryEfficiency	1.0
PacketsBundled	9422
PacketsReceived	107904
PacketsRepeated	0
PacketsResent	1
PacketsResentEarly	1
PacketsResentExcess	0
PacketsSent	50663

Note: Cluster management operations such as Stop/Start Nodes, Stop/Start Cluster, Provisioning of new nodes or Coherence managed servers and cluster are not supported.

24.4 Discovering Coherence Targets

Enterprise Manager monitors the entire Coherence cluster and its artifacts. The key targets that can be monitored are Oracle Coherence Cluster, Oracle Coherence Node, and Oracle Coherence Cache. The Oracle Coherence Cluster target provides a high level view of the health of the entire cluster. The Oracle Coherence Node and Oracle Coherence Cache are child targets of the Oracle Coherence Cluster. In addition to monitoring the above target types, additional Coherence components such as Services, Connections, and Applications can also be monitored.

Note: To provision new Coherence nodes, start, and stop nodes, the Management Agent must be installed on all the hosts on which the nodes are running. For more details on provisioning Coherence nodes, see the Enterprise Manager Lifecycle Management Guide.

Prerequisites

Before you discover a Coherence cluster, you must have completed the following tasks:

- Created a Coherence cluster with one JMX management node and one or more other nodes.
- Started the JMX management node with the necessary parameters as defined in [Section 24.3.1.1, "Creating and Starting a JMX Management Node"](#).
- Started the other nodes with the necessary parameters as defined in [Section 24.3.1.2, "Configuring All Other Nodes"](#).

To discover an already running Coherence cluster, follow these steps:

1. Login to Enterprise Manager as an administrator with the **Add Target** privilege.

- From the **Targets** menu, select **Middleware**. You will see a list of Middleware targets.

Note: Alternatively, you can add a Coherence target from the Setup menu. From the **Setup** menu, select **Add Target**, then select **Add Targets Manually**. In the Add Targets Manually page, select the **Add Non-Host Targets Using Guided Process** option. Follow the steps in the wizard to add the Coherence target.

- Select Oracle Coherence in the **Add** drop-down box and click **Go**. The Oracle Coherence Cluster: Discover Cluster, Node, and Cache Targets page is displayed.

Figure 24–8 Add Coherence Target

Oracle Coherence Cluster Discovery Page Refreshed May 6, 2014 6:28:46 PM PDT

Add Oracle Coherence Cluster: Discover Cluster, Node and Cache Targets Continue Cancel

Oracle Coherence Cluster Setup Prerequisites

Before you discover a Coherence Cluster in Oracle Enterprise Manager, you must ensure that the following prerequisites are met.

- Any node, including the Coherence Management Node (MBeanServer Node), must be configured as follows:
 - Each Node must be started with `tangosol.coherence.member` (MemberName) property where the MemberName must be unique across the entire Coherence Cluster.
 - Each Node must be started with `oracle.coherence.machine` (Machine) property where the Machine must be the same as the host name used to discover the corresponding host in Oracle Enterprise Manager.
 - If the Coherence version you are using supports `tangosol.coherence.management.extendedmbeanname` (ExtendedMBean) property, Oracle recommends that this property be used for each Cluster Node. If you use this property, you must set its value to `true`.
 - If you set this property, Coherence Node target status will be automatically refreshed in Oracle Enterprise Manager when a Node is restarted.
 - If you do not set this property, you will have to invoke a Refresh Cluster from Oracle Enterprise Manager to update Coherence Node target status when a Node is restarted.
 - If you start any Node in the Cluster with the ExtendedMBean property, you must start all Nodes in the Cluster with this property.
 - Any Node started without these guidelines will be treated as a mis-configured Node and will not be added to Oracle Enterprise Manager.
- The Coherence Management Node (MBean Server) must be configured as follows:
 - The Coherence Management Node must include the `coherenceMint.jar` and `bulkoperationsmbean.jar` in its classpath. These jars are available in the `<PLUGIN_HOME>/<MIDDLEWARE_MONITORING_PLUGIN_DIRECTORY>/archives/coherence` directory. Oracle recommends that this node be **storage disabled**.
 - Coherence Management Node must be started with the `oracle.syrman.integration.coherence.LIntegrationServer` class.
 - If Coherence Management Node is not started with these guidelines, the Cluster Discovery will be aborted.

MBean Server Connection

Specify the access details for Coherence MBean Server. You may specify either the Service URL or the Host, Port and Service.

☒ Enter Host, Port and Service

* Management Node Host: * JMX Remote Port:

Service Name:

☐ Enter Service URL

MBean Server Credentials

If JMX authentication is enabled, you must specify both the username and password for accessing the Coherence MBean Server.

Username: Password:

Oracle Coherence Cluster Discovery and Monitoring Agent

Select a Management Agent that is running on the same host on which the Coherence MBean Server is running. This agent will be used to monitor the Coherence Cluster.

* Agent:

- On this page, specify the connection details of the Coherence JMX management node. This is required to discover the Coherence cluster, node and cache targets. You can select either of the following options to provide MBean Server details:
 - Host, Port, and Service:** Enter the following details:
 - Management Node Host:** Select the host on which the Management Node is running.
 - JMX Remote Port:** The port used for the JMX RMI connection. If you are using the MBean connector for Coherence MBeans, specify the `tangosol.coherence.management.remote.connectionport` property.

Note: It is recommended that you use the `com.sun.management.jmxremote.port` property.

- Service Name:** The service name used for the connection. The default is `jmxrmi`.
- MBean Server Credentials:** If JMX authentication is used, specify the user name and password required to access the MBean Server.

- **JMX Service URL:** Service URL that will be used for the connection. If you enter the URL, the values specified in the Machine Name, Port, Communication Protocol, and ServiceName fields will be ignored. For example,
`service:jmx:rmi://localhost:3000/jndi/rmi://localhost:9000/server.`
 For more details on the URL format, refer to <http://java.sun.com/j2se/1.5.0/docs/api/javax/management/remote/JMXServiceURL.html>

You may need to specify the Service URL only in complex cases like when the RMI registry and the MBean Server ports are different. It is recommended that you use the Machine Name and Port option for the MBean server connection.

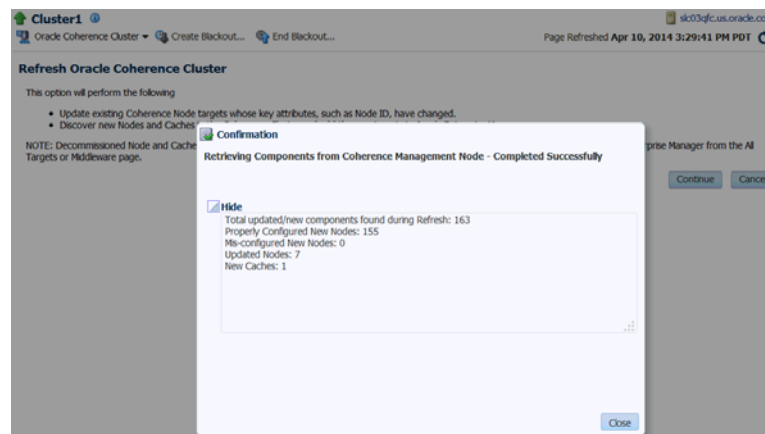
5. Select the Management Agent that will be used to monitor the Coherence target and click **Continue**.
6. The details of the discovered targets are displayed. Click **Add Targets** to add these targets to Enterprise Manager.

Note: To automatically discover a new node or target in Enterprise Manager, you must refresh the cluster as described in [Section 24.4.1, "Refreshing a Cluster"](#).

24.4.1 Refreshing a Cluster

You can manually synchronize the cluster targets with the running Coherence cluster. Click **Refresh** Cluster from the Oracle Coherence Cluster menu. A message indicating that new Coherence nodes and caches that have been discovered will be added as Enterprise Manager targets is displayed. Nodes are updated if there are any changes to their attributes. Click **Continue** to refresh the cluster. This ensures that the latest changes are applied.

Figure 24–9 Refresh Cluster



Click **Close**. The list of nodes and caches that can be added are displayed. Click **Add Targets** to add the targets to the cluster.

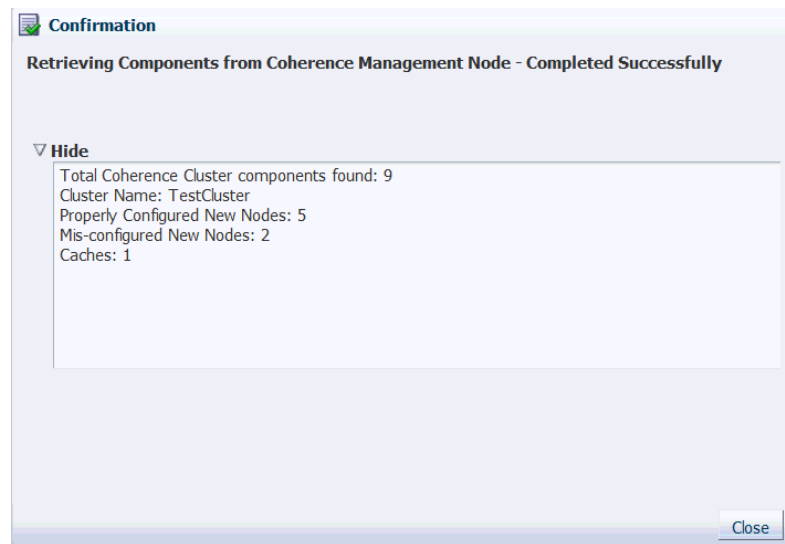
Note: Decommissioned nodes and caches will not be removed during the **Refresh** process. You must remove them manually.

24.4.2 Managing Mis-configured Nodes

While discovering a Coherence cluster, all nodes must be started with the proper guidelines as described in [Section 24.3, "Configuring a Coherence Cluster for Monitoring"](#).

If a node is improperly configured or has been started without the necessary guidelines, it will be categorized as a mis-configured node and will not be a part of the newly discovered cluster. During discovery, if any improperly configured nodes are present in the cluster, you will see the following screen:

Figure 24–10 Mis-configured Nodes



This indicates that there are some improperly configured nodes in the cluster. Click **Close**. The following page is displayed.

Figure 24–11 Mis-configured Nodes II

Add Oracle Coherence Cluster: Target Details Add Targets Cancel

Warning
Mis-configured Coherence Nodes found in Oracle Coherence Cluster. You can either choose to abort discovery and fix these mis-configured Nodes OR continue with discovery for properly configured Nodes. You can invoke Refresh Cluster on discovered Coherence Cluster after fixing mis-configured Nodes.

Oracle Coherence Cluster
 Oracle Coherence Cluster Target Name: TestCluster
 Monitoring Agent: [REDACTED]
 Oracle Coherence Cluster Name: TestCluster
 Oracle Coherence Cluster Version: 3.7.1.0
 Extended MBean: false

Oracle Coherence Nodes
 Following Coherence Nodes cannot be saved in Oracle Enterprise Manager due to misconfiguration. After fixing mis-configured nodes, you can invoke **Refresh Cluster** on discovered Coherence Cluster target to add Node targets to Oracle Enterprise Manager.
 Total Mis-configured Nodes: 2

PID	Member Name	Machine	ID	Reason for Discovery Failure
12415	n/a	[REDACTED]	7	Node does not have a unique member name
12097	NotMachine	[REDACTED]	6	Machine Name is not specified for Node

Node Targets
 Following Coherence Nodes will be saved in Oracle Enterprise Manager.
 Total Node Targets: 5

Target Name	Member Name	Machine	ID	PID
TestCluster/Node1	Node1	[REDACTED]	5	11704
TestCluster/Node2	Node2	[REDACTED]	26	2904
TestCluster/Node3	Node3	[REDACTED]	3	11625
TestCluster/Node4	Node4	[REDACTED]	4	11701
TestCluster/Node5	Node5	[REDACTED]	25	1463

Oracle Coherence Caches
 Following Coherence Caches discovered will be saved in Oracle Enterprise Manager.
 Total Cache Targets: 1

Target Name	Cache Name	Service Name
TestCluster/PartitionedPofCache/contacts	contacts	PartitionedPofCache

The list of improperly configured nodes along with the reasons for their failure is listed in this page. You can either choose to cancel the discovery process and fix these nodes or continue with the discovery with the properly configured nodes.

If you wish to continue with the discovery process, follow the steps listed in [Section 24.4, "Discovering Coherence Targets"](#).

If you click **Cancel**, the discovery process is aborted and the cluster is not refreshed. If mis-configured nodes are found during the Refresh process, they must be fixed before you can run the Refresh operation again. See [Section 24.4.1, "Refreshing a Cluster"](#) for details) and then discover the cluster.

24.5 Enabling the Management Pack

You must enable the Management Pack for Oracle Coherence if you want to use any custom features. If the management pack is not enabled, you can access only the Home pages and base platform features. To enable the Management Pack, do the following:

1. From the **Setup** menu, select **Management Packs**, then select Management Pack Access.
2. Select **Oracle Coherence** in the Search drop-down list and click **Go**.
3. All the Coherence targets being monitored are displayed. Check the **Pack Access Agreed** check box for the Coherence target and click **Apply** to enable the Management Pack.

Note: Apart from enabling the Management Pack, you must grant VIEW privileges to all users on the Management Agent that is monitoring the Coherence targets. This ensures that all targets being monitored by the Management Agent are visible to the user.

Monitoring a Coherence Cluster

After you have discovered the Coherence target and enabled the Management Pack Access, you can start monitoring the health and performance of the cluster. You can monitor the entire cluster or drill down to the various entities of the cluster like nodes, caches, services, proxies, and connections.

This chapter contains the following sections:

- [Understanding the Page Layout](#)
- [Home Pages](#)
- [Summary Pages](#)
- [Performance Pages](#)
- [Viewing Incidents](#)

Before you start monitoring a cluster in Enterprise Manager, you must perform the following tasks:

- Install the 12.1.0.4.0 Management Agent on all hosts where Coherence nodes are running.
- Deploy the 12.1.0.6.0 Fusion Middleware Plug-in on all the Management Agents.
- Verify that all Coherence MBeans are available in the Coherence JMX management node as described in the [Section 24.3.1.3, "Testing the Configuration"](#).

Note: If the Management Agent is upgraded to 12.1.0.4.0, you must ensure that the Fusion Middleware Plug-in is also upgraded to 12.1.0.6.0.

25.1 Understanding the Page Layout

This section describes the layout of the Coherence pages in Enterprise Manager and how the pages can be customized. It contains the following sections:

- [Navigation Tree](#)
- [Personalization](#)

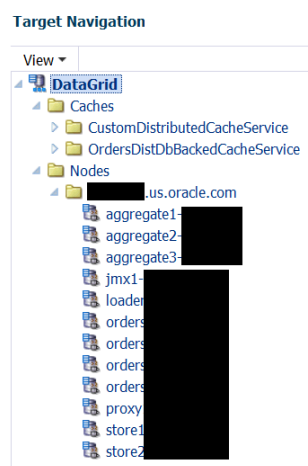
25.1.1 Navigation Tree

All Coherence pages in Enterprise Manager contain a navigation tree in the left panel of the page. The navigation tree displays all the entities in a selected cluster with the Cluster at the top level, followed by caches and nodes as the children entities. The entities are grouped as follows:

- All caches that belong to a particular cluster are listed under the Caches folder in the navigation tree.
- Cache targets of a service type are grouped together.
- The Nodes folder contains host names on which the nodes are running as children entities.
- Nodes that are running a particular host are grouped together.

You can expand or collapse any entity in the navigation tree by clicking on the Expand/Collapse icon. Click on an entity such as a node, cache, or service in the tree to view the associated home page on the right hand side. A snap shot of the navigation is shown below.

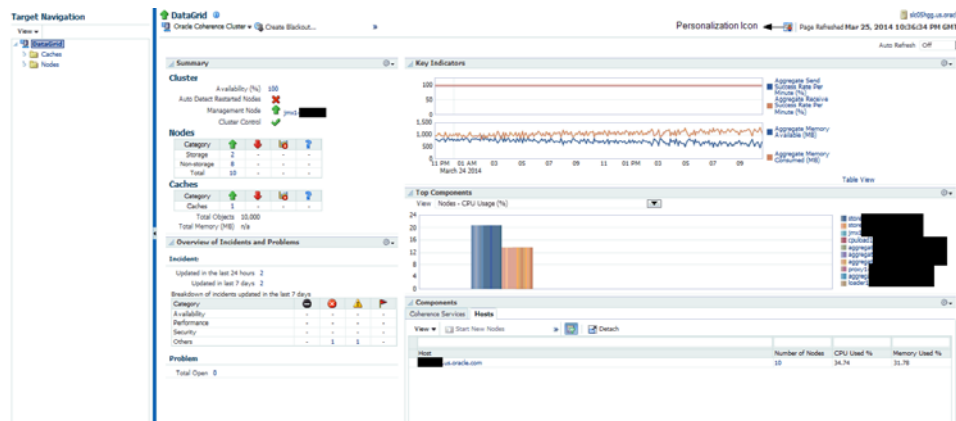
Figure 25–1 Navigation Tree



25.1.2 Personalization

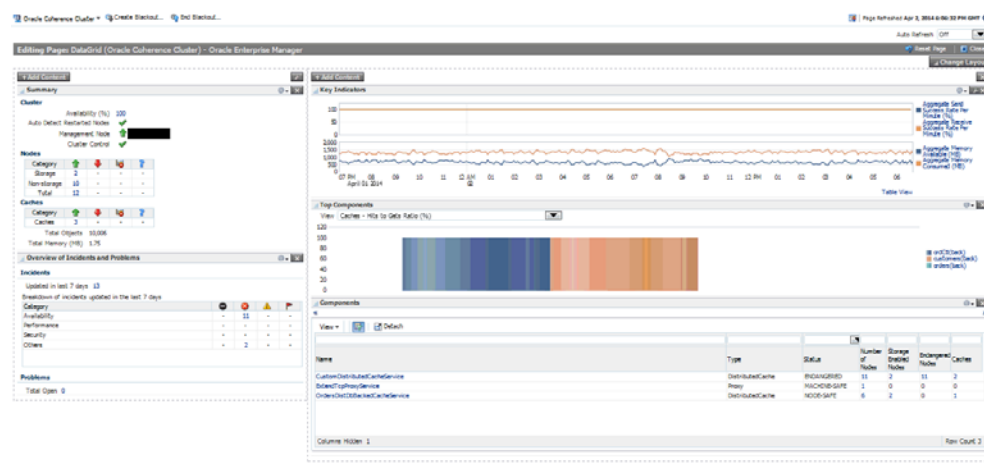
You can personalize any of the Coherence pages and select the regions to be displayed, the order in which they are displayed, the metrics to be included in the charts and so on. Click the Personalization icon on a page to view the page in Edit mode.

Figure 25–2 Cluster Home Page (Personalization Icon)



You will see the page in Edit mode as shown below.

Figure 25–3 Cluster Home Page (Edit Mode)



In the Edit mode, you can do the following:

- **Change Layout:** Click **Change Layout** and select a different layout for the page.
- **Add Content:** Click **Add Content**. The regions that can be displayed on the page are displayed. Select a region, click **Add**, then click **Close** to return to the previous page.
- **Edit Regions:** Click the Edit icon for a region to add or delete any parameters or metrics being displayed in the region.
- **Move Up / Move Down:** You can change the location of a region on a page by using the Move Up / Down icon.

After you have made all the changes, click **Close** to apply the changes or click **Reset Page** to return to the default mode.

25.2 Home Pages

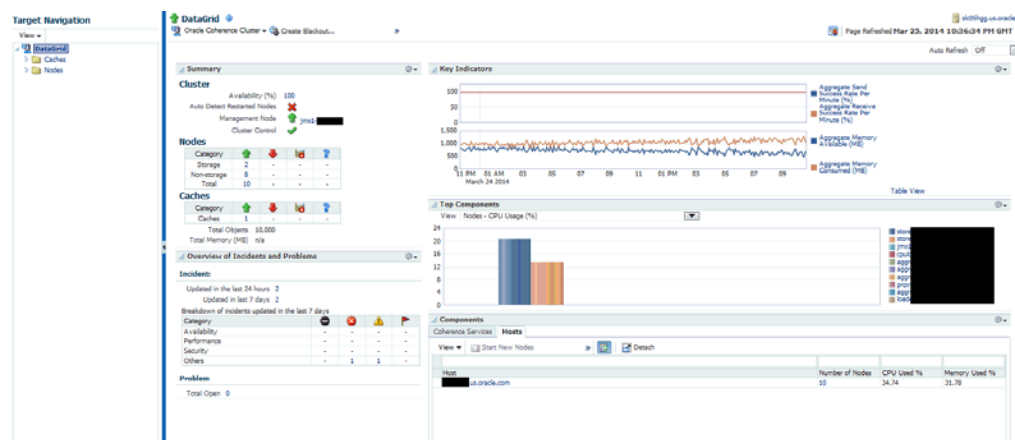
When you discover a Coherence cluster, a Coherence cluster target, caches, and properly configured nodes are created. Each of these entities collect a rich set of metrics. From the Home pages, you can view the overall cluster summary and key indicators from components such as nodes, caches, and services.

25.2.1 Coherence Cluster Home Page

Note: The data shown on this page is not real time data but is based on the latest data available from the OMS repository. After the Coherence cluster has been discovered, the most recent data is displayed only after the performance and configuration collection has been completed for the cluster and its members.

To see a global view of the cluster, from the **Targets** menu, select **Middleware**, then click on a Coherence Cluster target. The Coherence Cluster Home page appears:

Figure 25–4 Cluster Home Page



The following regions are displayed:

- **Summary:** The following details are displayed:
 - **Cluster**
 - Availability (%): The availability of the cluster over the last 24 hours.
 - Auto Detect Restarted Nodes: If the cluster has been started with an extendedMBean property, the Auto Detect Restarted Nodes property is enabled and a check mark is displayed.
 - Management Node: Shows the name of the management node and its status. Click on the link to drill down to the Node Home page.
 - Cluster Control: Indicates if the Start / Stop feature is supported by this cluster. This flag is enabled if all the hosts on which the cluster is running are monitored by Enterprise Manager.
 - **Nodes**
 - Total Nodes: The total number of nodes in the cluster. Click on the link to drill down to the All Nodes page.
 - Storage Nodes: The number of storage enabled nodes in the cluster. Click on the link to drill down to the Storage Nodes page.

Note: The Number of Nodes and Storage Nodes listed here may be different from the number of node targets that have been discovered. As a result, when you click on the link, the number of nodes displayed may be lesser than the nodes shown in this table.

 - Non Storage Nodes: The nodes that are not storage enabled such as proxy, client nodes, and so on.
 - **Caches**
 - Caches: The total number of caches in the cluster. Click on the link to drill down to the All Caches page.
 - Total Objects: The total number of objects stored across all the back caches in the cluster.
 - Total Memory: The total memory in MB used by all the objects in the back caches. A numeric value is displayed only if a Binary calculator is used in

cache configuration. If a Binary calculator is not used, a N/A will be displayed in this field.

- **Overview of Incidents and Problems:** This region lists any incidents that have occurred over the last 7 days and any problems in the cluster and its associated targets (nodes, caches, and hosts). Click on the link to drill down to the Incident Manager page.
- **Key Indicators:** This region displays graphs with key metrics that indicate the health and performance of the cluster. You can use the Personalization feature to specify the key metrics that are to be included in the charts.
- **Top Components:** This region contains a graphical representation of the top 10 performing targets for a selected metric based on the latest available data from the OMS repository. The top components are listed in ascending or descending order depending on the metric selected and indicates how the top component data has been collected. Select a metric from the View drop down list to see a graphical representation of the top 10 targets for the selected metric. For example, if you select the Cache - Cache Objects metric, the graph displays the top 10 cache targets. Click on the graph or legend to drill down to the detail pages.
- **Components:** This is a tabbed region with Coherence Services tab showing the Coherence Cluster Services and the Hosts table showing the list of hosts on which the cluster nodes are running. A detailed description of each tab is given below:

Coherence Service: This tab shows all the services in the Coherence cluster. It contains the following details.

- **Service Name:** The unique name assigned to the service. Click on the link to drill down to the Service Home page.
- **Service Type:** Some of the service types available are:
 - Cluster Service: This service is started when a cluster node needs to join the cluster. It keeps track of the membership and services in the cluster.
 - Distributed Cache Service: Allows cluster nodes to distribute (partition) data across the cluster so that each piece of data in the cache is managed (held) by only one cluster node.
 - Invocation Service: This service provides clustered invocation and supports grid-computing architectures
 - Replicated Cache Service: This is the synchronized replicated cache service, which fully replicates all of its data to all cluster nodes that are running the service.
- **Status:** The high availability status of this service. This can be:
 - MACHINE-SAFE: This means that all the cluster nodes running on any given machine could be stopped at once without data loss.
 - NODE-SAFE: This means that any cluster node could be stopped without data loss.
 - ENDANGERED: This indicates that termination of any cluster node that runs this service may cause data loss.

Note: If new nodes that support a service are added to the cluster, the updated number is displayed only after the configuration collection has occurred.

If the Coherence cluster is running on an Exalogic rack, apart from the above, the following status types are available:

- * **RACK-SAFE:** This status indicates that a rack can be stopped without any data loss.
- * **SITE-SAFE:** This status indicates that a site can be stopped without any data loss.
- **Number of Nodes:** The number of nodes in the service. Click on the link to drill down to the Node Performance page.
- **Storage Enabled Nodes:** The number of storage enabled nodes for this service.

Note: The Number of Nodes and Storage Enabled Nodes listed here may be different from the number of node targets that have been discovered. As a result, when you click on the link, the number of nodes displayed may be lesser than the nodes shown in this table.

- **Endangered Nodes:** Shows the number of endangered nodes for this service. Click on the link to drill down to the Node Performance page. Note: If new nodes have been added the cluster, the updated number is displayed only after the configuration collection has occurred.
- **Caches:** The number of caches in the service. Click on the link to drill down to the Caches page.
- **Active Transactions:** Transactional caches are specialized distributed caches that provide transactional guarantees. At run-time, transactional caches are automatically used together with a set of internal transactional caches that provide transactional storage and recovery. Transactional caches also allow default transaction behavior (including the default behavior of the internal transactional caches) to be overridden at run-time. The number of active transactions for this service is displayed here.

Hosts: This tab shows the hosts on which the nodes are running. It contains the following details:

- **Host:** The host on which the node is present. The Host Name link is displayed if: only if the Machine Name property has been defined for the node.
 - * The host on which the nodes are running is monitored by Enterprise Manager.
 - * The name of the discovered host target must be the same as the name specified in the `oracle.coherence.machine` system property.
- **Number of Nodes:** The number of nodes present on each host. Click the link to drill-down to the Node Performance page.
- **CPU Used%:** The percentage of CPU used on the host.
- **Memory Used%:** The percentage of memory used on the host.

25.2.1.1 Cluster Management Operations

You can perform cluster management operations if you meet the following prerequisites:

- The hosts on which the nodes are going to be started or stopped must be monitored targets in Enterprise Manager.

- The Coherence nodes are started with the `-Doracle.coherence.machine` Java option and the names match the host names monitored by Enterprise Manager.
- The Coherence nodes are started with `-Doracle.coherence.startscript` and `-Doracle.coherence.home` Java options.

The `oracle.coherence.startscript` option specifies the absolute path to the start script needed to bring up a Coherence node. All customizations needed to start this node must be in this script. The `oracle.coherence.home` option specifies the absolute path to the location in which the coherence folder is present which is `$INSTALL_DIR/coherence`. This folder contains Coherence binaries and libraries.

- Preferred Credentials have been setup for all hosts on which Cluster Management operations are to be performed.

The operations you can perform are:

- **Start New Nodes:** You can start one or more nodes based on an existing node. The new node will have the same configuration as the existing node. You can start multiple nodes on multiple remote hosts in one operation. Select the hosts on which the new node is to be started and click **Start New Nodes**. You will see the Start New Nodes page where you can add one or more nodes.
- **Stop Nodes:** You can stop all the nodes on a specific host. Select a host and click **Stop Nodes**. You will see the Stop Nodes page where the details of the nodes being stopped are displayed.

Note:

- The **Start New Nodes** and **Stop Nodes** options will be available only if the hosts on which the nodes are running are monitored by Enterprise Manager. An asterisk indicates hosts that are not monitored by Enterprise Manager.
 - Information about a newly started node is uploaded into the repository only after one regular agent metric collection i.e. by default value of 5 minutes.
-
-

25.2.1.2 Cluster Menu Navigation

The following key menu options are available from the Coherence Cluster Home menu:

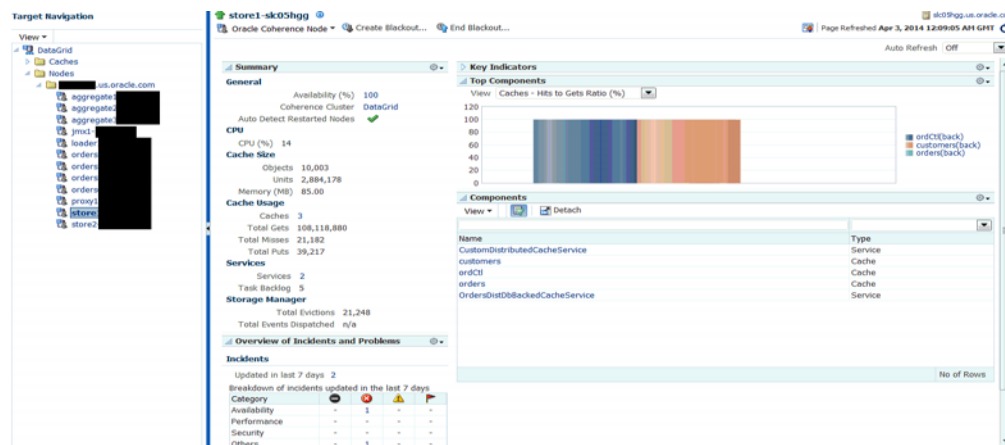
- **Viewing The Performance Summary:** From the **Oracle Coherence Cluster** menu, select **Monitoring**, then select **Performance Summary**. You can view the performance of the cluster on this page. See [Section 25.4.1, "Performance Summary Page"](#) for details.
- **Metric and Collection Settings:** From the **Oracle Coherence Cluster** menu, select **Monitoring**, then select **Metric and Collection Settings**. You can set up corrective actions to add nodes and caches as Enterprise Manager targets.
- You can navigate to the following pages:
 - Nodes
 - Caches
 - Services
 - Applications
 - Proxies

- **Cluster Administration:** From the Oracle Coherence Cluster menu, select Administration. See [Section 26.1, "Cluster Administration Page"](#) for details.
- **Refresh Cluster:** From the **Oracle Coherence Cluster** menu, select **Refresh Cluster**. You can refresh a cluster to synchronize Coherence targets in Enterprise Manager with a running cluster.
- **Coherence Node Provisioning:** From the **Oracle Coherence Cluster** menu, select Coherence Node Provisioning. You can deploy a Coherence node across multiple targets in a farm. See Enterprise Manager Lifecycle Management Administrator's Guide for more details on Coherence Node Provisioning.
- **Last Collected Configuration:** From the **Oracle Coherence Cluster** menu, select **Configuration**, then select **Last Collected**. You can view the latest or saved configuration data for the Coherence cluster.
- **Topology:** From the **Oracle Coherence Cluster** menu, select **Configuration**, then select **Topology**. The Configuration Topology Viewer provides a visual layout of the Coherence deployment and shows the Coherence cluster and its associated nodes and caches.
- **JVM Diagnostics:** From the **Oracle Coherence Cluster** menu, select **JVM Diagnostics** to view the Coherence Cluster JVM Diagnostics Pool Drill Down page. This option is available only if the cluster has been configured for JVM Diagnostics and the WLS Management Pack EE Management Pack has been included. See [Section 28, "Coherence Integration with JVM Diagnostics"](#) for details.

25.2.2 Node Home Page

This page provides details of a selected node in the cluster.

Figure 25–5 Coherence Node Home Page



It contains the following regions:

- **Summary**
 - **General**
 - * Availability: The availability of the node over the last 24 hours.
 - * Coherence Cluster: The cluster with which this node is associated.
 - * Auto Detect Restarted Nodes: If the node has been started with an extendedMBean flag, this flag is enabled and a check mark is displayed.

- **CPU**
 - * CPU (%): The CPU percentage used.
- **Cache Size**
 - * Objects: The aggregate number of objects in the cache.
 - * Units: The aggregate number of units in the cache.
 - * Memory: The aggregate memory used by the cache.
- **Cache Usage**
 - * Caches: The total number of caches in the cluster.
 - * Total Gets: The total number of get() operations over the last 24 hours.
 - * Total Misses: The total number of cache misses in the last 24 hours.
 - * Total Puts: The total number of put() operations over the last 24 hours.
- **Services**
 - * Services: The total number of services running on the cache.
 - * Task Backlog: The size of the backlog queue that holds tasks scheduled to be executed by one of the service pool threads.
- **Storage Manager**
 - * Total Evictions: The total number of evictions from the backing map managed by this Storage Manager.
 - * Total Events Dispatched: The total number of events dispatched by the Storage Manager per minute.
- **Overview of Incidents and Problems**

This region lists any incidents that have occurred over the last 7 days and any problems in the node and its associated host target. Click on the link to drill down to the Incident Manager page.
- **Key Indicators**

This region displays graphs with key metrics that indicate the health and performance of the node over the last 24 hours. You can customize the metrics specify the key metrics that are to be included in the charts by selecting them from the metric palette.
- **Top Components**

This region contains a graphical representation of the top 10 performing targets for a selected metric from the last metric collection. The graph does not display real time data. The top components are listed in ascending or descending order depending on the metric selected and indicates how the top component data has been collected. Select a metric from the View drop down list to see a graphical representation of the top 10 targets for the selected metric. For example, if you select the Cache - Cache Objects metric, the graph displays the top 10 cache targets.
- **Components**

This region lists the components associated with the node such as caches, services, connections, connection managers, and applications. the cluster. The table displays the name and type of the component.

25.2.2.1 Node Menu Navigation

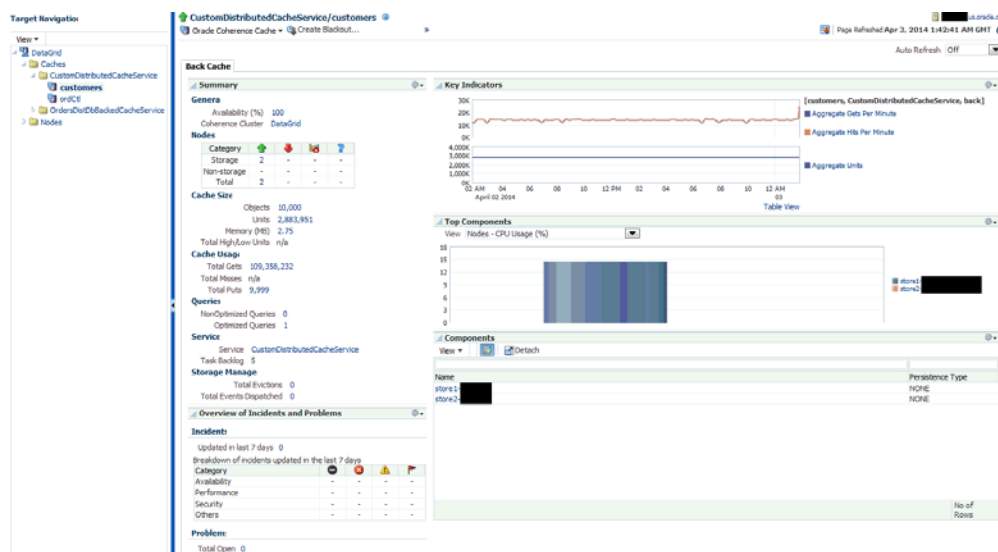
The following key menu options are available from the Oracle Coherence Node Home page:

- **Viewing The Performance Summary:** From the **Oracle Coherence Node** menu, select **Monitoring**, then select **Performance Summary**. You can view the performance of the cluster on this page. See [Section 25.4.1, "Performance Summary Page"](#) for details.
- **Metric and Collection Settings:** From the **Oracle Coherence Node** menu, select **Monitoring**, then select **Metric and Collection Settings**. You can set up corrective actions to add nodes and caches as Enterprise Manager targets.
- You can navigate to the following pages:
 - Caches
 - Services
- **Administration:** From the **Oracle Coherence Node** menu, select **Administration**. See [Section 26.2, "Node Administration Page"](#) for details.
- **Last Collected Configuration:** From the **Oracle Coherence Node** menu, select **Configuration**, then select **Last Collected**. You can view the latest or saved configuration data for the Coherence cluster.
- **Topology:** From the **Oracle Coherence Node** menu, select **Configuration**, then select **Topology**. The Configuration Topology Viewer provides a visual layout of the Coherence deployment and shows the Coherence cluster and its associated nodes and caches.
- **JVM Diagnostics:** From the **Oracle Coherence Node** menu, select **JVM Diagnostics** to view the Coherence Node JVM Pool Drill Down page. This option is available only if the node has been configured for JVM Diagnostics and the WLS Management Pack EE Management Pack has been included. See [Section 28, "Coherence Integration with JVM Diagnostics"](#) for details.

25.2.3 Cache Home Page

This page provides detailed information of a selected cache.

Figure 25–6 Cache Home Page



It contains the following regions:

- **Summary**

- **General**

- * **Availability:** The availability of the cache over the last 24 hours.
 - * **Coherence Cluster:** The cluster with which this cache is associated.

- **Nodes**

- * **Total Nodes:** The total number of nodes in the cluster. Click on the link to drill down to the All Nodes page.
 - * **Storage Nodes:** The number of storage enabled nodes in the cluster. Click on the link to drill down to the Storage Nodes page.

Note: New storage enabled nodes are not automatically added to the cluster. You must refresh the cluster to add node targets for physical nodes added to cluster.

- * **Non Storage Nodes:** The nodes that are not storage enabled such as proxy, client nodes, and so on. These are relevant for front caches only. See [Section 25.2.3.1, "Near Cache"](#) for details.

- **Cache Size:**

- * **Objects:** The aggregate number of objects in the cache.
 - * **Units:** The aggregate number of units in the cache.
 - * **Memory:** The aggregate memory used by the cache.
 - * **Total High / Low Units:** This represents the high and low units configured for the cache. If this parameter has not been configured, an **n/a** will be displayed.

- **Cache Usage**

- * **Total Gets:** The aggregate number of get operations across all nodes supporting this cache in the last 24 hours.
- * **Total Misses:** The aggregate number of cache misses across all nodes supporting this cache in the last 24 hours.
- * **Total Puts:** The aggregate number of put operations across all nodes supporting this cache in the last 24 hours.
- **Queries**
 - * **Non Optimized Queries:** The total execution time, in milliseconds for queries that could not be resolved per minute.
 - * **Optimized Queries:** The total number of parallel queries that were fully resolved using indexes per minute.
- **Service**
 - * **Service:** The service supporting this cache.
 - * **Task Backlog:** The size of the backlog queue that holds tasks scheduled to be executed across all services.
- **Storage Manager** (These metrics are applicable only for Back caches.)
 - * **Total Evictions:** The aggregate number of evictions from the backing map managed by this Storage Manager.
 - * **Total Events Dispatched:** The total number of events dispatched by the Storage Manager per minute.
- **Overview of Incidents and Problems**

This region lists any incidents that have occurred over the last 7 days and any problems in the node and its associated host target. Click on the link to drill down to the Incident Manager page.
- **Key Indicators**

This region displays graphs with key metrics that indicate the health and performance of the node over the last 24 hours. You can customize the metrics that are charted by selecting them from metric palette.
- **Top Components**

This region contains a graphical representation of the top 10 performing targets for a selected metric from the last configuration collection. The top components are listed in ascending or descending order depending on the metric selected and indicates how the top component data has been collected. Select a metric from the View drop down list to see a graphical representation of the top 10 targets for the selected metric. For example, if you select the Cache - Cache Objects metric, the graph displays the top 10 cache targets.
- **Components**

This region lists the nodes with which the cache is associated. Click on the Name link to drill down to the Node Home page.

25.2.3.1 Near Cache

A near cache is a hybrid cache; it typically fronts a distributed cache or a remote cache with a local cache. A **near cache** invalidates front cache entries, using a configured invalidation strategy, and provides excellent performance and synchronization. Near cache backed by a partitioned cache offers zero-millisecond local access for repeat data

access, while enabling concurrency and ensuring coherency and fail over, effectively combining the best attributes of replicated and partitioned caches.

The objective of a **near cache** is to provide the best of both worlds between the extreme performance of the Replicated Cache and the extreme scalability of the Distributed Cache by providing fast read access to Most Recently Used (MRU) and Most Frequently Used (MFU) data. Therefore, the **near cache** is an implementation that wraps two caches: a "front cache" and a "back cache" that automatically and transparently communicate with each other by using a read-through/write-through approach.

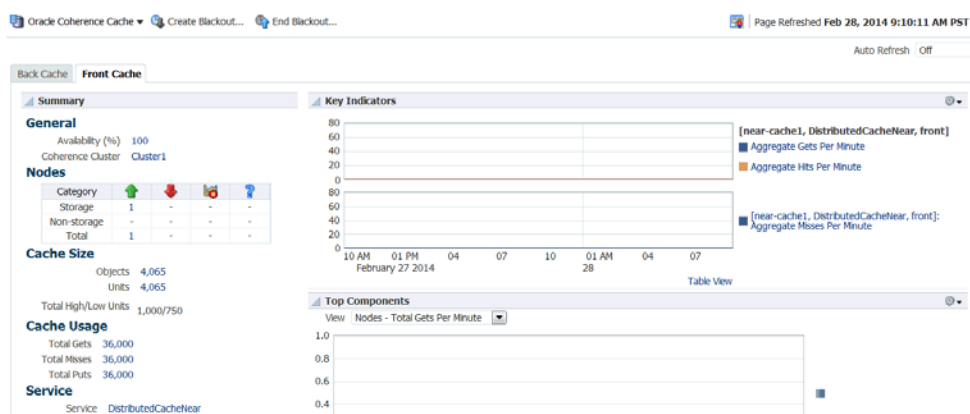
The "front cache" provides local cache access. It is assumed to be inexpensive, in that it is fast, and is limited in terms of size. The "back cache" can be a centralized or multitiered cache that can load-on-demand in case of local cache misses. The "back cache" is assumed to be complete and correct in that it has much higher capacity, but more expensive in terms of access speed.

If a **near cache** is present in the cluster, you will see a tabbed Cache Home, one for each of back and front caches respectively.

Figure 25–7 Near Cache (Back Cache)



Figure 25–8 Near Cache (Front Cache)



25.2.3.2 Cache Menu Navigation

The following key menu options are available from the Coherence Cache Home page:

- **Viewing The Performance Summary:** From the **Oracle Coherence Cache** menu, select **Monitoring**, then select **Performance Summary**. You can view the performance of the cluster on this page. See [Section 25.4.1, "Performance Summary Page"](#) for details.
- **Metric and Collection Settings:** From the **Oracle Coherence Cache** menu, select **Monitoring**, then select **Metric and Collection Settings**. You can set up corrective actions to add nodes and caches as Enterprise Manager targets.
- You can navigate to the following pages:
 - Nodes
 - Services
- **Administration:** From the **Oracle Coherence Cache** menu, select **Administration**. See [Section 26.3, "Cache Administration Page"](#) for details.
- **Cache Data Management:** The Cache Data Management feature allows you to define indexes and perform queries against currently cached data that meets a specified set of criteria. See [Section 26.5, "Cache Data Management"](#) for details.
- **Last Collected Configuration:** From the **Oracle Coherence Cluster** menu, select **Configuration**, then select **Last Collected**. You can view the latest or saved configuration data for the Coherence cluster.
- **Topology:** From the **Oracle Coherence Cluster** menu, select **Configuration**, then select **Topology**. The Configuration Topology Viewer provides a visual layout of the Coherence deployment and shows the Coherence cluster and its associated nodes and caches.
- **JVM Diagnostics:** From the **Oracle Coherence Cache** menu, select **JVM Diagnostics** to view the Coherence Cache JVM Diagnostics Pool Drill Down page. This option is available only if the cluster has been configured for JVM Diagnostics and the WLS Management Pack EE Management Pack has been included. See [Section 28, "Coherence Integration with JVM Diagnostics"](#) for details.

25.2.4 Application Home Page

This page allows you to view and monitor the application data stored in various types of caches. To view this page, select the **Applications** option from the **Oracle Coherence Cluster** menu.

If an application contains multiple web modules, the application data for each module is displayed. Click **Reset Statistics** to reset the session management statistics.

The following graphs are displayed:

- Local Attribute Count: Shows the local attribute count.
- Local Session Count: Shows the local session count.
- Overflow Updates: Shows the number of overflow updates per minute.
- Session Updates: Shows the number of session updates per minute
- Reap Duration: Shows the average reap duration in milliseconds.
- Reap Session: Shows the average number of reaped sessions in a reap cycle.

Overflow Cache

This table contains the following details:

- Module: The name of the Coherence cluster with the application.

- **Node ID:** This is the node target name. Click on the link to drill down to the Node Home page.
- **Cache:** This is the name of the cache target. Click on the link to drill down to the Cache Home page.
- **Average Size:** The average size (in bytes) of a session object placed in the session storage clustered cache since the last time statistics were reset.
- **Max Size:** The maximum size (in bytes) of a session object placed in the session storage clustered cache since the last time statistics were reset.
- **Threshold:** The minimum length (in bytes) that the serialized form of an attribute value must be in order for that attribute value to be stored in the separate "overflow" cache that is reserved for large attributes.
- **Overflow Updates:** The number of updates to session attributes stored in the "overflow" clustered cache since the last time statistics were reset.

Clustered Session Cache

- **Module:** The name of the Coherence cluster with the application.
- **Node ID:** This is the node target name. Click on the link to drill down to the Node Home page.
- **Cache:** This is the name of the cache target. Click on the link to drill down to the Cache Home page.
- **Average Size:** The average size (in bytes) of a session object placed in the session storage clustered cache since the last time statistics were reset.
- **Min Size:** The minimum size (in bytes) of a session object placed in the session storage clustered cache since the last time statistics were reset.
- **Max Size:** The maximum size (in bytes) of a session object placed in the session storage clustered cache since the last time statistics were reset.
- **Session ID Length:** The length of the generated session IDs.
- **Timeout:** The session expiration time (in seconds) or -1 if sessions never expire.
- **Session Updates:** The number of updates of session objects stored in the session storage clustered cache per minute.
- **Pinned Objects:** The number of session objects that are pinned to this instance of the web application or -1 if sticky session optimizations are disabled.

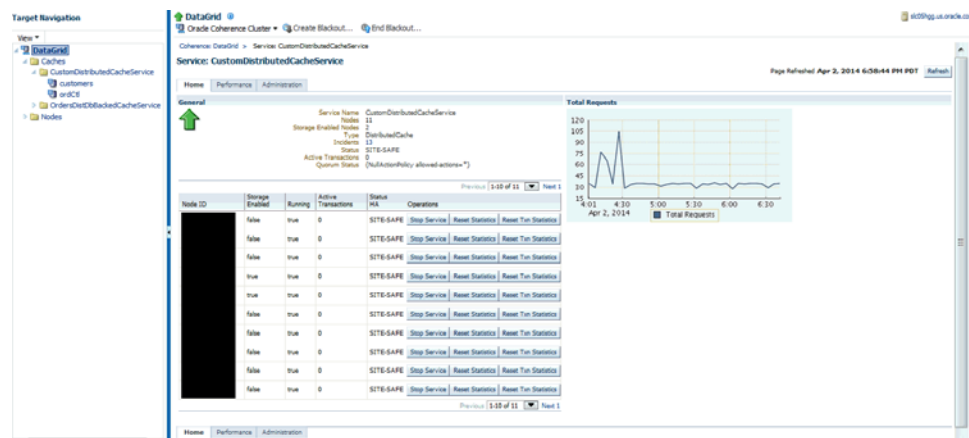
Reaped Sessions

- **Module:** The name of the Coherence cluster with the application.
- **Node ID:** This is the name of the node target. Click on the link to drill down to the Node Home page.
- **Average Reap Duration:** The average reap duration in minutes.
- **Average Reaped Sessions:** The average number of reap sessions since the statistics were last reset.
- **Total Reaped Sessions:** The total number of expired sessions that have been reaped since the statistics were last reset.

25.2.5 Service Home Page

This page shows all the details of a service in a coherence cluster.

Figure 25–9 Service Home Page



It contains the following regions:

- **Name:** The name assigned to the service.
- **Nodes:** The number of nodes in the service.
- **Storage Enabled Nodes:** The number of storage enabled nodes supporting this service.
- **Type:** Some of the service types available are:
 - **Cluster Service:** This service is started when a cluster node needs to join the cluster. It keeps track of the membership and services in the cluster.
 - **Distributed Cache Service:** Allows cluster nodes to distribute (partition) data across the cluster so that each piece of data in the cache is managed (held) by only one cluster node.
 - **Invocation Service:** This service provides clustered invocation and supports grid-computing architecture.
 - **Replicated Cache Service:** This is the synchronized replicated cache service, which fully replicates all of its data to all cluster nodes that are running the service.
- **Incidents:** Any incidents or problems that have occurred. Click on the link to drill down to the Incident Manager page.
- **Status:** The High Availability status for this service. This can be:
 - **MACHINE-SAFE:** This means that all the cluster nodes running on any given machine could be stopped at once without data loss.
 - **NODE-SAFE:** This means that any cluster node could be stopped without data loss.
 - **ENDANGERED:** This indicates that abnormal termination of any cluster node that runs this service may cause data loss.
 - **RACK-SAFE:** This status indicates that a rack can be stopped without any data loss.
 - **SITE-SAFE:** This status indicates that a site can be stopped without any data loss.
- **Active Transactions:** The total number of currently active transactions. An active transaction is counted as any transaction that contains at least one modified entry

and has yet to be committed or rolled back. Note that the count is maintained at the coordinator node for the transaction, even though multiple nodes may have participated in the transaction.

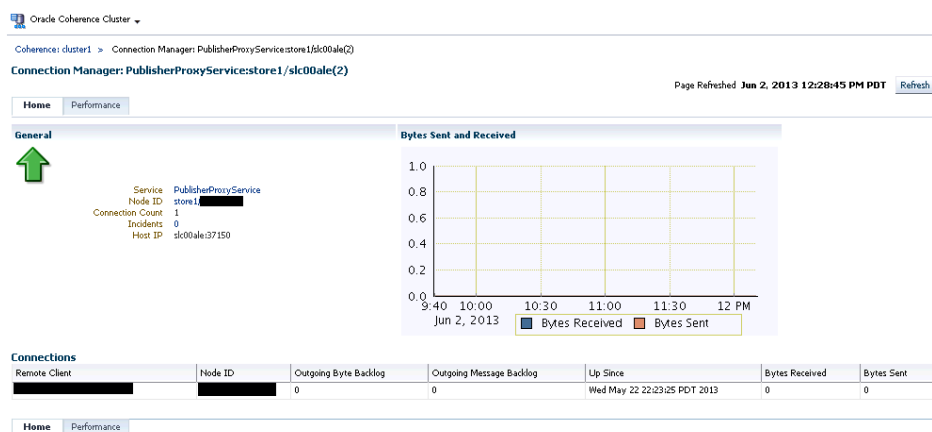
Total Requests

This graph shows the total number of synchronous requests issued by the service since the last collection interval.

25.2.6 Connection Manager Home Page

Use this page to view the Connection Manager details in the Coherence cluster.

Figure 25–10 Connection Manager Home Page



This page contains the following sections:

- **General**
 - Service Name: The unique name assigned to the service.
 - Node ID: This is the node target name.
 - Connection Count: The number of connections associated with the connection manager instance.
 - Incidents: Any incidents that have occurred.
 - Host IP: The IP address of the host machine.
- **Bytes Sent and Received:** This graph displays the number of bytes that were sent and received per minute. Click on the graph to drill down to the Bytes Sent Metric page.
- **Connections**
 - Remote Client: A unique hexadecimal number assigned to each connection.
 - Node ID: This is the node target name.
 - Outgoing Byte Backlog: The number of outgoing bytes in the backlog.
 - Outgoing Message Backlog: The number of outgoing messages in the backlog.
 - Up Since: The date and time from which the connection manager instance is up.

- Bytes Received: The number of bytes received per minute.
- Bytes Sent: The number of bytes sent per minute.

25.3 Summary Pages

These pages describe the target pages such as nodes, caches, services, and so on associated with the cluster.

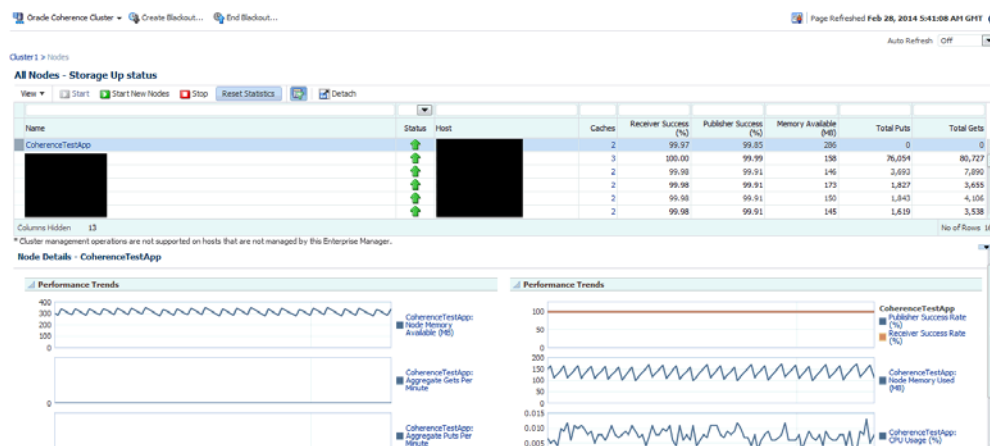
25.3.1 Nodes Page

This page lists all the discovered node targets that belong to the cluster, support a cache, or a service. The list of nodes displayed will vary depending on how you have navigated to this page.

This is a master detail page where you can select a node in the master table to view the key performance metrics in the Details region. The list of nodes displayed here can vary based on how you have navigated to this page. To view this page, you can:

- From the **Targets** menu, select **Middleware**, then click on a Coherence Cluster. In the Oracle Coherence Cluster Home page, select **Nodes** from the **Oracle Coherence Cluster** menu. You can also navigate to this page from the Cache Home page.
- Click on the **Storage**, **Non Storage Nodes**, or the **Number of Nodes** link in the Oracle Coherence Cluster Home page.

Figure 25–11 Nodes Page



The following details are displayed by default. To display the hidden fields, from the **View** menu, select **Columns**, then select **Manage Columns**. In the Manage Columns table, select one or more columns from the **Hidden Column** list, move them to the **Visible Columns** list and click **OK**. The selected fields will be displayed in the table.

Note: You can filter the list of nodes displayed in the table by specifying values in the Query by Example fields at the top of the table. If you want to see a list of nodes that are running on **xyz** host for instance, you can enter 'xyz' in the Host query field.

- **Name:** This is the name of the node target. Click on the link to drill down to the Node Home page.
- **Status:** Shows whether the node is Up, Down, in an Error, or Unknown status.
- **Host:** The host on which node is running. If the host is a monitored target in Enterprise Manager, you can click on the link to drill down to the Host Home page.
- **Caches:** The total number of cache targets that this node supports.
- **Receiver Success (%):** The percentage of received packets out of the total packets sent.
- **Publisher Success (%):** This is the rate at which the publisher transmits packets on the network.
- **Memory Available (MB):** The memory available on this node.
- **Total Puts:** The aggregate number of put operations.
- **Total Gets:** The aggregate number of get operations.

Select a node in the table to view a detailed graphical representation of the node. The following graphs are displayed.

- **Node Memory Available:** This graph shows the nodes that have lowest available memory over the last 24 hours.
- **Aggregate Gets Per Minute:** This graph displays the aggregate get operations across all the caches supported by the selected node.
- **Aggregate Puts Per Minute:** This graph displays the aggregate put operations across all the caches supported by the selected node.
- **Publisher Success Rate:** These graphs show the rate at which the publisher transmits packets on the network.
- **Receiver Success Rate:** The percentage of received packets out of the total packets sent.
- **Node Memory Used (MB):** The total memory used by the node.
- **CPU Usage (%):** The CPU percentage used.

Note: You can use the Personalization feature to customize these charts.

You can perform the following actions:

- **Start:** You can start any node that has a Down status. This option is available only if the node is running on an Enterprise Manager monitored host.
- **Stop:** You can stop any node that has a Up status. This option is available only if the node is running on an Enterprise Manager monitored host.
- **Start New Nodes:** You can start new nodes on the same host on which a selected node is running. The host must be monitored by Enterprise Manager.
- **Reset Statistics:** Select a node and click **Reset Statistics**. You are prompted for the password for the host on which the node is running. Enter the password and click OK to reset the statistics. This option is available only for nodes with an Up status.

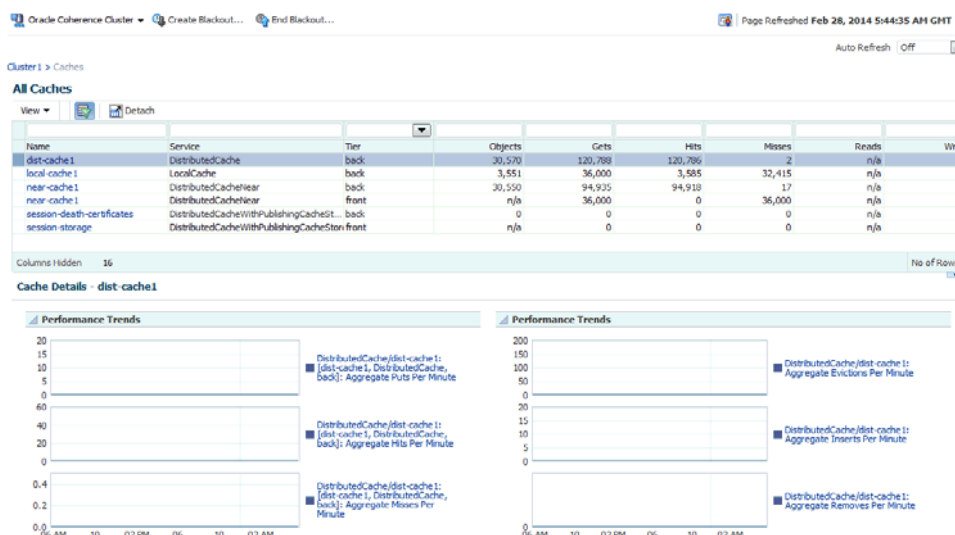
- **Query by Example:** Click the Query by Example icon. In the Query row that appears, enter a query string in any of the columns to search for. All nodes that meet the specified criteria are displayed.

25.3.2 Caches Page

This page lists all the discovered cache targets that belong to the cluster. This is a master detail page where you can select a cache in the master table to view the key performance metrics in the Details region. The list of nodes displayed here can vary based on how you have navigated to this page. To view this page, you can:

- From the **Targets** menu, select **Middleware**, then click on a Coherence Cluster. In the Oracle Coherence Cluster Home page, select **Nodes** from the **Oracle Coherence Cluster** menu.
- Click on the **Caches** link in the Oracle Coherence Cluster Home page.

Figure 25–12 Caches Page



For each cache, the following details are displayed:

- **Name:** This is the name of the cache target. Click on the link to drill down to the Cache Home page.
- **Service:** The name of the caching service used by the cache.
- **Tier:** The back tier is displayed for most caches. For a Near Cache, the cache can have front and back tiers. In this case, multiple rows for the same cache with unique tier values will be displayed.
- **Objects:** The number of objects in the cache.
- **Gets:** The aggregate number of get() operations in the cache.
- **Hits:** The aggregate number of successful fetches of cached objects.
- **Misses:** The aggregate number of failed fetches of cached objects.
- **Reads:** The aggregate number of reads to a data store.
- **Writes:** The aggregate number of writes to a data store.

Select a cache in the table to view a detailed graphical representation of the aggregated values across all the nodes supporting a cache. For example, Aggregate Puts Per Minute is the per minute value computed for put operations aggregated across all nodes supporting a cache.

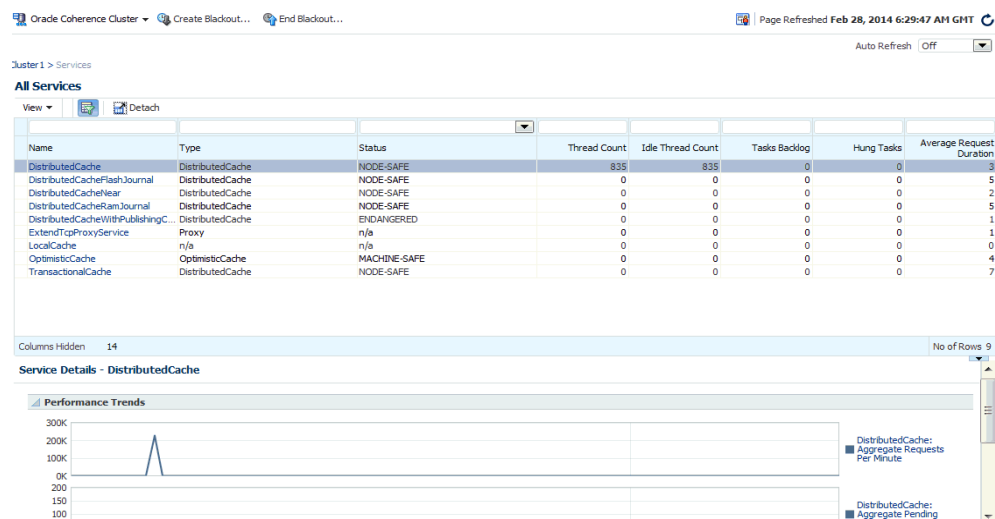
By default, the following graphs are displayed but this can be customized. Click the Personalize button and select the graphs to be displayed and the metrics to be included in each graph.

- **Aggregated Puts Per Minute:** The aggregate number of put operations per minute across all the nodes supporting this cache.
- **Aggregated Hits Per Minute:** The aggregate number of get operations per minute across all the nodes supporting this cache.
- **Aggregated Misses Per Minute:** The aggregate number of failed fetches of the cached objects per minute across all the nodes supporting this cache.
- **Aggregated Evictions Per Minute:** The aggregate number of eviction operations per minute across all the nodes supporting this cache.
- **Aggregate Inserts Per Minute:** The aggregate number of insert operations per minute across all the nodes supporting this cache.
- **Aggregate Removes Per Minute:** The aggregate number of delete operations per minute across all the nodes supporting this cache.

25.3.3 Services Page

This page lists all the discovered service targets that belong to the cluster. This is a master detail page where you can select a service in the master table to view the key performance metrics in the Details region. The list of nodes displayed here can vary based on how you have navigated to this page. To view this page, select the **Services** option from the Oracle Coherence Cluster menu.

Figure 25–13 All Services Page



For each service, the following details are displayed:

- **Name:** The name assigned to the service. Click on the link to drill down to the Service Home page.

- **Type:** Some of the service types available are:
 - **Cluster Service:** This service is started when a cluster node needs to join the cluster. It keeps track of the membership and services in the cluster.
 - **Distributed Cache Service:** Allows cluster nodes to distribute (partition) data across the cluster so that each piece of data in the cache is managed (held) by only one cluster node.
 - **Invocation Service:** This service provides clustered invocation and supports grid-computing architecture.
 - **Replicated Cache Service:** This is the synchronized replicated cache service, which fully replicates all of its data to all cluster nodes that are running the service.
- **Status:** The High Availability status for this service. This can be:
 - **MACHINE-SAFE:** This means that all the cluster nodes running on any given machine could be stopped at once without data loss.
 - **NODE-SAFE:** This means that any cluster node could be stopped without data loss.
 - **ENDANGERED:** This indicates that termination of any cluster node that runs this service may cause data loss.
 - **RACK-SAFE:** This status indicates that a rack can be stopped without any data loss.
 - **SITE-SAFE:** This status indicates that a site can be stopped without any data loss.
- **Thread Count:** The number of threads in the service thread pool.
- **Idle Thread Count:** The number of currently idle threads in the service thread pool.
- **Tasks Backlog:** The size of the backlog queue that holds tasks scheduled to be executed by one of the service pool threads.
- **Hung Tasks:** The id of the of the longest currently executing hung task.
- **Average Request Duration:** The average duration (in milliseconds) of an individual synchronous request issued by the service.

Select a service in the table to view a detailed graphical representation of the aggregated values across all the nodes supporting the service. The following graphs are displayed.

- **Aggregated Requests Per Minute:** The total number of the synchronous requests issued by the service.
- **Aggregated Pending Requests:** This graph displays the aggregate number of pending requests issued by the service.
- **Average Active Threads:** This graph displays the average number of active threads in the service thread pool.

25.3.4 Applications Page

This page lists all the applications associated with the cluster. For each application, the following details are displayed:

- **Local Attribute Cache**

- Local Session Cache
- Overflow Cache
- Clustered Session Cache

Click on the Application Name link to drill down to the Application Home page.

25.3.5 Proxies Page

This page shows the performance of all connection managers and connections in the cluster. To view this page, select **Proxies** from the **Coherence Cluster** menu. The following Connection Manager graphs are displayed:

- Top Connection Managers with Most Bytes Sent since the connection manager's statistics were last reset.
- Top Connection Managers with Most Bytes Received since the connection manager's statistics were last reset.

A table with the list of Connection Managers is displayed with the following details:

- Connection Manager: This is the name of the connection manager. It indicates the Service Name and the Node ID where the Service Name is the name of the service used by this Connection Manager. Click on the link to drill down to the Connection Manager Home page.
- Service: The name of the service. Click on the link to drill down to the Service Home page.
- Node ID: This is the node target name.
- Bytes Sent: The number of bytes sent per minute.
- Bytes Received: The number of bytes received per minute.
- Outgoing Buffer Pool Capacity: The maximum size of the outgoing buffer pool.
- Outgoing Byte Backlog: The number of outgoing bytes in the backlog.

The following Connection related graphs are displayed:

- Top Connections with Most Bytes Sent since the connection's statistics were last reset.
- Top Connections with Highest / Most Bytes Received since the connection's statistics were last reset.

A table with the list of connections is displayed. Click on the link to drill down to the Details page.

- Remote Client: The host on which this connection exists.
- Up Since: The date and time from which this connection is running.
- Connection Manager: The name of the connection manager. Click on the link to drill down to the Connection Manager Home page.
- Service: The name of the service. Click on the link to drill down to the Service Home page.
- Node ID: This is the node target name.
- Bytes Sent: The number of bytes sent per minute.
- Bytes Received: The number of bytes received per minute.
- Connection Time: The connection time in milliseconds.

- Outgoing Message Backlog: The number of outgoing messages in the backlog.
- Outgoing Byte Backlog: The number of outgoing bytes in the backlog.

25.4 Performance Pages

This section describes the Performance Summary page, and the service and connection manager performance pages.

25.4.1 Performance Summary Page

The Performance Summary page can be used to monitor the performance of the selected component or application. To view this page, select **Monitoring**, then **Performance Summary** from the **Oracle Coherence Cluster** menu. The performance page typically contains:

- A set of default performance charts that shows the values of specific performance metrics over time. You can customize these charts to help you isolate potential performance issues.
- A series of regions that is specific to the component or application. For example, the Oracle Cache Performance Summary page displays metrics such as Aggregate Cache Objects, Aggregate Evictions, Maximum Query Duration, and so on. These sections will vary from component to component.

25.4.1.1 Customizing the Performance Page Charts

The Performance page is configured to provide a default set of metric charts, but you can customize the charts in different ways. You can identify potential performance issues by correlating and comparing specific metric data. To customize the charts, some of the actions you can perform are:

- Click **Show Metric Palette** to display a hierarchical tree, containing all the metrics for the selected component or application. The tree organizes the performance metrics into various categories of performance data.
- Select a metric in the palette to display a performance chart that shows the changes in the metric value over time. The chart will continue to refresh automatically to show updated data.
- Click the "x" icon on the chart to close a chart. Click and drag the right side of the chart to move the chart to a new position on the page.
- Drag and drop a metric from the metric palette and drop it on top of an existing chart. The existing chart will show the data for both metrics.

See the Enterprise Manager Online Help for more details on customizing the Performance Page.

25.4.2 Service Performance Page

This page displays the performance of the selected service over a specific period of time. The Request Average Duration and the Request Max Duration charts are displayed.

25.4.3 Connection Manager Performance Page

This page displays the performance of the selected connection manager over a specified period of time. The following graphs are displayed:

- Bytes Sent: This graph shows the number of bytes sent since the connection manager was last started.
- Bytes Received: This graph shows the number of bytes received since the connection manager was last started.

Performance:

The average performance over the selected period is displayed.

- Outgoing Byte Backlog: The number of outgoing bytes in the backlog.
- Outgoing Message Backlog: The number of outgoing messages in the backlog.
- Incoming Buffer Pool Capacity: The maximum size of incoming buffer pool.
- Incoming Buffer Pool Size: The currently used value of the incoming buffer pool.
- Outgoing Buffer Pool Capacity: The maximum size of the outgoing buffer pool.
- Bytes Received: The number of bytes received per minute.
- Bytes Sent: The number of bytes sent per minute.

25.5 Viewing Incidents

The Incident Manager shows incidents for a target and its members. When the Incident Manager is launched from Coherence Cluster target, incidents for Cluster, Node and Cache targets in cluster are displayed. Similarly, when the Incident Manager is launched in the context of Node target, incidents for the Node target and for all Cache targets that are deployed on the node are displayed. When Incident Manager is launched from the Cache target, incidents for that target are displayed.

You can launch the Incident Manager by clicking on the number of Incidents in the General section for Coherence Cluster, Node and Cache targets. Alternatively, from the **Oracle Coherence Cluster** (Node or Cache) menu, select **Monitoring**, then select **Incident Manager** to navigate to the Incident Manager page.

25.6 Target Information

From the Oracle Coherence Cluster menu, select Target Information. The following information is displayed for the target in a pop-up window.

- Up Since: The date and time from which the cluster is up and running.
- Availability%: The percentage of time that the management agent was able to communicate with the cluster. Click the percentage link to view the availability details for the past 24 hours.
- Version: The version of Coherence software obtained from Cluster MBean.
- Oracle Home: The location of the Oracle Home.
- Agent: The Management Agent that Oracle Enterprise Manager is using to communicate with the MBean Server. Click on the link to drill down to the Agent Home page.
- Host: The host on which the cluster is running. Click on the link to drill down to the Host Home page.
- Name: This is the actual name of the cluster that is discovered and may be different from the name of the cluster target in Enterprise Manager.

- **Auto Detect Restarted Nodes:** The value displayed can be true or false and indicates whether all the nodes in this cluster have been started with the `tangosol.coherence.management.extendedmbeanname` property.
- **MBean Server Host:** Shows the host on which the Coherence management node with Mbean Server is running.

If the node on the MBean Server Host is not accessible, the monitoring capability of the node will be affected. To avoid this, we recommend that at least two management nodes are running in the cluster. If a management node departs from the cluster, you must update the host and port target properties to point to the host with the running management node.

Administering a Coherence Cluster

This chapter describes the administration options available for the various Coherence targets. It contains the following sections:

- [Cluster Administration Page](#)
- [Node Administration Page](#)
- [Cache Administration Page](#)
- [Service Administration Page](#)
- [Cache Data Management](#)

26.1 Cluster Administration Page

This page allows you to change the configuration of nodes, caches, and services.

Note: Any changes made to the configuration are applied to the active cluster but will not be saved.

Figure 26–1 Cluster Administration Page

The screenshot displays the 'Administration' page for a Coherence cluster. It features three main sections: 'Node', 'Service', and 'Cache', each with a 'Change Configuration' form. The 'Node' section has a dropdown for 'Node' set to 'CoherenceTestApp' and a 'Go' button. The 'Service' section has a dropdown for 'Service' set to 'DistributedCacheWithPublishingCacheStore' and a 'Go' button. The 'Cache' section has a dropdown for 'Service' set to 'DistributedCache', a dropdown for 'Cache' set to 'dist-cache1', a dropdown for 'Node' set to 'CoherenceTestApp', and a 'Go' button. There are also 'Tier' and 'Loader' dropdowns in the 'Cache' section.

Coherence: Cluster1 > Administration
Administration

Node
Change Configuration
Select a node to change its configuration
Node: CoherenceTestApp [Go]

Service
Change Configuration
Select a service and its node to change configuration
Service: DistributedCacheWithPublishingCacheStore [Go]

Cache
Change Configuration
Select a cache and its node to change configuration
Service: DistributedCache [Cache: dist-cache1 [Node: CoherenceTestApp [Tier: back [Loader: None [Go]

On this page, you can select an entity (node, cache, or service) for which the configuration needs to be modified and click **Go**. The Change Configuration page is displayed. Enter the new values and click **Update** to save the values and return to the Coherence Cluster Administration page.

26.1.1 Changing the Node Configuration

To change the node configuration, select a node from the Node drop down list and click **Go**. The Change Configuration on Node page appears.

Figure 26–2 Change Node Configuration

Oracle Coherence Cluster: Cluster1

Update Update All Return

Change Configuration on Node: CoherenceTestApp/sk03qka

Connection
Changes to following attributes will result in an asynchronous configuration collection. To prevent multiple configuration collections, update all the values that need to be modified and click on Update or Update All button finally.

Multicast Threshold (%) 25

Network

Resend Delay (ms)	200	Traffic Jam Count	8192
Send Ack Delay (ms)	16	Traffic Jam Delay (ms)	10

Logging

Logging Limit	2147483647	Logging Level	5
---------------	------------	---------------	---

Credentials
Select credential from one of the following options.

Credential ☒ Preferred ☐ Named ☐ New

Preferred Credential Name Normal Host Credentials

Credential Details Default preferred credentials are not set.

You can change the following values:

Connection

- **Multicast Threshold:** The percentage (0 to 100) of the servers in the cluster that a packet will be sent to, above which the packet will be multicasted and below which it will be unicasted.

Network

- **Resend Delay:** The minimum number of milliseconds that a packet will remain queued in the Publisher's re-send queue before it is resent to the recipient(s) if the packet has not been acknowledged.
- **Traffic Jam Count:** The maximum total number of packets in the send and resend queues that forces the publisher to pause client threads. Zero means no limit.
- **Send Ack. Delay:** The minimum number of milliseconds between the queuing of an Ack packet and the sending of the same. This value should be not more than a half of the Resend Delay value.
- **Traffic Jam Delay:** The number of milliseconds to pause client threads when a traffic jam condition has been reached. Anything less than one (e.g. zero) is treated as one millisecond.

Logging

- **Logging Level:** Specifies which logged messages will be output to the log destination.
- **Logging Limit:** The maximum number of characters that the logger daemon will process from the message queue before discarding all remaining messages in the queue.

Credentials

Specify the credentials of the host on which the Management Agent is running.

Usage Tips

- Click **Update** to save the changes of the selected node and click **Return** to return to the Node Administration page.

- Click **Update All** to update all the nodes in the cluster and click **Return** to return to the Node Administration page.

26.1.2 Changing the Cache Configuration

Use this page to modify the configuration of the selected node of the cache. You can change the following values:

- **High Units:** The limit of the cache size measured in units. The cache will prune itself automatically once it reaches its maximum unit level.
- **Low Units:** The number of units to which the cache will shrink when it prunes.
- **Expiry Delay:** The time-to-live for cache entries in milliseconds. Value of zero indicates that the automatic expiry is disabled.

Usage Tips

- Click **Update** to save the changes of the selected node and return to the Cache Administration page.
- Click **Update All** to update all the nodes that support the selected cache.
- Click **Return** to return to the previous page.

26.1.3 Changing the Service Configuration

Use this page to modify the configuration of the selected node of the service. You can change the following values:

- **Request Timeout:** The request execution timeout value.

After you have modified the value of the parameters, you must specify the credentials. You can do either of the following:

- Click **Update** to save the changes of the selected node and click **Return** to return to the Service Administration page.
- Click **Update All Nodes** to update all the nodes that support the selected service and click **Return** to return to the Service Administration page.

26.2 Node Administration Page

On this page, you can perform the following administration tasks:

- **Change the Node Configuration:** Click **Change Configuration** to modify the configuration of the node. The Change Configuration page is displayed. Enter the new values and click **Update** to save the values and return to the Coherence Node Administration page. See [Section 26.1.1, "Changing the Node Configuration"](#) for details.
- **Setup Log Alerts:** You can set up each Coherence node to log all its messages into a log file on the host on which this node is running. Click the **Log Alert Setup** link to drill down to the Metric and Policy Settings page. Configure the Log File Pattern Matched Line Count metric to specify a specific string pattern in the log file name. This metric should be set up on the host on which the Coherence node is running. The log file related alerts will be displayed in the Node Details Home page.

Note: You can set up Log Alerts only for nodes that are running on hosts monitored by Enterprise Manager.

26.3 Cache Administration Page

This page allows you to perform the following cache related administration tasks.

- **Cache Data Management:** Click **Go** to perform cache data management operations. The Cache Data Management page is displayed where you can perform operations like view, export, import, insert, update, purge, add, and remove indexes from Cache Data Management page. See [Section 26.5, "Cache Data Management"](#) for details.
- **Changing the Cache Configuration:** Select a node from the list, Tier, Loader, and click **Go**. The Change Configuration page is displayed. Enter the new values and click **Update** to save the values and return to the Coherence Cache Administration page. See [Changing the Cache Configuration](#) for details.

Note: To perform the Cache Data Management and Change Cache Configuration tasks, you need to login as a user with Administrator privileges.

26.4 Service Administration Page

This page allows you to change the configuration of a service. Select a node from the list and click **Go**. The Change Configuration page is displayed. Enter the new values and click **Update** to save the values and return to the Coherence Service Administration page. See [Changing the Service Configuration](#) for details.

26.5 Cache Data Management

The Cache Data Management feature allows you to define indexes and perform queries against currently cached data that meets a specified set of criteria.

Note: This feature is available to users with Administration privileges only if the Cache Data Management MBean has been registered in the Coherence JMX management node.

To perform cache data management operations, navigate to the Cache target Administration page and click **Go** in the Cache Data Management section. In the Cache Data Management page, you can select an operation and a query to perform a data management operation on the cache. You can perform the following operations:

- **Add Indexes:** To create an index, select the **Add Index** option in the Operation field. In the Value Extractor List field, specify a comma separated list of expressions that identify the index, and enter the Host Credentials. The Value Extractor is used to extract an attribute from a given object for indexing.
- **Remove Indexes:** To remove an index, select the **Remove Index** option in the Operation field and specify the Value Extractor List that identifies the index. Specify the Host Credentials and click **Execute** to remove the index from the cache.
- **Export:** You can export the queried data onto a file. Select a query from the Query section or click **Create** to create a new query. Select the **Export** option in the

Operation field and enter the absolute path to the file. This file can be saved on the host machine on which the management node is running.

- **Import:** You can import queried data from a file. This file should be present on the host machine on which the management node is running. Select the **Import** option in the operation field and enter the absolute path to the file.
- **Insert:** Select the Insert option in the Operation field and specify an unique (key value) pair. This key value pair will be inserted into the cache and can be provided from:
 - UI Table on this Page: Select the Type of Keys and Type of Values and the Host Credentials.
 - Text File on Management Host: If the queries are stored in a text file, select this option and specify the location of the file.
 - Database Table: If the queries are stored in a database table, specify the Database URL, Credentials, the SQL Query Statement and Properties.
- **Purge:** Select **Purge** from the Operation drop-down list. Data matching the selected query will be deleted from the cache
- **View Data:** Select **View Data** from the Operation drop-down list and specify the number of key-value pairs to be displayed on each page. Data matching the criteria will be displayed.
- **Update:** Select **Update** from the Operation drop-down list. Specify the credentials for the host. Select a query from the Query table or create a new query to update the data in the cache.
- **Explain Plan:** Select **Explain Plan** from the Operation drop down list. Select a query that is to be evaluated from the Query table. See View Explain page for details.
- **Trace:** Select **Trace** from the Operation drop down list. Select a query that is to be evaluated from the Query table. See View Trace page for details.

26.5.1 Explain Plan

A query explain record provides the estimated cost of evaluating a filter as part of a query operation. The cost takes into account whether or not an index can be used by a filter. The cost evaluation is used to determine the order in which filters are applied when a query is performed. Filters that use an index have the lowest cost and get applied first.

The Explain Plan option allows you to estimate the cost of evaluating a filter as part of a query operation. When you select this option, a query record containing details of each step in the query is displayed. After viewing the details, click **Execute** to perform the selected operation or **Return** to return to the previous page.

Note: The Explain Plan option can be used with Coherence version 3.7.1 or later.

26.5.2 Trace

The Trace option allows you to view the actual cost of evaluating a filter as part of a query operation. When you select this option, a query is executed in the cluster and a query record containing details of each step in the query is displayed. After viewing

the details, click **Execute** to perform the selected operation or click **Return** to return to the previous page.

Note: The View Trace Plan option can be used with Coherence version 3.7.1 or later.

Troubleshooting and Best Practices

This chapter lists a few tips for troubleshooting Coherence and some Coherence best practices. It contains the following sections:

- [Troubleshooting Coherence](#)
- [Best Practices](#)

27.1 Troubleshooting Coherence

- **Collecting Metric Data:** If you cannot collect metric data for any of the Coherence targets, check the following to ensure that the steps involved in discovering the target have been followed correctly.
 - Make sure that the management node has been successfully started and the host on which the management node is running is accessible from the Agent host.
 - Specify the appropriate User Name and Password if password authentication is enabled.
 - If you are not using SSL to start the management node, make sure that you have started the JVM using the `com.sun.management.jmxremote.ssl=false` option.
- **Dynamic Client Nodes:** If there are dynamic client nodes that are not running all the time, these nodes can be removed from the cluster and proxy service can be used.
- **Target Proliferation of Nodes:** If there is a target proliferation of nodes, this may be due to NULL or duplicate `tangosol.coherence.member` value for the nodes. Verify that each node has a nonNull and unique value for the `tangosol.coherence.member` property.

27.2 Best Practices

This section describes some of the best practices that can be used while setting up and using Oracle Coherence. It covers the following:

- [Monitoring Templates](#)

27.2.1 Monitoring Templates

Monitoring templates for each of the Coherence Cluster, Node, and Cache targets are available out-of-the-box. These templates can be used as default monitoring templates

for all Coherence targets. Based on specific requirements, you can enable, disable certain metrics or change the collection frequency.

Note: The threshold values provided in the templates are examples and must be changed.

Coherence Integration with JVM Diagnostics

This chapter describes the JVM Diagnostics integration with Coherence. It contains the following sections:

- [Overview](#)
- [Configuring Coherence Nodes for JVM Diagnostics Integration](#)
- [Accessing JVM Diagnostics from Coherence Targets](#)
- [Including the JVM Diagnostics Regions in the Coherence Target Home Pages](#)

28.1 Overview

JVM Diagnostics provides deep visibility into the runtime of the JVM. It allows administrators to identify the root cause of performance problems in the production environment without having to reproduce them in the test or development environment. You can view the JVM Diagnostics data if the JVM Diagnostics Manager and JVM Diagnostics Agent have been deployed on the host machine on which the OMS running.

You can also use JVM Diagnostics to diagnose performance issues in Oracle Coherence cluster nodes. You can drill down to a Coherence node's JVM to identify the method or thread that is causing a delay. This feature allows you to trace live threads, identify resource contention related to locks, and trace the Java session to the database. To diagnose performance issue in a Coherence node, you must configure the node so that it can be monitored by JVM Diagnostics.

Note: JVM Diagnostics is a part of the WLS Management Pack EE Management Pack.

28.2 Configuring Coherence Nodes for JVM Diagnostics Integration

To setup JVM Diagnostics on each Coherence node, you must download the JVM Diagnostics Agent. To download the JVM Diagnostics Agent, follow the steps listed in the Enterprise Manager Cloud Control Administrator's Guide. When the JVM Diagnostics is downloaded, the `jamagent.war` file is downloaded. You must to copy the `.war` file to all machines on which the Coherence nodes are to be integrated with JVM Diagnostics, and add it to the class path.

Additionally, you must add the `Doracle.coherence.jamjvmid` system property. The value of this property must match the value specified for `jamjvmid`. For more details on setting up the `jamjvmid` property, refer to the Enterprise Manager Cloud Control Administrator's Guide.

28.2.1 Example Start Script for Coherence Management Node

An example start script is given below.

```
#!/bin/sh

CP=$CP:<Path to jamagent.war>:<EM CC_Agent_
Home>/plugins/oracle.sysman.emas.agent.plugin_
12.1.0.6.0/archives/coherence/coherenceEMIntg.jar:
<EM CC_Agent_Home>/plugins/oracle.sysman.emas.agent.plugin_
12.1.0.6.0/archives/coherence/bulkoperationsmbean.jar
COH_OPTS="$COH_OPTS -cp $CP"

JVM_ID=<coherence_cluster_name/node_member_name>

JAM_TARGET="jamagent.jamrun"

JAM_ARGS=" "
JAM_ARGS="$JAM_ARGS jamconshost=<oms_host>"
JAM_ARGS="$JAM_ARGS jamconspport=<oms_port>"
JAM_ARGS="$JAM_ARGS jamjvmid=$JVM_ID"
JAM_ARGS="$JAM_ARGS jampool=<coherence_cluster_name>"

$JAVA_HOME/bin/java $COH_OPTS
-Dtangosol.coherence.management.extendedmbeaname=true
-Dcom.sun.management.jmxremote.authenticate=false
-Dcom.sun.management.jmxremote
-Dcom.sun.management.jmxremote.ssl=false
-Dtangosol.coherence.management=all
-Dtangosol.coherence.member=<unique member name>
-Doracle.coherence.machine=<hostname_as_discovered_in_EM>
-Dcom.sun.management.jmxremote.port=<OpenTCP_Port>
-Doracle.coherence.home=$COHERENCE_HOME
-Dtangosol.coherence.distributed.localstorage=false
-Dtangosol.coherence.management.refresh.expiry=1m
-Doracle.coherence.jamjvmid=$JVM_ID
$JAM_TARGET $JAM_ARGS
-server
-Xms2048m -Xmx2048m
oracle.sysman.integration.coherence.EMIntegrationServer
```

28.2.2 Example Start Script for All Other Nodes

An example start script for all other nodes is given below.

```
#!/bin/sh

JVM_ID=<coherence_cluster_name/node_member_name>

JAM_TARGET="jamagent.jamrun"

JAM_ARGS=" "
JAM_ARGS="$JAM_ARGS jamconshost=<oms_host>"
JAM_ARGS="$JAM_ARGS jamconspport=<oms_port>"
JAM_ARGS="$JAM_ARGS jamjvmid=$JVM_ID"
JAM_ARGS="$JAM_ARGS jampool=<coherence_cluster_name>"

COH_OPTS="$COH_OPTS -cp $CP"
$JAVA_HOME/bin/java $COH_OPTS
-Dtangosol.coherence.management.extendedmbeaname=true
-Dtangosol.coherence.management.remote=true
```



```

-Dcom.sun.management.jmxremote.authenticate=false
-Dcom.sun.management.jmxremote.ssl=false
-Doracle.coherence.home=<coherence home>
-Dtangosol.coherence.member=<unique member name>
-Doracle.coherence.machine=<hostname_as_discovered_in_EM>
-Doracle.coherence.jamjvmid=$JVM_ID
$JAM_TARGET $JAM_ARGS
com.tangosol.net.DefaultCacheServer

```

28.3 Accessing JVM Diagnostics from Coherence Targets

If the Coherence nodes have been correctly configured for JVM Diagnostics, menu items for JVM Diagnostics will be available from each of the Oracle Coherence Node, Oracle Coherence Cache and Oracle Coherence Cluster targets.

28.3.1 Accessing JVM Diagnostics from Oracle Coherence Node Menu

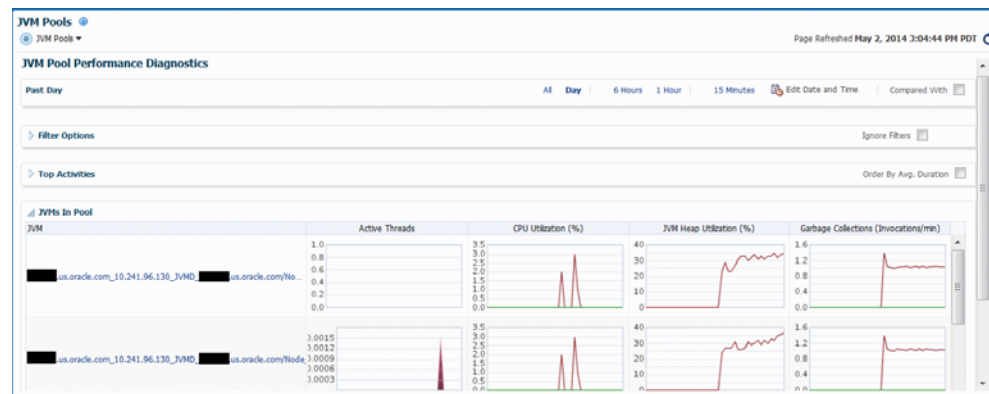
From the Oracle Coherence Node Home page, select **JVM Diagnostics** from the **Oracle Coherence Node** menu. The drill down page for the JVM corresponding to the Coherence node appears.

Figure 28–1 Coherence Node JVM Diagnostics Drill Down Page



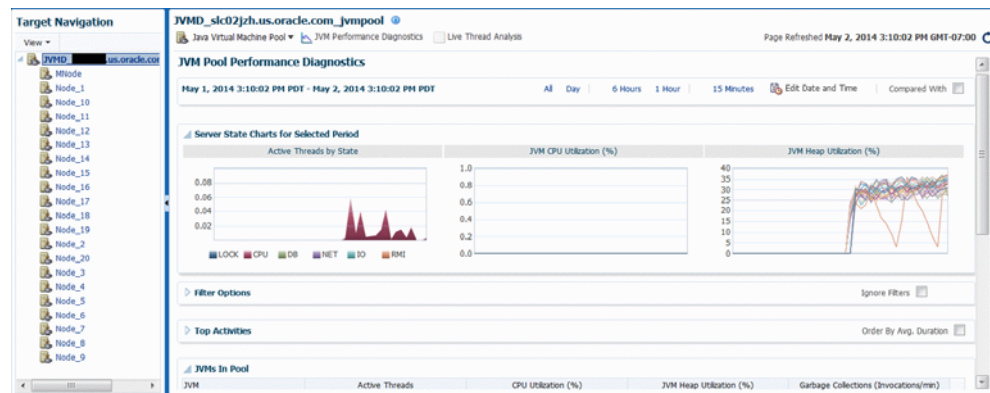
28.3.2 Accessing JVM Diagnostics from Oracle Coherence Cache Menu

From the Oracle Coherence Cache Home page, select **JVM Diagnostics** from the **Oracle Coherence Cache** menu. The JVM Pool Performance Diagnostics page which will show a summary of JVMs for the nodes that supports the cache appears.

Figure 28–2 Coherence Cache JVM Diagnostics Pool Drill Down Page

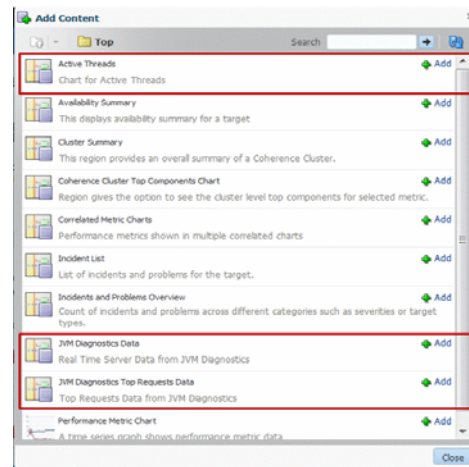
28.3.3 Accessing JVM Diagnostics from Oracle Coherence Cluster Menu

From the Oracle Coherence Cluster Home page, select **JVM Diagnostics** from the **Oracle Coherence Cluster** menu. The JVM Pool Performance Diagnostics page which will show a summary of JVMs for the nodes that supports the cache appears.

Figure 28–3 Coherence Cluster JVM Pool Drill Down Page

28.4 Including the JVM Diagnostics Regions in the Coherence Target Home Pages

If the Coherence cluster nodes have been configured with JVM Diagnostics, the JVM Diagnostics regions can be included in the Coherence cluster and node Home pages. You can add these regions using the [Section 25.1.2, "Personalization"](#) feature.

Figure 28–4 Adding JVM Diagnostics Regions

Part IX

Using Identity Management

The chapters in this part provide a brief introduction to the Management Pack Plus for Identity Management. The chapters guide you through the process of discovering and configuring Oracle Identity Management targets and discusses key features in the Management Pack Plus for Identity Management.

The chapters are:

- Chapter 29, "Getting Started with Oracle Identity Management"
- Chapter 30, "Prerequisites for Discovering Oracle Identity Management Targets"
- Chapter 31, "Discovering and Configuring Oracle Identity Management Targets"
- Chapter 32, "Investigating and Analyzing Problems"

Getting Started with Oracle Identity Management

As more and more businesses rely on the Oracle Identity and Access Management Suite to control access to their mission-critical applications (both packaged applications and custom-built web applications) and to provision resources across their organizations, the need to achieve predictable performance and availability for Oracle Identity Management systems has become a top priority for many businesses. An outage or slow performance in access and identity services, for instance, can have negative impacts on the business bottom-line as end-users are unable to log in to mission-critical applications.

To help you maximize the value of Oracle Identity Management systems and to deliver a superior ownership experience while restraining the systems management costs, Oracle provides Oracle Management Pack Plus for Identity Management (the Identity Management Pack), which leverages the Oracle Enterprise Manager Cloud Control advanced management capabilities, to provide an integrated and top-down solution for your Oracle Identity Management environment.

To view a video about managing Oracle Identity Management, [click here](#).

29.1 Benefits of the Using Identity Management Pack

The benefits of using Identity Management Pack include:

- Using a centralized systems management solution to efficiently manage multiple Oracle Identity Management deployments including testing, staging, and production environments from a single console
- Gaining the ability to monitor a wide range of performance metrics for all critical Identity Management components to find root causes of problems that could potentially slow performance or create outages
- Automating configuration management to accelerate problem resolution
- Recording synthetic Web transactions (or service tests) to monitor Identity Management Service availability and analyze end user response times
- Defining Service Level Objectives (SLO's) in terms of out-of-box system-level metrics, as well as end user experience metrics to accurately monitor and report on Service Level Agreement (SLA) compliance

29.2 Features of the Identity Management Pack

The features in the Identity Management Pack include:

- Enterprise-Wide View of Oracle Identity Management
 - The "Identity and Access" dashboard provides a centralized view of all Oracle Identity Management components - including Identity Management 10g and Identity Management 11g components.
 - From the "Identity and Access" dashboard, users can view the performance summary of the associated systems and services based on the underlying dependencies and monitor the overall health of the Identity Management environment.
- Performance Management
 - A wide range of out-of-box performance metrics to find root causes of problems that could potentially slow performance, extend response times, or create outages
 - Customizable performance summaries with a "Metric Palette" that allows users to drag and drop performance charts
- Configuration Management
 - Perform key configuration management tasks like keeping track of configuration changes for diagnostic and regulatory purposes, taking snapshots to store configurations, and comparing component configurations to ensure consistency of configurations within the same environment or across different environments.

29.2.1 New Features for this Release

New features for Identity Management Pack include:

- Problem Analysis

Problem analysis is now available for IDM targets. See [Chapter 32, "Investigating and Analyzing Problems"](#) for more information.
- Performance Page

This page shows the performance of the database corresponding to the Oracle Access Manager (OAM) Enterprise Manager target. Using this data, the OAM administrator can identify problems causing performance bottlenecks.
- Configuration Compare Templates

Using a template, you can remove properties that typically signal "false positives" in comparisons by setting flags to ignore differences. When comparing hosts, for example, you know that host names will be different, so you can indicate to ignore differences on the name property value.
- Performance Management
 - Out-of-box reports for Oracle Internet Directory, Oracle Access Manager, and Oracle Identity Manager
 - Oracle Identity Manager database performance page to analyze the performance of the underlying Oracle Identity Manager database in the context of the OIM-specific tables and user. **Note:** The database target will need to be discovered to take advantage of all the features on the database performance page.
- Configuration Management

Automated compliance monitoring and change detection for Oracle Identity Manager is now available to help customers meet compliance and reporting requirements.

To enable the compliance standard association with the Oracle Identity Manager Cluster target. Perform the following steps:

1. Click the Oracle Identity Manager Cluster target. From the **Target** menu, select **Compliance**, then select **Standard Associations**.
2. Click **Edit Association Settings**. Click **Add** and then select **Oracle Identity Manager Cluster Configuration Compliance**.
3. Click **OK** and then **OK** again to enable the new association setting.

- **Monitoring Support**

As part of the Oracle Access Management Suite, added monitoring support for the Oracle Mobile and Social, Identity Federation. This includes Up and Down status of Mobile and Social service along with the collection of the select Mobile and Social metrics.

29.3 Monitoring Oracle Identity Management Components in Enterprise Manager

You can use Enterprise Manager to monitor the following Identity Management 11g components ([Table 29-1](#)).

Table 29–1 Licensed Targets for Identity Management 11g Targets

Enterprise Manager Target Type	Purpose
Oracle Adaptive Access Manager Oracle Access Manager Oracle Directory Integration Platform Oracle Identity Federation Oracle Identity Manager Oracle Internet Directory Oracle Virtual Directory	<p>Each component will be presented as a target in Enterprise Manager which provides an interface with access to target overview, customizable performance summary, process control, configuration management, compliance analysis, and Information Publisher reports.</p> <p>For all the Oracle Adaptive Access Managers, Oracle Access Managers, and Oracle Identity Managers that are deployed within the same WebLogic domain, a cluster target will be created for each component:</p> <ul style="list-style-type: none"> ■ Oracle Adaptive Access Manager Cluster ■ Oracle Access Manager Cluster ■ Oracle Identity Manager Cluster <p>Each cluster target is a logically related group of components that are managed as a unit.</p> <p>Every target is part of a WebLogic domain.</p>
Oracle Directory Server Enterprise Edition	<p>The following types of targets will be created for each Oracle Directory Server Enterprise Edition deployment:</p> <ul style="list-style-type: none"> ■ Oracle Directory Server Enterprise Edition Server A target represents the LDAP service and all internal resources ■ Directory Server Group User logical grouping of Oracle Directory Server Enterprise Edition Servers ■ Directory Server Enterprise A set of Oracle Directory Server Enterprise Edition Servers connected through a network that participates in the service, including Directory Server Groups. <p>Each target provides an interface in Enterprise Manager with access to target overview, customizable performance summary, process control, and configuration management.</p>

The following Identity Management 10g components can be monitored by Enterprise Manager ([Table 29–2](#)).

Table 29–2 Licensed Targets for Identity Management 10g Targets

Enterprise Manager Target Type	Purpose
Oracle Delegated Administration Server Oracle Directory Integration Platform Oracle Internet Directory Oracle Single Sign-On	Each component will be presented as a target in Enterprise Manager which provides an interface with access to target overview and performance summary
Oracle Access Manager - Access Server Oracle Access Manager - Identity Server Oracle Identity Federation	<p>Each component will be presented as a target in Enterprise Manager which provides an interface with access to target overview and performance summary.</p> <p>A system target will be created for each component to provide end-to-end system oriented view of the component:</p> <ul style="list-style-type: none"> Access Manager - Access System Access Manager - Identity System Identity Federation System <p>The underlying LDAP servers, database instances and hosts will be monitored within the system.</p>
Oracle Identity Manager	<p>The following types of targets will be created for each Oracle Identity Manager:</p> <ul style="list-style-type: none"> Identity Manager Server A target represents the server tier of Oracle Identity Manager Identity Manager Repository A target represents the data and enterprise integration tier of Oracle Identity Manager <p>A system target will be created for Oracle Identity Manager to provide an end-to-end system oriented view of the component.</p> <ul style="list-style-type: none"> Identity Manager System <p>The underlying LDAP servers, database instances, and hosts will be monitored within the system.</p>

The monitored targets in the Identity Management pack associated with both release 10g and release 11g are summarized in [Table 29–3](#).

Table 29–3 Targets Associated with Both Identity Management 10g and Identity Management 11g Targets

Enterprise Manager Target Type	Purpose
Generic Service	With the Management Pack Plus for Identity Management, users can create targets of type Generic Service associated with any of the monitored Identity Management Systems: Access Manager - Access System, Access Manager - Identity System, Identity Federation System, Identity Manager System, and Identity and Access System. The Generic Service target provides an end-to-end service oriented view of the monitored Oracle Identity Management targets with access to performance and usage metrics, service tests, service level rules, service availability definition, alerts, charts, and topology view.
Host	Representation of hosts running Oracle Identity Management components providing access to metrics, alerts, performance charts, remote file editor, log file alerts, user-defined metrics, host commands and customized reports.

Table 29–3 (Cont.) Targets Associated with Both Identity Management 10g and Identity Management 11g

Enterprise Manager Target Type	Purpose
Oracle Database	Representation of Oracle Database that is used by Oracle Identity Management components providing access to metrics, alerts, performance charts, compliance summary, and configuration management.
Oracle Identity and Access System	System target that can be modeled with any discovered Oracle Identity Management target (including both Identity Management 10g and Identity Management 11g targets) and the underlying hosts and databases as the key components providing an end-to-end system oriented view of the monitored Identity Management environment. The Identity and Access System target provides access to member status, metrics, charts, incidents, and topology view.
Oracle SOA Suite	Representation of Oracle SOA Suite that is used by Oracle Identity Manager 11g providing access to metrics, alerts, performance charts, and configuration management of the SOA infrastructure instance and its service engines.

Prerequisites for Discovering Oracle Identity Management Targets

This chapter lists the system requirements and prerequisites needed to discover identity management targets.

30.1 System Requirements

Table 30–1 lists the supported Oracle Identity Management products in the Management Pack Plus for Identity Management in Enterprise Manager Cloud Control 12c.

Note: For the most up-to-date list of supported platforms, check My Oracle Support Certification Matrix on My Oracle Support (<http://support.oracle.com>).

Table 30–1 Supported Identity Management Products and Platforms in Enterprise Manager Cloud Control

Product	Application Server	Directory Server/Database
Oracle Access Manager	Not Applicable	Oracle Internet Directory; Microsoft Active Directory
Oracle Access Manager	Oracle WebLogic Server	Oracle Database
Oracle Adaptive Access Manager	Oracle WebLogic Server	Oracle Database
Oracle Directory Integration Platform	Oracle WebLogic Server	Oracle Database
Oracle Directory Server Enterprise Edition	Not Applicable	Not Applicable
Oracle Identity Federation	Oracle Application Server	Oracle Internet Directory
Oracle Identity Federation	Oracle WebLogic Server	Oracle Internet Directory
Oracle Identity Management Suite - Delegated Administration Services	Oracle Application Server	Oracle Database
Oracle Identity Management Suite - Directory Integration Platform	Oracle Application Server	Oracle Database
Oracle Identity Management Suite - Oracle Internet Directory	Oracle Application Server	Oracle Database
Oracle Identity Management Suite - Single Sign-On Server	Oracle Application Server	Oracle Database
Oracle Identity Manager	Oracle WebLogic Server	Oracle Database
Oracle Identity Manager	Oracle WebLogic Server; Oracle SOA Suite	Oracle Database

Table 30–1 (Cont.) Supported Identity Management Products and Platforms in Enterprise Manager Cloud

Product	Application Server	Directory Server/Database
Oracle Internet Directory	Oracle WebLogic Server	Oracle Database
Oracle Unified Directory	Not Applicable	Not Applicable
Oracle Virtual Directory	Oracle WebLogic Server	Not Applicable

30.2 Installing Oracle Enterprise Manager Cloud Control 12c

Before you begin configuring Cloud Control 12c to manage your Identity Management components, you must install and configure Cloud Control 12c on at least one host computer on your network. Oracle recommends that you install Cloud Control on dedicated host(s).

For example, if the Identity Management components are installed on emHost1.example.com, then install and configure the Oracle Management Service and Oracle Management Repository on emHost2.example.com. Install the Cloud Control 12c Management Agent on every host that includes the components you want to manage with Cloud Control.

See Also:

Oracle Enterprise Manager Cloud Control Basic Installation Guide

All documentation files can be accessed on the Oracle OTN website:

http://docs.oracle.com/cd/E24628_01/nav/portal_booklist.htm

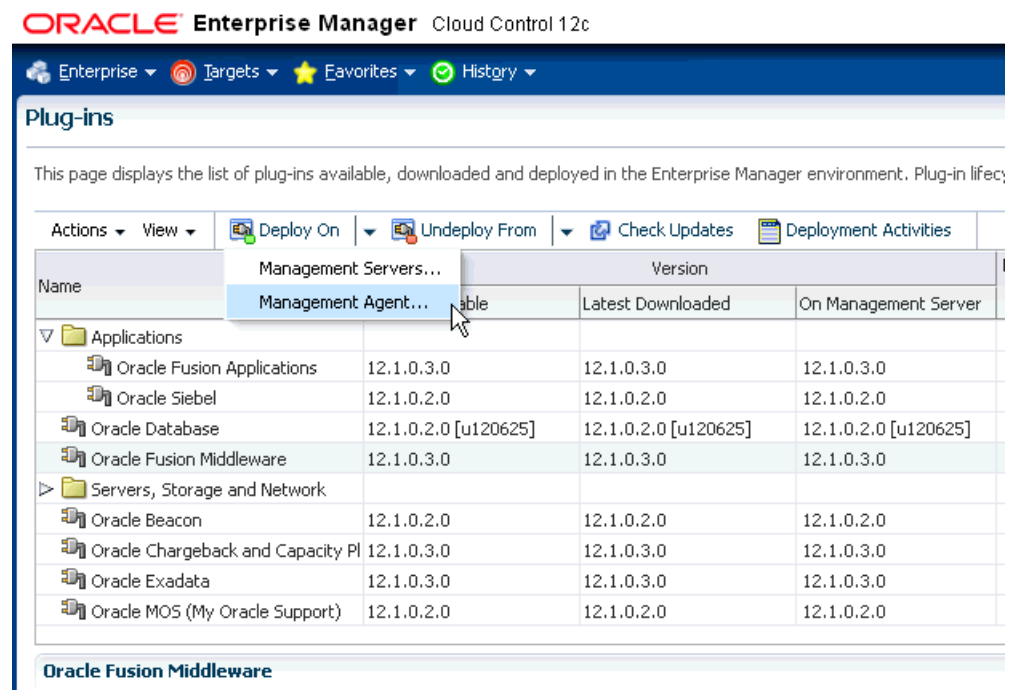
30.3 Prerequisites for Discovering Identity Management Targets in Enterprise Manager

Before you start monitoring Oracle Identity Management targets in Enterprise Manager, you must perform the following tasks:

- Install Cloud Control 12c Agent on each of the hosts that run Oracle Identity Management components.

If you would like to monitor additional targets, such as Oracle Application Server, Oracle WebLogic Server, JBoss Application Server, MS Active Directory, MS IIS and databases supporting Oracle Identity Management, and you have the proper license for monitoring these targets, then install Cloud Control 12c Management Agent on these hosts as well.

- Deploy the "Oracle Fusion Middleware" plug-in on the agents running on the hosts for Oracle Identity Management.
 1. Log in to Enterprise Manager. Navigate to **Setup**, select **Extensibility**, then select **Plugins**.
 2. Select Oracle Fusion Middleware plug-in and ensure that it has been deployed on the agents running on the hosts for Oracle Identity Management. See [Figure 30–1](#).

Figure 30–1 Plug-Ins Deploy On Options

- After Enterprise Manager Cloud Control OMS and Management Agents are installed, complete the following steps before initiating the discovery process:

Oracle Access Manager 10.1.4.2, 10.1.4.3.0

1. Install Oracle Access Manager SNMP Agent on each of the hosts where the Oracle Access Manager Access Server and Identity Server are running. The SNMP Agent collects performance metrics and configuration parameters for the Oracle Access Manager Access Server and Identity Server, allowing you to monitor the various Oracle Access Manager components through Enterprise Manager Cloud Control. Refer to the *Oracle Access Manager Installation Guide* for instructions on installing the SNMP Agent (http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25353/snmp.htm#CHDFBJJC).

2. Configure the SNMP Agent and specify the Management Agent's UDP and TCP Ports as well as the SNMP Agent Community Name. Make sure that you record the SNMP Agent UDP Port and Community Name, because these details will be needed in the discovery process. Refer to the *Oracle Access Manager Installation Guide* for instructions on configuring the SNMP Agent (http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25353/snmp.htm#CEGEIIFI).

Also, refer to the *Oracle Access Manager Identity and Common Administration Guide* for instructions on setting up the SNMP Agent (http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25343/snmpmtr.htm#CEGHHDBC).

3. Enable SNMP monitoring for both the Oracle Access Manager Access Server and Oracle Access Manager Identity Server by completing the following tasks:
 - From the Identity (or Access) System Console, select System Configuration, Identity Server (or Access Server).

- Click a link for a particular server.
- Click **Modify** to display the page where you can turn SNMP monitoring on or off. Click the **SNMP State On** button at the bottom of the page to turn on the collection of SNMP statistics.
- In the SNMP Agent Registration Port field, enter the **port number** to define or change the port on which the SNMP Agent listens.
- Restart the Identity Server (or Access Server).

Refer the *Oracle Access Manager Identity and Common Administration Guide* for instructions on setting up the SNMP Agent

(http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25343/snmpmtr.htm#BABFFDDA).

4. Complete all the configuration steps for the Oracle Access Manager Identity Server and Oracle Access Manager Access Server. Ensure that the communication details and the directory server details are defined so that Enterprise Manager can discover the topology of your Oracle Access Manager environment.

Refer to the *Oracle Access Manager Installation Guide* for instructions on configuring the Identity Server

(http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25353/id_setup.htm#CHDHIBIB) and the *Access Server* (http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25353/a_srvr.htm#BGBEFBBD).

5. If you plan to monitor the directory server through Oracle Enterprise Manager Cloud Control, then ensure that the directory server is appropriately discovered in Enterprise Manager before moving on to the discovery of Oracle Access Manager Identity Server and Oracle Access Manager Access Server. Complete the following tasks to discover the supported directory servers:

- Oracle Internet Directory 10.1.4

Discovery of Oracle Identity Management Suite 10g (including Oracle Internet Directory, Directory Integration Platform, Delegated Administration Server, and Single Sign-On Server) can be done using the discovery wizard on the Middleware page. From the Middleware page, select **Oracle Application Server** from the **Add** menu. For more information, refer to the Discovering Oracle Identity Management Suite 10.1.4.2, 10.1.4.3.0 section.

- Self Update

Use the Self Update option in Enterprise Manager to get the plug-in.

1) From the **Setup** menu, select **Extensibility**, then select **Self Update**.

2) Click **Plug-in** and select the available plug-in for Microsoft Active Directory or other non-Oracle products that need to be monitored. See [Figure 30-2](#).

Figure 30–2 Self Update Screen

Self Update Page Refreshed **Aug 2, 2012 11:03:17 AM**

Oracle periodically provides new functionality and updates for existing features in Enterprise Manager. The Self Update home allows administrators to receive notifications and view, download, and apply updates. While these updates are retrieved automatically, a manual check can be made at any time.

Status Information

Connection Mode: **Offline** Last Download Time: May 22, 2012 3:35:50 AM EDT Last Apply Time: N/A
 Most Recent Refresh Time: **Aug 1, 2012 11:20:31 PM EDT** Last Download Type: Plug-in Last Apply Type: N/A
 Last Successful Refresh Time: N/A

Actions: Open Check Updates Plug-in

Type	Available Updates	Downloaded Updates	Applied Updates	Description
Agent Software	0	0	1	Agent software has to be installed on hosts for managing the host.
Compliance Content	0	0	0	Compliance Content contains Framework, Standard, Rules with support of add a delete on these entities.
Diagnostic Checks	0	0	0	Target side policy checks that identify conditions that may require the attention of target administrators.
EM Deployment Prerequisite Resources	0	0	0	EM Deployment Pre-requisite Checks are the metadata used for checking prerequisites for Install, Upgrade, Patching of EM Platform and Plugins.
Management Connector	0	0	1	Management Connectors are components that integrate different enterprise frameworks into the Enterprise Manager Console
Middleware Profiles and Gold Images	0	0	0	A collection of Software Components used for provisioning of Oracle Application Server homes.
Oracle Database Provisioning Profiles	0	0	0	A collection of Software Components used for provisioning of Oracle Database, Clusterware and Grid Infrastructure homes.
Plug-in	0	12	12	Plug-in extends Enterprise Manager to manage newer target type as well as to vertical functionality
Provisioning Bundle	0	0	1	Provisioning bundle is a collection of deployment procedures, software library entities, and other related artifacts that cater to the provisioning and patching of

Oracle Identity Federation 10.1.4.2, 10.1.4.3.0

1. Complete all the configuration steps for the Oracle Identity Federation. Ensure that the Federation Data Store details and User Data Store details are defined so that Enterprise Manager can discover the topology of your Oracle Identity Federation environment.

Refer to the *Oracle Identity Federation Administrator's Guide* for instructions on configuring the Identity Federation

(http://download.oracle.com/docs/cd/B28196_01/idmanage.1014/b25355/configuring.htm#BCGDGAAJ).

2. Discover the Oracle Application Server on which Oracle Identity Federation is deployed in Enterprise Manager Cloud Control. Complete the following steps to discover Oracle Application Server in Cloud Control:
 - Log in to Enterprise Manager. Select **Target**, then select **Middleware**.
 - From the **Add** menu, select Oracle Application Server.
 - Enter the information requested for Oracle Application Server. Click **Next** once all the information requested is entered.
3. If you plan to monitor the directory server through Oracle Enterprise Manager Cloud Control, then ensure that the directory server is appropriately discovered in Enterprise Manager before moving on to the discovery of Oracle Identity Federation Server. Complete the following tasks to discover the supported directory servers:
 - Oracle Internet Directory 10.1.4

Discovery of Oracle Identity Management Suite 10g (including Oracle Internet Directory, Directory Integration Platform, Delegated Administration Server, and Single Sign-On Server) can be done using the discovery wizard on the Middleware page.

From the **Middleware** page, select **Oracle Application Server** from the **Add** menu. For more information, refer to the Discovering Oracle Identity Management Suite 10.1.4.2, 10.1.4.3.0 section.

4. If Oracle Database is used for the User Data Store, ensure that the database instance is discovered in Enterprise Manager Cloud Control before moving on to the discovery of the Oracle Identity Federation Server. Complete the following steps to discover Oracle Database Instance in Cloud Control:
 - Log in to Enterprise Manager. Select **Targets**, then select **Databases**.
 - Select **Add** from the Search List view.
 - Enter the information requested for the Database Instance. Click **Next** once all the information requested is entered.

Oracle Identity Manager 9.1.0.1

1. Complete all the configuration steps for Oracle Identity Manager. Ensure that the application server and database are appropriately set up and configured for Oracle Identity Manager.

Refer to the *Oracle Identity Manager Installation and Upgrade Guide* for instructions on configuring Oracle Identity Manager (http://download.oracle.com/docs/cd/B31081_01/index.htm).

2. Discover the application server on which Oracle Identity Manager is deployed in Enterprise Manager Cloud Control.

Note: To verify whether the version of your third-party software for Oracle Identity Manager is supported in Oracle Enterprise Manager Cloud Control, refer to the certification matrix located on My Oracle Support (<https://support.oracle.com>).

Complete the following steps to discover the supported application servers:

- JBoss Application Server Version 4.0.2:

Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.

From the **Add** menu, select **JBoss Application Server**.

Enter the information requested for the JBoss Application Server. Click **Next** once all the information requested is entered.
- Oracle WebLogic Application Server Version 7.x and 8.x:

Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.

From the **Add** menu, select **Oracle WebLogic Domain 7.x and 8.x**.

Enter the information requested for the WebLogic Application Server. Click **Next** once all information requested is entered.
- Oracle WebLogic Application Server Version 10.x and later:

Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.

From the **Add** menu, select **Oracle Fusion Middleware/WebLogic Domain**.

Enter the information requested for WebLogic Domain. Click **Continue** once all information requested is entered

– WebSphere Application Server:

Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.

From the **Add** menu, select **IBM WebSphere Application Server**.

Enter the information requested for the WebSphere Application Server.

Click **Next** once all information requested is entered.

3. If Oracle Database is used for Oracle Identity Manager, ensure that the database instance is discovered in Enterprise Manager Cloud Control before moving on to the discovery of the Oracle Identity Manager Server.

Complete the following steps to discover Oracle Database Instance in Cloud Control:

Log in to Enterprise Manager. Select **Targets**, then select **Database**.

Select **Add** from the Search List view.

Enter the information requested for the Database Instance. Click **Next** once all information requested is entered.

Discovering and Configuring Oracle Identity Management Targets

This chapter provides the information needed to discover and configure Oracle Identity Management targets.

31.1 Discovering Identity Management Targets

This section describes how to discover Identity Management targets.

31.1.1 Discovering Identity Management 11g

Enterprise Manager has a simple Discovery wizard for Oracle Identity Management 11g (including Oracle Internet Directory, Directory Integration Platform, Oracle Virtual Directory, Oracle Identity Federation, Oracle Access Manager, Oracle Adaptive Access and Oracle Identity Manager) targets. The Discovery wizard collects details about Oracle Identity Management 11g targets including information about the host, WebLogic User Name/Password, and other details.

Note: Before discovering the targets associated with Oracle Access Manager 11g, download and install patch 10094106.

To discover Oracle Identity Management 11g (including Oracle Internet Directory, Directory Integration Platform, Oracle Virtual Directory, Oracle Identity Federation, Oracle Access Manager, Oracle Adaptive Access Manager and Oracle Identity Manager), perform the following steps:

1. Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
2. From the **Add** menu, select **Oracle Fusion Middleware/WebLogic Domain**.
3. Enter the information requested to discover Oracle Identity Management 11g targets.

Field	Description
Administration Server Host	Host on which the WebLogic domain for Identity Management is running. Import the certificates for this WLS domain on the agent if this is a secured domain.
Port	Port used for the WebLogic domain. Enter a number between 1 and 65535.
User Name	WebLogic domain user name.

Field	Description
Password	WebLogic domain password.
Unique Domain Identifier	A unique identifier for the Identity Management domain and is used to create a unique target name. The Unique Domain Identifier can contain only alphanumeric characters and the special character '_' and cannot contain any other special characters.
Agent	Agent that is running on the Identity Management host. Only an agent 12.1 or later can be used for finding targets.
Advanced Fields	Description
JMX Protocol	JMX protocol is used to make a JMX connection to the Administration Server.
Discover Down Servers	A signal to discover the servers that are down.
JMX Service URL	JMX Service URL is used to make a JMX connection to the Administration Server. If the URL is not specified, it will be created based on the input parameters. If the URL is specified, the Administration server host and port information must still be provided in the input parameters.
External Parameters	These parameters will be passed to the java process which makes a connection to the Administration Server. All the parameters must begin with -D.
Discovery Debug File Name	The agent side discovery messages for this session will be logged into this file. This file will be generated in the discovery agent's log directory <agent home>/sysman/log. If this file already exists, it will be updated.

- A list of all the Identity Management targets is displayed. Click **Add** to complete the discovery. **Note:** If the Configured Agent text-box is blank for one or more of the targets, copy and paste the Management Agent URL before you proceed.
- The status of target discovery is summarized in this screen. Ensure that all targets have been successfully added to Enterprise Manager. Press **OK** to finish the discovery process.
- The discovered targets will now be listed on the Identity and Access dashboard. From the **Targets** menu, select **Middleware**, then select **Middleware Features**.

31.1.2 Discovering Oracle Directory Server Enterprise Edition 6.x, 7.x, 11g

To discover Oracle Directory Server Enterprise Edition 6.x, 7.x, 11g targets, perform the following steps:

- Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
- From the **Add** menu, select **Oracle Directory Server Enterprise Edition**.
- Enter the information requested.
 - Oracle Directory Server Enterprise Edition Registry Host: Host of the Directory Server Control Center Registry
 - Oracle Directory Server Enterprise Edition Registry Port: Port of the Directory Server Control Center Registry
 - Directory Server User Name - for example CN=Directory Manager
 - Directory Server User Password

- e. Oracle Directory Server Enterprise Edition Install Home: Path under which Directory Server Enterprise Edition is installed.
- f. Unique Deployment Identifier: A unique identifier for ODSEE deployment.

31.1.3 Discovering Oracle Access Manager Access Server 10.1.4.2 and 10.1.4.3.0

Enterprise Manager has a simple Discovery wizard for Oracle Access Manager 10g targets. The Discovery wizard collects details about Oracle Access Manager Targets including information about the host name, host login credentials, SNMP Agent credentials, and other details.

After the Discovery wizard is complete, you can add the discovered targets into an existing System topology or you can create a new System target that stores your topology into the Management Repository.

To discover Oracle Access Manager - Access Server, perform the following steps:

1. Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
2. From the **Add** menu, select **Oracle Identity Management 10g (OAM, OIF, OIM)**.
3. Select **Access Manager - Access Server** and enter the host name on which your Access Server is running. Click **OK** to continue with the discovery of the Access Server.
4. Enter the information requested for Access Server. (The following table provides descriptions of the fields.) Click **Next** once all information requested is entered.

Field	Description
Host User Name	User name on the operating system with administrator privileges.
Host User Password	Password of host administrator account. <ul style="list-style-type: none"> ■ Save as Preferred Credentials. Select this check box if you would like to save the user name/password for the administrator account. ■ Management Agent is running on Host other than SNMP Host Select this check box if your Cloud Control Management Agent is running on a host other than the SNMP Agent host.
Access Server Home	Enter the home directory of your Access Server (<OAM_HOME>\access) - for example, C:\Program Files\OracleAccessManager\access
Access Server Version	Enter the version of your Oracle Access Manager - Access Server - for example, 10.1.4.0.1
SNMP Agent Host	If your Simple Network Management Protocol (SNMP) Agent is running on a host other than the Cloud Control Management Agent host, then enter the SNMP Agent host name. Otherwise, skip this section.
SNMP Agent Port	Enter the UDP Port of the SNMP Agent - for example, 161
SNMP Agent Community Name	Enter the community name of the SNMP Agent.
LDAP Server Host	Name of the Lightweight Directory Access Protocol (LDAP) host. The host name is available in the LDAPSERVERNAME parameter located in the <AccessServerInstallDir>/config/ldap/ConfigDB.xml file.

Field	Description
LDAP Server Port	Name of the LDAP port. The port name is available in the LDAPSERVERPORT parameter located in the <AccessServerInstallDir>/config/ldap/ConfigDB.xml file.
LDAP User Name	Name of the LDAP user. The user name is available in the LDAPROOTDN parameter located in the <AccessServerInstallDir>/config/ldap/ConfigDB.xml file.
LDAP Password	Password for the LDAP user.
LDAP Base	Name of the LDAP base. The base name is available in the LDAPOBLIXBASE parameter located in the <AccessServerInstallDir>/config/configInfo.xml file.

- Enterprise Manager discovers the topology of your Oracle Access Manager - Access Server deployment including the associated databases and directory servers.

To add this topology into an existing Access Manager - Access System target, select **Use the specified system**, and select an existing target of type Access Manager - Access System.

If you want to create a new Access Manager - Access System target, select the **Create a new system** and enter the name of the new system target. Click **Finish** to complete the discovery.

- The next page shows a message confirming the discovery of Oracle Access Manager - Access Server.

31.1.4 Discovering Oracle Access Manager Identity Server 10.1.4.2 and 10.1.4.3.0

Enterprise Manager has a simple Discovery wizard for Oracle Access Manager 10g targets. The Discovery wizard collects details about Oracle Access Manager Targets including information about the host name, host login credentials, SNMP Agent credentials, and other details.

After the Discovery wizard is complete, you can add the discovered targets into an existing System topology or you can create a new System target that stores your topology into Management Repository.

- Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
- From the **Add** menu, select **Oracle Identity Management 10g (OAM, OIF, OIM)**.
- Select **Access Manager - Identity Server** and enter the host name on which your Identity Server is running. Click **OK** to continue with the discovery of the Identity Server.
- Enter the information requested for Oracle Access Manager - Identity Server. (The following table describes the fields.) Click **Next** once all information requested is entered.

Field	Description
Host User Name	User name on the operating system with administrator privileges.

Field	Description
Host User Password	Password of host administrator account. <ul style="list-style-type: none"> Save as Preferred Credentials. Select this check box if you would like to save the user name/password for the administrator account. Management Agent is running on Host other than SNMP Host Select this check box if your Cloud Control Management Agent is running on a host other than the SNMP Agent host.
Identity Server Home	Enter the home directory of your Identity Server (<OAM_HOME>\identity) - for example, C:\Program Files\OracleAccessManager\identity
Identity Server Version	Enter the version of your Oracle Access Manager - Identity Server - for example, 10.1.4.0.1
SNMP Agent Host	If your Simple Network Management Protocol (SNMP) Agent is running on a host other than the Cloud Control Management Agent host, then enter the SNMP Agent host name. Otherwise, skip this section.
SNMP Agent Port	Enter the UDP Port of the SNMP Agent - for example, 161
SNMP Agent Community Name	Enter the community name of the SNMP Agent.

- Enterprise Manager discovers the topology of your Oracle Access Manager - Identity Server deployment including the associated databases and directory servers. To add this topology into an existing Access Manager - Identity System target, select **Use the specified system** and select an existing target of type Access Manager - Identity System. If you want to create a new Access Manager - Identity System target, select **Create a new system** and enter the name of new system target. Click **Finish** to complete the discovery.
- The next page shows a message confirming the discovery of Oracle Access Manager - Identity Server.

31.1.5 Discovering Oracle Identity Federation Server 10.1.4.2 and 10.1.4.3.0

Enterprise Manager has a simple Discovery wizard for Oracle Identity Federation targets. The Discovery wizard collects details about Oracle Identity Federation targets including information about the host name, host login credentials, and other details.

After the Discovery wizard is complete, you can add the discovered targets into an existing System topology or you can create a new System target that stores your topology into the Management Repository.

To discover Oracle Identity Federation Server, perform the following steps:

- Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
- From the Add menu, select **Oracle Identity Management 10g (OAM, OIF, OIM)**.
- Select **Identity Federation Server** and enter the host name on which your Oracle Identity Federation Server is running. Click **OK** to continue with the discovery of the Identity Federation Server.
- Enter the information requested for Oracle Identity Federation Server. Click **Continue** once all required information is entered.

Field	Description
Application Server Target	Select the Application Server target on which Oracle Identity Federation is running.
Host User Name	User name on the operating system with administrator privileges.
Host User Password	Password of host administrator account.

- Enterprise Manager discovers the topology of your Oracle Identity Federation Server deployment including the associated databases and directory servers.

To add this topology into an existing Identity Federation System target, select **Use the specified system** and select an existing target of type Identity Federation System.

If you want to create a new Identity Federation System target, select **Create a new system** and enter the name of new system target. Click **Finish** to complete the discovery.
- The next page shows a message confirming the discovery of Oracle Identity Federation Server.

31.1.6 Discovering Oracle Identity Management Suite 10.1.4.2 and 10.1.4.3.0

Enterprise Manager has a simple Discovery wizard for Oracle Identity Management Suite 10g (including Oracle Internet Directory, Directory Integration Platform, Delegated Administration Server, and Single Sign-On Server) targets. The Discovery wizard collects details about Oracle Identity Management Suite 10g targets including information about the host name, host login credentials, and other details.

To discover Oracle Identity Management Suite 10g (including Oracle Internet Directory, Directory Integration Platform, Delegated Administration Server, and Single Sign-On Server), perform the following steps:

- Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
- From the **Add** menu, select **Oracle Application Server**.
- Select the host on which Oracle Identity Management Suite 10g targets are running.
- A confirmation page lists Oracle Application Servers found on the host selected. Click **OK** to continue. **Important:** Ensure that the Application Server is up before discovering the Identity Management Suite targets.
- A final confirmation page appears. Click **OK** to finish the discovery process.

31.1.7 Discovering Oracle Identity Manager Server 9.1.0.1

Enterprise Manager has a simple Discovery wizard for Oracle Identity Manager targets. The Discovery wizard collects details about Oracle Identity Manager targets including information about the host name, host login credentials, and other details.

After the Discovery wizard is complete, you can add the discovered targets into an existing System topology or you can create a new System target that stores your topology into Enterprise Manager's Repository.

To discover Oracle Identity Manager Server, perform the following steps:

- Log in to Enterprise Manager. Select **Targets**, then select **Middleware**.
- From the **Add** menu, select **Oracle Identity Management 10g (OAM, OIF, OIM)**.

3. Select **Identity Manager Server** and enter the host name on which your Oracle Identity Manager is running. Click **OK** to continue with the discovery of the Oracle Identity Manager Server.
4. Enter the information requested for Oracle Identity Manager Server. Click **Continue** once all the required information is entered.

Field	Description
Application Server Target	Select the Application Server target on which Oracle Identity Manager is running.
Configured Database Target	Select the configured Database target used by Oracle Identity Manager
Database User Name	Enter the database user name used to access the tablespace reserved for Oracle Identity Manager.
Database Password	Enter the password for the database account reserved for Oracle Identity Manager.
Identity Manager Library Path	Enter the directory path for the Oracle Identity Manager library (<OIM_HOME>\xellerate\lib).
Host User Name	User name on the operating system with administrator privileges
Host Password	Password of host administrator account.

5. Enterprise Manager discovers the topology of your Oracle Identity Manager Server deployment including the associated databases and directory servers.

To add this topology into an existing Identity Manager System target, select **Use the specified system** and select an existing target of type Identity Manager System.

If you would like to create a new Identity Manager System target, select **Create a new system** and enter the name of new system target. Click **Finish** to complete the discovery.

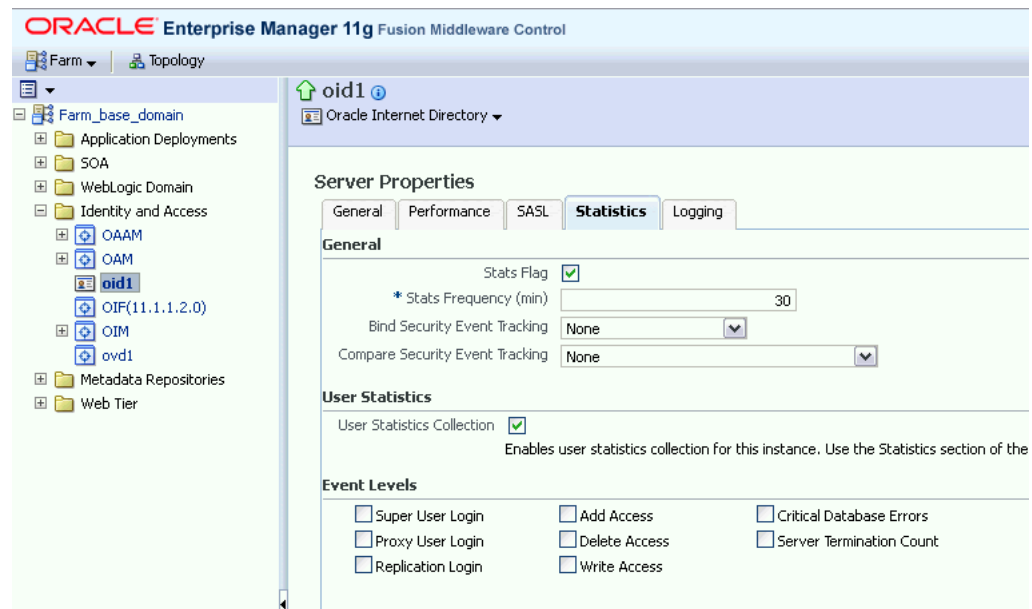
6. The next page shows a message confirming the discovery of Oracle Identity Manager Server.

31.2 Collecting User Statistics for Oracle Internet Directory

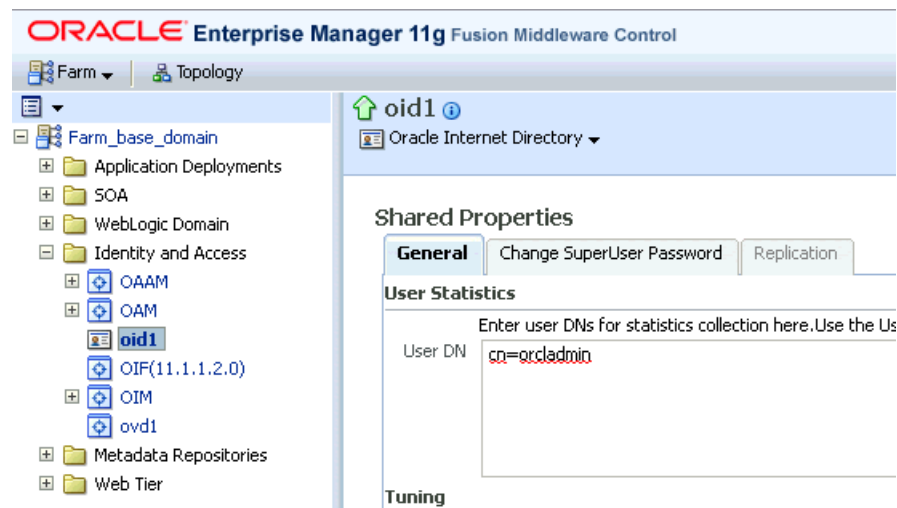
With Enterprise Manager, you can collect user statistics for Oracle Internet Directory allowing you to view charts for failed and completed LDAP operations like Add, Bind, Compare, Delete, Modify, and Search.

To enable the collection of user statistics, perform the following steps:

1. From the **Targets** menu, select **Middleware**. From the **Middleware Features** menu, select **Identity and Access**.
2. Select the discovered Oracle Internet Directory target.
3. From the **Oracle Internet Directory** menu, select **Fusion Middleware Control**.
4. From the **Targets** menu in Fusion Middleware Control, select **Administration**, then select **Server Properties**. Check the box next to **User Statistics Collection** to enable this feature. Click **Apply** to save your changes. See [Figure 31-1](#).

Figure 31–1 Server Properties - Statistics Tab

- From the **Target** menu in Fusion Middleware Control, select **Administration**, then select **Shared Properties**. Enter a valid User DN (for example, cn=orcladmin) to enable user statistics collection for that user. See [Figure 31–2](#).

Figure 31–2 Shared Properties - General Tab

31.3 Creating Identity Management Elements

This section describes how to create Identity Management elements.

31.3.1 Creating Identity and Access System Target

With Enterprise Manager, you can create an Identity and Access System target that can be modeled with any discovered Oracle Identity Management target (including both Identity Management 10g and Identity Management 11g targets) and the underlying

hosts, databases and LDAP servers as the key components providing an end-to-end system oriented view of the monitored Identity Management environment.

The Identity and Access System target provides access to metrics, alerts, charts, and topology view. In addition to monitoring your Oracle Identity Management environment from a system perspective, you can also monitor your environment from a service-oriented perspective using the Cloud Control Service Level Management framework.

To create a target of type Identity and Access System associated with any of the monitored Identity Management targets, perform the following steps:

1. Log in to Enterprise Manager. Select **Targets**, then select **Systems**.
2. From the **Add** menu, select **Identity and Access System**.
3. Select the Identity Management root target that you would like to include in your system topology. This can be the WebLogic Domain or the ODSEE Registry server. Click **Next** to continue.
4. Select the targets within the domain that you would like to include in your system topology. You can also add additional targets that are not in the Identity Management domain, for example, databases, non-Oracle middleware, and so on. Click **Next** to continue.
5. Click **Finish** to complete the creation of Identity and Access System.

31.3.2 Creating Generic Service or Web Application Targets for Identity Management

The Discovery wizard for Oracle Identity and Access Management Suite allows you to create a System target to store the end-to-end topology of monitored Oracle Identity Management components. The Management Pack Plus for Identity Management allows you to create the following System targets:

- Access Manager - Access System
- Access Manager - Identity System
- Identity Federation System
- Identity Manager System
- Identity and Access System

A System target is modeled with all monitored Oracle Identity Management components and the underlying hosts as the key components providing an end-to-end system oriented view of the monitored Oracle Identity Management environment.

A System target provides access to metrics, alerts, charts, and topology view of all the infrastructure components. In addition to monitoring your Oracle Identity Management environment from a system perspective, you can also monitor your environment from a service-oriented perspective using the Cloud Control Service Level Management framework.

With the Management Pack Plus for Identity Management, users can create targets of type Generic Service or Web Application associated with any of the monitored Identity Management Systems: Access Manager - Access System, Access Manager - Identity System, Identity Federation System, and Identity Manager System.

The Web Application or Generic Service target provides an end-to-end service oriented view of the monitored Oracle Identity Management targets with access to performance and usage metrics, service tests, service level rules, service availability definition, alerts, charts, and topology view.

To create a target of type Generic Service associated with any of the monitored Identity Management Systems, perform the following steps:

1. Log in to Enterprise Manager. Select **Targets**, then select **Services**.
2. From the **Add** menu, select **Generic Service**.
3. Enter the general information requested for the new Generic Service.

31.3.3 Creating a Service Dashboard Report

Once you have created Generic Service or Web Application targets associated with your monitored Oracle Identity Management Systems, you can create a Services Monitoring Dashboard that summarizes Service Level Agreement Compliance, Actual Service Level Achieved, Key Performance and Usage Metrics, and Status of Key Components.

Perform the following steps to create a Services Monitoring Dashboard:

1. From the **Enterprise** menu, select **Reports**, then select **Information Publisher Reports**.
2. Click the **Create** button.
3. Enter the general information requested for the new Report. Click the **Elements** tab once all information requested is entered.
 - a. Title
Enter a title for your new dashboard
 - b. Category/Sub-Category
Select a category and sub-category for your dashboard, for example, Category: Monitoring, Sub-Category: Dashboards
 - c. Use the specified target
Leave blank if this report has no report-wide target.
 - d. Options - Visual Style
Select Dashboard for a dashboard-view of your services.
4. Enter the elements information requested for the new Report. Click the **Schedule** tab once all information requested is entered.
 - a. Add
Select **Services Monitoring Dashboard** and click **Continue**.
 - b. Set Parameters
Click **Set Parameters**. Select the available services and click the **Move** button to add them to the Selected Services.
5. Enter the schedule information requested for the new Report. Click the **Access** tab once all information requested is entered.
 - a. Schedule
Enter your scheduling preferences for the report
 - b. E-Mail Report
Enter the email address and preferences for the report recipient.

6. Enter information about your access and security preferences for the new report. Click **OK** to create the new Services Monitoring Dashboard.

Investigating and Analyzing Problems

You can use the Problem Analysis and Analyze Log pages in Cloud Control to help you inspect metrics, target status information, incidents, and logs during troubleshooting.

32.1 Accessing Problem Analysis and Logs

There are several navigation methods to access problem analysis and log pages:

- **Middleware access method**
 1. From the Targets menu of the Cloud Control console, select **Middleware**.
 2. Select and click on an **Oracle Access Manager Server** or **Oracle WebLogic Server** from the Details Table.
 3. In the home page that appears, click on a metric legend that appears below the Response and Load chart.
 4. In the pop-up that appears, click on **Problem Analysis** or **Log Messages**.
- **Incident Manager access method**
 1. From the Targets menu of the Cloud Control console, select **Hosts**.
 2. Click a numbered link in the **Incidents** column of the summary table.
 3. In the Incident Manager page that appears, select an incident in the table, then click on the **Problem Analysis** link located in the Diagnostics section in the lower right portion of the page.
 4. In the pop-up that appears, click on **Problem Analysis**.
- **Correlation charts method**

Correlation charts are the pages in which the charts are shown as a stack of charts.

 1. From any correlation chart, click on the chart legend.
 2. In the pop-up that appears, click on **Problem Analysis** or **Log Messages**.
- **Chart regions method**
 1. Click on the chart legend or chart line.
 2. In the pop-up that appears, click on **Problem Analysis** or **Log Messages**.

32.2 Viewing and Analyzing Problems

You can inspect metrics, status information, and logs using Cloud Control as follows:

1. Specify the time period for which you want the charts to display data. Near the top of the default Related Metrics tab, adjust the left and right slider to specify the time period, or click and drag within a metric chart to indicate the time period you want to inspect.
2. Inspect the charts for unusual increases in recorded metrics.
 - Out of the box, Enterprise Manager provides two charts: Source Metric and Enterprise Manager Identified Related Metrics. You can add more chart displays to suit your needs by using the Metric Palette. See "Customizing the Display" below for more information.
 - Increased request processing time due to a high number of requests per minute may indicate a need to increase the capacity of your system.
3. If the metric charts do not indicate the cause of the problem, select the **Related Targets** tab and inspect the table for information about target health (status) and recent configuration changes.

If you want to see a reminder of the topology of the components for which data is being displayed, click the **Topology** tab.
4. If the table does not indicate the cause of the problem, return to the Related Metrics tab and click on the **View Related Log Messages** link near the top of the tab. This action displays log messages for the selected target and its members during the selected time period.
5. Inspect any log messages that are displayed for possible causes of problems.

32.3 Customizing the Display

You can create your own metric charts and then recall them later when needed.

1. From the Metric Palette on the Related Metrics tab, select a target from the Targets pane, then select the desired metrics associated with the target from the Metrics pane.

A new region called User Identified Related Metrics appears in the lower portion of the page, and displays a chart for each metric you have selected in the Metric Palette.

2. *Optional:* Save any modifications to the current chart by clicking **Save**.

You can also save your modified chart to Enterprise manager and have it appear as a choice in the Charts Sets menu for recall at a later time. To do so, select **Save Charts As...** from the Chart Sets menu, then name the chart and click **OK**.

You can also set this chart as the default chart that appears when you access this page by selecting **Set as Default Chart Set** from the Chart Sets menu.

Tip: If you prefer seeing the chart data in a tabular format, you can click the **Table View** link below the last chart.

Part X

Discovering and Monitoring Non-Oracle Middleware

The chapters in this part describe how to discover and monitor non-Oracle middleware components.

The chapters are:

- [Chapter 33, "Discovering and Monitoring IBM WebSphere MQ"](#)
- [Chapter 34, "Discovering and Monitoring IBM WebSphere Application Servers, Clusters, and Cells"](#)
- [Chapter 35, "Discovering and Monitoring JBoss Application Server"](#)
- [Chapter 36, "Discovering and Monitoring Apache HTTP Server"](#)

Discovering and Monitoring IBM WebSphere MQ

IBM WebSphere MQ is a message oriented middleware and its primary infrastructure is queue based. Message Queue (MQ) clusters are used for high availability, and management and monitoring are supported by a command line tool, a user interface, and programmable command format messages.

IBM WebSphere MQ enables administrators to derive instant value, while giving them the flexibility to fine-tune thresholds according to their specific operational requirements.

Note: The support for discovering and monitoring IBM WebSphere MQ targets is offered via the Oracle Fusion Middleware Plug-in.

The following topics are discussed in this document:

- [Introduction](#)
- [Prerequisites](#)
- [Understanding Discovery](#)
- [Monitoring](#)

33.1 Introduction

IBM WebSphere MQ offers several key benefits, including the following:

- Out-of-box availability and performance monitoring
- Centralized monitoring of all information in a single console
- Enhanced service modeling and comprehensive root cause analysis

33.1.1 Out-of-Box Availability and Performance Monitoring

You can see immediate value through out-of-box availability and performance monitoring. Some of the key areas of more than 60 performance indicators monitored include queue manager status, channel status, queue depth, bytes sent or received, and messages sent or received.

To further aid administrators with critical tasks, such as problem diagnosis, trend analysis, and capacity planning, the monitoring of IBM WebSphere MQ targets includes various out-of-box reports, summarizing key information about availability and performance. Some of the key features include:

- **Blackout Periods**
Prevent unnecessary alerts from being raised during scheduled maintenance operations, such as hardware upgrade.
- **Monitoring Templates**
Simplify the task of standardizing monitoring settings across the entire IBM WebSphere MQ environment, by allowing administrators to specify the monitoring settings (metrics, thresholds, metric collection schedules and corrective actions) once and applying them to any number of queue manager instances.
- **Corrective Actions**
Ensure that routine responses to alerts are automatically executed, thereby saving administrators time and ensuring problems are dealt with before they noticeably impact users.
- **Notification Rules, Methods, and Schedules**
Define when and how administrators should be notified about critical problems with their applications, ensuring quicker problem resolution. For more information on notifications see the chapter *Using Notifications* in the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.
- **Groups/Systems**
Simplify management of large numbers of components, allowing administrators to *manage many-as-one*.

33.1.2 Centralized Monitoring of all Information in a Single Console

IBM WebSphere MQ provides a consolidated view of the entire enterprise, enabling administrators to monitor and manage all of their components from a central place.

Having such an integrated console reduces the total cost of ownership by eliminating the need to manually compile critical information from several different tools, thus streamlining the correlation of availability and performance problems across the entire set of IT components.

33.1.3 Enhance Service Modeling and Perform Comprehensive Root Cause Analysis

Enterprise Manager Cloud Control's Service Level Management functionality provides a comprehensive monitoring solution that helps IT organizations achieve high availability, performance, and optimized service levels for their business services. Administrators can monitor services from the end-users' perspective using service tests or synthetic transactions, model relationships between services and underlying IT components, diagnose root cause of service failure, and report on achieved service levels.

The monitoring of IBM WebSphere MQ targets in Enterprise Manager Cloud Control enables IT organizations running applications on top of Oracle and IBM to derive greater value from the Service Level Management features in a number of ways:

- **Enhanced Service Modeling**
Mapping of relationships between services and queue manager instances.
- **Complete Service Topology**
Including IBM WebSphere MQ as part of the topology view of a service.
- **Comprehensive Root Cause Analysis**

Identifying or excluding IBM WebSphere MQ as the root cause of service failure.

33.2 Prerequisites

This section covers the following:

- [Basic Prerequisites](#)
- [JAR File Requirements \(for Local Monitoring and Remote Monitoring\)](#)

33.2.1 Basic Prerequisites

The following prerequisites must be met before installing the IBM WebSphere MQ plug-in:

- Queue Manager must be running
- TCP listener must be up
- SYSTEM.DEF.SVRCONN channel must be available

Oracle Management Agent (Management Agent) must be up and running, either locally or remotely, and must be able to upload data successfully to Oracle Management Repository. The Preferred Credentials must have been set and successfully tested for the agent node. The Host Credentials to be used for the discovery should be either the Management Agent user or a user part of the same group (primary gid).

33.2.2 JAR File Requirements (for Local Monitoring and Remote Monitoring)

For local monitoring, the Management Agent OS user should have read privileges over the following JAR files, which are needed for the discovery of the target IBM WebSphere MQ.

For remote monitoring, the TCP listener port of the Queue Manager must be open to the Agent Host. The appropriate JAR files must be copied on the node which is accessible to the Management Agent, and the OS user starting this Management Agent must have *read* privileges on these files. For example, create a directory `/new_dir/sysman/mq_jar_files` and copy the JAR files into this directory.

IBM WebSphere MQ V6

- `$MQ_HOME/java/lib/com.ibm.mq.jar`
- `$MQ_HOME/java/lib/connector.jar`
- `$MQ_HOME/eclipse/plugins/com.ibm.mq.pcf_6.0.0/pcf.jar`

IBM WebSphere MQ V7

- `$MQ_HOME/java/lib/com.ibm.mq.jar`
- `$MQ_HOME/java/lib/com.ibm.mq.jmqi.jar`
- `$MQ_HOME/java/lib/com.ibm.mq.commonservices.jar`
- `$MQ_HOME/java/lib/com.ibm.mq.headers.jar`
- `$MQ_HOME/java/lib/com.ibm.mq.pcf.jar`
- `$MQ_HOME/java/lib/connector.jar`

33.3 Understanding Discovery

IBM WebSphere MQ supports the discovery of entire Queue Manager Clusters from a single Queue manager. Administrators can derive instant value, while giving them the flexibility to fine-tune thresholds according to their specific operational requirements. Some of the key areas include queue manager status, channel status, queue depth, bytes sent and/or received, and messages sent and/or received.

To further aid administrators with critical tasks such as problem diagnosis, trend analysis, and capacity planning, plug-in includes various out-of-box reports, summarizing key information about availability and performance.

The topics covered under this section are:

- [Discovery Prerequisites for Local Agent](#)
- [Discovery Prerequisites for Remote Agent](#)
- [Queue Manager Cluster Discovery](#)
- [Standalone Queue Manager Discovery](#)

33.3.1 Discovery Prerequisites for Local Agent

To enable discovery for the local agent, the queue manager must be running and the TCP listener must be up. In addition, the following JAR files are required for discovery and should therefore be accessible to agent:

- `com.ibm.mq.jar` (present under `MQ_HOME/java/lib`)
- `connector.jar` (present under `MQ_HOME/java/lib`)
- `pcf.jar` (present under `MQ_HOME/eclipse/plugins/com.ibm.mq.pcf_<version>`)

The Agent Host Credentials to be used for discovery should be either Oracle Agent User or should be part of the same group. The `SYSTEM.DEF.SVRCONN` channel should also be available.

33.3.2 Discovery Prerequisites for Remote Agent

To enable discovery for the remote agent, the queue manager must be running and the TCP listener must be up. The TCP listener port of the Target Queue Manager must also be accessible to the agent. In addition, the following JAR files are required for discovery and should therefore be accessible to agent:

- `com.ibm.mq.jar` (present under `MQ_HOME/java/lib`)
- `connector.jar` (present under `MQ_HOME/java/lib`)
- `pcf.jar` (present under `MQ_HOME/eclipse/plugins/com.ibm.mq.pcf_<version>`)

The Agent Host Credentials to be used for discovery should be either Oracle Agent User or should be part of same group. The `SYSTEM.DEF.SVRCONN` channel should also be available.

33.3.3 Queue Manager Cluster Discovery

A cluster will be discovered automatically if the queue manager is part of a cluster. To discover other members of cluster, those queue managers should be running. If the queue manager is part of more than one cluster, then all clusters will be discovered.

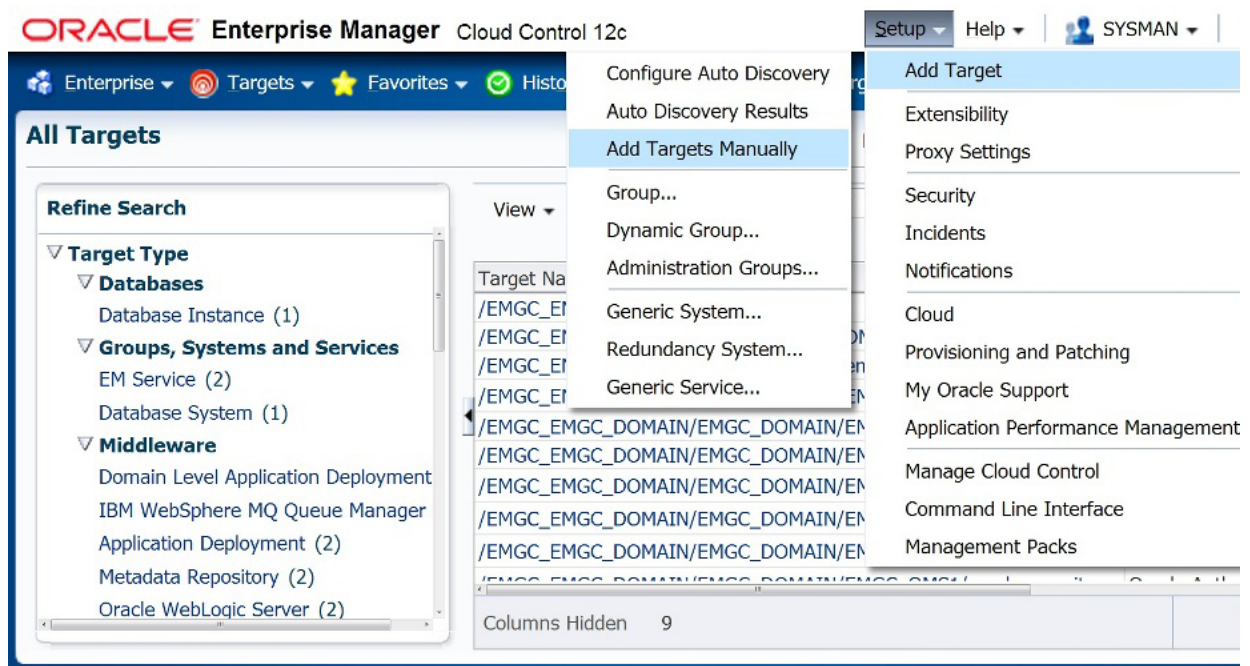
The following points outline the logic involved in cluster discovery:

- To discover the entire cluster you first discover any member of cluster,

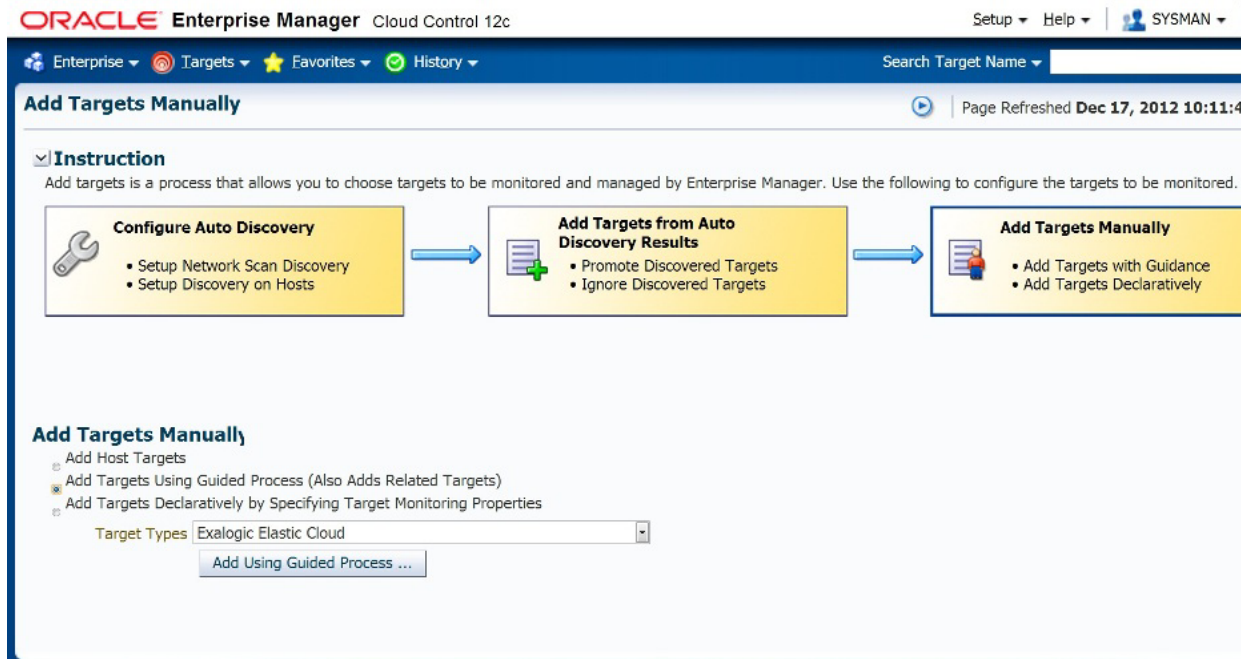
- Get connection details of all other queue managers along with cluster name
If the queue manager is part of multiple clusters then repeat the step for each cluster,
- Connect to each queue manager using the connection details
If the queue manager is part of multiple clusters then repeat the step for each cluster,
- Get the name of the queue manager (queue manager should be running)
- Once the cluster is added to Enterprise Manager Cloud Control, you cannot explicitly remove any member queue managers from that cluster.

To manually add targets, complete the following:

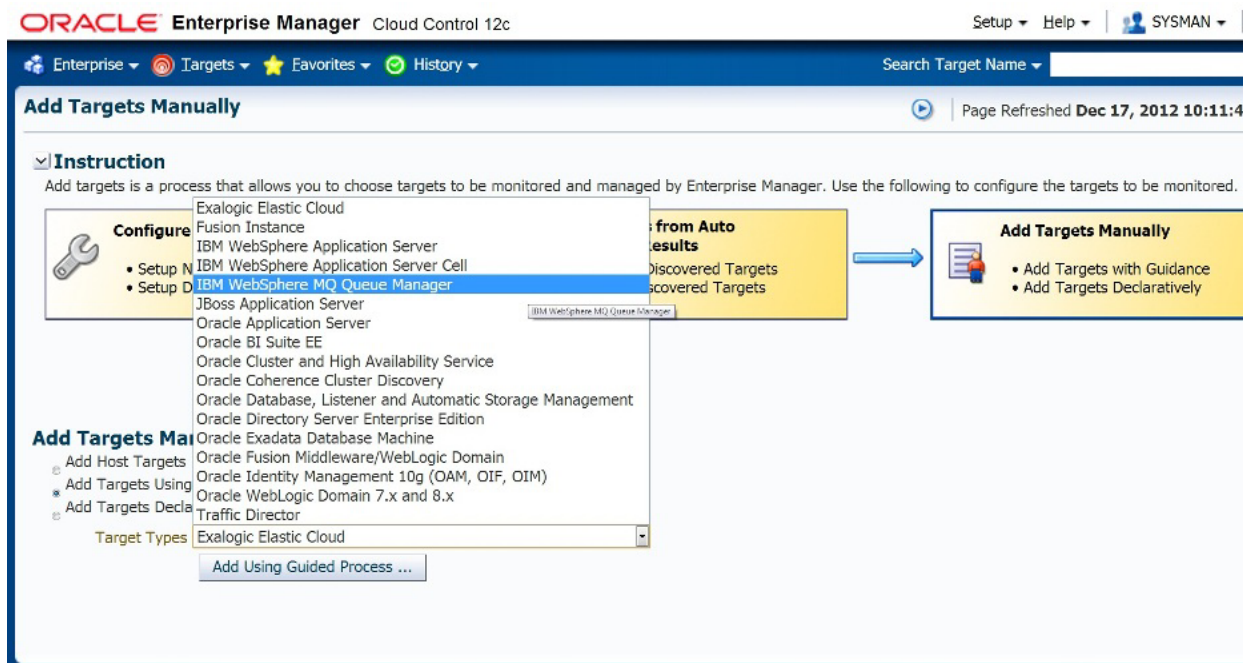
1. From the **Setup** menu, select **Add Target**, then select **Add Target Manually**.



2. Select **Add Targets Using Guided Process (Also Adds Related Targets)**.



3. From the **Target Types** list, select **IBM WebSphere MQ Queue Manager**, and click **Add Using Guided Process**.



4. Provide the following required information for discovery, and click **Next**.
 - a. Host on which IBM MQ is running.
 - b. Port number of the queue manager you want to discover (associated cluster and all queue manager in this cluster will also be discovered).
 - c. Server connection channel to be used for monitoring.
 - d. Jar path location (location must be accessible to the OEM agent).

Mention the full path of all the required individual JARs in the **Jar Path** field as shown below:

```
$MQ_HOME/java/lib/com.ibm.mq.jar:$MQ_
HOME/java/lib/com.ibm.mq.jmqi.jar:$MQ_
HOME/java/lib/com.ibm.mq.commonservices.jar:$MQ_
HOME/java/lib/com.ibm.mq.headers.jar:$MQ_
HOME/java/lib/com.ibm.mq.pcf.jar:$MQ_HOME/java/lib/connector.jar
```

Note: For local monitoring replace \$MQ_HOME in the above classpath with the actual IBM WebSphere MQ home directory path, and for remote monitoring, replace \$MQ_HOME with the path where all the JAR files are stored. In case of a Windows agent, replace the ':' (colons) in the above classpath with ';' (semi-colons).

- e. Provide the agent host details used to monitor IBM WebSphere MQ.
- f. MQ administration credentials.

ORACLE Enterprise Manager Cloud Control 12c Help

Add IBM WebSphere MQ Targets: Authentication

In order to add an IBM WebSphere MQ Target to Enterprise Manager, you must first specify details of the host on which the IBM WebSphere MQ Server is running. The MQ server must be running. Cancel

WebSphere MQ Host Information

* Host: Provide the WebSphere MQ Host name, port and location for PCF jar file.

* Port: TCP/IP listener port of Queue Manager

Channel: Specify the name of the Server Connection channel to be used for monitoring.

* Jar Path: Provide the WebSphere MQ Host name, port and location for PCF jar file.

Agent Credentials

* Host: Provide the Agent URL, user name and password.

WebSphere MQ Admin Credentials

* MQ Admin User: Provide the WebSphere MQ Admin user name and password.

* MQ Admin Password: Cancel

5. Select the cluster you want to discover, and click **Next**.

ORACLE Enterprise Manager Cloud Control 12c Help

Authentication Available Targets Confirmation

Add IBM WebSphere MQ Targets: Authentication

In order to add an IBM WebSphere MQ Target to Enterprise Manager, you must first specify details of the host on which the IBM WebSphere MQ Server is running. The MQ server must be running. Cancel

WebSphere MQ Host Information

* Host Provide the WebSphere MQ Host name, port and location for PCF jar file.

* Port TCP/IP listener port of Queue Manager

Channel Specify the name of the Server Connection channel to be used for monitoring.

* Jar Path

Agent Credentials

* Host Provide the Agent URL, user name and password.

WebSphere MQ Admin Credentials

* MQ Admin User Provide the WebSphere MQ Admin user name and password.

* MQ Admin Password Cancel

The following image shows a Queue Manager cluster:

ORACLE Enterprise Manager Cloud Control 12c Help

Authentication Available Targets Confirmation

Add IBM WebSphere MQ Targets: Available Targets

Cancel Back Step 2 of 3 Next

List Of All Available Websphere MQ Target(s)

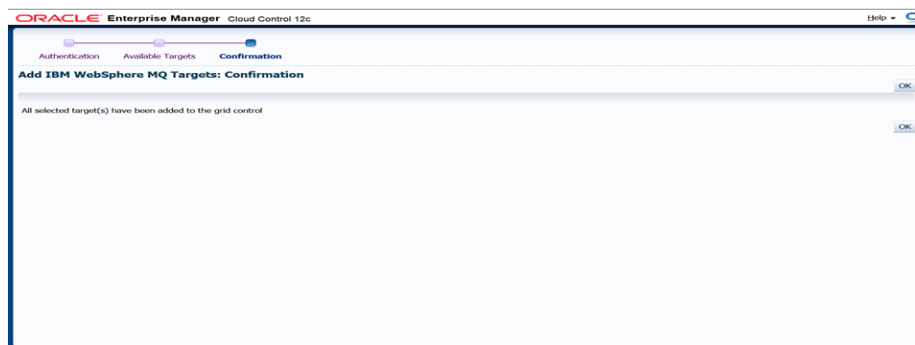
MQ Targets

Select All | Select None

Select	Target Name	Type	Host	Port	Target Exists
<input type="checkbox"/>	▼ Possible Targets				
<input type="checkbox"/>	▼ Cluster1				No
<input type="checkbox"/>	Qmgr1	Queue Manager	hostname	1414	No
<input type="checkbox"/>	Qmgr2	Queue Manager	hostname	1415	No

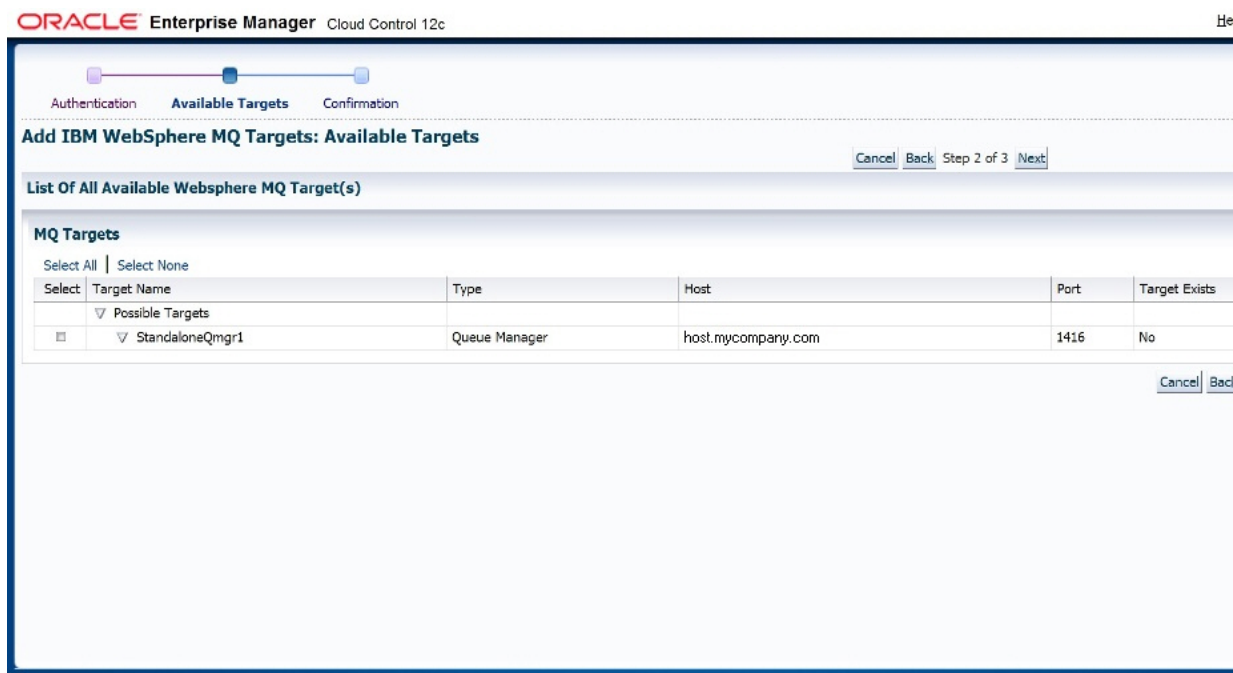
Cancel Back

6. Click **OK** to finish discovery.



33.3.4 Standalone Queue Manager Discovery

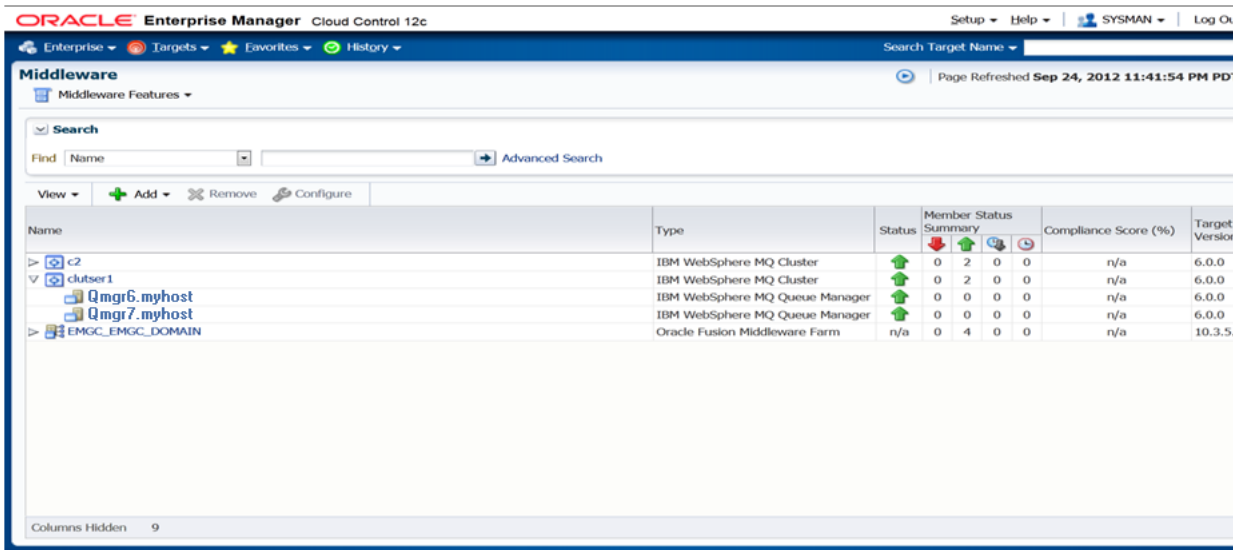
Standalone queue manager discovery is also supported. The steps to manually add a standalone queue manager are the same as those described for cluster queue manager discovery. see [Queue Manager Cluster Discovery](#) for more information. The only difference is that you select a standalone queue manager from the list of possible targets on the Add IBM WebSphere MQ Targets: Available Targets page, as shown in the following graphic:



33.4 Monitoring

The following illustrates some of the different methods used to monitor the performance of the IBM WebSphere MQ targets:

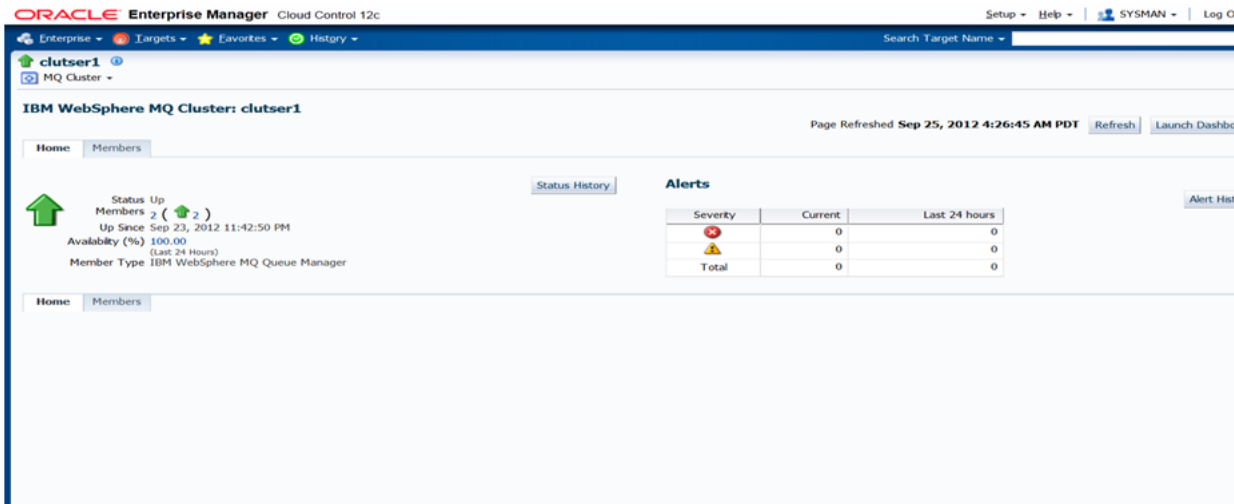
- Middleware page displaying the discovered IBM MQ clusters and queue-managers.



The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface. The top navigation bar includes 'Enterprise', 'Targets', 'Favorites', and 'History'. The main content area is titled 'Middleware' and contains a search bar and a table of targets. The table has columns for Name, Type, Status, Member Status Summary, Compliance Score (%), and Target Version. The targets listed are c2, cluter1, Qmgr6.myhost, Qmgr7.myhost, and EMGC_EMGC_DOMAIN.

Name	Type	Status	Member Status Summary	Compliance Score (%)	Target Version
c2	IBM WebSphere MQ Cluster	Up	0 2 0 0	n/a	6.0.0
cluter1	IBM WebSphere MQ Cluster	Up	0 2 0 0	n/a	6.0.0
Qmgr6.myhost	IBM WebSphere MQ Queue Manager	Up	0 0 0 0	n/a	6.0.0
Qmgr7.myhost	IBM WebSphere MQ Queue Manager	Up	0 0 0 0	n/a	6.0.0
EMGC_EMGC_DOMAIN	Oracle Fusion Middleware Farm	Up	0 4 0 0	n/a	10.3.5

- Cluster page displaying information about a cluster.



The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface for a specific cluster member. The page is titled 'cluter1' and 'MQ Cluster'. It displays a status summary with a green arrow indicating 'Status Up', 'Members 2 (2)', and 'Up Since Sep 23, 2012 11:42:50 PM'. The availability is 100.00% (Last 24 Hours) and the member type is 'IBM WebSphere MQ Queue Manager'. There is also an 'Alerts' section with a table showing severity, current, and last 24 hours counts.

Severity	Current	Last 24 hours
Warning	0	0
Error	0	0
Total	0	0

- Cluster Member's page displaying information about members of the cluster.

clutser1
MQ Cluster

IBM WebSphere MQ Cluster: clutser1

Page Refreshed **Sep 24, 2012 11:47:41 PM PDT** [Refresh](#) [Launch Dashboard](#)

Home **Members**

View **All** [Go](#) [View Flat](#)

Expand All | Collapse All

Name	Type	Status	Alert	Host	Port
clutser1	IBM WebSphere MQ Cluster	Up	0 0		
Qmgr6.myhost	IBM WebSphere MQ Queue Manager	Up	0 0	myhost	1425
Qmgr7.myhost	IBM WebSphere MQ Queue Manager	Up	0 0	myhost	1426

TIP For an explanation of the icons and symbols used in this page, see the [Icon Key](#).

Home **Members**

- Queue-Manager page displaying information about queues and channels.

Qmgr6.myhost
WebSphere MQ Queue Manager

Home **Performance**

General

Status **Up** [Black Out](#)

Availability (%) **100**
(Last 24 Hours)

Host **host.mycompany.com**

Target Specific Data

Host Platform: Unix
Maximum Handles: 256
Member Of Cluster: yes
Default DeadLetter Queue:
Default Transmission Queue:
Max. Length of Message: 4194304

Cluster Information

Name	Connection	Channel	Type
clutser1	host(1423)		Repository
clutser1	host(1427)		Repository

Queue Manager Components

View **All** [Go](#)

Expand All | Collapse All

Name:

- MQ Component
 - Queues
 - Local
 - Queue1
 - Queue2
 - Channels
 - Cluster Receiver
 - TQ-Qmgr6
 - Cluster Sender
 - TQ-Qmgr7

Incidents

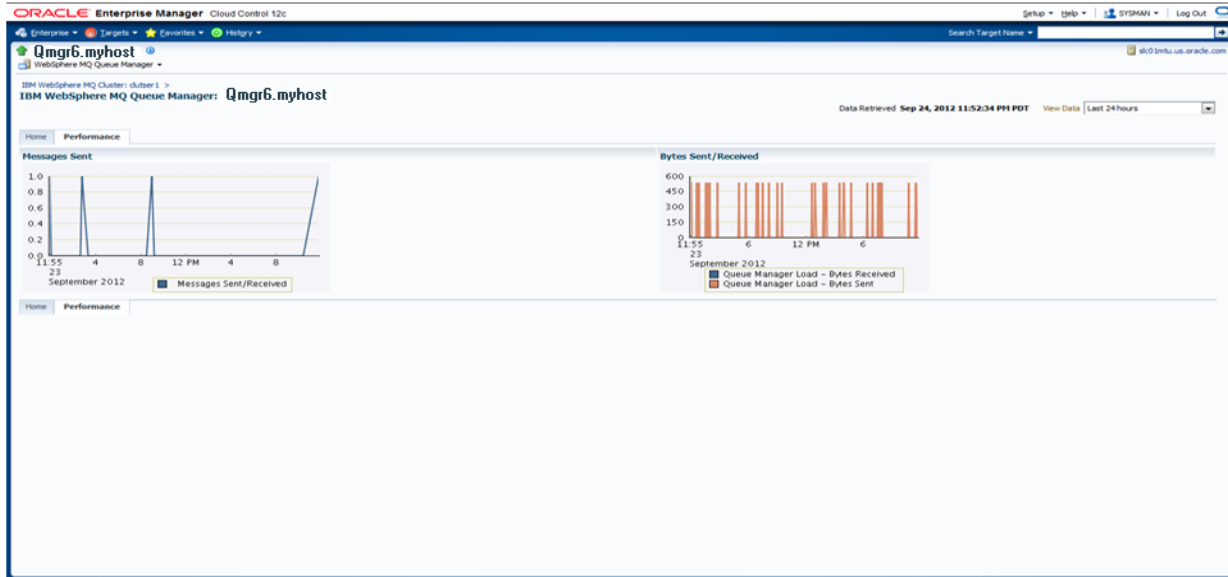
Severity	Message	Created At	Last Updated At	Escalation Level
No incidents found.				

Host Incidents

Metrics Collection Errors **1**

Severity	Message	Created At	Last Updated At	Escalation Level
No incidents found.				

- Queue-manager performance page displaying information about messages.



- All metric page for the IBM MQ plug-in displaying all the metrics collected.

Oracle Enterprise Manager Cloud Control 12c

Qmgr6.myhost

IBM WebSphere MQ Queue Manager

Page Refreshed Sep 24, 2012 11:55:17 PM PDT

All Metrics

Search

View By Metrics

Collection Schedule: Every 3 Minutes

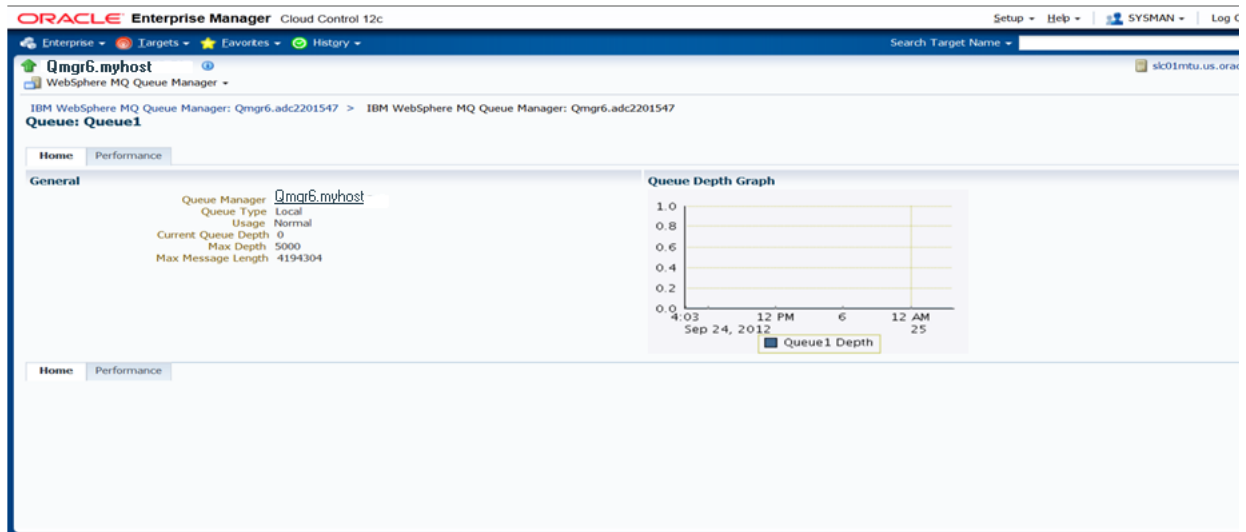
Upload Interval: Every Collection

Last Updated: Sep 24, 2012 11:45:10 PM PDT

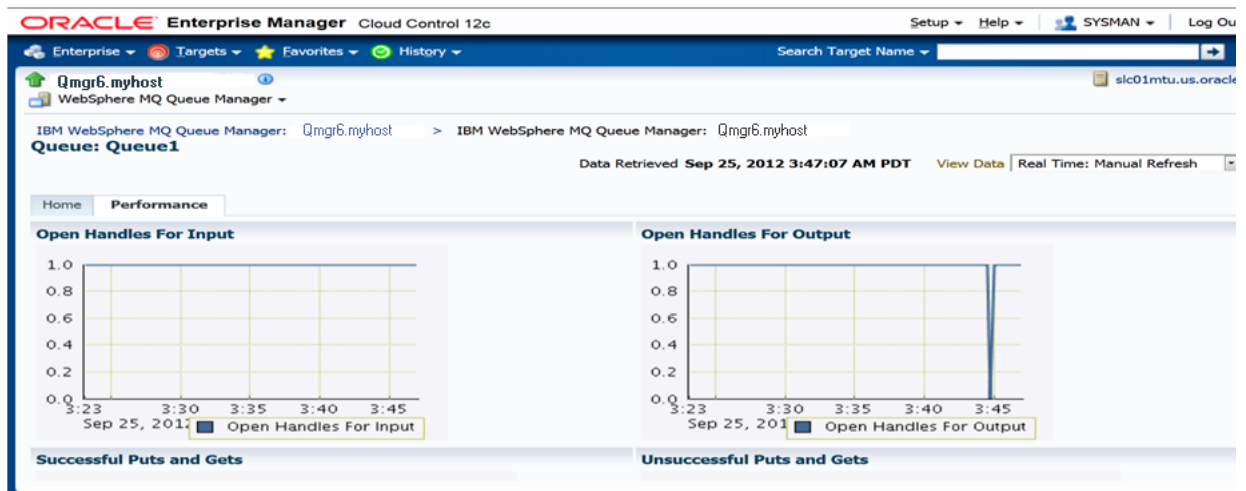
Name	Channel Current Status - Bytes Received	Channel Current Status - Bytes Sent	Channel Current Status - Delta Bytes Received	Channel Current Status - Delta Bytes Sent	Channel Current Status - Delta Messages Sent/Received	Channel Current Status - Status
SYSTEM.DEF.SVRCONN	3,020	0	0	0	10	RUNNING

Data shown in above table is collected in real time.

- Queue page displaying information about queues discovered.



- Queue performance page displays various information about queue.



- Performance Summary page displays the overall performance of IBM WebSphere MQ Metrics.

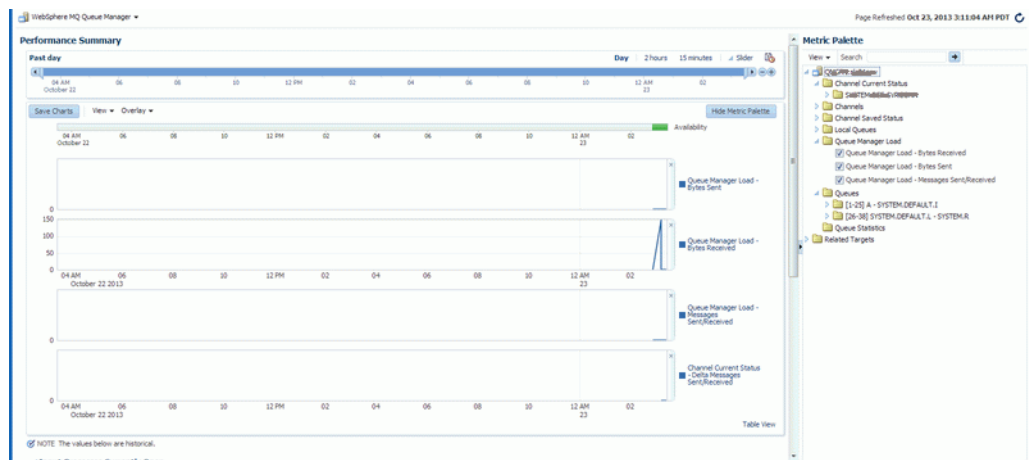
You can use the IBM WebSphere MQ Metric Performance Summary page to do the following:

- Monitor the Metric performance for preferred metrics

Using the Performance Summary page, you can monitor the overall performance of the IBM WAS MQ metrics.



- Select a preferred chart set
From the **Chart Set** list, select the preferred chart set.
- Update an existing chart set
You can customize a chart set according to your requirements, and save changes by clicking **Save Charts**. You can create a new chart set by using the Save Charts option.
- Change time frames
You can use the slider to set the time frame manually, or you can select from the default values provided.
- Show/Hide the Metrics Palette



- Delete metric performance charts
- You can delete metric performance charts either by clicking the close button on the chart itself, or by deselecting the metric name on the Metric Palette.
- Create new metric performance charts
- You can create new metric performance charts by selecting the preferred metrics. The charts are automatically created once the metrics are selected from the Metric Palette.
- Drag and drop metrics
- You can drag and drop the metrics from a particular metric group to the same chart.
- View individual metrics on a chart

When you hover the cursor over a particular metric on the chart, the other metrics are greyed out.

Discovering and Monitoring IBM WebSphere Application Servers, Clusters, and Cells

IBM WebSphere Application Server is an application server developed and maintained by IBM Corporation. It offers options for a faster, more flexible Java application server runtime environment with enhanced reliability and resiliency. It supports single server environments and medium-sized configurations, as well as dynamic web applications requiring web tier clustering over multiple application server instances.

IBM WebSphere Application Server Cell is a high-level, logical grouping of IBM WebSphere Application Server Clusters within your enterprise configuration. Each IBM WebSphere Application Server Cluster is a composite target, or in other words, a logical target, comprising one or more individual IBM WebSphere Application Servers.

Enterprise Manager Cloud Control enables you to discover IBM WebSphere Application Servers, IBM WebSphere Application Server Clusters, and IBM WebSphere Application Server Cells in your environment, and add them for central monitoring and management.

This chapter describes how you can discover and monitor these IBM WebSphere Application Server targets in Enterprise Manager Cloud Control. In particular, this chapter covers the following:

- [About Managing IBM WebSphere Application Servers, Clusters, and Cells](#)
- [Supported Versions for Discovery and Monitoring](#)
- [Prerequisites for Discovering IBM WebSphere Application Servers, Clusters, and Cells](#)
- [Discovering IBM WebSphere Application Servers, Clusters, and Cells](#)
- [Monitoring IBM WebSphere Application Servers](#)
- [Monitoring IBM WebSphere Application Server Clusters](#)
- [Monitoring IBM WebSphere Application Server Cells](#)
- [Troubleshooting IBM WebSphere Application Server Discovery and Monitoring Issues](#)

34.1 About Managing IBM WebSphere Application Servers, Clusters, and Cells

Using Enterprise Manager Cloud Control, you can do the following with IBM WebSphere Application Server targets:

- Discover the following for central monitoring and management:

- IBM WebSphere Application Servers
- IBM WebSphere Application Server Clusters

When you discover an IBM WebSphere Application Server that is part of an IBM WebSphere Application Server Cluster, the IBM WebSphere Application Server Cluster and all other IBM WebSphere Application Servers that are part of that cluster get automatically discovered and added to Enterprise Manager Cloud Control.

- IBM WebSphere Application Server Cells

When you discover an IBM WebSphere Application Server that is part of an IBM WebSphere Application Server Cell, the IBM WebSphere Application Server Cell and all other IBM WebSphere Application Server Clusters and IBM WebSphere Application Servers that are part of that cell get automatically discovered and added to Enterprise Manager Cloud Control.

- Monitor the status, the availability percentage, the CPU usage, the heap usage, and so on.
- View a summary of incidents and problems occurred for a given interval.
- Monitor the status and the overall health of the member application servers that are part of IBM WebSphere Application Server Clusters and IBM WebSphere Application Server Cells.
- Diagnose, notify, and correct performance and availability problems with the help of GUI-rich, intuitive graphs and illustrations.
- Monitor the status of deployed applications.
- Monitor the status of most requested Servlets, EJBs, and JSPs in the last 24 hours.
- Create or end blackouts to suspend or resume the collection of metric data, respectively.
- Monitor and manage configuration details that were last collected and also the ones that were saved at a given point of time.
- Compare the configuration between:
 - A last collected configuration of a server instance with a saved configuration of the same server instance or a different server instance.
 - A last collected configuration of a server instance with a last collected configuration of a different server instance.
 - A saved configuration of a server instance with another saved configuration of the same server instance or a different server instance.
 - A saved configuration of a server instance with a last collected configuration of the same server instance or a different server instance.
- View compliance-related information, such as the compliance standards and frameworks associated with the server, the real-time observations, the evaluation results, and so on.
- View a list of metrics, their collection interval, and the last upload for each metric.

34.2 Supported Versions for Discovery and Monitoring

To search for the IBM WebSphere Application Server versions that are supported for discovery and monitoring in Enterprise Manager Cloud Control, follow these steps:

1. Log into <https://support.oracle.com/>
2. On the My Oracle Support home page, select **Certifications** tab.
3. On the Certifications page, enter the following search criteria in the Certification Search section.
 - Enter the product name **Enterprise Manager Base Platform - OMS** in the Product field.
 - Select the release number **12.1.0.4.0** from the Release list.
4. Click **Search**.
5. In the Certification Results section, expand the **Application Server** menu to view the certified IBM WebSphere Application Server versions.

Certified With	Number of Releases / Versions
Operating Systems (8 Items)	
Agents (1 Item)	
Application Servers (10 Items)	
Apache Tomcat (Managed Target)	5 Releases (7.*, 6.0.*, 5.5.*, 5.0.30, 5.0.3+)
IBM WebSphere Application Server (Managed Target)	4 Releases (8.0, 7.*, 6.1, 6.0)
JBoss Application Server (Managed Target)	4 Releases (6.*, 5.0.1, 4.2.*, 4.0.*)
Oracle Application Server (Managed Target)	3 Releases (10.1.3.5.0, 10.1.3.4.0, 10.1.2.3.0)
Oracle Application Server Single Signon (Managed Target)	1 Release (10.1.4.2.0)
Oracle GlassFish Server (Managed Target)	3 Releases (4.0, 3.1.2.2, 3.1.1)
Oracle WebLogic Portal (Managed Target)	4 Releases (10.3.3.0.0, 10.3.2.0.0, 10.3.1.0.0, 10.3.0.0.0)
Oracle WebLogic Server (Infrastructure)	2 Releases (10.3.6.0.0, 10.3.5.0.0)
Oracle WebLogic Server (Managed Target)	7 Releases (12.1.2.0.0, 12.1.1.0.0, 10.3.6.0.0, 10.3.5.0.0, 10.3.4.0.0, 10.3.3.0.0, 10.3.2.0.0)
WebLogic Server (Managed Target)	7 Releases (10.0.2.0.0, 10.0.1.0.0, 9.2.4.0.0, 9.2, 9.1, 9.0, 8.0)
Databases (8 Items)	
Desktop Applications, Browsers and Clients (5 Items)	
Directory/LDAP Services (6 Items)	
Enterprise Applications (150 Items)	
Management and Development Tools (49 Items)	
Middleware (28 Items)	
Other (3 Items)	
Server (2 Items)	
Virtualization Software (1 Item)	

34.3 Prerequisites for Discovering IBM WebSphere Application Servers, Clusters, and Cells

Meet the following prerequisites for discovering IBM WebSphere Application Server, IBM WebSphere Application Server Clusters, and IBM WebSphere Application Server Cells.

- For IBM WebSphere Application Server Cell-based installation, ensure that the Deployment Manager is running.
- For standalone IBM WebSphere Application Servers, ensure that the particular Server is running.
- Ensure that the Oracle Management Agent (Management Agent), which will be used for discovering the IBM WebSphere Application Server (and its associated cluster and cell), is not monitoring any other J2EE application server such as Oracle WebLogic Server, Apache Tomcat, and so on.

If the Management Agent is monitoring other application servers, and the targets are not required to be monitored using this particular Management Agent, then Oracle recommends that you delete the targets from Enterprise Manager Cloud Control. Alternatively, you can also use a different Management Agent for monitoring them.

- Ensure that the SOAP connector port of the IBM WebSphere Application Server or the Deployment Manager is open to the Management Agent host.

To find the SOAP connector ports, perform the following searches:

- Search for the keyword SOAP_CONNECTOR_ADDRESS in the following location:

```
$<WEBSphere_  
HOME>/AppServer/profiles/<PROFILE>/config/cells/<cellname>/nodes/<n  
odename>/serverindex.xml
```
- Search for the keyword SOAP_CONNECTOR_ADDRES in the following location:

```
$<WEBSphere_  
HOME>/AppServer/profiles/<PROFILE>/config/cells/<cellname>/nodes/<n  
odename>/serverindex.xml
```

- Ensure that the PMI Service is enabled. To do so, follow these steps:
 - For IBM WebSphere Application Server 5.1.x
 - * Log in using the IBM WebSphere Application Server Administrator Console, and select **Application Servers**.
 - * From the list of servers that are a part of the IBM WebSphere Application Server Cell, select the required server.
 - * From the **Additional Properties** menu, select **Performance Monitoring Service**.
 - * Select the check box for **Startup**, and set the **Initial Specification Level** to **Standard**, and click **Apply**.
 - * Once the changes are applied, restart the server.
 - For IBM WebSphere Application Server WebSphere 6.0 and 6.1
 - * Log in using the IBM WebSphere Application Server Administrator Console, and select **Application Servers**.
 - * From the **Servers** menu, select **Application Servers**.
 - * From the list of servers that are a part of the IBM WebSphere Application Server Cell, select the required server.
 - * On the **Configuration** tab, under **Performance**, select **Performance Monitoring Infrastructure (PMI)**.
 - * Enable PMI by select the check box for **Enable Performance Monitoring Infrastructure (PMI)**, and under **Currently Monitored Statistic Set**, select **All**.
 - * Click **Apply**, and once the changes are applied, restart the server.
 - For IBM WebSphere Application Server 7.x
 - * Log in to the Integrated Solutions Console.
 - * From the **Monitoring and Tuning** menu, select **Performance Monitoring Infrastructure (PMI)**.
 - * Select the application server instance.
 - * From the **Configuration** tab, under **General Properties**, enable PMI by select the check box for **Enable Performance Monitoring Infrastructure (PMI)**.

- * From **Currently Monitored Static Set**, select **Custom**. Click the **Custom** link, and specify the list of metrics that are to be enabled. Click **OK**.
- * Click **Save**, and restart the server.

Note: For a clustered configuration, enable PMI for each server individually.

- Ensure that when Administrative Security is enabled with the absolute path, a Java Trust Keystore is provided during the discovery.
- For local monitoring, you must have *read* privileges over the following IBM WebSphere directories and JAR files:
 - For IBM WebSphere 6.0.x
`$<WEBSphere_HOME>/lib`
 Many jar files under this directory are required to perform discovery, and these JARs are then made part of the Management Agent class path to enable metric collection.
 - For IBM WebSphere 6.1
`$<WEBSphere_HOME>/runtimes/com.ibm.ws.admin.client_6.1.0.jar`
`$<WEBSphere_HOME>/plugins/com.ibm.ws.runtime_6.1.0.jar`
 - For IBM WebSphere 7.0
`$<WEBSphere_HOME>/runtimes/com.ibm.ws.admin.client_7.0.0.jar`
- For remote monitoring, you must copy the required WebSphere JARs and the Trusted Keystore file to a folder on the remote Management Agent.
 - For IBM WebSphere 6.0.x, perform the following steps.
 - * Create a dummy WebSphere home directory on the remote Agent host; for example `/scratch/WebSphere6Jars/AppServer` and under it, create the following directory structure:


```
WAS_HOME
/trustedKeyStore
/lib
/java
/java/jre
/java/jre/lib
/java/jre/lib/ext
/java/jre/lib/endorsed
```
 - * Copy the jar files listed below from the WebSphere host to the remote Agent host (in the similar locations of the actual WAS_HOME):


```
WAS_HOME/lib
admin.jar
bootstrap.jar
classloader.jar
```

emf.jar
ffdc.jar
idl.jar
iwsorb.jar
j2ee.jar
mail-impl.jar
management.jar
ras.jar
runtime.jar
sas.jar
security.jar
soap.jar
utils.jar
wasjmx.jar
wasproduct.jar
wlmclient.jar
wsexception.jar
wssec.jar
WAS_HOME/java/jre/lib
ibmcertpathprovider.jar
WAS_HOME/java/jre/lib/ext
ibmjceprovider.jar
WAS_HOME/java/jre/lib/endorsed
Ibmcertpathprovider

* If Admin Security is enabled:

Copy the trusted keystore file from its location on the WebSphere host. For example, WAS_HOME/profiles/Dmgr01/etc, to the WAS_HOME/trustedKeyStore directory on the remote Agent host.

– For IBM WebSphere 6.1

- * Create a dummy WebSphere home directory on the remote Agent host; for example /scratch/WebSphere6Jars/AppServer and under it, create the following directory structure:

WAS_HOME
/trustedKeyStore
/runtimes
/plugins
/java/jre/lib/ext

- * Copy the jar files listed below from the WebSphere host to the remote Agent host (in the similar locations of the actual WAS_HOME):

```

WAS_HOME/runtimes
com.ibm.ws.admin.client_6.1.0.jar
WAS_HOME/plugins
com.ibm.ws.runtime_6.1.0.jar

```

- If Admin Security is enabled:

Copy the following jar file to WAS_HOME/java/jre/lib/ext directory:

```
ibmkeycert.jar
```

Copy the trusted keystore file from its location on the WebSphere host, for example, WAS_HOME/profiles/Dmgr01/etc, to the WAS_HOME/trustedKeyStore directory on the remote Management Agent host.

- For IBM WebSphere versions 6.1.0.13 and 6.1.0.15:

Copy the following jar file to WAS_HOME/plugins directory

```
<WASHOME>/pluginsorg.eclipse.osgi_3.2.1.R32x_v20060919.jar
```

- For IBM WebSphere 7.0.x

- * Create a dummy WebSphere home directory on the remote Agent host; for example /scratch/WebSphere7Jars/AppServer and under it, create the following directory structure:

```

WAS_HOME
/trustedKeyStore
/runtimes
/plugins
/java/jre/lib/ext

```

- * Copy the jar files listed below from the WebSphere host to the remote Agent host (in the similar locations of the actual WAS_HOME):

```

WAS_HOME/runtimes
com.ibm.ws.admin.client_7.0.0.jar
WAS_HOME/java/jre/lib/ext
ibmkeycert.jar
WAS_HOME/java/jre/lib
ibmjgssprovider.jar

```

- * If Admin Security is enabled:

Copy the trusted keystore file from its location on the WebSphere host, for example, WAS_HOME/profiles/Dmgr01/etc, to the WAS_HOME/trustedKeyStore directory on the remote Management Agent host.

- For IBM WebSphere 8.0.x

- * Create a dummy WebSphere home directory on the remote Agent host; for example /scratch/WebSphere8Jars/AppServer and under it, create the following directory structure:

```

WAS_HOME
/trustedKeyStore

```

- /runtimes
- /plugins
- /java/jre/lib/ext
- * Copy the jar files listed below from the WebSphere host to the remote Agent host (in the similar locations of the actual WAS_HOME):
 - WAS_HOME
 - /runtimes
 - com.ibm.ws.admin.client_8.0.0.jar
 - WAS_HOME/java/jre/lib/ext
 - ibmkeycert.jar
 - WAS_HOME/java/jre/lib
 - ibmjgssprovider.jar
 - ibmorb.jar
- * If Admin Security is enabled:
 - Copy the trusted keystore file from its location on the WebSphere host, for example, WAS_HOME/profiles/Dmgr01/etc, to the WAS_HOME/trustedKeyStore directory on the remote Management Agent host.

34.4 Discovering IBM WebSphere Application Servers, Clusters, and Cells

Enterprise Manager Cloud Control enables you to discover and add IBM WebSphere Application Servers (and their associated clusters and cells) for central monitoring and management.

To add an IBM WebSphere Application Server (and their associated clusters and cells), follow these steps:

1. Meet the prerequisites. More
2. From the **Targets** menu, select **Middleware**.
3. On the Middleware page, from the **Add** menu, select **IBM WebSphere Application Server**.
4. Click **Go**.

Enterprise Manager Cloud Control displays the IBM WebSphere Application Server Discovery Wizard.

5. On the Host page, enter the details of the host on which the IBM WebSphere Application Server and Oracle Management Agent are running. In case of IBM WebSphere Application Server Cell-based installation, enter the details of the Deployment Manager so that all IBM WebSphere Application Servers present under the cell are automatically discovered.

Figure 34–1 IBM WebSphere Application Server Host Page

IBM WebSphere Application Server Discovery

Host Select Servers Review

IBM WebSphere Application Server Discovery: Host Back Step 1 of 3 Next Cancel

In order to add an IBM WebSphere Application Server to Enterprise Manager, you must first specify details of the host on which the server is running. In case of Cell based installation, provide the details of Deployment Manager to discover all the servers present under the Cell.

* WebSphere Application Server Host

* SOAP Connector Port


* Version

User Name

Password

Trusted Keystore Filename

* Server Home Directory

* Agent 

Link	Description
WebSphere Application Server Host	Enter the name of the host on which the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager is installed.
SOAP Connector Port	Enter the SOAP connector port on which the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager is listening.
Version	Select the version of the IBM WebSphere Application Server.
User Name	Enter the user name to access the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager.
Password	Enter the password to access the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager.
Trusted Keystore Filename	<p>If the port is SSL enabled, then enter the absolute path to the trusted keystore file. Keystore is a protected database that holds keys and certificates for an enterprise. Ensure that the path leads up to the file name.</p> <p>For example,</p> <p>/net/host1/software/IBM/WebSphere/AppServer/profiles/Dmgr01/etc/DummyClientTrustFile.jks</p>
Server Home Directory	<p>Enter the absolute path to the Oracle home directory where the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager is installed.</p> <p>For example,</p> <p>/net/host1/software/IBM/WebSphere/AppServer/</p>
Agent	Click the search icon and select the Oracle Management Agent (Management Agent) that is monitoring the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager. The Management Agent can be local or remote to the IBM WebSphere Application Server or the IBM WebSphere Deployment Manager.

- On the Select Servers page, select the IBM WebSphere Application Servers and/or the IBM WebSphere Application Server Clusters that you want to monitor in Enterprise Manager Cloud Control.

On selection of an IBM WebSphere Application Server Cluster, all the IBM WebSphere Application Servers that are part of the cluster are automatically selected and added to Enterprise Manager Cloud Control for monitoring.

7. On the Review page, review the information you have provided in the previous screens for discovering IBM WebSphere Application Servers and IBM WebSphere Application Server Cells.

If you want to modify any information, click **Back** repeatedly to reach the page where you want to make some changes. If you are satisfied with the information, click **Submit**.

34.5 Monitoring IBM WebSphere Application Servers

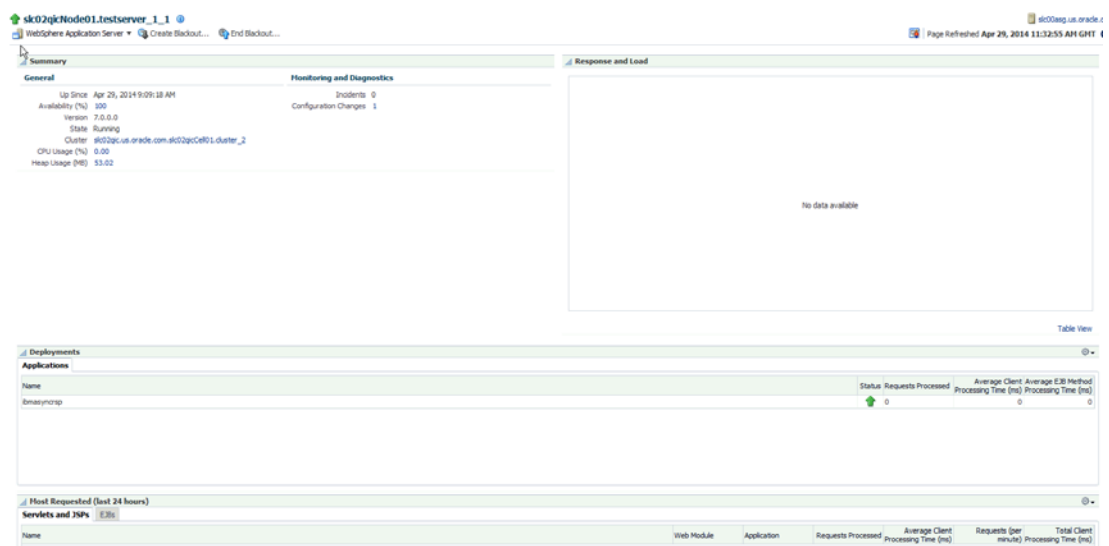
This section covers the following:

- [Monitoring IBM WebSphere Application Servers](#)
- [Administering IBM WebSphere Application Servers](#)
- [Monitoring the Performance of IBM WebSphere Application Servers](#)
- [Monitoring the Applications Deployed to IBM WebSphere Application Servers](#)
- [Viewing the Top EJBs of IBM WebSphere Application Servers](#)
- [Viewing the Top Servlets and JSPs of IBM WebSphere Application Servers](#)
- [Viewing IBM WebSphere Application Server Metrics](#)

34.5.1 Monitoring IBM WebSphere Application Servers

To monitor IBM WebSphere Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.
3. On the IBM WebSphere Application Server Home page, you can monitor the availability, usage, and performance of the selected server at a high level.



The IBM WebSphere Application Server Home page has the following sections:

34.5.1.1 General Section

Provides general information about the health of the server.

Element	Description
Up/Down/Pending Since	Date and time when the status was last determined.
Availability (%)	Percentage of time that the server was up during the last 24 hours. Click the percentage link to view availability details for the past 24 hours.
Version	Version of the server that is being monitored.
State	Current state of the server, whether it is running or shut down.
CPU Usage (%)	CPU consumption as a percentage of CPU time at any given moment in time. Click the percentage link to view availability details for the past 24 hours
Heap Usage (MB)	Current JVM Memory heap Usage in MB as per the last Metric collection

34.5.1.2 Monitoring and Diagnostics Section

Provides a summary of incidents and configuration changes made to the server. Use this information to diagnose and troubleshoot performance issues with the server.

Element	Description
Incidents	Number of unresolved issues that require your attention and corrective action. Click the value to drill down and view more detailed information.
Configuration Changes	Number of incidents related to the applications. The displayed integer is also a link to the Incident Manager page. Click the value to drill down and view more detailed information.

34.5.1.3 Response and Load Section

Provides a graphical representation of the server's performance, measuring request-processing time for a given interval. To switch to a tabular format, click **Table View**. To drill down and view more detailed metric-related information and to diagnose issues by looking at other related infrastructure metrics, click the server names in the legend and select an appropriate option in the Additional Information message.

34.5.1.4 Applications Tab

Provides critical information about the applications deployed to the server. For more details, see [Section 34.5.4](#).

34.5.1.5 Servlets and JSPs Tab

Provides details of the most requested Servlets and JSPs in the last 24 hours.

34.5.1.6 EJBs Tab

Provides details of the most requested EJBs in the last 24 hours.

34.5.2 Administering IBM WebSphere Application Servers

To administer IBM WebSphere Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired IBM WebSphere Application Server.
3. On the IBM WebSphere Application Server Home page, you can view high-level information pertaining to the selected server.

To perform administrative tasks on the IBM WebSphere Application Server, from the **WebSphere Application Server** menu, select any of the following according to your needs:

- **Monitoring**, to monitor the performance of the target, view metric details, view status information, view incidents and alerts raised so far for the target, and view blackouts created for the target.
- **Diagnostics**, to analyze and diagnose performance issues.
- **Control**, to create or end blackouts.
- **Job Activity**, to view details of the jobs created for the target.
- **Information Publisher Reports**, to view reports.
- **Administer**, to directly administer the IBM WebSphere Application Server using the IBM WebSphere Application Server Console.
- **Configuration**, to search, view, and compare configuration details.
- **Compliance**, to view and create compliance standards.
- **Target Setup**, to view monitoring configuration details and target properties, to remove the target or add it to a group, to view the properties of the target.
- **Target Sitemap**, to view the overall topology of the target.
- **Target Information**, to view general information about the target.

34.5.3 Monitoring the Performance of IBM WebSphere Application Servers

Enterprise Manager Cloud Control provides several key performance charts that can help you quickly assess the health of your IBM WebSphere Application Server.

To check the performance of an IBM WebSphere Application Server, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.
3. On the IBM WebSphere Application Server Home page, from the **WebSphere Application Server** menu, select **Monitoring**, then select **Performance Summary**.
4. On the Performance Summary page, you can do the following:
 - View a set of performance charts, monitor the performance over a given interval, and diagnose and correct problems.
 - Customize the set of performance charts that appear on the page. To do so, click **Show Metric Palette**, and select the charts you want to add to the page.
 - Show or hide the Metrics Palette. To do so, click **Show Metric Palette** or **Hide Metric Palette**, respectively.
 - Reorder the performance charts. To do so, from the **View** menu, select **Reorder Charts**.

- Customize the performance charts to show or hide availability and threshold details, and grid lines. To do so, from the **View** menu, select **Availability**, **Thresholds**, or **Grid Lines**, respectively.
- Draw a comparison with another IBM WebSphere Application Server's performance, or with the previous day's performance. To do so, from the **Compare** menu, select **With Another IBM WebSphere Application Server** or **Today with Yesterday**, respectively.
- Remove comparison. To do so, from the **Compare** menu, select **Remove Comparison**.
- Create or delete baselines. To do so, from the **Compare** menu, select **Create Baseline** or **Delete Baseline**, respectively.
- Delete metric performance charts either by clicking the close button on the chart itself, or by deselecting the metric name in the Metric Palette.
- Change time frames using the slider, or set a default value.
- Create new metric performance charts by selecting the preferred metrics from the Metric Palette. The charts are automatically created once the metrics are selected.
- Drag and drop the metrics from a particular metric group to the same chart.

34.5.4 Monitoring the Applications Deployed to IBM WebSphere Application Servers

To monitor the applications running on a IBM WebSphere Application Server, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.
3. On the IBM WebSphere Application Server Home page, in the **Deployments** section, in the **Applications** region, view the following details about applications deployed to the server.

Column	Description
Name	Name of the application deployed to the server.
Status	Status of the application, either Up or Down.
Number of Requests Processed	Total number of requests processed by the application in the last 24 hours.
Average Request Processing Time	Average time taken to service the requests.
Average Request Processing Time by EJB Method	Average time taken by the EJB methods to service the requests.

34.5.5 Viewing the Top EJBs of IBM WebSphere Application Servers

To view the top or the most requested EJBs of an IBM WebSphere Application Server, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.

3. On the IBM WebSphere Application Server Home page, in the **EJBs** section, view a list of EJBs that were most requested in the last 24 hours.

34.5.6 Viewing the Top Servlets and JSPs of IBM WebSphere Application Servers

To view the top or the most requested Servlets and JSPs of an IBM WebSphere Application Server, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.
3. On the IBM WebSphere Application Server Home page, in the **Servlets and JSPs** section, view a list of Servlets and JSPs that were most requested in the last 24 hours.

34.5.7 Viewing IBM WebSphere Application Server Metrics

To view all IBM WebSphere Application Server metrics, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server**.
3. On the IBM WebSphere Application Server Home page, from the **WebSphere Application Server** menu, select **Monitoring**, then select **All Metrics**.

34.6 Monitoring IBM WebSphere Application Server Clusters

This section covers the following:

- [Monitoring IBM WebSphere Application Server Clusters](#)
- [Administering IBM WebSphere Application Server Clusters](#)
- [Viewing IBM WebSphere Application Server Cluster Members](#)
- [Viewing IBM WebSphere Application Server Cluster Metrics](#)

34.6.1 Monitoring IBM WebSphere Application Server Clusters

To monitor IBM WebSphere Application Server Clusters, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server Cluster**.
3. On the IBM WebSphere Application Server Cluster Home page, you can monitor the availability, usage, and performance of the selected cluster at a high level.

The status of an IBM WebSphere Application Server Cluster depends on the status of all its members, that is the individual IBM WebSphere Application Servers within the cluster. IBM WebSphere Application Server is an application server developed and maintained by IBM Corporation.

The IBM WebSphere Application Server Cluster Home page has the following sections:

34.6.1.1 Summary Section

Provides a quick, high-level, graphical summary of the availability of the cluster in the last 24 hours.

To view the status (either up or down), hover your mouse over the timeline bar. To zoom in and review the hours of a particular time period, place the cursor at one particular hour of the timeline bar, and with the mouse key pressed, drag the cursor to another hour of interest. You will see that the timeline bar zooms in and displays the hours, minutes, and seconds within that particular time period. This helps when you want to identify the exact time when the cluster went down.

34.6.1.2 Monitoring and Diagnostics Section

Provides a summary of incidents, descendant target incidents, and configuration changes made to the server. Use this information to diagnose and troubleshoot performance issues with the server.

Element	Description
Incidents	Number of unresolved issues that require your attention and corrective action. Click the value to drill down and view more detailed information.
Descendant Target Incidents	Number of changes made to the server configuration in the last 7 days. Click the value to drill down and view more detailed information.
Configuration Changes	Number of incidents related to the applications. The displayed integer is also a link to the Incident Manager page. Click the value to drill down and view more detailed information.

34.6.1.3 Servers Section

Provides information about the members of the cluster, mainly the IBM WebSphere Application Servers that are part of the cluster.

Column	Description
Name	Name of the IBM WebSphere Application Server that is part of the cluster. To navigate to the home page of the server, click the member or server name.
Status	Current status of the IBM WebSphere Application Server. To drill down to the Status History page, click the status icon. You will be taken to the Status History (Availability) page, which shows the availability of the server along with the availability history of the constituents that are used to compute its availability.
Active Sessions	Total number of active or live HTTP sessions in the server over 24 hours. The value appears as a link. To view the number of active sessions for each hour of the 24-hour scale, click the value (link). A graph appears depicting the active sessions for each hour. To drill down further and view more detailed metric-related information, click Metric Details .
Request Processing Time (ms)	Average time taken (in milliseconds) to service a request in the last 24 hours.

34.6.1.4 Resource Usage Section

Provides a graphical representation of the CPU utilization rate and the memory used by JVM for a given interval. To switch to a tabular format, click **Table View**. To drill down and view more detailed metric-related information and to diagnose issues by

looking at other related infrastructure metrics, click the server names in the legend and select an appropriate option in the Additional Information message.

34.6.2 Administering IBM WebSphere Application Server Clusters

To administer IBM WebSphere Application Server Clusters, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired IBM WebSphere Application Server Cluster.
3. On the IBM WebSphere Application Server Cluster Home page, you can view high-level information pertaining to the selected server.

To perform administrative tasks on the IBM WebSphere Application Server Cluster, from the **WebSphere Cluster** menu, select any of the following according to your needs:

- **Monitoring**, to monitor the performance of the target, view metric details, view status information, view incidents and alerts raised so far for the target, and view blackouts created for the target.
- **Diagnostics**, to analyze and diagnose performance issues.
- **Control**, to create or end blackouts.
- **Job Activity**, to view details of the jobs created for the target.
- **Information Publisher Reports**, to view reports.
- **Members**, to view and monitor the health of the members of the IBM WebSphere Application Server Cluster. The members are typically the IBM WebSphere Application Servers that are part of the cluster.
- **Configuration**, to search, view, and compare configuration details.
- **Compliance**, to view and create compliance standards.
- **Target Setup**, to view monitoring configuration details and target properties, to remove the target or add it to a group, to view the properties of the target.
- **Target Sitemap**, to view the overall topology of the target.
- **Target Information**, to view general information about the target.

34.6.3 Viewing IBM WebSphere Application Server Cluster Members

Enterprise Manager Cloud Control helps you view the members of an IBM WebSphere Application Server Cluster. You can see what type of members form the cluster, monitor their status, and perform various administrative operations.

To view the members of an IBM WebSphere Application Server Cluster, follow these steps:

1. From the **Targets** menu, click **Middleware**.
2. On the Middleware page, click the desired IBM WebSphere Application Server Cluster.
3. On the IBM WebSphere Application Server Cluster Home page, from the **WebSphere Cluster** menu, select **Members**, then select **Show All** to view the following details of the members.

Column	Description
Name	Name of the IBM WebSphere Application Server that is part of the IBM WebSphere Application Server Cluster. Click the name to access the home page of that IBM WebSphere Application Server.
Type	Type of the member. Typically, IBM WebSphere Application Server.
Status	Current status of the member. Click the status icon to see a consolidated availability summary. You can see the current and past availability status within the last 24 hours, 7 days, or month (31 days).
Incidents	Number of fatal, critical, and warning incidents that occurred for the member server. To drill down to the Incident Manager page and view more detailed information about the incident, click the count.

To search for a particular member, use the **Search** menu.

By default, all members of the IBM WebSphere Application Server Cluster are listed in the table. To refresh the table and view only a particular type of members, select either **Direct Members** or **Indirect Members** from the **View** section.

To save the information about members in a file and to download that file to your local disk, click **Export**.

34.6.4 Viewing IBM WebSphere Application Server Cluster Metrics

To view all IBM WebSphere Application Server metrics, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server Cluster**.
3. On the IBM WebSphere Application Server Cluster Home page, from the **WebSphere Cluster** menu, select **Monitoring**, then select **All Metrics**.

34.7 Monitoring IBM WebSphere Application Server Cells

This section covers the following:

- [Monitoring IBM WebSphere Application Server Cells](#)
- [Administering IBM WebSphere Application Server Cells](#)
- [Viewing IBM WebSphere Application Server Cell Members](#)

34.7.1 Monitoring IBM WebSphere Application Server Cells

To monitor IBM WebSphere Application Server Cells, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **IBM WebSphere Application Server Cell**.
3. On the IBM WebSphere Application Server Cell Home page, you can monitor the availability, usage, and performance of the selected cell at a high level.

The status of an IBM WebSphere Application Server Cell depends on the status of all its members, that is the individual IBM WebSphere Application Server Clusters within the cell. The status of each IBM WebSphere Application Server Cluster depends on the status of each IBM WebSphere Application Server within that cluster.

The IBM WebSphere Application Server Cell Home page has the following sections:

34.7.1.1 General Section

Column	Description
WebSphere Cell	Name of the IBM WebSphere Application Server Cell.
Deployment Manager	Name of the Deployment Manager that manages the operations of the IBM WebSphere Application Server Cell being monitored.
Deployment Manager Host	Name of the host where the Deployment Manager is running.
Deployment Manager SOAP Connector Port	SOAP connector port number used to connect to the Deployment Manager.
WebSphere Cell Refreshed	Date and time when the membership of the IBM WebSphere Application Server Cell was last refreshed.

34.7.1.2 Incidents Summary Section

Provides a summary of the fatal, critical, warning, and escalated incidents and problems that occurred on the IBM WebSphere Application Server Cell.

To filter and view a particular category of incidents and problems, from the **Category** list, select a particular category. The table automatically refreshes and lists the incidents and problems pertaining to the selected category.

To hide, unhide, and reorder columns, and to filter and view either all incidents, all incidents without symptoms, or only causes, from the **View** menu, select an appropriate option.

Column	Description
Summary	Intuitive message indicating what the incident is about.
Target	Target type on which the incident or problem occurred.
Severity	Severity of the incident or problem. The severity is either Fatal, Critical, or Warning.
Status	Status of the incident or problem. The status can be either New, Work in Progress, Closed, or Resolved.
Escalation Level	Escalation level signifying the level of attention required on the incident. The escalation level can be either None, which means it is not escalated, or Level 1 through Level 5.
Type	Type of incident or problem being reported.
Time Since Last Update	Date and time the incident was last updated or when the incident was closed.

34.7.1.3 Clusters Section

Provides availability information about the IBM WebSphere Application Server Cluster member targets that are part of the IBM WebSphere Application Server Cell.

Column	Description
Name	Name of the IBM WebSphere Application Server Cluster member target that is part of the IBM WebSphere Application Server Cell. To navigate to the home page of the cluster, click the cluster name.
Status	Current status of the IBM WebSphere Application Server Cluster member target.
Number of Servers	Number of IBM WebSphere Application Servers that are part of the IBM WebSphere Application Server Cluster.

34.7.1.4 Servers Section

Provides availability information about the IBM WebSphere Application Server member targets that are part of the IBM WebSphere Application Server Cell.

Column	Description
Name	Name of the IBM WebSphere Application Server member target that is part of the IBM WebSphere Application Server Cell. To navigate to the home page of a member target, click the member name.
Status	Current status of the IBM WebSphere Application Server member target.
Cluster	Name of the IBM WebSphere Application Server Cluster to which the IBM WebSphere Application Server member target belongs. This column applies only to server targets that are part of a cluster target.

34.7.2 Administering IBM WebSphere Application Server Cells

To administer IBM WebSphere Application Server Cells, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired IBM WebSphere Application Server Cell.
3. On the IBM WebSphere Application Server Cell Home page, you can view high-level information pertaining to the selected cell.

To perform administrative tasks on the IBM WebSphere Application Server Cell, from the **WebSphere Cell** menu, select any of the following according to your needs:

- **Monitoring**, to monitor the performance of the target, view metric details, view status information, view incidents and alerts raised so far for the target, and view blackouts created for the target.
- **Diagnostics**, to analyze and diagnose performance issues.
- **Control**, to create or end blackouts.
- **Job Activity**, to view details of the jobs created for the target.

- **Information Publisher Reports**, to view reports.
- **Members**, to view and monitor the health of the members of the IBM WebSphere Application Server Cell. The members are typically IBM WebSphere Application Cells, IBM WebSphere Application Server Clusters, and IBM WebSphere Application Servers that are part of the cell.
- **Configuration**, to search, view, and compare configuration details.
- **Compliance**, to view and create compliance standards.
- **Target Setup**, to view monitoring configuration details and target properties, to remove the target or add it to a group, to view the properties of the target.
- **Target Sitemap**, to view the overall topology of the target.
- **Target Information**, to view general information about the target.

34.7.3 Viewing IBM WebSphere Application Server Cell Members

Enterprise Manager Cloud Control helps you view the members of an IBM WebSphere Application Server Cell. You can see what type of members form the cell, monitor their status, and perform various administrative operations.

To view the members of an IBM WebSphere Application Server Cell, follow these steps:

1. From the **Targets** menu, click **Middleware**.
2. On the Middleware page, click the desired IBM WebSphere Application Server Cell.
3. On the IBM WebSphere Application Server Cell Home page, from the **WebSphere Cell** menu, select **Members**, then select **Show All** to view the following details of the members.

Column	Description
Name	Name of the IBM WebSphere Application Server Cluster or the IBM WebSphere Application Server that is part of the IBM WebSphere Application Server Cell. To navigate to the home page of a member, click the member name.
Type	Type of the member. Typically, IBM WebSphere Application Server Cluster or IBM WebSphere Application Server.
Status	Current status of the member. Click the status icon to see a consolidated availability summary. You can see the current and past availability status within the last 24 hours, 7 days, or month (31 days).
Incidents	Number of fatal, critical, and warning incidents that occurred for the member server. To drill down to the Incident Manager page and view more detailed information about the incident, click the count.

To search for a particular member, use the **Search** menu.

By default, all members of the IBM WebSphere Application Server Cell are listed in the table. To refresh the table and view only a particular type of members, select either **Direct Members** or **Indirect Members** from the **View** section.

To save the information about members in a file and to download that file to your local disk, click **Export**.

34.8 Troubleshooting IBM WebSphere Application Server Discovery and Monitoring Issues

This section provides troubleshooting tips for the issues encountered while discovering or monitoring IBM WebSphere Application Servers.

- [Troubleshooting Discovery Issues](#)
- [Troubleshooting Monitoring Issues](#)

34.8.1 Troubleshooting Discovery Issues

1. Problem Description

The discovery of a target IBM WebSphere fails at the Host Credentials phase. The discovery of IBM WebSphere fails when you click next after having entered valid target properties for discovery with the following error message.

Could not find the required library, specify the home directory.

This message is expected at this step as the Agent does not know the WAS_HOME directory. However when you enter the WAS_HOME directory, you still get the same error.

Root Cause

This issue is a known issue.

Action

Apply the following workaround.

1. Create a directory without any space in it and copy the jar files required for discovery in this directory as mentioned in [Section 34.3](#). Remember to create these directories logged as the OS user you defined in the Agent Host Preferred Credentials.
2. Check the box "Agent is running on a host other than the Deployment Manager" as if it was remote monitoring and provide the correct path to the jar files.

2. Problem Description

The IBM WebSphere Application Server still reports Metric Collection errors even after the Agent has been stopped and re-started.

Root Cause

The PMI Service for IBM WebSphere Application Server has not been enabled or the same agent is used to monitor other application servers like WebLogic or tomcat.

Action

Enable the PMI Service for the WebSphere server that is being Monitored.

Make sure the same agent is not already in use to monitor other application servers like WebLogic or tomcat. Use a different agent or install a new agent to monitor WebSphere server.

3. Problem Description

In the server home page, select the Applications tab from the IBM WebSphere Application Server Home Page then Applications, you do not see any application listed.

Also, in the all metrics page when you click on a particular metric, you see no data instead of some values.

Root Cause

If you don't see any data in the applications tab or in any particular metric, it just means that there is no load on the Deployed Applications. But, if the load is there and still the data is not seen, the required resources are not created on the server.

Action

None except if there is load on Deployed Applications.

Else enable the option "Create MBeans for Resources" for the application in question from the IBM WebSphere Console.

4. Problem Description

The discovery of IBM WebSphere Application server (as well as other Third Party Application Servers) passes successfully all discovery phases.

It fails only when the button "Finish" is pressed and the following error is displayed:

Discovery failed unknown error.

You may be redirected automatically to the first step of the Discovery Wizard.

Root Cause

You were not logged in Cloud Control as a Super User. As stated in the Pre-Requisites, you must be logged with a Super User account (like SYSMAN) in order to successfully discover a target IBM WebSphere Application Server (Cell or Standalone).

Action

Logout of Cloud Control and Login with a Super User account.

5. Problem Description

The discovery of IBM WebSphere Application Server or Application Server Cell fails with the following message displayed:

Error:

No application servers were found on the host <host>. If the port is SSL enabled, specify the port number and the Trusted Keystore file name.

The OMS trace file \$ORACLE_HOME/sysman/log/emoms.trc includes:

Caused by:

```
com.ibm.websphere.management.exception.ConnectorNotAvailableException:
[SOAPException: faultCode=SOAP-ENV:Client; msg=Error opening socket:
javax.net.ssl.SSLHandshakeException: com.ibm.jsse2.util.h: No trusted
certificate found; targetException=java.lang.IllegalArgumentException:
Error opening socket: javax.net.ssl.SSLHandshakeException:
com.ibm.jsse2.util.h: No trusted certificate found]
```

at

```
com.ibm.ws.management.connector.soap.SOAPConnectorClient.reconnect(SOA
PConnectorClient.java:344)
```

```
at
com.ibm.ws.management.connector.soap.SOAPConnectorClient.<init>(SOAPCo
nectorClient.java:177)
```

... 6 more

Caused by: [SOAPException: faultCode=SOAP-ENV:Client; msg=Error opening socket: javax.net.ssl.SSLHandshakeException: com.ibm.jsse2.util.h: No trusted certificate found; targetException=java.lang.IllegalArgumentException: Error opening socket: javax.net.ssl.SSLHandshakeException: com.ibm.jsse2.util.h: No trusted certificate found]

Potential Cause

The SOAP port provided for the discovery process could be incorrect.

Action

Find the correct SOAP port for the node or cell that needs to be discovered.

```
<WAS_HOME>/profiles/<PROFILE>/config/cells/<CELL_NAME>/nodes/<NODE_
NAME>/serverindex.xml
```

The SOAP port is defined within the following XML tags:

```
<specialEndpoints xmi:id="NamedEndPoint_4" endPointName="SOAP_
CONNECTOR_ADDRESS">

<endPoint xmi:id="EndPoint_4" host="celtpvm4.us.example.com"
port="8879"/>

</specialEndpoints>
```

In this example the node or cell SOAP port is 8879.

This is the value that should be used for 'SOAP connector port' in the discovery form.

6. Problem Description

After having discovered the WebSphere instance, the following metric collection error is returned:

```
oracle.sysman.emSDK.emd.fetchlet.FetchletException:
java.lang.NoClassDefFoundError:

Could not initialize class
com.ibm.websphere.management.AdminClientFactory
```

Root Cause

Caused by an incorrect class path used during discovery

Action

From the **Targets** tab, select **Middleware**, and then select **IBM WebSphere Server Target**.

From the **Target Setup** menu, select **Monitoring Configuration**, and enter the correct WebSphere Home path, and click **OK**.

7. Problem Description

The discovery of IBM WebSphere Application Server or Application Server Cell fails with unknown error.

After following the above trouble shooting sections if the discovery issue is still not resolved, we recommend to run the discovery from UI with the following property set on the agent.

Potential Cause

There could be various causes for the discovery failure; looking at the log file - emagent_perl.trc with the following property set, will help to identify the root cause for the discovery failure.

Action

1. Add the following property in the file \$AGENT_INSTALL_HOME/sysman/config/emd.properties:

EMAGENT_PERL_TRACE_LEVEL=DEBUG
2. Perform the discovery from the UI.
3. Look at the log file \$AGENT_INSTALL_HOME/sysman/log/emagent_perl.trc.

for the xml output beginning with the tag

```
<Targets>
```

```
.....
```

```
</Targets>
```

The error message encoded in the xml output will help identify the root cause of the discovery.

8. Problem Description

An error is displayed after initiating a refresh of an upgraded WebSphere Cell target from EM.

After a WebSphere AS instance is upgraded to a newer version and when a refresh action of the existing WebSphere Cell targets on EM is performed, the following error is displayed:

```
<DiscoveryWarning DISCOVERY_SCRIPT="666">Version
incorrect</DiscoveryWarning>
```

Note: The error mentioned above can be seen on the Management Agent from emagent_perl.trc log file when debug mode is enabled.

Root Cause

The version of WebSphere AS captured as a part of **Monitoring Configuration** of all the WebSphere AS targets within the affected WebSphere Cell needs to be updated to reflect the upgraded version before initiating a refresh of the WebSphere Cell.

Action

The **Version** field captured as part of the Monitoring Configuration of any WebSphere AS target can be updated in one of the two ways mentioned below:

Method 1

1. In the EM Cloud Control console, click **WebSphere Application Server** drop-down button and select **Target Setup**.
2. Select **Monitoring Configuration**.

3. Edit the **Version** field to display the new version.

Note: The **Version** field is editable only in EM Cloud Control 12c FMW Plug-in 12.1.0.5.x and below. For versions 12.1.0.6.0 and above, this field is read-only on the EM CC console. Hence for versions 12.1.0.6.0 and above use the 'emcli modify_target' command to update the this field.

Method 2

Use emcli modify_target command. Enter the following command:

```
emcli modify_target -name="was_target_name" -type="websphere_
j2eeserver" -properties="version:x.x.x.x"
```

The above command modifies the version field of **Monitoring configuration** for the specified WebSphere AS Target.

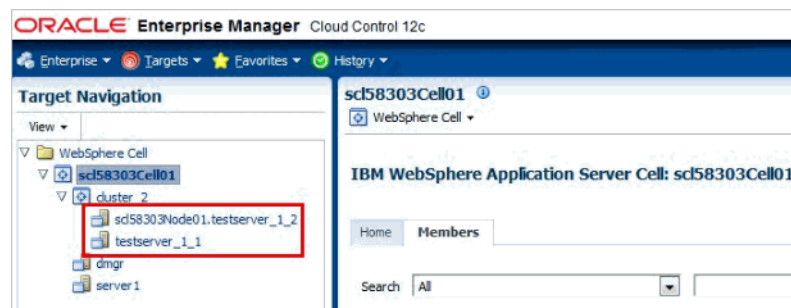
To view the list of WebSphere AS targets currently monitored by EM enter the following command:

```
emcli get_targets -targets="websphere_j2eeserver"
```

34.8.2 Troubleshooting Monitoring Issues

The names of the IBM WebSphere Application Servers discovered in Enterprise Manager Cloud Control 12c Release 2 (12.1.0.2) or lower, appear only with the server name. For example, testserver_1_1. However, the names of the IBM WebSphere Application Servers discovered in Enterprise Manager Cloud Control 12c Release 3 (12.1.0.3) or higher, appear with the node name and server name. For example, exampleNode01.testserver_1_2. See [Figure 34–2](#).

Figure 34–2 Issue with the Display Name of IBM WebSphere Application Server



Discovering and Monitoring JBoss Application Server

JBoss Application Server is the market-leading, open source Java Platform, Enterprise Edition (Java EE) application server, delivering a high-performance and enterprise-class platform for e-business applications. JBoss provides enterprise-class security, transaction support, resource management, load balancing, and clustering.

JBoss Partition is a logical grouping of JBoss Application Servers within your enterprise configuration. The status of JBoss Partition depends upon the status of all its members, that is the JBoss Application Servers within the partition.

Enterprise Manager Cloud Control enables you to discover JBoss Application Servers and JBoss Partitions in your environment, and add them for central monitoring and management.

This chapter describes how you can discover and monitor these JBoss Application Server targets in Enterprise Manager Cloud Control. In particular, this chapter covers the following:

- [About Managing JBoss Application Servers and JBoss Partitions](#)
- [Finding Out the Supported Versions for Discovery and Monitoring](#)
- [Prerequisites for Discovering JBoss Application Servers and JBoss Partitions](#)
- [Discovering JBoss Application Servers and JBoss Partitions](#)
- [Migrating to JMX-Based Monitoring of JBoss Application Servers](#)
- [Monitoring JBoss Application Servers](#)
- [Monitoring JBoss Partitions](#)
- [Deploying JVM Diagnostics on JBoss Application Server to Diagnose Issues](#)
- [Troubleshooting JBoss Application Server Discovery and Monitoring Issues](#)

35.1 About Managing JBoss Application Servers and JBoss Partitions

Using Enterprise Manager Cloud Control, you can do the following with JBoss Application Server targets:

- Discover the following for central monitoring and management:
 - JBoss Application Servers
 - JBoss Partitions

When you discover a JBoss Application Server that is part of a JBoss Partition, the JBoss Partition and all other JBoss Application Servers that are part of that JBoss Partition gets automatically discovered and added to Enterprise Manager Cloud Control.

- Monitor the status, the availability percentage, the CPU usage, the heap usage, the Java vendor and version used, and so on.
- Monitor the status and the overall health of the member application servers that are part of JBoss Partitions.
- Monitor the performance by measuring the load and the request processing time for a given interval.
- Diagnose, notify, and correct performance and availability problems with the help of GUI-rich, intuitive graphs and illustrations.
- Monitor the status of the deployed applications.
- Monitor the Servlets and JSPs running on the application servers, including the most requested Servlets in the last 24 hours.
- View details about the associated JVM threads and data sources.
- Create or end blackouts to suspend or resume the collection of metric data, respectively.
- Monitor and manage configuration details that were last collected and also the ones that were saved at a given point of time.
- Compare the configuration between:
 - A last collected configuration of a server instance with a saved configuration of the same server instance or a different server instance.
 - A last collected configuration of a server instance with a last collected configuration of a different server instance.
 - A saved configuration of a server instance with another saved configuration of the same server instance or a different server instance.
 - A saved configuration of a server instance with a last collected configuration of the same server instance or a different server instance.
- View compliance-related information, such as the compliance standards and frameworks associated with the server, the real-time observations, the evaluation results, and so on.
- View a list of metrics, their collection interval, and the last upload for each metric.

35.2 Finding Out the Supported Versions for Discovery and Monitoring

To search for the JBoss Application Server versions that are supported for discovery and monitoring in Enterprise Manager Cloud Control, follow these steps:

1. Log into <https://support.oracle.com/>
2. On the My Oracle Support home page, select **Certifications** tab.
3. On the Certifications page, enter the following search criteria in the Certification Search section.
 - Enter the product name **Enterprise Manager Base Platform - OMS** in the Product field.

- Select the release number **12.1.0.4.0** from the Release list.
- 4. Click **Search**.
- 5. In the Certification Results section, expand the **Application Server** menu to view the certified JBoss Application Server versions.

Certification Search	
Certification Results	
Displaying Enterprise Manager Base Platform - Certifications.	
View ▾	
Certified With	Number of Releases / Versions
➤ Operating Systems (8 Items)	
➤ Agents (1 Item)	
▼ Application Servers (10 Items)	
Apache Tomcat (Managed Target)	5 Releases (7.0, 6.0.0, 5.5.0, 5.0.30, 5.0.3+)
IBM WebSphere Application Server (Managed Target)	4 Releases (8.0, 7.0, 6.1, 6.0)
JBoss Application Server (Managed Target)	4 Releases (6.0, 5.0.1, 4.2.0, 4.0.0)
Oracle Application Server (Managed Target)	3 Releases (10.1.3.5.0, 10.1.3.4.0, 10.1.2.3.0)
Oracle Application Server Single Signon (Managed Target)	1 Release (10.1.4.2.0)
Oracle GlassFish Server (Managed Target)	3 Releases (4.0, 3.1.2.2, 3.1.1)
Oracle WebLogic Portal (Managed Target)	4 Releases (10.3.3.0.0, 10.3.2.0.0, 10.3.1.0.0, 10.3.0.0.0)
Oracle WebLogic Server (Infrastructure)	2 Releases (10.3.6.0.0, 10.3.5.0.0)
Oracle WebLogic Server (Managed Target)	7 Releases (12.1.2.0.0, 12.1.1.0.0, 10.3.6.0.0, 10.3.5.0.0, 10.3.4.0.0, 10.3.3.0.0, 10.3.2.0.0)
WebLogic Server (Managed Target)	7 Releases (10.0.2.0.0, 10.0.1.0.0, 9.2.4.0.0, 9.2, 9.1, 9.0, 8.1)
➤ Databases (8 Items)	
➤ Desktop Applications, Browsers and Clients (5 Items)	
➤ Directory/LDAP Services (6 Items)	
➤ Enterprise Applications (150 Items)	
➤ Management and Development Tools (49 Items)	
➤ Middleware (28 Items)	
➤ Other (3 Items)	
➤ Server (2 Items)	
➤ Virtualization Software (1 Item)	

35.3 Prerequisites for Discovering JBoss Application Servers and JBoss Partitions

Meet the following prerequisites for discovering JBoss Application Servers and JBoss Partitions.

- Ensure that you use only Oracle Management Agent 12c Release 3 (12.1.0.3) or higher for discovery.
- Ensure that you download and extract the JBoss Application Server ZIP file, and set the JBOSS_HOME and PATH environment variables as follows:

```
setenv JBOSS_HOME <jboss_install_location>
setenv PATH "${PATH}:/${JBOSS_HOME}/bin"
```

- If you are adding JBoss Application Server 4.x or 5.x, then ensure that you meet the following prerequisites:

- a. In the run.conf file that is present in the \${JBOSS_INSTALL_HOME}/bin directory, add the following entries:

JBoss Application Server 4.x

Make a note of the port used here, as the same port must be used for discovery.

```
JAVA_OPTS="$JAVA_OPTS -Dcom.sun.management.jmxremote.port=<any_unused_port>"
JAVA_OPTS="$JAVA_OPTS -Dcom.sun.management.jmxremote.authenticate=false"
JAVA_OPTS="$JAVA_OPTS -Dcom.sun.management.jmxremote.ssl=false"
JAVA_OPTS="$JAVA_OPTS -Djboss.platform.mbeanserver"
JAVA_OPTS="$JAVA_OPTS
-Djavax.management.builder.initial=org.jboss.system.server.jmx.MBeanServerBuilderImpl"
```

JBoss Application Server 5.x

```
JAVA_OPTS="$JAVA_OPTS -Djboss.platform.mbeanserver"
```

b. Restart the JBoss Application Servers.

- Ensure that you start the JBoss Application Server or the JBoss Partition by running the following command from the `bin` directory:

```
./run.sh -c <deployment_profile> -b <binding_address>  
[-Djboss.partition.name=<partition_name>]
```

Here, `<deployment_profile>` indicates whether you are starting a standalone JBoss Application Server or a JBoss Partition. The `<binding_address>` is the host name or the IP address running the JBoss Application Server. The `<partition_name>` is the partition name from where the JBoss Application Servers must start. By default, they start as part of DefaultPartition.

For example,

```
./run.sh -c node1 -Djboss.service.binding.set=ports-01 -b example.oracle.com
```

Note:

- To start a standalone JBoss Application Server, set the `<deployment_profile>` to `default`.

For example,

```
./run.sh -c default -b <binding address>
```

- To start a JBoss Partition, enable the JBoss clustering service, set the `<deployment_profile>` to `all`.

For example,

```
./run.sh -c all -b <binding address>
```

- To start multiple server instances on the same host, complete the following:

(a) Create multiple deployment profiles as per your requirements.

(b) Use a different port-set to start the individual servers. Note that `ports-01`, `ports-02`, `ports-03`, and `ports-04` are predefined port-sets.

For example,

```
-Djboss.service.binding.set=ports-01
```

35.4 Discovering JBoss Application Servers and JBoss Partitions

Note: Discovery is not supported if the JBoss Application Server is monitored with Oracle Management Agent 12c Release 2 (12.1.0.2) or lower.

To discover JBoss Application Servers and JBoss Partitions, follow these steps:

1. From the **Targets** menu, select **Middleware**.

2. On the Middleware page, from the **Add** menu, select **JBoss Application Server**.
3. Click **Go**.
Enterprise Manager Cloud Control displays the JBoss Discovery Wizard.
4. On the Host page, enter details about the host on which the JBoss Application Server is running.

Figure 35–1 JBoss Application Server Host Page

JBoss Application Server Discovery

Host Select Server Review

JBoss Application Server Discovery: Host Back Step 1 of 3 Next Cancel

In order to add a JBoss Application Server to Enterprise Manager, specify details of the host on which the JBoss Application Server is running.

* JBoss Application Server Host

* JMX Connector Port

* Agent Provide the JBoss Server Version

* Version

Username

Password

Element	Description
JBoss Application Server Host	Enter the name of the host where the JBoss Application Server is running.
JMX Connector Port	Enter the JMX connector port number.
Agent	Select the Management Agent that is installed on the host where the JBoss Application Server is running.
Version	Select the version of the JBoss Application Server you want to discover.
Username	Enter the JMX user name for authentication.
Password	Enter the JMX password for authentication.

5. On the Select Server page, view a list of JBoss Partitions and standalone JBoss Application Servers discovered on the host you specified, and to select the ones you want to add and monitor in Enterprise Manager Cloud Control.

Figure 35–2 JBoss Application Server Select Server Page

JBoss Application Server Discovery

Host Select Server Review

JBoss Application Server Discovery: Select Server Back Step 2 of 3 Next Cancel

Select the servers to be monitored

Name	Type	Port	Username	Password	Version
<input checked="" type="checkbox"/> slc00amk	JBoss Partition				
<input checked="" type="checkbox"/> slc00amk.us.oracle.com_slc00amk_1	JBoss Application Server	1190			5.1.0
<input checked="" type="checkbox"/> slc00amk.us.oracle.com_slc00amk_1	JBoss Application Server	1190			5.1.0
<input checked="" type="checkbox"/> slc00amk.us.oracle.com_slc00amk_1	JBoss Application Server	1190			5.1.0

Column	Description
Name	Name of the JBoss Partitions and standalone JBoss Application Servers discovered on the specified host.
Select	Select the JBoss Partition or standalone JBoss Application Server that you want to add and monitor in Enterprise Manager Cloud Control. Note: When you select a JBoss Application Server, the associated JBoss Partition also gets selected for monitoring.
Type	Type of JBoss target discovered on the specified host. They can be either JBoss Partition or JBoss Application Server.
Port	Enter the JMX connector port of the JBoss Application Server. By default, the port number appears for a JBoss Application Server target if you entered it in the previous page of the wizard. Otherwise, the field is blank.
Username	Enter the JMX user name for authentication.
Password	Enter the JMX password for authentication.
Version	Version of the JBoss Application Server discovered on the specified host.

Note: Enterprise Manager Cloud Control does not validate the values you provide for User Name and Password. So if you provide incorrect values, Enterprise Manager will add the JBoss target without displaying any errors now, but will eventually show the status as *Down*.

- On the Review page, review the details you have provided for discovering and adding JBoss targets to Enterprise Manager Cloud Control. Click **Submit** to discover the JBoss targets.

Note: When you discover a JBoss Application Server that is part of a JBoss Partition, the JBoss Partition and all other JBoss Application Servers part of that partition get automatically discovered and added to Enterprise Manager Cloud Control. At any point after discovering a JBoss Partition, if new JBoss Application Servers are added to the partition, then you can refresh the JBoss Partition as described in [Section 35.7.3](#).

35.5 Migrating to JMX-Based Monitoring of JBoss Application Servers

JBoss Application Server monitoring with Enterprise Manager Cloud Control 12c Release 3 (12.1.0.3) or lower with Oracle FMW Plug-in 12.1.0.5 or lower was essentially based on Java EE Management EJB (MEJB), a JSR-77 standard way of exposing enterprise management functionality. However, starting from Enterprise Manager Cloud Control 12c Release 4 (12.1.0.4), the JBoss Application Server monitoring is based on Java Management Extensions (JMX) technology.

With this change in technology, Enterprise Manager Cloud Control now eliminates the need for deploying the MEJB JAR file (ejb-management.jar) on hosts where JBoss Application Servers are running, which was earlier a prerequisite for discovery. In

addition, Enterprise Manager Cloud Control now offers new, additional, enhanced metrics.

Oracle strongly recommends that you move to JMX-based monitoring so that you benefit from the enhancements the new approach offers. Otherwise, the monitoring of JBoss Application Servers will continue to be done using MEJB, the newly introduced metrics will not appear, and the prerequisite on deploying the MEJB JAR file as a prerequisite for discovery will continue to exist.

35.5.1 For JBoss Application Servers Already Discovered and Monitored in Enterprise Manager

For JBoss Application Servers already discovered and monitored in Enterprise Manager Cloud Control 12c Release 3 (12.1.0.3) or lower with Oracle FMW Plug-in 12.1.0.5 or lower, do the following:

1. Upgrade both Oracle Management Service and Oracle Management Agent to 12c Release 4 (12.1.0.4) or higher.
2. Upgrade the Oracle FMW Plug-in to 12.1.0.6 or higher.
3. Migrate to JMX-based monitoring.
 - a. From the **Targets** menu, select **Middleware**.
 - b. On the Middleware page, do one of the following:

For Standalone JBoss Application Servers

- (i) On the Middleware page, click the desired JBoss Application Server.
- (ii) On the JBoss Application Server home page, from the **JBoss Server** menu, select **Target Setup**, then select **Migrate to Use JMX**.
- (iii) On the Migrate to Use JMX page, enter the JMX port to be used for the selected JBoss Application Server.
- (iv) Click **Submit**.

For JBoss Application Servers that are grouped in a JBoss Partition

- (i) On the Middleware page, click the JBoss Partition.
- (ii) On the JBoss Partition page, from the **JBoss Partition** menu, select **Target Setup**, and then select **Migrate to Use JMX**.
- (iii) On the Migrate to Use JMX page, enter the JMX ports to be used for all the JBoss Application Servers that are part of the partition.
- (iv) Click **Submit**.

Note: If your Enterprise Manager Cloud Control is currently at 12c Release 1 (12.1.0.1), 12c Release 2 (12.1.0.2), or 12c Release 3 (12.1.0.3), and if you are unwilling to upgrade your OMS and Management Agent to 12c Release 4 (12.1.0.4) or higher, then in the current release, do the following for each of the discovered JBoss Application Servers so that they show the accurate status in their Home pages.

1. On the JBoss Application Server Home page, from the **JBoss Server** menu, select **Target Setup**, then **Monitoring Configuration**.
 2. Enter the library path you provided while discovering the JBoss Application Server, and click **OK**.
 3. Restart the Management Agents.
-

35.5.2 For New JBoss Application Servers to Be Discovered in Enterprise Manager

For new JBoss Application Servers to be discovered and monitored in Enterprise Manager Cloud Control 12c Release 4 (12.1.0.4), do the following:

1. Upgrade both Oracle Management Service and Oracle Management Agent to 12c Release 4 (12.1.0.4) or higher.
2. Upgrade the Oracle FMW Plug-in to 12.1.0.6 or higher.
3. Deploy a Management Agent on the host where the JBoss Application Server to be discovered is running. For instructions, see *Installing a Fresh Oracle Management Agent*.
4. Add the JBoss Application Server to Enterprise Manager Cloud Control. For instructions, see *Adding JBoss Application Server*.

35.6 Monitoring JBoss Application Servers

This section covers the following:

- [Monitoring JBoss Application Servers](#)
- [Administering JBoss Application Servers](#)
- [Monitoring the Applications Deployed to JBoss Application Servers](#)
- [Monitoring the Performance of JBoss Application Servers](#)
- [Monitoring the Servlets and JSPs Running on JBoss Application Servers](#)
- [Viewing JBoss Application Server Metrics](#)
- [Analyzing Problems Using Metric Correlation](#)

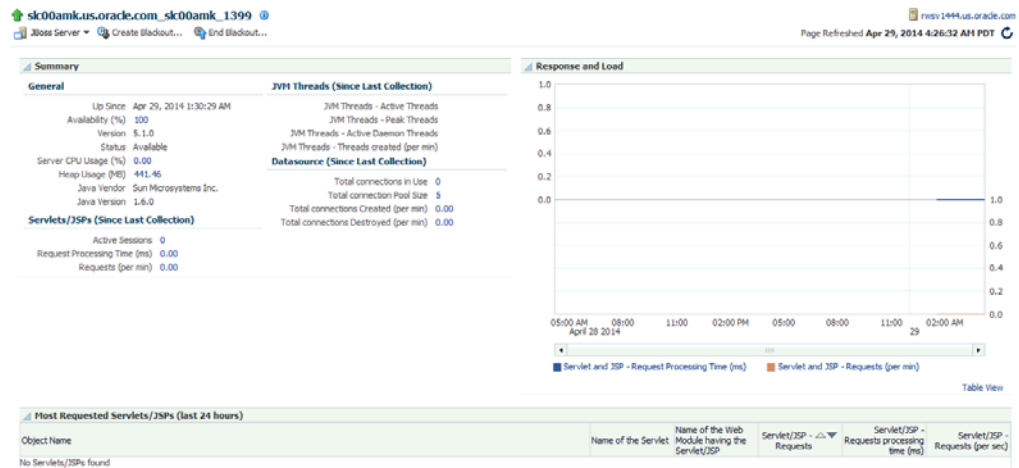
Note: To view a visual demonstration on how to monitor and manage JBoss Application Server targets, access the following URL and click **Begin Video**. The monitoring and management described in this visual demonstration is based on Enterprise Manager Cloud Control 12c Release 3 (12.1.0.3).

http://apex.oracle.com/pls/apex/f?p=44785:24:0::::P24_CONTENT_ID,P24_PREV_PAGE:8530,1

35.6.1 Monitoring JBoss Application Servers

To monitor JBoss Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **JBoss Application Servers**.
3. On the JBoss Application Server Home page, you can view a summary of the most critical information pertaining to JBoss Application Server. You can view general information about the server, information about the Servlets and JVM threads running on the server, and performance summary in terms of load and response time.



The JBoss Partition Home page has the following sections:

- General Section
- Servlet Section
- JVM Threads
- Datasource
- Response and Load Section
- Most Requested Servlets (last 24 hours)

35.6.1.1 General Section

Element	Description
Up/Down/Pending Since	Date and time when the status was last determined.
Availability (%)	Indicates whether the JBoss Application Server is available and the availability percentage over the last 24 hours. To drill down to the Status History (Availability) page, click the link. The Status History page displays the availability of the JBoss Application Server along with the availability history of the constituents that are used to compute its availability.
Version	Version of the JBoss Application Server.
Status	Current status of the JBoss Application Server. The status can be down even if incorrect JMX credentials were provided while discovering the JBoss target.
Server CPU Usage (%)	Percentage of CPU time used by the JBoss Application Server.
Heap Usage (MB)	Amount of heap space (in MB) used by the JBoss Application Server over a given interval.
Java Vendor	Vendor of the Java Virtual Machine that this JBoss Application Server runs.
Java Version	Version of the Java Virtual Machine that this JBoss Application Server runs.

35.6.1.2 Servlet Section

Element	Description
Active Sessions	Number of active servlet sessions.
Request Processing Time (ms)	Average time taken (in milliseconds) to service a request in the last 24 hours.
Requests (per min)	Number of requests serviced per minute in the last 24 hours.

35.6.1.3 JVM Threads

Element	Description
JVM Threads - Active Threads	Number of active JVM threads, including both daemon and non-daemon threads.
JVM Threads - Peak Threads	Number of peak active JVM threads since the Java Virtual Machine started or peak was reset.
JVM Threads - Active Daemon Threads	Number of active daemon JVM threads.
JVM Threads - Threads Created (per min)	Number of JVM threads created per minute.

35.6.1.4 Datasource

Element	Description
Total connections in Use	Number of active database connections in this instance of the data source since the data source was instantiated.
Total connection Pool Size	Total size of the connection pool.
Total connections Created (per min)	Number of connections created per minute for this data source.
Total connections Destroyed (per min)	Number of connections closed per minute for this data source.

35.6.1.5 Response and Load Section

Provides a graphical representation of the server's performance, measuring request-processing time for a given interval. To switch to a tabular format, click **Table View**. To drill down and view more detailed metric-related information and to diagnose issues by looking at other related infrastructure metrics, click the metric names in the legend and select an appropriate option in the Additional Information message.

35.6.1.6 Most Requested Servlets (last 24 hours)

Provides details of the most requested servlets in the last 24 hours.

35.6.2 Administering JBoss Application Servers

To administer JBoss Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.

2. On the Middleware page, click the desired JBoss Application Server.
3. On the JBoss Application Server Home page, you can view high-level information pertaining to the selected JBoss Application Server.

To perform administrative tasks on the JBoss Application Server, from the JBoss Server menu, select any of the following according to your needs:

- **Monitoring**, to monitor the performance of the target, view metric details, view status information, view incidents and alerts raised so far for the target, and view blackouts created for the target.
- **Diagnostics**, to analyze and diagnose performance issues.
- **Control**, to create or end blackouts.
- **Job Activity**, to view details of the jobs created for the target.
- **Information Publisher Reports**, to view reports.
- **Configuration**, to search, view, and compare configuration details.
- **Compliance**, to view and create compliance standards.
- **Target Setup**, to view monitoring configuration details and target properties, to remove the target or add it to a group, to migrate and use JMX.
- **Target Sitemap**, to view the overall topology of the target.
- **Target Information**, to view general information about the target.

35.6.3 Monitoring the Applications Deployed to JBoss Application Servers

To monitor the applications deployed to JBoss Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the JBoss Application Server where the Servlets and JSPs are deployed.
3. On the JBoss Application Server Home page, from the **JBoss Server** menu, select **Monitoring**, then select **Performance Summary**.
4. On the Performance Summary page, scroll down to the **Applications** section.

35.6.4 Monitoring the Performance of JBoss Application Servers

Enterprise Manager Cloud Control helps you monitor the overall performance of JBoss Application Servers. You can view the graphs that depict their memory usage and heap usage, and see details about the servlets and JSPs. This helps you gauge the performance and perform a root cause analysis to drill down to the problem areas and fix them before they affect the end users.

To monitor the performance of a JBoss Application Server:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the JBoss Application Server whose performance you want to monitor.
3. On the JBoss Application Server Home page, from the **JBoss Server** menu, select **Monitoring**, then select **Performance Summary**.
4. On the Performance Summary page, you can do the following:

- View a set of performance charts, monitor the performance over a given interval, and diagnose and correct problems.
- Customize the set of performance charts that appear on the page. To do so, click **Show Metric Palette**, and select the charts you want to add to the page.
- Show or hide the Metrics Palette. To do so, click **Show Metric Palette** or **Hide Metric Palette**, respectively.
- Reorder the performance charts. To do so, from the **View** menu, select **Reorder Charts**.
- Customize the performance charts to show or hide availability and threshold details, and grid lines. To do so, from the **View** menu, select **Availability**, **Thresholds**, or **Grid Lines**, respectively.
- Draw a comparison with another IBM WebSphere Application Server's performance, or with the previous day's performance. To do so, from the **Compare** menu, select **With Another IBM WebSphere Application Server** or **Today with Yesterday**, respectively.
- Remove comparison. To do so, from the **Compare** menu, select **Remove Comparison**.
- Create or delete baselines. To do so, from the **Compare** menu, select **Create Baseline** or **Delete Baseline**, respectively.
- Delete metric performance charts either by clicking the close button on the chart itself, or by deselecting the metric name in the Metric Palette.
- Change time frames using the slider, or set a default value.
- Create new metric performance charts by selecting the preferred metrics from the Metric Palette. The charts are automatically created once the metrics are selected.
- Drag and drop the metrics from a particular metric group to the same chart.

35.6.5 Monitoring the Servlets and JSPs Running on JBoss Application Servers

Enterprise Manager Cloud Control helps you monitor the Servlets and JSPs that are running on JBoss Application Servers. You can not only view high-level information about them but also a performance summary that reflects their response time and load. You can also drill down and diagnose issues by viewing related infrastructure metrics, alert history, and so on.

To monitor the Servlets and JSPs running on JBoss Application Servers, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the JBoss Application Server where the Servlets and JSPs are deployed.
3. On the JBoss Application Server Home page, do these:
 - a. To view high-level information about the Servlets, see the **Servlets** region. To understand the metric details displayed in this region, click **Help**.
 - b. To monitor the performance of Servlets and JSPs, see the response and load graphic.
 - c. To drill down and diagnose issues, click a metric name in the legend. From the pop-up message, click **Problem Analysis**.

- d. To view metric statistics, thresholds, and metric value history, click a metric name in the legend. From the pop-up message, click **Metric Details**.

35.6.6 Viewing JBoss Application Server Metrics

To view all JBoss Application Server metrics, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **JBoss Application Server**.
3. On the JBoss Application Server Home page, from the **JBoss Server** menu, select **Monitoring**, then select **All Metrics**.

35.6.7 Analyzing Problems Using Metric Correlation

For information on spikes in the performance of metrics, you can use the Problem Analysis page to compare results between the source metric and related metrics. Currently, problem analysis is only available for the following metrics.

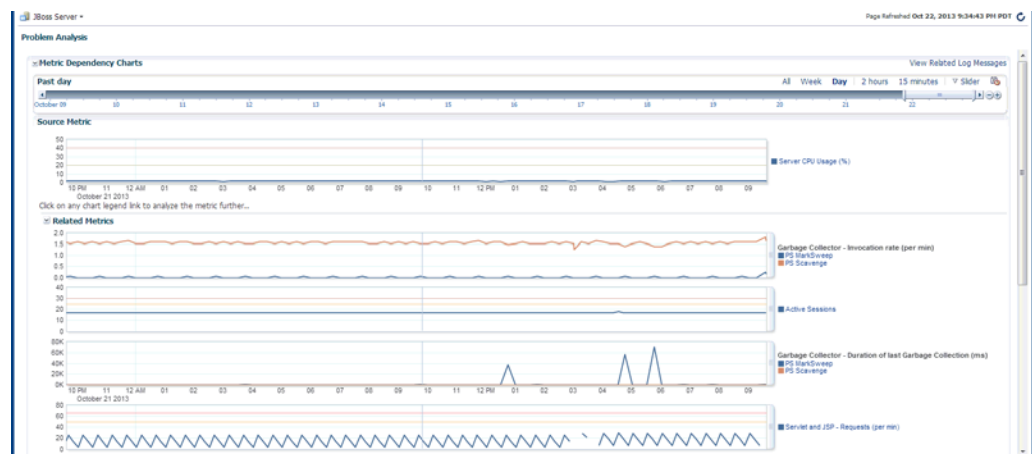
- Server CPU Usage
- Servlet and JSP - Request Processing Time

To access the Problem Analysis page, follow these steps.

1. From the **Performance Summary** page, click the name of the metric next to the performance chart.
2. From the window that pops up, select **Problem Analysis**.



3. On the Problem Analysis page, you can compare the results of the Source Metric and the Related Metrics.



35.7 Monitoring JBoss Partitions

This section covers the following:

- [Monitoring JBoss Partitions](#)
- [Administering JBoss Partitions](#)
- [Viewing JBoss Partition Members](#)
- [Refreshing JBoss Partition](#)

35.7.1 Monitoring JBoss Partitions

To monitor JBoss Partitions, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, click the desired **JBoss Partition**.
3. On the JBoss Partition Home page, you can do the following:
 - View a summary of the most critical information pertaining to the JBoss Partition.
 - Monitor the status and availability of all the members within the JBoss Partition.
 - View the refresh status on the partition membership.

Using the JBoss Partition Home page, you can not only monitor the collective status of the partition but also the individual status of each of the members. You can also refresh the partition to update the membership and reflect the current deployment state. You can also view the member application servers' resource usage, availability, performance, configuration information, and reports with or without historical data.

The JBoss Partition Home page has the following sections:

- [General Section](#)
- [Refresh Partition Section](#)
- [Servers Section](#)

35.7.1.1 General Section

The General section provides general information about JBoss Partition.

Element	Description
Up/Down/Pending Since	Date and time when the status was last determined.
Availability (%)	Availability rate for the last 24 hours, considering the status of all the members of the JBoss Partition. For example, if there are four JBoss Application Servers within a partition, and if only three of them are up, then the pie chart shows 75% up and 25% down status.
Version	Version of the JBoss Application Servers that are part of the JBoss Partition.
Agent	Management Agent used for discovering the JBoss Application Servers that are part of the JBoss Partition. To drill down to the Management Agent home page, click the link.

35.7.1.2 Refresh Partition Section

The Refresh Partition section displays the date when the JBoss Partition was last refreshed. To refresh the membership of the JBoss Partition and to reflect the current deployment state, click **Update the Partition**.

35.7.1.3 Servers Section

The Servers section provides a real-time view of the status and availability of all the members within the JBoss Partition. For example, if there are four JBoss Application Servers within a JBoss Partition, and if three of these are up, then the pie chart shows 75% up and 25% down status. Accordingly, the legend shows 3 against the Up status to indicate the JBoss Application Servers that are up, and 1 against the Down status to indicate the server that is down.

The table provides high-level details of the JBoss Application Servers that are part of the JBoss Partition. To drill down and view information about a JBoss Application Server, click the JBoss Application Server name. To view more information about the status, click the status icon.

35.7.2 Administering JBoss Partitions

To administer JBoss Partitions, follow these steps:

1. From the **Targets** menu, click **Middleware**.
2. On the Middleware page, click the desired JBoss Partition target.
3. On the JBoss Partition Home page, you can view high-level information pertaining to the selected JBoss Partition.

To perform administrative tasks on the JBoss Partition, from the **JBoss Partion** menu, select any of the following according to your needs:

- **Monitoring**, to monitor the performance of the target, view metric details, view status information, view incidents and alerts raised so far for the target, and view blackouts created for the target.
- **Diagnostics**, to analyze and diagnose performance issues.
- **Control**, to create or end blackouts.
- **Job Activity**, to view details of the jobs created for the target.
- **Information Publisher Reports**, to view reports.
- **Members**, to view details of the JBoss Application Servers that are part of the JBoss Partition.
- **Configuration**, to search, view, and compare configuration details.
- **Compliance**, to view and create compliance standards.
- **Target Setup**, to view monitoring configuration details and target properties, to remove the target or add it to a group, to migrate and use JMX.
- **Target Sitemap**, to view the overall topology of the target.
- **Target Information**, to view general information about the target.

35.7.3 Refreshing JBoss Partition

Enterprise Manager Cloud Control allows you to refresh the membership of a JBoss Partition so that it can reflect the current deployment state. This helps you add additional JBoss Application Servers to the existing JBoss Partition.

To refresh a JBoss Partition, follow these steps:

1. From the **Targets** menu, click **Middleware**.
2. On the Middleware page, click the desired JBoss Partition target.
3. On the JBoss Partition Home page, in the Refresh Partition section, click **Refresh Partition**.

Enterprise Manager Cloud Control takes to the Refresh Partition Host Credentials page. For information on this page, click Help on the page. On the Refresh Partition Agent Host Credentials page, provide the credentials of the host where Management Agent, which was used for discovering the existing JBoss Application Server members, is running. On the Refresh Partition Add Members page, select the standalone JBoss Application Servers that should be added to the JBoss Partition.

35.7.4 Viewing JBoss Partition Members

Enterprise Manager Cloud Control helps you view the members of a JBoss Partition. You can see what type of members form the partition, monitor their status, and perform various administrative operations

To view a list of members, follow these steps:

1. From the **Targets** menu, click **Middleware**.
2. On the Middleware page, click the desired JBoss Partition target.
3. On the JBoss Partition Home page, from the **JBoss Partition** menu, select **Members**, then select **Show All** to view the following details of the members.

Column	Description
Name	Name of the JBoss Application Server that is part of the JBoss Partition. Click the name to access the home page of that JBoss Application Server.
Type	Type of the member.
Status	Current status of the member. Click the status icon to see a consolidated availability summary. You can see the current and past availability status within the last 24 hours, 7 days, or month (31 days).
Incidents	Number of critical, warning, and error alerts generated for the past 24 hours. Click the alert links to drill down and see more detailed information.

To search for a particular member, use the **Search** menu.

By default, all members of the JBoss Partition are listed in the table. To refresh the table and view only a particular type of members, select either **Direct Members** or **Indirect Members** from the **View** section.

To capture the membership configuration details in a spreadsheet, click **Export**.

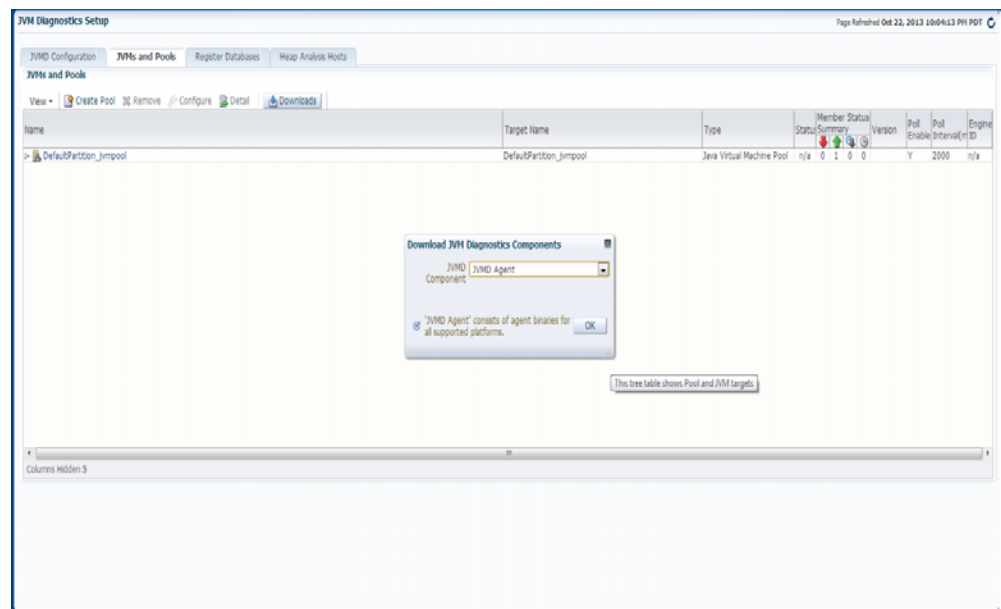
35.8 Deploying JVM Diagnostics on JBoss Application Server to Diagnose Issues

Oracle Enterprise Manager Cloud Control 12c's JVM Diagnostics enables administrators to diagnose performance problems in a Java application in the production environment. By eliminating the need to reproduce problems, it reduces the time required to resolve these problems. This improves application availability and performance. The correlation between the JBoss target and the JVMD/JVM target enables administrators to navigate to the JVM in context of a JBoss Application Server.

To deploy JBoss on JVMD, complete the following:

1. From the **Setup** menu, select **Middleware Management**, then select **Application Performance Management**.
2. On the Application Performance Management page, select **JVM Diagnostic Engines**, and then click **Configure**.
3. From the JVMs and Pools tab, click **Downloads**.

Figure 35–3 Download JVM Diagnostics Components



4. From the **Download JVM Diagnostics Components** window, select **JVMD Agent**, then click **OK**.
5. From the JVM Diagnostics Agent web.xml Parameters window, select the appropriate JVMD manager from the Available Managers list.

Figure 35–4 JVM Diagnostics Agent web.xml Parameters

6. Uncheck the WebLogic Server checkbox, enter a pool name, then click **Download**.

This will download the jamagent.war file. You need to copy this file to the target machine (the machine the JBoss is running).

7. Copy the script contained at the following location to the same location on the target machine where the jamagent.war. file was copied:

<https://stbeehive.oracle.com/content/dam/st/NonOracle%20MW/Public%20Documents/makeJAMagents.sh>

8. Run the script passing the names of the JBoss instances (or whatever names you give to the JVM of each JBoss server). The name has to be unique for each server.

This script will create a separate jamagent WAR for each name you pass to this script.

9. Deploy each of these created WARs on the respective JBoss server. Typically you can use the admin console or copy the WAR file to the deploy folder.

If the hot deployment is not enabled, you may have to restart the JBoss server. Once the WAR is deployed successfully, you will see the respective JVM target on the Middleware page.

35.9 Troubleshooting JBoss Application Server Discovery and Monitoring Issues

This section provides troubleshooting tips for the issues encountered while discovering or monitoring JBoss Application Servers.

- [Troubleshooting Monitoring Issues](#)
- [Troubleshooting Discovery Issues](#)
- [Additional Useful Resources](#)

35.9.1 Troubleshooting Monitoring Issues

- If the target status is DOWN after discovery, check the Monitoring properties page for the JBoss Application Server and verify the following:
 - Local discovery: only JBoss home is present
 - Remote discovery: only Library path is present
- If the target status is PENDING (due to a metric collection error) after discovery, ensure that no other application server is being monitored using the same Management Agent (such as Weblogic).

The following are the various log locations:

- JBoss server logs: \$JBoss_HOME/server/<config_mode>/log
- OMS logs: emoms.trc (under \$OMS_HOME)
- Agent logs: \$AGENT_STATE_DIR/sysman/log

35.9.2 Troubleshooting Discovery Issues

In the case of JBoss discovery failure, provide the library path along with the install home and try again.

For discovery related issues, manually run the discovery script to check the output, which should look similar to the following:

```
java -Doracle.home=<AGENT_PLUGIN_LOCATION> \
-cp \
<AGENT_PLUGIN_LOCATION>/lib/xmlparserv2.jar:\
<AGENT_PLUGIN_LOCATION>/jlib/emConfigInstall.jar:\
<AGENT_PLUGIN_LOCATION>/sysman/jlib/log4j-core.jar:\
<AGENT_PLUGIN_LOCATION>/modules/oracle.http_client_11.1.1.jar:\
<DISCOVERY_PLUGIN_LOCATION>/archives/em-as-thirdparty-discovery.jar \
oracle.sysman.emas.thirdparty.discovery.jboss.JBossDiscovery \
<JMX_PORT> <SERVER_HOST> " "
```

35.9.3 Additional Useful Resources

Useful troubleshooting information can also be found by checking the following:

- Monitoring Configuration page
- Targets.xml on the agent
- OMS and Agent logs
- Agent metric browser
- JBoss JMX Console
- JConsole
- JBoss server logs

Discovering and Monitoring Apache HTTP Server

Enterprise Manager Cloud Control enables you to discover Apache HTTP Servers in your environment, and add them for central monitoring and management. This chapter describes how to discover and monitor these Apache HTTP Server targets.

In particular, this chapter covers the following topics:

- Introduction to HTTP Servers
- Supported Versions of Apache HTTP Server for Discovery and Monitoring
- Prerequisites for Discovering and Monitoring Apache HTTP Server
- Discovering Apache HTTP Servers
- Monitoring Apache HTTP Servers
- Configuration Management for Apache HTTP Servers
- Troubleshooting Apache HTTP Server Issues

36.1 Introduction to HTTP Servers

Using Enterprise Manager Cloud Control, you can do the following with Apache HTTP Server targets:


- Discover the Apache HTTP Server targets for real-time and historical availability monitoring.
- Create or end blackouts to suspend or resume the collection of metric data, respectively.
- View a list of metrics, their collection interval, and the last upload for each metric.
- Create monitoring templates that can be used as a source for all the future installations, so that they follow a standard, consistent configuration.
- Generate availability and event reports.

36.2 Supported Versions of Apache HTTP Server for Discovery and Monitoring

To search for the Apache HTTP Server versions that are supported for discovery and monitoring in Enterprise Manager Cloud Control, follow these steps:

1. Log into <https://support.oracle.com/>

2. On the My Oracle Support home page, select the **Certifications** tab.
3. On the Certifications page, enter the following search criteria in the Certification Search section.
 - Enter the product name **Enterprise Manager Base Platform - OMS** in the Product field.
 - Select the release number **12.1.0.4.0** from the Release list.
4. Click **Search**.
5. In the Certification Results section, expand the **Middleware** menu to view the certified Apache HTTP Server versions.

Certification Results	
Displaying Enterprise Manager Base Platform - OMS 12.1.0.4.0 Certifications.	
View 	
Certified With	Number of Releases / Versions
> Operating Systems (9 Items)	
> Agents (1 Item)	
> Application Servers (10 Items)	
> Databases (9 Items)	
> Desktop Applications, Browsers and Clients (5 Items)	
> Directory/LDAP Services (5 Items)	
> Enterprise Applications (11 Items)	
> Management and Development Tools (60 Items)	
▼ Middleware (28 Items)	
Apache HTTP Server (Managed Target)	2 Releases (2.4.*, 2.2.*)
Exalogic Elastic Cloud Software (Managed Target)	5 Releases (2.0.4.0.0, 2.0.1.0.0, 2.0.0.0.0, 1.0.0.2.0, 1.0.0.0.0)
IBM WebSphere MQ (Managed Target)	2 Releases (7.0.*, 6.0.*)
IBM WebSphere Portal Server (Managed Target)	3 Releases (7.0.0.0, 6.1.0.2+, 6.0.1+)
Microsoft .NET Framework (Managed Target)	3 Releases (3.0.*, 2.0.*, 1.1.*)
Oracle Access Manager (Managed Target)	7 Releases (11.1.2.2.0, 11.1.2.1.0, 11.1.2.0.0, 11.1.1.5.0, 11.1.1.3.0, 10.1.4.3.0, 10.1.4.2.0)
Oracle Adaptive Access Manager (Managed Target)	4 Releases (11.1.2.1.0, 11.1.2.0.0, 11.1.1.5.0, 11.1.1.3.0)
Oracle BPEL Process Manager (Managed Target)	4 Releases (10.1.3.5.0, 10.1.3.4.0, 10.1.3.3.0, 10.1.3.1.0)
Oracle Business Intelligence Enterprise Edition (Managed Target)	5 Releases (11.1.1.7.0, 11.1.1.6.0, 11.1.1.5.0, 10.1.3.4.1, 10.1.3.4.0)
Oracle Business Intelligence Publisher (Infrastructure)	1 Release (11.1.1.7.0)
Oracle Business Process Management (Managed Target)	1 Release (11.1.1.7.0)
Oracle Coherence (Managed Target)	7 Releases (12.1.2.0.0, 3.7.1.0.0, 3.7.0.0.0, 3.6.1.0.0, 3.6.0.0.0, 3.5.0.0.0, 3.4.0.0.0)
Oracle Data Integrator Agent (Managed Target)	3 Releases (12.1.3.0.0, 12.1.2.0.0, 11.1.1.7.0)
Oracle Enterprise Content Management (Managed Target)	5 Releases (11.1.1.6.0, 11.1.1.5.0, 11.1.1.4.0, 11.1.1.3.0, 11.1.1.2.0)
Oracle Forms (Managed Target)	8 Releases (11.1.2.2.0, 11.1.2.1.0, 11.1.1.7.0, 11.1.1.6.0, 11.1.1.4.0, 11.1.1.3.0, 11.1.1.2.0, 11.1.1.1.0)
Oracle Fusion Middleware (Infrastructure)	1 Release (11.1.1.6.0)
Oracle Fusion Middleware 12c Infrastructure (Managed Target)	1 Release (12.1.2.0.0)
Oracle HTTP Server (Managed Target)	9 Releases (12.1.2.0.0, 11.1.1.7.0, 11.1.1.6.0, 11.1.1.5.0, 11.1.1.4.0, 11.1.1.3.0, 11.1.1.2.0, 11.1.1.1.0, 10.1.2.0.0)

36.3 Prerequisites for Discovering and Monitoring Apache HTTP Server

Meet the following prerequisites for discovering Apache HTTP Servers:

- The Management Agent must be installed and running on the same host where the Apache HTTP Server is being configured. Remote agent is not supported.
- Ensure that the same user/role is used to install the Management Agent and the Apache HTTP Server.
- Ensure that you download and install the 12.1.0.6 Fusion Middleware Plug-in for monitoring the Apache HTTP Server. You do not need any other plug-in to import or deploy this target.

36.4 Discovering Apache HTTP Servers

To discover Apache HTTP Server Servers, follow these steps:

1. In Cloud Control, from **Setup** menu, select **Add Target**, then select **Add Targets Manually**.
2. On the Add Targets Manually page, select **Add Targets Declaratively by Specifying Target Monitoring Properties**, and then click **Add Host**.
3. From the Target type menu, select **Apache HTTP Server**. To select the Management Agent, click on the search icon. From the Target Selector dialog box, select the target name, and then click **Select**.

4. Click **Add Manually** to add the Apache HTTP Server target to the host selected.
5. On the Add: Apache HTTP Server page, provide the target name, the directory location where the `httpd.conf` file has been downloaded, and the directory location where the Apache binaries (like the `bin` folder) are stored. Click **OK**.

Add: Apache HTTP Server

Add a target to be monitored by Enterprise Manager by specifying target monitoring properties.

OK Cancel

Target

* Target Name

Target Type Apache HTTP Server

Agent <https://slc03qym.us.oracle.com:1838/emd/main/>

Properties

* Absolute path of httpd.conf

* Apache Binaries Home

> Global Properties

36.5 Monitoring Apache HTTP Servers

After adding the Apache HTTP Server target, it becomes automatically available for monitoring. For this target, only the response metrics and configuration metrics are collected or monitored.

After discovery, to access the Apache HTTP Server targets, from **Targets** menu, select **All targets**. From the Refine Search section on the left hand pane, expand **Middleware**. From the list, select **Apache HTTP Server**. Click on the target name to view the status of the target.

apache_2218

Apache HTTP Server

Page Refreshed Nov 14, 2014 10:07:08 AM UTC Refresh

monitor_apache.gif
Type: GIF File
Size: 35.3 KB
Dimension: 1232 x 431 pixels

General

Status Up Black Out

Availability (%) 100
(Last 24 Hours)

Apache Home /scratch/rkplish/apache2218/bin

Version 2.2.18 (Unix)

Host slc00bbh.us.oracle.com

Incidents

Severity	Message	Created At	Last Updated At	Escalation Level
No incidents found.				

Host Incidents

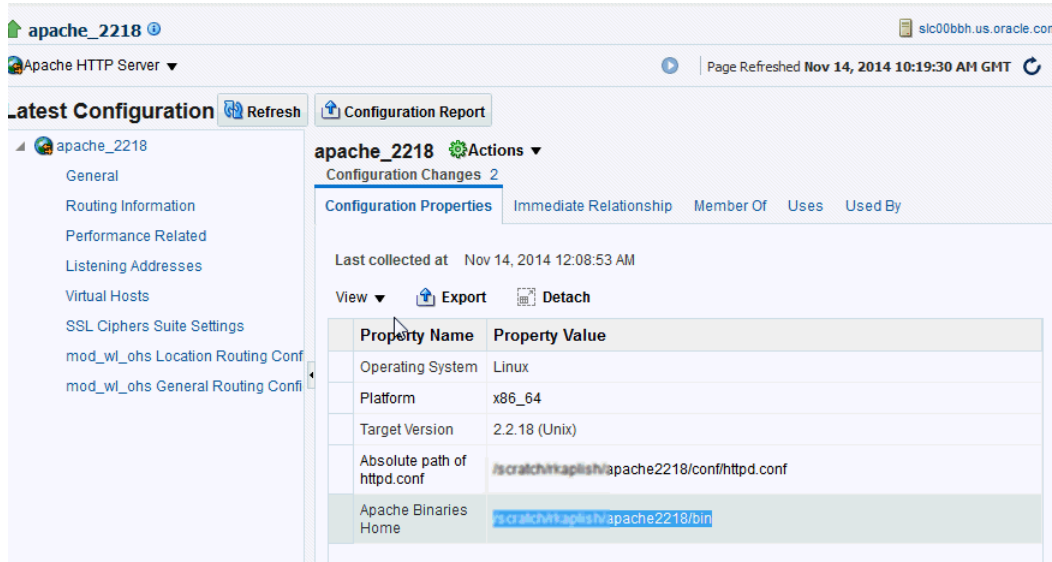
Severity	Message	Created At	Last Updated At	Escalation Level
No incidents found.				

On the Apache HTTP Server home page, you can view general information about the server, information about the status of the server, the availability, the absolute path to the Apache server binaries, and so on.

36.6 Configuration Management for Apache HTTP Servers

The configuration data for the Apache HTTP server is collected on a daily basis.

To view the configuration data, on the Apache HTTP Server home page, from **Apache HTTP Server** menu, select **Configuration**, and then click **Last Collected**.



The following configuration details are collected for Apache HTTP server:

- Generic information like server name, listen port, and so on.
- General Routing information for WebLogic/WebSphere requests.
- Apache Server listen host ports and protocol.
- Virtual host information which is used for routing the requests that come to Apache Server to particular host port.

36.7 Troubleshooting Apache HTTP Server Issues

Issue: Response and Configuration Metrics collection for Apache HTTP Server fails

Problem: If the process owner (Apache installation owner) is different from Management Agent user, then Apache HTTP Server target will be discovered, but the response and configuration metrics will not be collected.

Workaround: Ensure that the same user/role is used to install the Management Agent and the Apache HTTP Server.

Part XI

Managing Oracle Data Integrator

The chapter in this part describes how you can configure and monitor Oracle Data Integrator.

This part contains the following chapter:

- [Chapter 37, "Configuring and Monitoring Oracle Data Integrator"](#)

Configuring and Monitoring Oracle Data Integrator

Oracle Data Integrator (ODI) provides a fully unified solution for building, deploying, and managing complex data warehouses or as part of data-centric architectures in an SOA or business intelligence environment. In addition, it combines all the elements of data integration - data movement, data synchronization, data quality, data management, and data services - to ensure that information is timely, accurate, and consistent across complex systems.

An ODI domain contains the following ODI components that can be managed using Enterprise Manager Cloud Control.

- One Master and one or more Work repositories attached to it.
- One or several Run-Time Agents attached to the Master Repositories. These agents must be declared in the Master Repositories to appear in the domain. These agents may be Standalone Agents, Colocated Standalone Agents, or Java EE Agents.
- One or several Oracle Data Integrator Console applications. An Oracle Data Integrator Console application is used to browse Master and Work repositories.

Note: Starting with Oracle Fusion Middleware Plug-in (12.1.0.6), you can monitor the repositories that are configured even with Microsoft SQL Server and IBM DB2. However, as a prerequisite, make sure you first deploy the Microsoft SQL Server Plug-in and IBM DB2 Plug-in, respectively, and then discover those database instances as targets in Enterprise Manager Cloud Control.

This chapter describes how you can set up and manage ODI targets using Enterprise Manager Cloud Control:

- [Prerequisites for Monitoring Oracle Data Integrator](#)
- [Monitoring Oracle Data Integrator](#)
- [Administering Oracle Data Integrator](#)
- [Creating Alerts and Notifications](#)
- [Monitoring Run-Time Agents](#)
- [Configuring Oracle Data Integrator Console](#)
- [Configuring an Oracle Data Integrator Domain](#)

37.1 Prerequisites for Monitoring Oracle Data Integrator

Before you start managing ODI with Enterprise Manager, you must do the following:

- Deploy the Oracle Management Agent

Oracle Management Agents must be installed on the database hosting the ODI repositories. Optionally, an Oracle Management Agent can also be installed on a machine hosting an ODI Agent.

See Installing the Oracle Management Agent in the *Oracle Enterprise Manager Cloud Control Basic Installation Guide*

- Discover ODI Targets

ODI targets are discovered along with the WebLogic domain linked to them. Use the Fusion Middleware discovery to discover your WebLogic domain. This in turn discovers two types of ODI targets, mainly ODI Standalone Agent and ODI Java EE Agent.

For additional information about Fusion Middleware discovery, see *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

- Discover the Databases Hosting ODI Repositories

Each database instance needs to be discovered because more than one database could be hosting the ODI repositories.

See Performing Additional Configuration Tasks in the *Oracle® Enterprise Manager Cloud Control Advanced Installation and Configuration Guide*

All the operations are available out-of-box in Enterprise Manager.

37.2 Monitoring Oracle Data Integrator

This section describes the following:

- [Monitoring Oracle Data Integrator](#)
- [Monitoring ODI Agents](#)
- [Monitoring Repositories](#)
- [Monitoring Load Plan Executions and Sessions](#)

37.2.1 Monitoring Oracle Data Integrator

To monitor ODI, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the ODI Home page, click the **Dashboard** tab.

The Dashboard tab has the following regions:

37.2.1.1 Master Repositories Health

This region reports the following:

- Number of master repositories that are either up or down. Click the number for a list of the repositories.
- Number of master repositories with incidents. Click the number to find out which repositories have incidents.

Note: Starting with Oracle Fusion Middleware Plug-in (12.1.0.6), you can monitor the repositories that are configured even with Microsoft SQL Server and IBM DB2. However, as a prerequisite, make sure you first deploy the Microsoft SQL Server Plug-in and IBM DB2 Plug-in, respectively, and then discover those database instances as targets in Enterprise Manager Cloud Control.

The database information that is stored in the ODI does not use local host or IP address to identify the database. It only uses the host name of the database. Ensure that the host name in the ODI is consistent with the host name stored in EMCC. Also, check the JDBC data sources defined in WLS for the Master and Work repositories. They should match the information stored in the ODI.

The supported JDBC patterns are:

- jdbc:oracle:thin:@//adc2120612.us.example.com:19016/db8482.us.example.com
- jdbc:oracle:thin:@adc2120612.us.example.com:19016:db8482
- jdbc:weblogic:sqlserver://adc6140804.us.example.com:50457;databaseName=ODI_REPOSITORY
- jdbc:weblogic:db2://slc02pfl.us.example.com:5031/orc1993

To resolve issues reported in this section:

- If the ODI repositories are down, then act based on the statuses by either bringing up the databases, which are hosting the repositories, or troubleshooting why they are down and resolving the issues.
- If there are any repositories that are undiscovered, then discover the databases, which are hosting the repositories, in Enterprise Manager Cloud Control.
- If there are any repositories with alerts, then identify the root cause for those alerts and resolve the issues.

37.2.1.2 ODI Agents Health

This region reports the following:

- Number of Agents that are either up or down. Click the number for a list of the Agents.
- Number of Agents that are not discovered as targets in Enterprise Manager. Click the number for a list of the Agents that have not been discovered.
- Number of Agents with incidents. Click the number to find out which repositories have incidents.

To resolve issues reported in this section:

- If the Agents are down, then act based on the statuses by either bringing up the Agents, which are down, or troubleshooting why they are down and resolving the issues.
- If there are any Agents that are undiscovered, then either discover the Agents or refresh the Oracle WebLogic Domain that is linked to those Agents.
- If there are any Agents with alerts, then identify the root cause for those alerts and resolve the issues.

37.2.1.3 Work Repositories Health

This region reports the following:

- Number of work repositories that are either up or down. Click the number for a list of the repositories.
- Number of work repositories that have not been discovered in Enterprise Manager. Click the number of a list of the work repositories that have not been discovered.
- Number of work Repositories with incidents. Click the number to find out which repositories have incidents.

To resolve issues reported in this section:

- If the ODI repositories are down, then act based on the statuses by either bringing up the databases, which are hosting the repositories, or troubleshooting why they are down and resolving the issues.
- If there are any repositories that are undiscovered, then discover the repositories in Enterprise Manager Cloud Control.
- If there are any repositories with alerts, then identify the root cause for those alerts and resolve the issues.

37.2.1.4 Data Servers Health

This region reports the following:

- Number of data servers that are either up or down. Click the number for a list of the servers.
- Number of data servers that have not been discovered in Enterprise Manager. Click the number of a list of the data servers that have not been discovered.
- Number of data servers with incidents. Click the number to find out which data servers have incidents.

To resolve issues reported in these sections:

- If the data servers are down, then act based on the statuses by either bringing up the databases used by the data servers, or troubleshooting why they are down and resolving the issues.
- If there are any data servers that are undiscovered, then discover the databases, which are used by the data servers, in Enterprise Manager Cloud Control.
- If there are any data servers with alerts, then identify the root cause for those alerts and resolve the issues.

37.2.1.5 Sessions/Load Plan Executions

This region reports the following:

- Number of sessions in error across all discovered ODI environments.
- Number of sessions with error records across all discovered ODI environments.
- Number of load plan executions in error across all discovered ODI environments.
- Number of load plan executions with error records across all discovered ODI environments.

37.2.2 Monitoring ODI Agents

To monitor the ODI Agents, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the ODI Home page, click the **ODI Agents** tab.

The ODI Agents tab has the following regions:

37.2.2.1 Search Agents

Use this region to search for agents for all Java EE and Standalone agents.

The latest specified search criteria are always retained. Specify a new criteria and click **Search** to see the updated results. Or, click **Reset** to reset the search form (you must still click **Search** to see the updated results). Note that the search criteria are reset each time you log out or navigate away from all the tabbed pages.

Element	Description
Master Repository	Select the Master Repository.
Execution Agent	Select an Agent from the drop-down list. You can also select All to list all the Agents.
Agent Status	Select the status of the Agent: Up, Down, All.
Discovery Status	Select the status of the Agent: Discovered, Not Discovered, All.

37.2.2.2 ODI Agents

Use this region to view information about the ODI Agents declared in the Master Repository.

Element	Description
Name	Displays the name of the Agent. Select an Agent to display the corresponding Agent Home page.
Status	Displays the current status of the Agent: Up, Down.
Discovery Status	A blue tick indicates that the Agent is discovered as a target in Enterprise Manager. A clock indicates that the Agent is not discovered as a target in Enterprise Manager.
View Performance	Click the eye glass icon to view the performance data of the Agent. The metrics include: <ul style="list-style-type: none"> ■ Maximum number of allowed sessions ■ Maximum number of allowed threads ■ Count of active sessions ■ Count of active threads
Active Sessions	Displays the number of active sessions.
Master Repository	A check mark indicates that the Master Repository is discovered. A clock indicates that the Master Repository is not discovered.

Element	Description
Version	Displays the version and date of the Agent.
Response Time (ms)	Displays the repository database response time (in milliseconds).
User Defined Alerts	Displays the number of Critical and Warning alerts. Click the number to view the alerts in the Incident Manager page.

37.2.3 Monitoring Repositories

To monitor the ODI repositories, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the ODI Home page, click the **Repositories** tab.

Note:

- The ODI database credentials have to be selected for this region to display. There are different credentials for different repositories. Choose the credentials based on your need.
 - Starting with Oracle Fusion Middleware Plug-in (12.1.0.6), you can monitor the repositories that are configured even with Microsoft SQL Server and IBM DB2. However, as a prerequisite, make sure you first deploy the Microsoft SQL Server Plug-in and IBM DB2 Plug-in, respectively, and then discover those database instances as targets in Enterprise Manager Cloud Control.
-
-

The Repositories tab has the following regions:

37.2.3.1 Search Repositories

Use this region to search for repositories for all master and work repositories.

The latest specified search criteria are always retained. Specify a new criteria and click **Search** to see the updated results. Or, click **Reset** to reset the search form (you must still click **Search** to see the updated results). Note that the search criteria are reset each time you log out or navigate away from all the tabbed pages.

Element	Description
Repository Type	Select the Repository type: Master Repository, Work Repository, All.
Repository Name	Enter the name or a part of the Repository name.
Repository Status	Select the status of the Repository: Up, Down, All.

37.2.3.2 Repositories

Use this region to view details of the work repositories.

Element	Description
Name	<p>Displays the name of the Master and Work Repository. A star icon against the name of the repository indicates that it is a non-Oracle Database repository.</p> <ul style="list-style-type: none"> ■ To view the Work Repositories under a particular Master Repository, expand the Master Repository name. ■ To drill down and access the respective database home page for more details, click the repository name. ■ For more details on a particular repository, select the row of that repository to see the Database Details table appear. For non-Oracle Database repositories, Enterprise Manager Cloud Control might not be able to display data for all the metrics.
Status	<p>Displays the status of the Work Repository database.</p> <ul style="list-style-type: none"> ■ Up (green arrow): on ■ Down (red arrow): off ■ Not configured: the Repository is declared in the Master Repository but no connection to this Work Repository is declared in Oracle Data Integrator Console.
Technology	Displays the technology used.
Host	Displays the name of the host on which the repository resides.
Port	Displays the port of the host on which the repository resides.
SID/Database Instance	Displays the system identifier of the repository or the database instance name.
Version	Displays the Repository version.
Response Time (ms)	Repository database response time in milliseconds.
External ID	Displays the ODI-specific unique identifier for the repository.
Incidents	Displays the number of incidents associated with this repository: Critical or Warning.
Schema Name	Displays the name of the schema associated with this repository.
LPE/Sessions Tablespace/File Group	Displays the total rows and segment size (in GB).
Purge	<p>Click the icon to purge the ODI logs.</p> <ul style="list-style-type: none"> ■ For 12.1.3 ODI Agents monitored with Oracle Fusion Middleware Plug-in (12.1.0.6), a separate dialog appears where you can provide the required information, and click Purge. The ODI logs will be deleted from within the Enterprise Manager Cloud Control Console. ■ For 12.1.3 ODI Agents monitored with Oracle Fusion Middleware Plug-in (12.1.0.5) or lower, and for all 12.1.2 or lower ODI Agents, a separate browser window with the ODI Console appears. Log in to the console, and delete the unwanted ODI logs.

37.2.3.3 Database Details

By looking at the database details, you have a clear picture of how your database is performing. For example, if the database tablespace is reaching near full, the Database Administrator can look at extending the table space.

In addition, by taking a look at the database performance chart, Throughput and Wait bottlenecks sections, the Database Administrator can recommend fine tuning the database.

- **Wait Bottlenecks**

This section provides the following statistics: Average Instance (CPU%), Active Sessions Waiting I/O, and Active Sessions Waiting Others.

- **Throughput**

This section provides the following statistics: Number of Transactions per second, Physical Writes per transaction, Physical Reads per transaction, and User Commits per transaction.

- **Performance**

This section provides usage information for CPU, I/O Wait, and others for the active sessions.

Note: For this region to appear, you must select the credentials and the repository. The credentials must be of a DBA user and must be of the type *Global*. The credentials are required to depict the tablespace and schema-related charts.

Note: For non-Oracle Database repositories, Enterprise Manager Cloud Control might not be able to display data for all the metrics

37.2.3.4 Tablespace/File Group Details

This section provides the growth rate for the tablespace by providing Space Used and Space Allocated statistics. Based on the information, you can decide whether to archive or purge the database data, or extend the tablespace.

Note: For non-Oracle Database repositories, Enterprise Manager Cloud Control might not be able to display data for all the metrics

37.2.4 Monitoring Load Plan Executions and Sessions

To monitor the load plan executions and sessions, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the ODI Home page, click the **Load Plan Executions/Sessions** tab.

The Load Plan Executions/Sessions tab enables you to search and view information about the load plan executions and sessions executed by the Agent. This tab has the following regions:

Expand a session and review the Steps and Tasks information. For example if an ODI Interface was executed, you can review each task that this interface executed, view the generated code, and drill down to the database execution details.

Note: Oracle Database Diagnostics and Tuning Packs are required to be able to use the Database Execution Details link and drill down into the Oracle Database monitoring pages.

The Load Plan Executions/Sessions tab has the following regions.

37.2.4.1 Search Sessions/LPEs

Use this region to search for sessions and load plan executions for all master and work repositories.

The latest specified search criteria are always retained. Specify a new criteria and click **Search** to see the updated results. Or, click **Reset** to reset the search form (you must still click **Search** to see the updated results). Note that the search criteria are reset each time you log out or navigate away from all the tabbed pages of the Oracle Data Integrator Cloud Control application.

Element	Description
Master Repository	Select the Master Repository containing the session information.
Work Repository	Select the Work Repository containing the session information.
Execution Agent	Select the Agent used to execute the session.
Context	Select the session's execution context
Execution Type	Select Sessions, Load Plan Executions, or All.
Begin Date	Use the calendar icon to select a date at which to start the search for sessions. Only session started after this date will be returned
End Date	Use the calendar icon to select a date at which to end the search for load plan executions and sessions. Only load plan executions and sessions ended before this date will be returned.
User Name	Name of the ODI user who started the execution.
Status	Select All or narrow the search to display specific statuses: Error, Running, Done, Warning, or Waiting. For example, you can select to view only Running and Warning statuses.
Message	Error message of the Load Plan Execution/Session run.
Keywords	Type keywords to narrow the search. When using multiple keywords, use a comma to separate each keyword, do not include spaces. For example use: lpe1,lpe2.
Execution Name	Type the name of the load plan execution.
Error Records	Select All or narrow the search to display load plan executions and sessions With Error Records or Without Error Records.
Execution ID	Specific Load Plan Execution or Session identifier.

37.2.4.2 Load Plan Executions/Sessions

Use this region to view execution details of the Load Plan Executions and Sessions executed by the Agent.

To view more details such as hierarchy, status of each step, the start and end time of each step, and so on, for a particular Load Plan Execution or Session, select the row in the table and scroll down the page to see the Load Plan Executions/Session Detail table.

Element	Description
Name	Displays the name of the Load Plan Execution or Session.

Element	Description
Execution ID	Load Plan Execution or Session identifier. Every time a Load Plan is executed, a new Load Plan Execution with a unique identifier is created.
Status	<p>Displays an icon to indicate the status of the Load Plan Execution run or Session executed. Hover your mouse over the icon to understand the status and view more details if there is an error. The status can be one of the following:</p> <ul style="list-style-type: none"> ■ Running: The Load Plan Execution/Session is currently running. ■ Done: The Load Plan Execution/Session has terminated successfully. ■ Waiting: The Load Plan Execution/Session is waiting to be executed. ■ Error: The Load Plan Execution/Session has terminated due to an error. ■ Warning: The session has terminated successfully but erroneous rows were detected by an interface during flow control. ■ Queued: The session is waiting for an Agent to be available for its execution.
Started On	Start date and time of the Load Plan Execution/Session run.
Updated On	Displays the last updated date of the Load Plan Execution/Session.
Execution Time	Displays how long it took the Load Plan Execution/Session to run.
Error Records	Displays the number of error records.
Execution Type	Displays the Load Plan or Sessions type, for example, Scenario.
Work Repository Name	Displays the name of the Work Repository into which this Load Plan/Session run execution information is stored.
Agent Name	Displays the name of the agent on which the Load Plan Execution/Session ran.
ODI User	Displays the name of the ODI user who started the execution.

37.2.4.3 Load Plan Executions/Session Detail

Use this region to view more detailed information on the Load Plan Executions and Sessions executed by the Agent.

Element	Description
Load Plan Executions/Session Hierarchy	Displays the hierarchy of the Load Plan Execution or Session. Click and expand the Load Plan Execution or Session name to view the complete hierarchy.
Status	Displays an icon to indicate the status of the Load Plan Execution or Session step. Hover your mouse over the icon to understand the status and view more details if there is an error.

Element	Description
Source Code	Displays the code executed on the source database. Click the icon to view details of the executed code. If the source and target databases are Oracle Databases, which have been discovered in Enterprise Manager Cloud Control, then you will see a Database Execution Details hyperlink. Click the link to drill down to the ASH Analytics page and view information about the active sessions run for a particular time period.
Target Code	Displays the code executed in the target database. Click the icon to view details of the executed code. If the source and target databases are Oracle Databases, which have been discovered in Enterprise Manager Cloud Control, then you will see a Database Execution Details hyperlink. Click the link to drill down to the ASH Analytics page and view information about the active sessions run for a particular time period.
Step Task Type	Displays the type of task performed by the step. The task type value is a hyperlink when the source and target systems are database systems. In that case, click the task type to view details of the source database and the target database that exchanged data.
Started On	Displays the date and time when the step started.
Ended On	Displays the date and time when the step ended.
Duration	Displays the time taken (in seconds) to execute the task.
Updates	Displays the number of updates or changes done to a row per task.
Inserts	Displays the number of data insertions done per task.
Error Records	Displays the number of error records reported per task.
Deletes	Displays the number of data deletions done per task.

37.3 Administering Oracle Data Integrator

You can perform the following operations while administering Oracle Data Integrator:

- [Starting Up, Shutting Down, and Restarting Oracle Data Integrator Agents](#)
- [Managing Agent Status and Activities](#)
- [Searching Sessions and Load Plan Executions](#)
- [Viewing Log Messages](#)

37.3.1 Starting Up, Shutting Down, and Restarting Oracle Data Integrator Agents

Note:

- Oracle Process Manager and Notification (OPMN) is used for release 11g Standalone Agents. WebLogic Management Framework is used for release 12c Colocated Standalone Agents only.
 - Only *Start* and *Stop* operations are supported for ODI Java EE Agents.
 - *Start* and *Stop* operations are supported for all ODI Standalone Agents managed by WebLogic Management Framework and OPMN instances. *Restart* operation is supported only for 11g Standalone Agents managed by OPMN instances, and not for 12c Colocated Standalone Agents managed by WebLogic Management Framework instances.
-
-

To start, stop, and restart Oracle Data Integrator Agents, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the Oracle Data Integrator Home page, click the **ODI Agents** tab.
4. In the ODI Agents tab, search for the ODI agents. Then, in the ODI Agents table, click the name of an Agent.
5. On the ODI Agent Home page, from the **ODI Agent** menu, select **Control**, then select either **Start Up**, **Shut Down**, or **Restart**.

Note: If you want to start or stop ODI Standalone Agents, that are not managed by OPMN or WebLogic Management Framework, you must use the Agent's startup and shutdown scripts. See "Managing Agents" in the *Oracle Fusion Middleware Developer's Guide for Oracle Data Integrator* for more information about how to start and shut down Agents.

37.3.2 Managing Agent Status and Activities

To manage the agent status and monitor its activities, follow these steps:

1. Click the target link corresponding to your JEE, Standalone, or Colocated Standalone Agent either in the target navigation pane or in the ODI Home Page. The Java EE Application Page for this agent appears.
2. From the **Agent Page** menu, select **Monitoring** then select **Performance Summary**.
Enterprise Manager Cloud Control displays the Performance Summary page, which enables you to view and customize the metrics and charts.

37.3.3 Searching Sessions and Load Plan Executions

To sessions and load plan executions, follow these steps:

1. From the **Targets** menu on Enterprise Manager, select **Middleware**.

2. In the Middleware Features menu, select **ODI Home**.
3. Click the **LPE/Sessions** tab. For more information on the tab, click **Help**.

37.3.4 Viewing Log Messages

You can view log messages of Java EE agents in Enterprise Manager Cloud Control.

The steps for this process are:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the Oracle Data Integrator Home page, click the **ODI Agents** tab.
4. In the ODI Agents tab, search for the ODI agents. Then, in the ODI Agents table, click the name of an Agent.
5. On the ODI Agent Home page, from the **ODI Agent** menu, select **Logs**, then select **View Log Messages**.

You can filter the displayed log messages, for example by date range and message type and search for a search term in the message.

To configure the log configuration settings, select **Logs** then select **Log Configuration** from the **ODI Agent** menu.

37.4 Creating Alerts and Notifications

For detailed information on alerts and notifications, see *Using Incident Management* and *Using Notifications* chapters in the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

As an example, to create an alert for the Master Repository status, see the instructions below:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the Oracle Data Integrator Home page, click the **ODI Agents** tab.
4. In the ODI Agents tab, search for the ODI agents. Then, in the ODI Agents table, click the name of an Agent.
5. On the ODI Agent Home page, from the **ODI Agent** menu, select **Monitoring**, then select **Metric and Collection Settings**.
6. In the Metric column, expand Master Repositories to see the Status row.
7. In the Critical Threshold text field, in the Status row, enter **0**.

0 indicates that EM will generate an alert when the Master Repository is down, whereas **1** will generate an alert when the Master Repository is up.

Note: Similarly, you can create warning or critical alerts for other rows mentioned in the Metric column.

37.5 Monitoring Run-Time Agents

The Agents Home page enables you to monitor the Oracle Data Integrator run-time Agents. The Management Pack for ODI can monitor and manage the following ODI Agent types:

- 11g: Java EE Agents and Standalone Agents managed by OPMN.
- 12c: Java EE Agents and Collocated Standalone Agents managed by the WebLogic Management Framework.

To access the ODI Agent Home page, follow these steps:

1. From the **Targets** menu, select **Middleware**.
2. On the Middleware page, from the **Middleware Features** menu, select **ODI Home**.
3. On the ODI Home page, click the **ODI Agents** tab.
4. In the ODI Agents tab, search for ODI Agents, and in the search results table, click the name of the ODI Agent that interests you.

For further details on the agent home page, see [Section 37.6, "Agent Home Page"](#).

37.6 Agent Home Page

The Agent Home page is arranged in the following order:

- [General Info](#)
- [Load](#)
- [Target Incidents](#)
- [LPEs/Sessions Execution Incidents](#)
- [Load Balancing Agents](#)

37.6.1 General Info

The General Info region displays general information about this Agent.

Element	Description
Response Time (ms)	Displays the repository database response time in milliseconds.
Agent Version	Displays the version of the Agent.
Host and Port	Displays the host (network name or IP address) of the machine where the Agent has been launched on and the port on which the Agent is listening.
Master Repository	Click to access the Database Performance page for the Master Repository.
Incidents	An event or a set of closely correlated events that represent an observed issue requiring resolution through (manual or automated) immediate action or root-cause problem resolution.

37.6.2 Load

The Load region displays the number of connections supported by the Agent over a period of time.

Elements	Description
Maximum number of allowed sessions	Maximum number of sessions allowed on this Agent.
Maximum number of allowed threads	Maximum number of threads allowed on this Agent.
Count of active sessions	Number of active sessions on this Agent.
Count of active threads	Number of active threads on this Agent.

37.6.3 Target Incidents

The Target Incidents region displays notifications raised by the Agents attached to this Repository.

Element	Description
Severity	<p>Seriousness of the incident.</p> <ul style="list-style-type: none"> Fatal - Corresponding service is no longer available. For example, a monitored target is down (target down event). A Fatal severity is the highest level severity and only applies to the Target Availability event type. Critical - Immediate action is required in a particular area. The area is either not functional or indicative of imminent problems. Warning - Attention is required in a particular area, but the area is still functional. Advisory - While the particular area does not require immediate attention, caution is recommended regarding the area's current state. Clear - Conditions that raised the incident have been resolved.
ID	Incident ID.
Summary	Summary description of the incident.
Category	Classification of an incident, for example, Error.

37.6.4 LPEs/Sessions Execution Incidents

The Load Plan Executions/Sessions Execution Incidents region displays notifications raised by the Agents attached to this Repository.

Element	Description
Severity	<p>Seriousness of the incident.</p> <ul style="list-style-type: none"> Fatal - Corresponding service is no longer available. For example, a monitored target is down (target down event). A Fatal severity is the highest level severity and only applies to the Target Availability event type. Critical - Immediate action is required in a particular area. The area is either not functional or indicative of imminent problems. Warning - Attention is required in a particular area, but the area is still functional. Advisory - While the particular area does not require immediate attention, caution is recommended regarding the area's current state. Clear - Conditions that raised the incident have been resolved.
ID	Incident ID.
Summary	Summary description of the incident.
Category	Classification of an incident, for example, Error.

37.6.5 Load Balancing Agents

The Load Balancing Agents region displays (if using ODI Load Balancing) the status and session metrics for the Agents declared as child Agents of the current Agent.

Element	Description
Name	Displays the name of the agent. This is the name you specified when you created the Agent in Oracle Data Integrator. Select an Agent to display the corresponding Agent Home page.
Status	<p>Displays the status of the Agent.</p> <ul style="list-style-type: none"> Up (green arrow): on Down (red arrow): off
Discovered	<p>A blue tick indicates that the ODI Agent is discovered as a custom target in Enterprise Manager. Click the Agent name to access the ODI Console's Agent Detail Page.</p> <p>A clock indicates that the ODI Agent is not discovered as a custom target in Enterprise Manager. Click the Agent name to access the Enterprise Manager Agent Target Page.</p>
Originating LPEs/Sessions	<p>Displays the status of the LPEs and Sessions.</p> <ul style="list-style-type: none"> Error - Number of sessions in error for this agent. Running - Number of sessions currently being executed by this agent. Done - Number of sessions completed by this agent. Warning - Number of sessions in warning state for this agent. Waiting - Number of sessions waiting to be executed. Queued: The session is waiting for an Agent to be available for its execution.
Avg Master Repo Response Time (ms)	Displays the master repository database response time in milliseconds.

Element	Description
Sessions	Maximum and active number of sessions allowed on this Agent.
Threads	Maximum and active number of threads allowed on this Agent.

37.7 Configuring Oracle Data Integrator Console

Oracle Data Integrator Console cannot be configured from Enterprise Manager Cloud Control. To make configuration changes you must use the Fusion Middleware Control Console. For information of how to configure Oracle Data Integrator, see *Oracle Fusion Middleware Developer's Guide for Oracle Data Integrator*.

However, you can configure Oracle Data Integrator Console from Enterprise Manager Cloud Control to define the linking between Enterprise Manager Cloud Control and Oracle Data Integrator Console.

By default, the fields on this page are populated with the Oracle Data Integrator Console host, the Oracle Data Integrator Console managed server port, and the default context root. If your Oracle Data Integrator Console must be accessed with a different configuration, you can change the configuration on this page.

The steps for this process are:

1. Navigate to the Agent home page.
2. From the **Agent Page** menu, select **ODI Console Administration**, then select **Basic Configuration**.

This page displays the current configuration for accessing the Oracle Data Integrator Console application. These values are automatically set when the application is discovered by Enterprise Manager and are used to access Oracle Data Integrator Console from Enterprise Manager, for example when clicking **Browse**.

You can modify these values to access Oracle Data Integrator Console in a different way, for example to connect to Oracle Data Integrator Console by using a load balancer.

3. To modify this configuration, enter new values in the fields and click **Apply**. Click **Revert** to revert to the previous settings.

Element	Description
Host	Displays the name of the server where your application is deployed. If using SSO, enter the Oracle HTTP Server (OHS).
Port	Displays the HTTP listener port number. If using SSO, enter the port of the machine where Oracle HTTP Server 10g or 11g Webgate is installed.
Context Root	Displays the Web application's context root.
Protocol	Displays the protocol of the connection

37.8 Configuring an Oracle Data Integrator Domain

Installing and configuring components for an Oracle Data Integrator domain is described in the *Oracle Fusion Middleware Installation Guide for Oracle Data Integrator*.

Part XII

Using Application Dependency and Performance

The chapters and appendixes in this part provide information regarding the usage of Application Dependency and Performance (ADP).

The chapters and appendixes are:

- [Chapter 38, "Introduction to Application Dependency and Performance"](#)
- [Chapter 39, "Exploring Application Dependency and Performance"](#)
- [Chapter 40, "ADP Methodology"](#)
- [Chapter 41, "Frequently Asked Questions About Application Dependency and Performance"](#)
- [Appendix A, "ADP Configuration Directories and Files"](#)
- [Appendix B, "Support Matrix for Application Dependency and Performance"](#)

Introduction to Application Dependency and Performance

The Application Dependency and Performance (ADP) pages within Enterprise Manager Cloud Control analyze ADF and SOA Suite applications to capture the complex relationships among various application building blocks in its Application Schema model - the core of the Oracle intelligent platform.

Using ADP you can:

- Monitor performance of applications deployed in the following type of Servers:
 - Oracle SOA Suite 11g
 - Oracle Application Development Framework (ADF)
- Have visibility into components defined by way of metadata within a framework (for example, components within a composite) with deep dive visibility, where available
- View static relationships defined within SOA Composites, such as between SOA Services, references, and components

This chapter includes the following:

- [Overview](#)
- [Architecture](#)

38.1 Overview

Using application framework metadata, ADP is able to deliver monitoring that is automatically configured out of the box and evolves with change. ADP enables an enterprise to more efficiently manage distributed applications, attain management agility, and lower total cost of ownership.

See the following sections:

- [Managing Complex SOA Suite and ADF Applications](#)
- [Delivering a Service-Oriented View Across Environments](#)
- [Eliminating Repetitive Do-It-Yourself \(DIY\) Manual Processes](#)
- [ADP Solution](#)

38.1.1 Managing Complex SOA Suite and ADF Applications

Today's SOA Suite and ADF applications enable enterprises to deliver mission-critical business functions to key constituencies - most often their customers, partners, and employees. These composite applications are assembled from many different Java EE components and exposed services distributed across a heterogeneous environment.

To be effective at managing today's complex, distributed SOA Suite and ADF applications across a heterogeneous environment, enterprises must adopt an intelligent monitoring platform with the following characteristics:

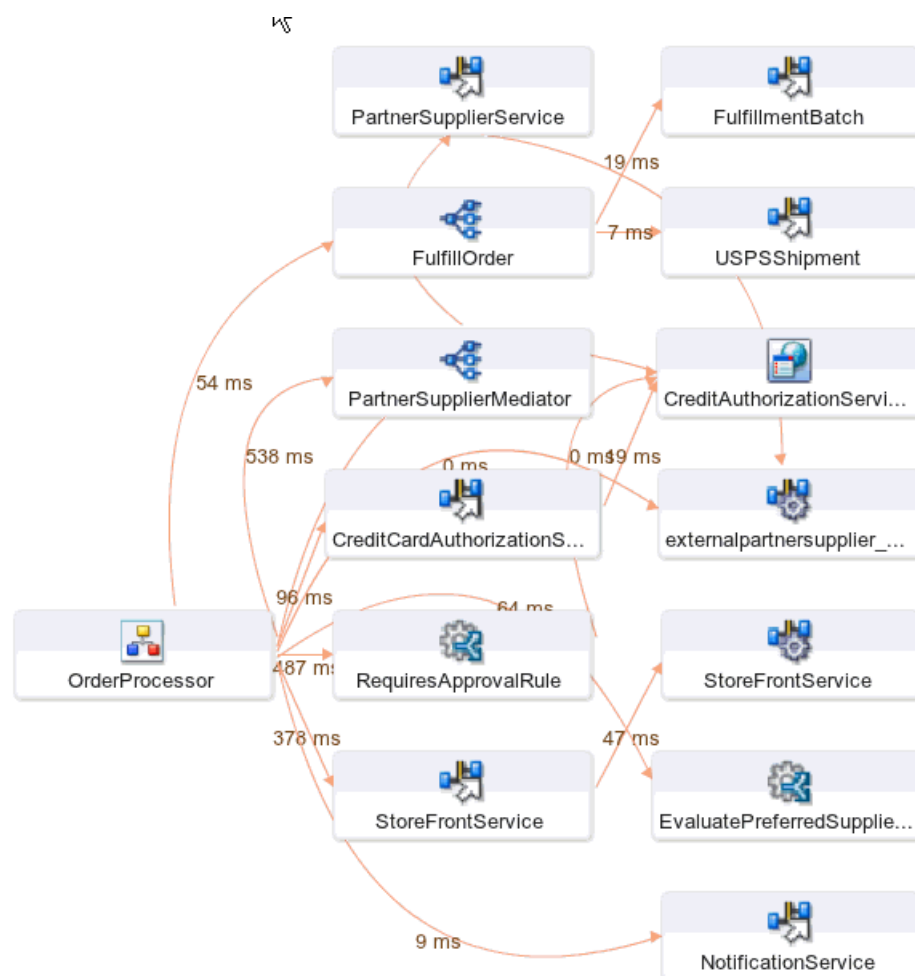
- Provides holistic, service-oriented views across heterogeneous environments
An intelligent monitoring platform must provide high-level service-oriented metrics that map to low-level technology-centric metrics. These measurements must be organized in a service-oriented fashion to deliver a unified, holistic view of the numerous interconnected application components deployed across heterogeneous environments.
- Requires minimal SOA Suite and ADF application expertise
An intelligent monitoring platform must have the ability to capture complex relationships among various interconnected components of today's SOA Suite and ADF applications. This ability can help minimize reliance on SOA Suite and ADF application experts for setting up and maintaining effective APM environments.
- Eliminates repetitive DIY manual processes
An intelligent monitoring platform must eliminate repetitive DIY manual processes by delivering the ability to self-customize out-of-the-box and evolve with change. Elimination of these repetitive DIY manual processes is the only way to deal with rising complexity and rapid rate of change with ease.

38.1.2 Delivering a Service-Oriented View Across Environments

Today's mission-critical business functions are powered by SOA Suite and ADF applications that comprise numerous interconnected components deployed across highly distributed environments. To manage these applications effectively, enterprises must first gain an understanding of the complex relationships among the business functions, associated interconnected components, and the underlying runtime environments. To enable clear and accurate understanding, IT organizations need holistic, service-oriented views that span across heterogeneous environments.

Furthermore, appropriate rendering of these views enables users at different levels of the organization to collaborate with each other and do their respective jobs more efficiently.

Figure 38–1 Application Dependency and Performance Topology View in Enterprise Manager Cloud Control



Application Schema Navigation provides efficient ways for you to access relevant information using techniques like hierarchical traversal, architecture model navigation, string queries, drill down, drill out and more.

38.1.3 Eliminating Repetitive Do-It-Yourself (DIY) Manual Processes

Based on a unique model-driven approach, ADP eliminates repetitive DIY manual processes. To achieve this level of self-customization and continuous change adoption, ADP uses its AppsSchema modeling technology to perform the critical task of analyzing application structure and infrastructure configuration. After capturing these insights in the Application Schema model, ADP leverages this information to establish a fully customized monitoring environment. To keep this environment up-to-date, ADP continuously updates the Application Schema model as new applications are deployed and changes are applied. ADP's unique ability to self-customize out-of-the-box and evolve with change enables fast time-to-value, low total-cost-of-ownership (TCO), and maximal return-on-investment (ROI).

38.1.4 ADP Solution

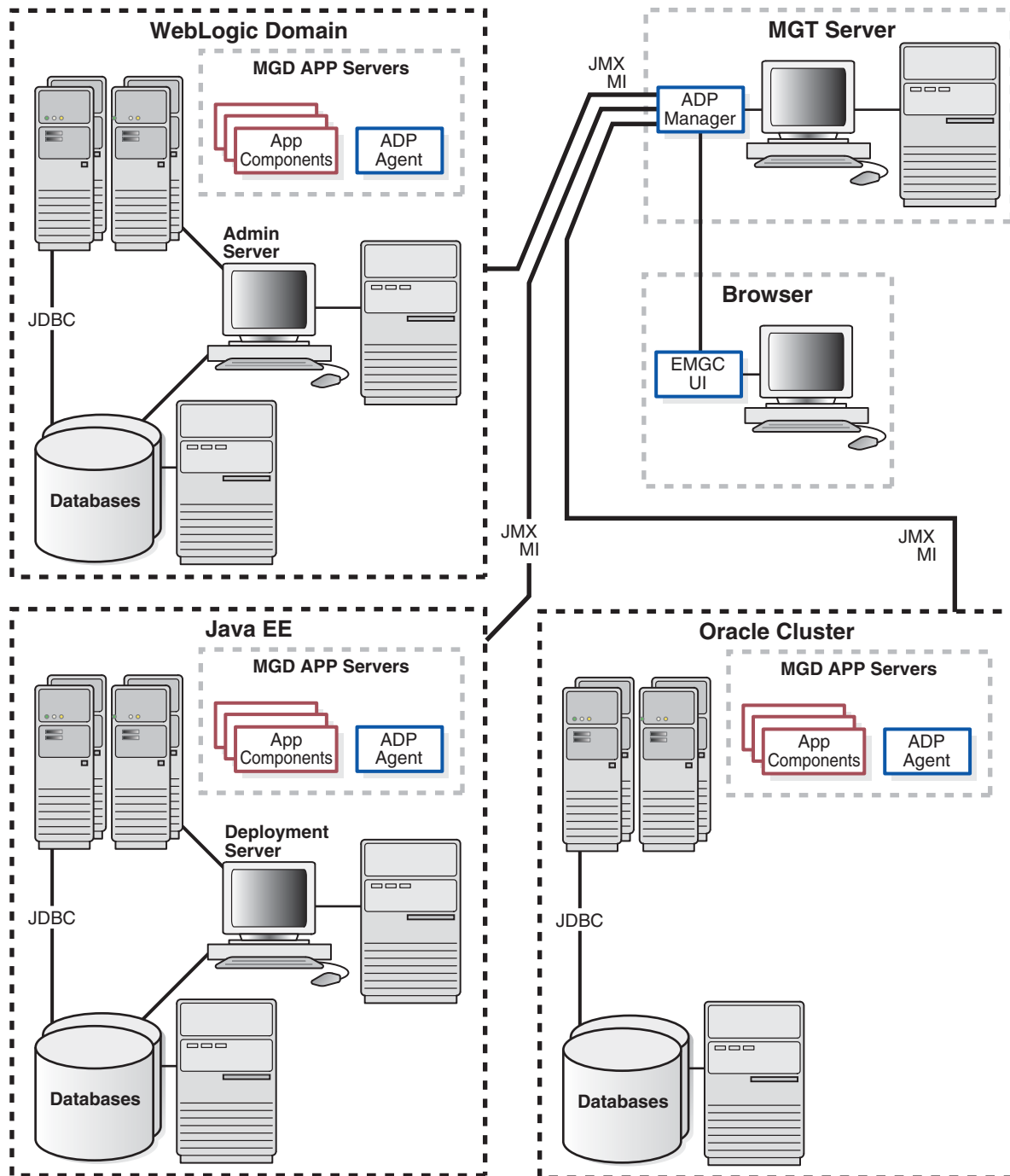
Oracle provides an intelligent monitoring platform for SOA Suite and ADF. Unlike conventional performance management tools, ADP analyzes the metadata of these frameworks and captures the relationships with the various application components.

38.2 Architecture

ADP employs a multi-tier, fully distributed, configurable architecture to provide the scalability and flexibility to meet the changing needs of enterprise deployments.

ADP operates as a service on the machine and automatically begins running when the machine first boots, and remains on perpetually. ADP is typically installed on its own machine and dedicated to monitor a group of managed application servers.

Figure 38–2 ADP Topology



The following core components are deployed to form the ADP monitoring system.

38.2.1 ADP Java Agents

ADP Java Agents are the data collectors of the ADP monitoring system. ADP Java Agents are deployed to all managed application servers to perform a series of tasks including collecting performance managements, tracking contextual relationships, and summarizing data in real-time while introducing as little overhead as possible. At the expiration of the predefined aggregation interval, these agents forward the summarized data to ADP for additional analysis. For various Java EE platforms such

as Oracle SOA Suite and Oracle WebLogic, ADP leverages their deployment infrastructures to quickly deploy the ADP Java Agents to all application servers.

38.2.2 ADP Manager

ADP Manager is the core analytical engine of the ADP monitoring system. In real-time, ADP Manager performs complex mathematical modeling and statistical calculations with summarized data from all ADP Java Agents. ADP Manager can be configured with a backup to provide higher level of availability.

38.2.2.1 ADP Manager and High Availability

Although the ADP Manager does not have high availability (HA) built into it, administrators can have a backup ADP Manager installed on a separate machine; this backup ADP Manager points to the same database but is disabled. If the production ADP Manager fails, the backup ADP Manager can then be enabled against the same database. The backup ADP Manager then rediscovers the application after the agent is redeployed from the backup ADP Manager, to the managed resources in order to synchronize them. All metrics are preserved, assuming the model does not change in the short time frame it takes to bring the backup ADP Manager online.

The key with this backup procedure is to backup the database that ADP uses as its repository in order to preserve the historical data. On the modeling side, the backup ADP Manager has to rediscover the application which should happen automatically, as long as the resources are configured and the new agent has been deployed.

If historical data preservation is not a necessity, users can simply have another ADP Manager and database and swap agents reducing the backup effort considerably.

38.2.3 ADP User Interface

The ADP User Interface (ADP UI) is the primary user interface for ADP users. Users can use ADP UI to set Service Level Objectives (SLOs), analyze monitoring data, and more. The ADP UI is fully configurable. To access ADP:

1. From the **Targets** menu, select **Middleware**.
2. From the **Middleware Features** menu on the Middleware page, select **Application Dependency and Performance**.

Exploring Application Dependency and Performance

This chapter examines the following:

- Exploring the User Interface
- Exploring the Monitoring Tab
- Exploring the Configuration Tab
- Exploring the Registration Tab

39.1 Exploring the User Interface

This section explores the ADP User Interface. Topics include:

- Accessing ADP
- General ADP UI Elements
- Drill Down in Operational Dashboard
- Time Frame
- Display Interval
- Graphs and Data Items
- Custom Metrics
- Functional View
- Metric Types

39.1.1 Accessing ADP

To access the Enterprise Manager Application Dependency and Performance (ADP) feature, do the following:

1. From the **Targets** menu, select **Middleware**.
2. From the **Middleware Features** menu on the Middleware page, select **Application Dependency and Performance**.

39.1.2 General ADP UI Elements

ADP UI consists of the following core components:

- Navigation Pane (left)

There are three types of workspaces in the ADP navigation pane: *Monitoring*, *Configuration*, and *Registration*. In the Monitoring workspace, you can navigate the managed environment and monitored applications in a tree.

- Use the Monitoring workspace to traverse the ADP tree model and identify abnormal activities.
- Use the Configuration workspace to create, modify, and review various configuration settings for ADP.
- Use the Registration workspace to enable and disable request monitoring.
- Main Display Window (right)

As you navigate through the ADP tree model and configuration categories, detailed performance information and configuration settings are displayed in the Main Display Window. You can refresh the Main Display Window at anytime by clicking the Refresh icon.

39.1.3 Drill Down in Operational Dashboard

The Operational Dashboard displays the health indicators for various key entities in the managed environment. ADP uses traditional traffic light colors to represent the health of these various key entities.

For each component, ADP uses the following health indicators to provide a comprehensive view. These health indicators are:

- Performance

The performance health indicator depicts the relative responsiveness of the monitored entity to the configured threshold.
- Availability

The availability health indicator informs you to what extent a particular entity is available to service requests. The Availability arrow explains the availability of the particular entity: Red down arrow means the entity is not available whereas the Green up arrow means the entity is available.
- Errors

The errors health indicator informs you if the number of errors and exceptions encountered by this entity are approaching or violating the configured threshold. If there is any errors in the server, the check mark is in red.
- Load

The load health indicator depicts how many operations have been performed and requests have been served by a particular entity.

ADP is aware of clusters. As such, these indicators display overall health of a particular entity across the entire cluster.

39.1.4 Time Frame

In ADP, you can specify the length of the time the window information is to be displayed. To specify the length of this time window, select the appropriate length in the Time Frame list. The following Time Frame values are available:

- 1 hour
- 2 hours

- 4 hours
- 8 hours
- 12 hours
- 24 hours

Note: The ADP default data collection interval is 60 seconds. As you adjust the data collection interval, ADP automatically adjusts the display time frames.

ADP automatically adjusts information displayed to fit the specified time window. You can drill down to see detailed performance information for a specific range of time.

For example, visualize the drill down process with two screen shots of the same graph with different Time Frames of the average response time for Portal campaign. The first graph has a Time Frame of 24 hours. The second graph has a Time Frame of 1 hour. By increasing the granularity of the Time Frame, you are performing a drill down operation.

For example, an IT Operations staff noticed abnormally high response time with Portal campaign subsystem. The person decided to investigate further to evaluate the extent of the problem. By changing the Time Frame from 24 hours to 1 hour, this user is able to see that between 14:17 and 14:18, the Portal campaign response time jumped from an average of 1000 milliseconds to 5000 milliseconds. While the problem did not persist, it may warrant additional investigation.

39.1.5 Display Interval

Display Interval, located above the Main Display window, indicates the start and end time for the data displayed in the Main Display Window. Display Intervals change as you change the following settings:

- Time Frame
- Interval Context
- Turning Off Time Frame Limitation

39.1.5.1 Time Frame

When you select a new Time Frame, the Display Interval automatically changes to fit the selected Time Frame. For example, if you were to change the Time Frame from 1 hour to 2 hours, the Start value of the Display Interval changes.

39.1.5.2 Interval Context

Display Interval can also be changed by setting the Interval Context. The settings for the Interval Context are:

- End Time Is Current System Time

The default Interval Context for ADP is to use the current system time as End value for the Display Interval. In this default setting, you have a sliding Display Interval and can see the latest performance information in the Main Display Window.

- End Time Is Fixed

You can also change the Interval Context setting to use a fixed time as the End value for the Display Interval. By selecting the fixed Interval Context, you can create a fixed time window to display performance data. The fixed time window is particularly useful for performing analytical tasks.

- **Date/Time Selector**

When you select to fix the End time for the Interval Context, the ADP UI enables a pair of Date/Time Selectors to allow you to set Start or End values for the Display Interval. Click the icon next to the Start and End times to open up the Date/Time Selector.

The Date/Time Selector allows you to set a specific Display Interval to fit your needs. Additionally, the Date/Time Selector enables ADP to compare current performance trends with historical data.

Note: Changing the start and end time do conceptually different things. Users are advised to always change their time frame by modifying the end time first, and then the start time. Changing the end time moves the window in time, whereas changing the start time increases/decreases the size of the window.

39.1.5.3 Turning Off Time Frame Limitation

To support the display of data for more than twenty four hours, ADP allows you to specify your own time frame for data display. To enable this feature, set **Interval Context** to **End time is fixed** and make sure the **Use time frame:** check box is unchecked. Turning off time frame limitation allows ADP to display eight days worth of data.

For example, when you specify the time frame to be eight days by adjusting the start and end times through the Date/Time Selector, ADP then adjusts its view to display eight days worth of data in a single graph. This feature allows you to perform trending analysis over time.

39.1.6 Graphs and Data Items

ADP displays performance information in various formats. Most commonly used display formats in ADP are tables and graphs.

- On graphs, you can gain more information about a data item by pointing the mouse over the interested item.
- Minimum and maximum response time measurements are stored in their database in addition to average response time measurements. The min and max metrics, if present, are displayed visually in the UI.
- For tables, you can perform a table sort by clicking the blue up/down arrow located in the column headings.

39.1.7 Custom Metrics

While ADP intelligently selects relevant performance metrics based on its SOA Suite and ADF application framework metadata, you can further customize the monitoring environment by configuring additional custom metrics. In addition, you can use custom metrics in problem diagnostic situations where additional visibility is needed to pinpoint problem root cause.

To configure a new custom metric:

1. Click **Custom Metric Configuration** on the Configuration tab
2. Click the **Create Custom Metric** button.
3. On the Custom Metric File page, either choose an existing custom metric file or provide the name of a new custom metric file. Click **Continue**. ADP walks you through the configuration process.

Custom Metric Configuration page includes the following fields, see [Table 39–1](#).

Table 39–1 Custom Metric Configuration Page

Field	Description
Name	This text field is for defining the display name for the custom metric.
Resource Name	This list is for defining the resource where the custom metric will be collected.
Class Name	This text field is for defining the fully qualified class name (package + class) associated with the custom metric.
Method Name	<p>This optional text field is for defining the method name associated with the custom metric.</p> <p>Usage:</p> <ol style="list-style-type: none"> 1. Type in * - ADP will instrument all methods. 2. Provide comma separated list of methods with no wildcards - ADP will create method entities and only instruments these methods in the agent. 3. Provide comma separated list of methods with wildcard prefixes or suffixes - ADP will instruct the agent to instrument the methods specified along with the wildcards. 4. Provide 1) or 2) preceded by "!" to create an excluded list - ADP will instruct the agent to instrument all methods in the class not defined in the exclude list. <p>Method field examples:</p> <ol style="list-style-type: none"> 1. methodA,methodB,methodC 2. ejb*,*context,methodA 3. !ejb*,*context,methodA

After you define the custom metrics, restart the application server instances associated with these customizations. The new custom metrics will be listed under the Custom Metrics node in the ADP navigation tree.

The newly configured custom metric provides class level performance data, for example invocation count and response time.

39.1.8 Functional View

Functional View is a type of Application Schema Visualization - a visual way for ADP to represent the information stored in its Application Schema model. This view is designed to help you understand how business functions are assembled with various functional building blocks. [Table 39–2](#) provides a list of functional views currently available in ADP.

Table 39–2 Functional View

Entity Type	Description
SOA Composite	This functional view depicts the SOA services, references, and components in a SOA composite along with their associated wiring.
BPEL Component	This functional view depicts the activities associated with a BPEL component.

Depending on the type of entity selected, ADP displays different functional views. Right-click and select Display Functional View to bring up the relevant Functional View associated with the selected entity.

39.1.9 Metric Types

Table 39–3 describes various types of metrics provided by ADP.

Note: All the ADP metric tables have a View drop-down list to change the order of the columns in the tables.

Table 39–3 Metric Types

Examples	Metric Type	Metric Description
Active Sessions Completions Pending Requests Running Instances Max Capacity Messages High	Snapshot Count	A count of the monitored entity at a point in time. ADP plots these snapshot counts in trend graphs.
Requests Serviced Total Sessions [Processes] Aborted [Processes] Terminated [Method] Invocation Count Bytes Received	Aggregated Count	A count of the monitored entity incrementally aggregated from the beginning of display time window. ADP shows these aggregated counts in summary tables.
Response Time Elapse Time Connection Delay	Average Timing	<p>Calculated every sampling period (default 60 seconds), the average timing is calculated by dividing the total amount of time needed to complete the monitored business unit of work by the number of completed business units of work.</p> <p>ADP uses this data in the following two ways:</p> <ol style="list-style-type: none"> 1. Plot the average timings in trend graphs. 2. Calculate average timing of this business unit of work for the display time window and display in a summary table.
Min/Max	Minimum and Maximum Response Time Measurement	Minimum and maximum response time measurements found per collection sampling intervals. These are stored in their embedded database in addition to average response time measurements. The default is 60 seconds.

39.2 Exploring the Monitoring Tab

When ADP is pointed to an Oracle WebLogic domain or an Oracle SOA Suite cluster, it automatically discovers information about this particular domain including all deployed applications, configuration, resources, and others. ADP displays this information in the Monitoring tab under Oracle Enterprise Manager.

Each node represents a construct in the platforms monitored by ADP. Each construct is described in this section.

Note: Promote to dashboard can be configured in ADP to incorporate ADP metrics tables in the ADP dashboard page. The dashboard configuration can be selected for

the entity type which is discovered by ADP and to display the entity metrics table on the dashboard.

This section includes the following topics:

- [Monitoring SOA Suite 11g Performance](#)
- [Monitoring OSB Performance](#)
- [Monitoring Oracle ADF](#)
- [Oracle BPEL Processes](#)
- [Oracle ESB](#)
- [Services](#)
- [Applications](#)
- [Oracle WebLogic Resources](#)
- [Oracle Resources](#)
- [Custom Metrics](#)
- [Status](#)
- [Service Component Architecture \(SCA\)](#)

39.2.1 Monitoring SOA Suite 11g Performance

To monitor the performance of service-oriented architecture applications (SOA), perform the following steps:

1. Navigate to **Application Dependency and Performance**.

From the **Targets** menu, select **Middleware**. On the Middleware page, click the SOA Infrastructure target. On the **Home** tab, select the **Summary** region and click the **Application Dependency and Performance** link.

2. Click the **Monitoring** tab.
3. ADP discovers all the deployed Composites on the configured Oracle WebLogic Domain.
4. A Composite node appears under the configured ADP Manager (for example, select Oracle Enterprise Manager, select SOAServer, then select Composites).

Under the Composites node, the following nodes appear:

- SCA Partition
- Composite
 - Services
 - Components
 - References
 - Wires

The performance metrics are displayed on the right-hand side panel when the respective node is selected.

39.2.2 Monitoring OSB Performance

To monitor the performance of Oracle Service Bus (OSB) applications, perform the following steps:

1. Navigate to **Application Dependency and Performance**.
From the **Targets** menu, select **Middleware**. On the Middleware page, click the OSB target. On the **Home** tab, select the **Summary** region and click the **Application Dependency and Performance** link.
2. Click the **Monitoring** tab, then select OSB in the tree.
3. ADP discovers all the deployed OSB proxy and business services on the configured Oracle WebLogic Domain.
4. An OSB node appears under the configured ADP Manager (for example, select Oracle Enterprise Manager, select servicbusServer, then select OSB).

Under the OSB node, the following nodes appear:

- Business Services
- Proxy Services
 - Pipeline
 - References

The performance metrics are displayed on the right-hand side panel when the respective node is selected.

39.2.3 Monitoring Oracle ADF

The ADF node in the navigation tree contains information about all the ADF-based applications running in managed domains.

Table 39–4 ADF Tree Summary

Component	Description
ADF Business Components	ADF business component
ADF Data Controls	ADF data controls
ADF Taskflows	ADF task flows provide a modular approach for defining control flow in an application. See Section 39.2.3.1, "ADF Task Flows" .
JSF Pages	JSF page definition files define the binding objects that populate the data in UI components at runtime. See Section 39.2.3.2, "JSF Pages" .

39.2.3.1 ADF Task Flows

Instead of representing an application as a single large JSF page flow, you can break it up into a collection of reusable task flows. Each task flow contains a portion of the application's navigational graph. The nodes in the task flows are activities. An activity node represents a simple logical operation such as displaying a view, executing application logic, or calling another task flow. The transactions between the activities are called control flow cases. A task flow consists of activities and control flow cases that define the transitions between activities.

39.2.3.1.1 User-Defined Taskflows The following taskflows are available in ADF.

Table 39–5 Taskflow Activities

Activity Name	Description
Managed Beans	A backing bean that is managed by the JSF framework and used during the JSF page lifecycle.
Taskflow Method Calls	Invokes a method, typically a method on a managed bean.
Taskflow Views	Displays a JSF page or page fragment. Multiple view activities can represent the same page or same page fragment.
Taskflow URL Views	Redirects the root view port (for example, a browserpage) to any URL-addressable resource, even from within the context of an ADF region.
Taskflow Calls	Calls an ADF bounded task flow from an ADFunbounded task flow or another bounded task flow
Routers	Evaluates an EL expression and returns an outcome based on the value of the expression. For example, a router in a credit check task flow might evaluate the return value from a previous method call and generate success, failure, or retry outcomes based on various cases. These outcomes can then be used to route control to other activities in the task flow.

39.2.3.1.2 Web 2.0 Service Oracle ADF provides a wide range of Web 2.0 capabilities, including discussion forums, wikis, blogs, content services, RSS, presence, instant messaging, linking, tagging, and search. Both developers and business users can easily add these services to their pages to maximize productivity.

Table 39–6 Taskflow Activities

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39.2.3.2 JSF Pages

A typical JSF application couples a backing bean with each page in the application. The backing bean defines properties and methods that are associated with the UI components used on the page. The UI component's value is bound to the bean's property.

A Managed Bean is a backing bean that is managed by the JSF framework and used during the JSF page lifecycle.

39.2.3.3 Monitoring ADF Application Performance

To monitor the performance of Application Development Framework (ADF) applications, perform the following steps:

1. Navigate to **Application Dependency and Performance**.

From the **Targets** menu, select **Middleware**. On the Middleware page, click the ADF target. On the **Home** tab, select the **Summary** region and click the **Application Dependency and Performance** link.

2. Click the **Monitoring** tab, then select the application in the tree.

3. ADP discovers all the deployed ADF artifacts on the configured Oracle WebLogic Domain release 11gR1.

4. An ADF node appears under the configured ADP Manager (for example, Oracle Enterprise Manager, select Server, then select ADF). The ADF node contains the following:

- ADF taskflows
- JSF Pages
- Managed Beans
- Business Components

The performance metrics for related components are displayed on the right-hand side panel when the respective component is selected.

Note: The ADP link from the ADF target page only works if an ADP manager is deployed and the ADP agent is deployed to the WebLogic server for that target.

39.2.4 Oracle BPEL Processes

The BPEL Processes node in the navigation tree contains information about all deployed Oracle BPEL processes within the managed domain. ADP organizes information for various process nodes into domains.

In the right-hand pane, you can view the minimum and maximum response time measurements stored in the database in addition to the average response time, arrivals, errors, and completions measurements. These metrics, if present, display visually in the window on the right pane.

When you select the root of the BPEL Processes tree, ADP displays the BPEL Processes Summary in the Main Display Window.

The BPEL Process Summary includes the following (Table 39–7):

Table 39–7 BPEL Process Summary Metrics

Metrics	Description
Domain	Name of the OC4J domain container
Process	Name of the BPEL process
Arrivals	Total number of currently running instances for a specific BPEL process
Response Time (ms)	Average response time in milliseconds for a specific BPEL process
Completions	Total number of fulfilled requests for a specific BPEL process. A Completed status represents a BPEL process instance that has finished normally.
Errors	Total number of aborted instances of a specific BPEL process
Min Response Time (ms)	Minimum average response time in milliseconds for a specific BPEL process
Max Response Time (ms)	Maximum average response time in milliseconds for a specific BPEL process

ADP presents these metrics in a table format in the Main Display Window when you select the BPEL Processes node. Graphical representations of two metrics, Arrivals and Completions, are displayed below the table.

When you click the plus (+) icon next to the domains sub-node under the main BPEL Processes node, ADP expands the tree to show all managed BPEL domains currently deployed on that particular Oracle SOA Suite instance.

You can see information specific to a particular process. By selecting a specific process, all information displayed in the Main Display Window changes to only show data relevant to this new context.

To see the BPEL process work flow associated with a BPEL process, select the node, right-click and select the Display Functional View option. ADP displays the appropriate functional work flow diagram and associated performance data in a new pop-up window.

See [Table 39–8](#) for BPEL Functional View summary.

Table 39–8 BPEL Functional View Summary

Column/Metric	Description
Activity	Name of a specific activity in the BPEL process
Type	Control Type for a specific node
Arrivals	Number of requests that have arrived for a specific node
Response Time (ms)	Average response time for a specific node
Completions	Number of completed requests for a specific node
Errors	Number of aborted instances for a specific node
Response Time Min (ms)	Minimum response time for a specific node
Response Time Max (ms)	Maximum response time for a specific node

By looking at this summary table, you can determine which BPEL process node is running slowly and whether there are errors.

In addition to the summary, the following views are available for a node:

- Delay Analysis view
- Metadata view
- Partner Links view
- Partner Link Type Role view
- Partner Link Bindings view
- Modeled Entities view
- Topology view

You can get to these views by selecting the appropriate tab.

39.2.4.1 Delay Analysis View

Delay Analysis gives you a bird's eye view of a specific BPEL process. You can see what nodes in the BPEL process are taking up a majority of the average elapsed time. The red bar indicates the slowest BPEL process group or BPEL process node. The blue represents the time spent for the particular nodes.

39.2.4.2 Metadata View

The Metadata view displays the tables containing specific metadata associated with the selected active BPEL process being displayed in the left-hand pane. Information provided in this view includes caller and called class metadata information as well as general summarized metadata in relation to the BPEL process and the associated web services. [Table 39–9](#) explains the metadata.

Table 39–9 Metadata View Summary

Column/Metric	Description
SummaryTable -Process	Name of the BPEL process node
SummaryTable -Web Service	Name of the web service being called from the BPEL process
SummaryTable -Version	Version of the web service being called from the BPEL process
SummaryTable -Location	Location of the web service being called from the BPEL process
Caller Table - Caller Class	Class name for the caller class that is calling the BPEL process
Caller Table - Caller Method	Class method for the caller class that is calling the BPEL process
Caller Table -Target Host	Target host that the caller class targeted to instantiate the BPEL process
Caller Table -Target Port	Target port that the caller class targeted to instantiate the BPEL process
Caller Table -Target URL	Target URL that the call class targeted to instantiate the BPEL process
Caller Table - Invocation Count	Number of invocations of the BPEL process instantiated by the caller class
Caller Table - Response Time	Average response time of the BPEL process instantiated by the caller class
Called Clients Table - Called Class	Class name of the class that was called by the BPEL process
Called Clients Table - Target URL	Target URL of the class that was called by the BPEL process
Called Clients Table - Invocation Count	Number of invocations made from the BPEL Process to the called class.
Called Clients Table - Response Time	Response time of the called class

39.2.4.3 Partner Links View

The partner links view provides detailed information on the various roles related to how and why the partner link service is being utilized. The information provided includes both the caller and callee roles, as well as the partner link type. See [Table 39–10](#).

Table 39–10 Partner Links View Summary

Column/Metric	Description
Partner Link	Name of the partner link
My Role	Role in regards to the BPEL process calling the partner link service
Partner Role	Role of the partner link service
Partner Link Type	Partner link category (type) of the service being called

39.2.4.4 Partner Link Type Role View

See [Table 39–11](#) describes the columns in the Partner Link Type Role view.

Table 39–11 Partner Link Type Role View Summary

Column/Metric	Description
Name	Name of the partner link
Link Type Name	Category (type) of the partner link
Port Type	Partner link service URL

39.2.4.5 Partner Link Bindings View

The Partner Link Bindings view provides insight into the actual roles and types of the partner link instances which represent web services that have been bound by the BPEL process. See [Table 39–12](#).

Table 39–12 Partner Link Bindings View Summary

Column/Metric	Description
Partner Link Role	Defines the web service role that the BPEL process will communicate with
Partner Link Type	Defines the web service type that the BPEL process will communicate with
WebService PortType	Name of the web service
WebService Port Namespace ID	URL of the webservice instance

39.2.4.6 Modeled Entities View

The modeled entities view consist of a list and count of the general entities as catalogued during the discovery phase of the resource configuration. The tables contain both a total entity count as well as a breakdown of the entity count by entity type. See [Table 39–13](#).

Table 39–13 Modeled Entities Summary

Column/Metric	Description
Total Entities Modeled Table - Total	Total entities (static label)
Total Entities Modeled Table - Count	Total number of entities catalogued during the discovery phase of the BPEL process
Modeled Entities Table - Entity Type	Entity type being catalogued as part of the discovery phase of the BPEL process
Modeled Entities Table - Count	Total number of entities catalogued during the discovery phase of the BPEL process for a particular entity type

39.2.4.7 Topology View

The Topology View utilizes the modeled entities that were captured during the discovery process to provide a bird's eye view of all of the various high-level relationships between BPEL processes, web services, and business services. You can toggle between static and dynamic relationship views using the tabs at the top of the Topology pane.

39.2.4.8 Node Hierarchy

Expanding a particular BPEL process further, the first item you see is the Node Hierarchy node. By selecting the Node Hierarchy node, ADP provides a list of nodes associated with the specific process.

When you click the plus (+) icon next to a specific Node Hierarchy node, ADP expands the tree to show BPEL process nodes in the Node Hierarchy. Click an individual BPEL

process node to see the load and performance of the selected node in the Main Display Window.

The BPEL process node information also includes the name of the method invoked. This information is displayed as part of the summary table at the top of the main view window.

39.2.5 Oracle ESB

The Oracle ESB node under Oracle Enterprise Manager contains information about all of the deployed Oracle ESB servers running in the managed domain. ADP organizes the information for various Oracle ESB nodes into various categories.

When you select the root of the ESB tree, ADP displays the ESB Summary in the Main Display Window.

The ESB Summary includes the following (Table 39–14):

Table 39–14 ESB Summary Metrics

Metric	Description
ESB System	Name of ESB System
ESB Service	Name of the ESB Service identifier
Arrivals	Total number of ESB service instance arrivals
Completions	Total number of ESB service instance completions
Response Time	Total number of completed instances for a specific BPEL process. A Completed status represents a BPEL process instance that has finished normally.

ADP presents these metrics in a table format in the Main Display Window when you select the ESB node. When you click the plus (+) icon next to the ESB Systems sub-node under the main ESB node, ADP expands the tree to show all managed ESB Systems currently deployed on that particular Oracle SOA Suite instance.

You can see information specific to a particular ESB System. By selecting a specific ESB System, all information displayed in the Main Display Window changes to only show data and the topology relevant to this new context.

By looking at the summary table, you can find out which ESB node is running slowly and whether there are errors.

Besides the summary, the following views are available for the Node Hierarchy node:

- Service Details view
- Service Parent Details view
- Service Definition view
- Service Operations view
- Operation Routing Rules view
- Topology view

You can get to these views by selecting the appropriate tab.

39.2.5.1 Service Details View

The Service Details view provides specific information related to the details of the bound service process instances. Instance IDs and other descriptive details are

included as part of this view. See [Table 39–15](#).

Table 39–15 Service Details View Summary

Column/Metric	Description
Service Name	Name of the ESB service
GUID	GUID of the ESB service
Qname	Canonical qualified name for the bound ESB service
Description	Description of the ESB service

39.2.5.2 Service Parent Details View

The Parent Service Details view provides specific information related to the details of the parent of the bound service process instances. Instance IDs, roles, and other descriptive details are included as part of this view. See [Table 39–16](#).

Table 39–16 Service Parent Details View Summary

Column/Metric	Description
Service Name	Name of the parent ESB service
ParentGUID	GUID of the parent ESB service
ParentQname	Canonical qualified name for the parent of the bound ESB service
ParentType	Parent type of the parent ESB service
MyRole	Role of the caller of the parent ESB service instance
ParentRole	Role of the callee of the parent ESB service instance

39.2.5.3 Service Definition View

The Service Definition view contains information regarding the bound ESB service including the Business Service (ESB) WSDL and Port Type as well as the associated URLs. See [Table 39–17](#).

Table 39–17 Service Definition View Summary

Column/Metric	Description
Service Name	Name of the ESB service
BusinessServiceWSDL	URL of the Business Service WSDL
BusinessServicePortType	Port type of the Business Service
ConcreteServiceWSDL	URL of the Concrete Service WSFL
ConcreteServiceURI	URI for the concrete service

39.2.5.4 Service Operations View

The Service Operations views provides details regarding the various method operations being executed. All information is provided in regards to the metadata associated with a specific business service instance. See [Table 39–18](#).

Table 39–18 Service Operations View Summary

Column/Metric	Description
Service Name	Name of the ESB service

Table 39–18 (Cont.) Service Operations View Summary

Column/Metric	Description
Name	Service operation name being executed
GUID	GUID of the ESB service
Qname	Canonical qualified name for the bound ESB service
Element	Associated element within the ESB Service
SchemaLocation	Schema location for the associated ESB service
Type	Type of ESB service operation

39.2.5.5 Operation Routing Rules View

The Operation Routing Rules view provides various details regarding the operation routing rules for Business Service operations. This includes the specific instance business service names being utilized for operations. See [Table 39–19](#).

Table 39–19 Operation Routing Rules View Summary

Column/Metric	Description
Service Name	Name of the ESB service
Name	Instance name ID of the ESB service instance
GUID	GUID of the ESB service instance

39.2.6 Services

The Services node in the navigation tree contains information about all external entry points into the managed domain. ADP currently monitors the following types of services:

- HTTP
- EJBs
- JDBC

Selecting each service type reveals service summary in the Main Display Window.

The minimum and maximum response time measurements are stored in the database in addition to the average response time measurements. These metrics, if present, display visually in the window in the right pane.

ADP displays entry point activity summary associated with the selected EJB service.

Tip: Setting thresholds at some of these entry points enables ADP to monitor the performance of key business services. When a violation event occurs, you can begin investigating from the Service node.

39.2.6.1 HTTP

Expanding the HTTP node under the Services node reveals a list of discovered HTTP based entry points into the managed domain. HTTP service end points include JSPs, struts actions, and servlet mappings. These discovered HTTP entry points are listed by their root context. When you select a specific HTTP entry point, ADP displays the associated summary in the Main Display Window.

When a specific file is selected, ADP displays more detailed performance data.

Method level performance data is displayed when you select a specific HTTP service entry point.

Table 39–20 HTTP Performance Summary

Column/Metric	Description
Servlet	Name of the servlet associated with the selected service
Method	Name of the method invoked by external call
Arrivals	Total number of requests received by this method
Invocation Count	Total number of method invocations
Response Time (ms)	Average method response time in milliseconds

39.2.6.2 EJBs

To view the performance summary for EJBs invoked from outside the JVM, click the EJBs node.

Table 39–21 EJB Performance Summary

Column/Metric	Description
EJB	Name of the EJB
Invocation Count	Number of times the EJB is called
Response Time (ms)	Average response time for the EJB in milliseconds
Delay (ms)	Overall delay contributed by the EJB in milliseconds

Tip: As a general rule, external calls that terminate in EJBs are RMI calls. Web services calls that ultimately terminate in EJBs use SOAP and enter the application server via HTTP.

39.2.6.3 JDBC

To bring up the performance summary for JDBC operations invoked from outside of the JVM, click the JDBC node.

Table 39–22 JDBC Performance Summary

Column/Metric	Description
SQL Statement	Generalized SQL Statement executed by the JDBC operation
Class	Name of the class used in the JDBC operation
Method	Name of the method used in the JDBC operation
Invocation Count	Number of times the JDBC operation is called
Response Time (ms)	Average response time for the JDBC operation in millisecond
Delay (ms)	Overall delay contributed by the JDBC operation in milliseconds

39.2.7 Applications

The Applications node in the navigation tree contains information about all deployed applications in the managed domain. By selecting the Applications node, ADP displays the Applications Summary.

The Applications Summary includes the following information ([Table 39–23, "Applications Summary"](#)):

Table 39–23 Applications Summary

Column/Metric	Description
Application	Name of application
Status	Operations status for a specific application
Response Time (ms)	Average response time in milliseconds for a specific application. This is the average of response times of all JSPs and servlets contained in the deployment archive.
Invocation Count	Total number of invocations for a specific application. This is the total invocation count of all JSPs and servlets contained in the deployment archive.

Tip: Application is a packaging unit in Java EE. Each EAR, WAR, and JAR files deployed to the application server is considered an individual application. These metrics track performance and arrival rate of these entities.

ADP presents these metrics in a table format in the Main Display Window when you select the Applications node. Graphical representations of the following metrics, Response Time, Invocation Count, and Active Sessions, are displayed below the table.

Expand the Applications tree by clicking the plus (+) icon next to Applications node. You can get more information about a specific application.

ADP displays performance summary for the selected application in the Main Display Window. You can obtain additional performance data by clicking different tabs in the Main Display Window.

The Applications Summary includes the following tabs ([Table 39–24](#)):

Table 39–24 Applications Summary Tabs

Tab Name	Description
Summary	Includes performance data at the application level including time-based trend graphs of Application Response Time, Application Invocation Count, and Application Active Sessions. The invocation count and response time for the top 10 slowest servlets, the usual application entry points, are also included.
Response Times	Includes time-based trend graphs of component response times. Graphs include Servlet Response Time, EJB Response Time, and JDBC Response Time.
Invocations	Includes time-based trend graphs of component invocation counts. Graphs include Servlet Invocation Count, EJB Invocation Count, and JDBC Invocation Count.
Errors/Exceptions	Errors metrics associated with the selected portal.
Transactions	Transaction events associated with the selected portal and children below. By default, the Transactions tab is not enabled.
Modeled Entities	Includes a catalog of entities modeled by ADP. Only the modeled entities associated with the selected application are included.
Instrumentation	Includes performance data by different types of instrumentation probe points. There are different tabs available: Class, Method, and SQL. Each tab includes basic information such as Probe Point Name, Invocation Count, and Response Time. This detailed performance data can help you identify low-level bottlenecks.
Topology	Includes the topology view associated with the selected application.

Under each named application node, ADP displays performance and other relevant information specific to that application. For example, by clicking the children nodes, the relevant data is displayed in the Main Display Window. Application response time

and invocations measurements can be reached by clicking the panes in the Main Display Window.

In this section, we will further expand on the following nodes:

- Services
- Dependencies
- Deployments
- Workshop Projects
- Web Applications
- Stateless Beans
- Stateful Beans
- Entity Beans
- Message Driven Beans

Note: The number of children nodes available under each application node depends solely on the complexity of the selected application. Simple Java EE web applications will not have nodes like Workshop Projects, Stateless Beans, Stateful Beans, Entity Beans, and Message Driven Beans.

39.2.7.1 Services

The Services node includes all the external entry points associated with the selected application. When this node is selected, ADP displays a summary view in the Main Display Window. ADP displays the performance data associated with various entry points associated with the selected application.

Tip: The children nodes under the Services node include entry point specific performance data.

39.2.7.2 Dependencies

The Dependencies node shows a list of internal and external components and share resources that a specific application depends on for its normal operation. When the Dependencies node is selected, ADP displays all external references made by the application in the Main Display Window. The following is a list of columns and their descriptions (Table 39–25):

Table 39–25 Dependencies Column Descriptions

Column/Metric	Description
Name	Display name of the component or resource used by the application. If this is undefined in the Deployment Descriptor, the reference name for the component is used.
Reference	Reference name of the component or resource used by the application.
Reference Type	Component or resource type.
Referer Component	Name of the component that is part of the application which obtained the reference to external component or resource.
Referer Module	Name of the module that is part of the application which obtained the reference to external component or resource.

ADP displays all the references associated with components in the selected application.

The Dependencies node can be further expanded by clicking the plus (+) icon. The children nodes of the Dependencies node are organized by type. Here are the list of dependency types and their descriptions ([Table 39–26](#)):

Table 39–26 *Dependency Types*

Dependency Type	Description
Data Sources	All shared data sources used by the application
Entity Beans	All entity beans used by the application
Session Beans	All session beans used by the application
JMS Queues	All JMS queues used by the application for publishing JMS messages
JMS Topics	All JMS topics subscribed by the application
Web Services	All web services used by the application

When a specific node is selected, ADP displays relevant performance summary. These nodes can also be expanded by clicking the plus (+) icons. The expanded tree includes specific components and share resources used by the application.

The Performance summary view associated with the Data Sources node under Dependencies provides information on both connection pools and SQL statements.

For more information on the metric description, refer to [Section 39.1.9, "Metric Types"](#).

39.2.7.3 Deployments

The Deployments node shows the architecture of the deployed application. When this node is selected, ADP shows all the modules deployed as part of this application. The default view in the Main Display Window shows the active module-level call path.

[Table 39–27](#) lists the tabs available as part of this summary view and their descriptions.

Table 39–27 *Deployment Tabs*

Tab Name	Description
Module Level Execution	Shows the active calling relationships among various Java EE modules (EAR, WAR, JAR, and more). Shared resources are also included. This is the default Architecture View at the module level.
Module Level	Shows the potential calling relationships among various Java EE modules. Shared resources are also included. By default, the Module Level tab is not enabled.
Instrumentation	Includes detailed performance data at the method level. The table includes caller components, caller method, callee (target) component, callee module, invocation count, and response time.
SQL Statement	Includes all SQL statements executed as part of this application. It also includes performance information such as invocation count and response time.

Active module-level call path is displayed as the default view for the Deployments node of a selected application.

Double-click a specific module to trigger ADP to display the architecture of the selected module.

Expand the Deployments node by clicking the plus (+) icon to reveal all the deployed modules in this application. Further expanding the nodes at the *module* level reveals

components associated with the selected module. Further expanding the nodes at the *component* level reveals methods associated with the selected component.

When you select one of these children nodes (module, component, and method levels), ADP displays associated tabs for active call path diagram, static call path diagram, instrumentation and SQL statements.

Tip: Use the active call path diagram as a guide to identify entities with performance data. If an entity does not have performance data, ADP displays *No data available for the selected time frame* in the Main Display Window.

39.2.7.4 Workshop Projects

The Workshop Projects node includes performance information about modules and components created using the Oracle WebLogic Workshop. These modules and components include WebLogic Integration processes, WebLogic Integration web services, and WebLogic Portal pageflows.

Workshop Project node and its children nodes provide performance data associated with WLI processes, web services, and WLP pageflows.

When you select a specific children node, ADP displays detailed performance information.

39.2.7.5 Web Applications

The Web Applications node includes performance information related to the Web Applications modules and components associated with the selected application. Click the Web Applications node to reveal a performance summary in the Main Display Window. Click the plus (+) icon to expand the Web Applications node to reveal various web modules deployed as part of this application.

Click the plus (+) icon to expand on a specific web module and reveal different groupings for web components, for example, Pageflows, Struts Modules and Servlets. Clicking one of these nodes triggers ADP to display rolled up performance summary for the entire grouping. You can further expand these nodes by clicking the plus (+) icon to reveal more detailed information. Fully expanded Web Applications node contains all web modules organized by type.

Detailed performance information at the individual pageflow, struts action, and servlet levels will be displayed when you click the lowest level nodes.

39.2.7.6 Stateless Beans

The Stateless Beans node includes activity information related to the stateless EJB components associated with the selected application. Click the Stateless Beans node to reveal an activity summary in the Main Display Window. Click the plus (+) icon to expand the Stateless Beans node to reveal various stateless EJBs deployed as part of this application.

You can further select individual nodes to obtain detailed activity information. Selecting a specific Stateless Bean node triggers ADP to display detailed activity metrics.

The detailed view contains the following activity metrics ([Table 39–28](#)):

Table 39–28 Stateless Beans Detail View

Column/Metric	Description
EJB	Name of the stateless EJB.
In Use	Number of instances for a specific stateless EJB currently being used from the free pool. [Snapshot Count]
Idle	Number of instances for a specific stateless EJB currently in the idle state in the free pool. These bean instances are available for use. [Snapshot Count]
Waits	Number of threads currently waiting for a specific stateless EJB bean instance from the free pool. [Snapshot Count]
Timeouts	Total number of threads that have timed out waiting for an available bean instance from the free pool. [Aggregated Count]

Note: The metrics reported in the Stateless Beans node are reported by the MBean (Management Bean) of the EJB container. These activity metrics can be used for checking the overall health of the EJB container. When the EJB container is restarted, these metrics are reset.

39.2.7.7 Stateful Beans

The Stateful Beans node includes activity information related to the stateful EJB components associated with the selected application. Click the Stateful Beans node to reveal an activity summary in the Main Display Window. Click the plus (+) icon to expand the Stateful Beans node to reveal various stateful EJBs deployed as part of this application.

You can further select individual nodes to obtain detailed activity information.

The Stateful EJB Summary includes the following tables:

- Stateful EJB Cache
- Stateful EJB Transactions
- Stateful EJB Locking

39.2.7.7.1 Stateful EJB Cache Stateful EJB Cache table includes the following information ([Table 39–29](#)):

Table 39–29 Stateful EJB Cache

Metrics	Description
EJB	Name of the Stateful EJB
Hits	Total number of times an attempt to access the Stateful EJB instance from the cache succeeded [Aggregated Count]
Accesses	Total number of attempts to access the Stateful EJB instance from the cache [Aggregated Count]
Size	Number of beans instances from this Stateful Home currently in the EJB cache [Snapshot Count]
Activations	Total number of beans from this Stateful Home that have been activated [Aggregated Count]
Passivations	Total number of beans from this Stateful Home that have been passivated [Aggregated Count]

Tip: Passivation (serializing EJB state information to disk) and activation (reconstitute EJB state information from disk) are resource intensive operations. Ideally, Oracle recommends low level of activity in these metrics.

39.2.7.7.2 Stateful EJB Transactions Stateful EJB Transactions table includes the following information (Table 39–30):

Table 39–30 Stateful EJB Transactions

Metrics	Description
EJB	Name of the Stateful EJB
Commits	Total number of transactions that have been committed for this Stateful [Aggregated Count]
Rollbacks	Total number of transactions that have been rolled back for this Stateful [Aggregated Count]
Timeouts	Total number of transactions that have timed out for this EJB [Aggregated Count]

Tip: High number of EJB Transaction Rollbacks may indicate problems with the data used; for some reason the target database is unable to commit the change. High number of EJB Transaction Time-outs may indicate problems accessing the database including network outage, database lock contention, and database outage.

39.2.7.7.3 Stateful EJB Locking Stateful EJB Locking table includes the following information (Table 39–31):

Table 39–31 Stateful EJB Locking

Metric	Description
EJB	Name of the Stateful EJB
Entries	Number of Stateful EJB instances currently locked [Snapshot Count]
Lock Accesses	Total number of attempts to obtain a lock on an Stateful EJB instance [Aggregated Count]
Current Waiters	Number of Threads that currently waiting for a lock on an Stateful EJB instance [Snapshot Count]
Total Waiters	Total number Threads that have waited for a lock on an Stateful EJB instance [Aggregated Count]
Timeouts	Total number Threads that have timed out waiting for a lock on an Stateful EJB instance [Aggregated Count]

Tip: Pay attention to Current Waiters and Time-outs. These metrics can indicate possible performance problems caused by EJB Locking. Ideally, 0s should be displayed for these metrics.

ADP presents these metrics in a table format in the Main Display Window when you select the Stateful Beans node. Graphical representations of two metrics, Stateful EJB cache access, and Stateful EJB lock access, are displayed below the table.

By looking at the activities related to Stateful EJBs, you can determine if there any abnormal activities associated with Stateful EJBs.

Note: The metrics reported in the Stateful Beans node are reported by the MBean (Management Bean) of the EJB container. These activity metrics can be used for checking the overall health of the EJB container. When the EJB container is restarted, these metrics are reset.

39.2.7.8 Entity Beans

The Entity Beans node includes activity information related to the Entity EJB components associated with the selected application. Click the Entity Beans node to reveal an activity summary in the Main Display Window. Click the plus (+) icon to expand the Entity Beans node to reveal various Entity EJBs deployed as part of this application.

You can further select individual nodes to obtain detailed activity information. Selecting a specific Entity Bean node triggers ADP to display detailed activity metrics.

The Entity EJB Summary includes the following tables:

- Entity EJB Activity
- Entity EJB Cache
- Entity EJB Transactions
- Entity EJB Locking

39.2.7.8.1 Entity EJB Activity Entity EJB Activity table includes the following information (Table 39–32):

Table 39–32 *Entity EJB Activity*

Metrics	Description
EJB	Name of the Entity EJB.
In Use	Number of instances for a specific Entity EJB currently being used from the free pool. [Snapshot Count]
Idle	Number of instances for a specific Entity EJB currently in the idle state in the free pool. These bean instances are available for use. [Snapshot Count]
Waits	Number of Threads currently waiting for a specific Entity EJB instance from the free pool. [Snapshot Count]
Timeouts	Total number of Threads that have timed out waiting for an available bean instance from the free pool. [Aggregated Count]

Tip: Pay attention to Waits and Timeouts metrics. Activities in the Waits metric and increasing count in the Timeouts metric are signs that requests are waiting to be serviced by the EJB container. Ideally, 0 should be indicated for these metrics.

39.2.7.8.2 Entity EJB Cache Entity EJB Cache table includes the following information (Table 39–33):

Table 39–33 Entity EJB Cache

Metrics	Description
EJB	Name of the Entity EJB
Hits	Total number of times an attempt to access the Entity EJB instance from the cache succeeded [Aggregated Count]
Accesses	Total number of attempts to access the Entity EJB instance from the cache [Aggregated Count]
Size	Number of beans instances from this EJB Home currently in the EJB cache [Snapshot Count]
Activations	Total number of beans from this EJB Home that have been activated [Aggregated Count]
Passivations	Total number of beans from this EJB Home that have been passivated [Aggregated Count]

Tip: Passivation (serializing EJB state information to disk) and activation (reconstituting EJB state information from disk) are resource intensive operations. Ideally, Oracle recommends a low level of activity in these metrics.

39.2.7.8.3 Entity EJB Transactions Entity EJB Transactions table includes the following information ([Table 39–34](#)):

Table 39–34 Entity EJB Transactions

Metric	Description
EJB	Name of the Entity EJB
Commits	Total number of transactions that have been committed for this EJB [Aggregated Count]
Rollbacks	Total number of transactions that have been rolled back for this EJB [Aggregated Count]
Timeouts	Total number of transactions that have timed out for this EJB [Aggregated Count]

Tip: High numbers of EJB Transaction Rollbacks may indicate problems with the data used; for some reason the target database is unable to commit the change. High numbers of EJB Transaction Timeouts may indicate problems accessing the database including network outage, database lock contention, database outage, and more.

39.2.7.8.4 Entity EJB Locking Entity EJB Locking table includes the following information ([Table 39–35](#)):

Table 39–35 Entity EJB Locking

Metric	Description
EJB	Name of the Entity EJB
Entries	Number of Entity EJB instances currently locked [Snapshot Count]
Lock Accesses	Total number of attempts to obtain a lock on an Entity EJB instance [Aggregated Count]
Current Waiters	Number of Threads that currently waiting for a lock on an Entity EJB instance [Snapshot Count]
Total Waiters	Total number Threads that have waited for a lock on an Entity EJB instance [Aggregated Count]
Timeouts	Total number Threads that have timed out waiting for a lock on an Entity EJB instance [Aggregated Count]

Tip: Pay attention to Current Waiters and Timeouts. These metrics can indicate possible performance problems caused by EJB Locking. Ideally, 0s should be displayed for these metrics.

When you select the Entity Beans node, ADP presents these metrics in a table format in the Main Display Window. Graphical representations of the following metrics, Entity EJB in use, Entity EJB cache access, and Entity EJB lock access, are displayed below the table.

Expand the Entity Beans tree by clicking the plus (+) icon next to Entity Beans node. You can get the same summary as previously described for a specific Entity EJB.

By looking at the activities related to Entity EJBs, you can determine if there any abnormal activities associated with Entity EJBs.

Note: The metrics reported in the Entity Beans node are reported by the MBean (Management Bean) of the EJB container. These activity metrics can be used for checking the overall health of the EJB container. When the EJB container is restarted, these metrics are reset.

39.2.7.9 Message Driven Beans

The Message Driven Beans node includes activity information related to the message driven EJB components associated with the selected application. Click the Message Driven Beans node reveals an activity summary in the Main Display Window. Click the plus (+) icon to expand the Message Driven Beans node to reveal various message driven EJBs deployed as part of this application.

You can further select individual nodes to obtain detailed activity information.

The Message Driven EJB Summary includes the following tables:

- Message Driven EJB Activity
- Message Driven EJB Transactions

39.2.7.9.1 Message Driven EJB Activity Message Driven EJB Activity table includes the following information ([Table 39–36](#)):

Table 39–36 *Message Driven EJB Activity*

Metric	Description
EJB	Name of the Message Driven EJB.
In Use	Number of instances for a specific Message Driven EJB currently being used from the free pool. [Snapshot Count]
Idle	Number of instances for a specific Message Driven EJB currently in the idle state in the free pool. These bean instances are available for use. [Snapshot Count]
Waits	Number of Threads currently waiting for a specific Message Driven EJB instance from the free pool. [Snapshot Count]
Timeouts	Total number of Threads that have timed out waiting for an available bean instance from the free pool. [Aggregated Count]

Tip: Pay attention to Waits and Timeouts metrics. Activities in the Waits metric and increasing count in the Timeouts metric are signs that requests are waiting to be serviced by the EJB container. Ideally, 0 should be indicated for these metrics.

39.2.7.9.2 Message Driven EJB Transactions Message Driven EJB Transactions table includes the following information (Table 39–37):

Table 39–37 Message Driven EJB Transactions

Metric	Description
EJB	Name of the Message Driven EJB
Commits	Total number of transactions that have been committed for this EJB [Aggregated Count]
Rollbacks	Total number of transactions that have been rolled back for this EJB [Aggregated Count]
Timeouts	Total number of transactions that have timed out for this EJB [Aggregated Count]

Tip: High numbers of EJB Transaction Rollbacks may indicate problems with the data used; for some reason the target database is unable to commit the change. High numbers of EJB Transaction Timeouts may indicate problems accessing the database including network outage, database lock contention, database outage, and more.

ADP presents these metrics in a table format in the Main Display Window when you select the Message Driven Beans node. Graphical representation of the Message Driven EJB in use metric is displayed below the table.

By looking at the activities related to Message Driven EJBs, you can determine if there are any abnormal activities associated with Message Driven EJBs.

Note: The metrics reported in the Message Driven Beans node are reported by the MBean (Management Bean) of the EJB container. These activity metrics can be used for checking the overall health of the EJB container. When the EJB container is restarted, these metrics are reset.

39.2.8 Oracle WebLogic Resources

The Resources node under Oracle Enterprise Manager contains information for the managed domain organized by logical clusters, machines, servers, and more. You can look for low-level technology metrics organized by technology subsystems for a specific WebLogic Server.

The Resources tree includes the following nodes (Table 39–38):

Table 39–38 WebLogic Resources Tree

Example Node	Description
CSS Domain	Name of the WebLogic Domain configured
b-15/192.168.128.15	ID of the physical machine
cgServer	Name of the WebLogic Server configured
Applications	Performance measurements of all deployed applications running on this server
JDBC	Information of all configured JDBC resources for this server
JMS Servers	Information of all JMS destinations configuration for this server
Execute Queues	Information of all Execute Queues configured for this server
JVM	JVM information including Heap Size for this server

Table 39–38 (Cont.) WebLogic Resources Tree

Example Node	Description
JRockit	JRockit information including Heap Size for this server
Modeling Status	Entities modeled by ADP for this server
ADP Modules	Status of the ADP Java Agent Module for this server

Expand these nodes by clicking the plus (+) icon next to the node name to get more information.

If the ADP OS Agent is deployed on the machine, clicking on the physical machine ID would show OS metrics collected by the OS Agent. These OS metrics include CPU Usage, Disk Usage, and Physical Memory Usage.

39.2.9 Oracle Resources

The Resources node under Oracle Enterprise Manager contains information for the managed domain organized by logical clusters, machines, servers, and more. You can look for low-level technology metrics organized by technology subsystems for a specific Oracle AS Server.

The Resources tree includes the following nodes ([Table 39–39](#)):

Table 39–39 Oracle Resources Tree

Example Node	Description
Managed System Resource Name	Top-level Resource name, for example, oc4j_soa
Oracle AS Server	Machine name which can be navigated to both within or outside a cluster, for example, oc4j_soa@192.168.1.119 which includes both the server name and the host server IP address
Applications	Performance measurements of all deployed applications running on this server
JDBC	Information of all configured JDBC resources for this server
JMS Servers	Information of all JMS destinations configuration for this server
Thread Pools	Performance information about all threads used by the container to process requests
JVM	JVM information including Heap Size for this server
BPEL Processes	Performance measurements about BPEL Processes deployed in the container
ESB	Performance measurements about ESB services deployed in the container
Modeling Status	Modeled entities for the container
ADP Modules	Status of the ADP Java Agent Module for this server
Applications	Performance information about the applications deployed in the container

Clicking the physical machine ID would show OS metrics. These OS metrics include CPU Usage, Disk Usage, and Physical Memory Usage.

39.2.10 Custom Metrics

The Custom Metrics node under Oracle Enterprise Manager contains all the custom metrics you defined. Currently ADP supports custom metrics for Java classes. When Custom Metrics node is selected, ADP displays various summaries. You can select individual entities to get more detailed performance information.

Expanding the Custom Metrics node reveals a list of Java classes with custom metrics configured.

The following is a list of columns in the Custom Class Performance table and their descriptions (Table 39–40):

Table 39–40 Custom Class Performance

Column/Metric	Description
Caller Class	Fully qualified name of the class that is making the inbound call
Caller Method	Method name in the class that is making the inbound call
Class	Fully qualified name of the class that is the destination of the inbound call
Invocation Count	Total number of times the inbound call is made
Response Time (ms)	Average response time of the inbound call in milliseconds

39.2.11 Status

Status in the navigation tree contains information for the ADP environment for the monitored WebLogic domain, WebSphere cell, or Oracle AS cluster. Select Status to see the ADP Java Agent status for the WebLogic domain.

The ADP Java Agent status includes the following (Table 39–41):

Table 39–41 ADP Java Agent Status

Column/Metric	Description
Server	Name of the WebLogic server, WebSphere cell, or Oracle AS cluster
Container Status	Operational status of the WebLogic, WebSphere, or Oracle AS server (running or not)
Agent In Sync	Version synchronization between ADP and ADP Agent status (true or false)
EJB Installed	ADP EJB installation status (true or false)
Agent Installed	ADP Java Agent installation status
Agent Activated	ADP Java Agent activation status
Agent Status	ADP Java Agent operational status
Server Type	Identifies server as administration, individual, or clustered server
Admin URI	Location of the domain admin server
Manager RMI Registry Host	Host name of the ADP RMI registry
Manager RMI Registry Port	Port number of the ADP RMI registry
EJB Major Version	ADP EJB major version
EJB Minor Version	ADP EJB minor version
EJB Build ID	ADP EJB build number - for version synchronization check
Agent Major Version	ADP Java Agent major version
Agent Minor Version	ADP Java Agent minor version
Agent Build ID	ADP Java Agent build number - for version synchronization check

Click the Modeling Status node under Status to see a table of all modeled entities in the managed domain. This table shows all the managed clusters, servers, and

applications in the ADP environment. Mismatches between the Modeling Status table and your environment are indications of configuration problems.

You can use this information to debug and resolve ADP configuration issues.

39.2.12 Service Component Architecture (SCA)

Service Component Architecture (SCA) provides a set of features and services that simplify the process of detecting the presence of Service-Oriented Architecture (SOA) components.

Table 39–42 SCA Composites

Composite	Description
Services	Metrics related to Services defined on the SOA composite.
Wires	Metadata related to Wires defined in the SOA composite
References	Metrics related to References defined in the SOA composite
Components	Metrics related to Components within the SOA composite

39.2.12.1 Components

The following components make up the Service Component Architecture:

Table 39–43 Components in SCA

Component	Description
Decision Services	Metrics related to components in the Decision Services engine
Mediators	Metrics related to components in the Mediator engine
Human Workflows	Metrics related to components in the Human Workflow engine
BPEL	Metrics related to components in the BPEL engine

39.3 Exploring the Configuration Tab

Using the Configuration tab you can set up the resources you want to monitor using ADP.

The configurations explained in this section are:

- [Database Configuration](#)
- [Resource Configuration](#)
- [Service Level Objective Configuration](#)
- [Custom Metric Configuration](#)

A running ADP manager must be registered in Enterprise Manager. After the registration, Enterprise Manager continues to keep the manager as a valid manager even if it is down. When this occurs, the Enterprise Manager UI displays the ADP manager as Unreachable.

39.3.1 Database Configuration

The Database Configuration page lists the databases accessible to ADP which you want to monitor. You can configure a database to be used by ADP, edit an existing database configuration, delete a database configuration, and enable a configuration.

39.3.2 Resource Configuration

The Resource Configuration node in the Configuration tree enables you to create resources (for example, target application server domains) that can be monitored by ADP.

39.3.3 Service Level Objective Configuration

In ADP, thresholds configured for various measurements are called Service Level Objectives (SLOs). A service level objective is a measurable attribute, for example, availability. Service Level Agreements (SLA) are made up of SLOs.

Configuring SLOs is a key activity for establishing and maintaining an effective performance monitoring system. To configure a SLO, click the **Configuration** tab and select the **Service Level Objective Configuration** option.

ADP categorizes SLOs into the following types:

- **Performance**
Depicts the relative responsiveness of the monitored entity to the configured threshold.
- **Availability**
Informs you to what extent a particular entity is available to service requests.
- **Errors**
Informs you if the number of errors and exceptions encountered by this entity are approaching or violating the configured threshold.
- **Load**
Depicts how many operations have been performed and requests have been served by a particular entity.

ADP is aware of clusters. As such, these indicators display overall health of a particular entity across the entire cluster.

To configure a SLO, perform the following steps:

1. From the **Targets** menu, select **Middleware**. On the Middleware page, select **Application Dependency and Performance** from the Middleware Features menu. Ensure the Configuration tab is highlighted.
2. Select **SLO Blackout Configuration**.
3. You can view any existing SLO blackout.
4. Use this window to create, delete, or view the details of existing blackouts.

39.3.3.1 Creating a New SLO

When you select Service Level Objectives Configuration, ADP displays the Service Level Objective Configuration window. This window allows you to apply existing SLOs or create new ones. When you click **Create New SLO**, ADP guides you through the process of setting up a new SLO.

The steps for SLO creation are as follow:

1. Either select a SLO file or create a new SLO file. ADP can store SLO configurations in different files to improve configuration portability.
2. Define the SLO Entity Type. ADP automatically selects the appropriate entity type for you based on the selected monitoring element. For example, if you want to set

a SLO on a Portal Desktop element, ADP automatically sets the Entity Type for you.

3. Other information is filled in by default. Normally, there is no need to modify the SLO Entity values.
4. When you are done setting the SLO Entity Type values, click **Create New SLO** to go to the second step of the SLO creation process, Defining the SLO Parameters. Note: The (*) character means Select All. It is recommended that you do not use the (*) character.

Note: SLOs are hierarchical which allows you to set service levels at any level within the modeled hierarchy of an application.

39.3.3.2 Defining SLO Parameters

Follow these steps to define the SLO parameters:

1. Navigate to **Application Dependency and Performance**.
From the **Targets** menu, select **Middleware**. On the Middleware page, click the target of choice. On the **Home** tab, select the **Summary** region and click the **Application Dependency and Performance** link.
2. Expand the **Configuration** tab. Select **Service Level Objective Configuration**.
3. Either create a new SLO or edit an existing SLO.
4. Select the performance metric.
5. Define the monitoring window size, which determines how long the condition must persist before generating an alert.
6. Set threshold values for the SLO.
7. Select what actions to take when a trigger is fired. A list of preconfigured actions is available in the view pane.
8. Add new actions by going to the Action Configuration node in the Configuration Workspace.
9. Click **Save** to set the SLO for this monitored element.
10. You can delete unwanted SLOs for any element from this window.

Types of SLOs

ADP categorizes SLOs as Performance, Availability, Error, and Load.

SLO Events Viewer

Right-click on any tree node and select **View Service Level Objective Events** to open a new window. You can see all the SLO violation events triggered for the selected entity. ADP automatically applies a filter to show only relevant events.

Once new SLOs are added, ADP updates the relevant graphs to visually display these new thresholds. [Table 39–44](#) explains the different line types.

Table 39–44 SLO Line Types

Line Description	Description
Solid Red Line	A violation threshold that triggers on high.
Solid Yellow Line	A cautionary threshold that triggers on high.
Dashed Red Line	A violation threshold that triggers on low.

Table 39–44 (Cont.) SLO Line Types

Line Description	Description
Dashed Yellow Line	A cautionary threshold that triggers on low.

39.3.3.3 SLO Blackout Configuration

You can prevent having unwanted alerts being fired during planned or unplanned down time. The SLO Blackout Configuration node in the Configuration tree enables you to create time periods when information will not be monitored for a specific SLO. You can define blackouts by a SLO file, an individual SLO, or by entity.

39.3.3.4 Creating and Maintaining SLO Blackouts

You can prevent having unwanted alerts being fired during planned or unplanned down time. SLO Blackout Configuration enables you to create time periods when information will not be monitored for a specific SLO. You can define blackouts by a SLO file, an individual SLO, or by entity.

To create and maintain SLO blackouts, perform the following steps:

1. Navigate to Application Dependency and Performance.
From the **Targets** menu, select **Middleware**. On the Middleware page, click the target of choice. Select **Application Dependency and Performance** from the Middleware Features menu.
2. Expand the **Configuration** tab. Select **SLO Blackout Configuration**.
3. You can view any existing SLO blackout.
4. Use this window to create, delete, or view the details of existing blackouts.

Creating SLO Blackout

1. Click **Create SLO Blackout** to view the detail window.
2. On the SLO Blackout File page, type the name of the blackout in the New SLO Blackout File field. Click **Continue**.
3. On the SLO Blackout Configuration page, fill in the fields. Refer to [Table 39–45](#) for details.

Table 39–45 SLO Blackout Configuration

Column/Metric	Description
Blackout Name	Type in the name.
Description	Type in the description of the SLO you are creating.
Blackout By SLO File	Use to blackout at the file level. The SLO files display in a list where you can select them or cancel out of the window. This option restricts the blackout to the SLO file name.
Blackout By SLOs	Use to blackout at the SLO level. The SLOs display in a list where you can select them or cancel out of the window. This option restricts the blackout to the SLO name.

Table 39–45 (Cont.) SLO Blackout Configuration

Column/Metric	Description
Blackout By Entity	Use to blackout at the entity type level. Click the Blockout by Entity: button to view the list of entity types. Select the entity. This option restricts the blackout to the entity type selected.
year, month, date, hour, minute, duration	Use the guidelines to the right of these columns to enter the appropriate information.
recurring	Select how often you would like to run this blackout event from the list.

Viewing SLO Blackout Summary List

1. Click **SLO Blackout Summary List**.
2. View the details on the existing SLO Blackout events.
3. Click **Show SLO Blackout List** to return to the previous window.

Deleting SLO Blackout

1. Select an existing event on the list.
2. Click **Delete SLO Blackout**.
3. Confirm that you want to delete the entry and click **Yes**.

39.3.3.5 Propagating Threshold Violation Events

ADP is designed to propagate threshold violation events up the hierarchy. Therefore, when a SLO is set on a lower level metric, the higher level health indicator light becomes activated. Additionally, the health indicator light for the application server that hosts this component also becomes active. Oracle calls this *containment approach* to SLO event propagation. When a lower level SLO is violated, the violation event propagates all the way up the hierarchy and changes the status of all containers for this event.

39.3.4 Event Integration

Use the Enterprise Manager Incident console to check for events fired as a result of SLO violations in ADP.

To access the ADP alerts:

1. From the Enterprise menu, select **Monitoring**, then select **Incident Manager**.
2. In the Views region, select **Events without incidents**.

Look for events with target type "Application Deployment" and "Application Dependency and Performance Alert". These are the ADP alerts.

39.3.5 Custom Metric Configuration

There are cases where additional instrumentation is needed based on your specialized requirements. Custom metrics allow you to instrument a class or method of your choice and receive performance metrics collected by the ADP agent.

To create a metric configuration, do the following:

1. From the **Targets** menu, select **Middleware**. In the Related Links sections, select **Application Dependency and Performance**.

2. Click the **Configuration** tab, choose the configuration in which you are interested. Click **Custom Metric Configuration**.
3. In the right pane, click the **Create Custom Metric** button.
4. On the Custom Metric File page, choose whether to use an existing .xml file or a new file. If you choose a new file, the ADP Manager will create the new .xml file. Click **Continue**.
5. On the Custom Metric Configuration page, provide the following information:
 - Resource name is a monitored WebLogic domain or Oracle Application Server or WebSphere cell.
You created a name when you configured ADP to monitor. The same name is used here during custom metric configuration.
 - Class name is the name of the implementation class in the code. You are required to enter a fully qualified class name.
 - Method name is the name of the implementation method in the code.

After you define the custom metrics, restart the application server instances associated with these customizations. The new custom metrics will be listed under the Custom Metrics node in the ADP navigation tree.

The newly configured custom metric provides class level performance data, for example, invocation count and response time.

39.4 Exploring the Registration Tab

The managers perform complex mathematical modeling and statistical calculations with summarized data from all Java Agents.

Using the Registration tab, you can add, edit, and remove Managers configured to Enterprise Manager. By accessing ADP through Remote Method Invocation (RMI), you can manipulate all the managers configured to Enterprise Manager through a secured protocol.

39.4.1 Using RMI Configuration for Managers

In ADP, the Configuration tab lists all the managers currently configured to Enterprise Manager. By using the Configuration for Managers feature, you can access Application Dependency and Performance through Remote Method Invocation (RMI). You can then manipulate all the managers configured to Enterprise Manager through a secured protocol. The following sections provide additional information.

- [Adding a New Manager \(RMI Configuration\)](#)
- [Editing a Previously Configured Manager \(RMI Configuration\)](#)
- [Removing or Disabling a Previously Configured Manager](#)

The Configuration tab displays only if the Enterprise Manager user is an Administrator as defined by examining the user's role.

39.4.2 Adding a New Manager (RMI Configuration)

The first time the Registration tab displays there are no managers in the Managers tree. To add a new manager, perform the following steps:

1. Navigate to the **Application Dependency and Performance** feature.

From the **Targets** menu, select **Middleware**. In the **Related Links** section, click **Application Dependency and Performance**.

2. In the **Registration** tab, click the **Managers** node in the tree.
3. Type the new manager information in the Main Display window.
4. Decide whether this manager should be monitored.

Request monitoring provides end-to-end visibility into requests, localizes end-user performance problems to specific application deployments, and provides a platform for context-based drill down diagnostics.

When you select **Enable Request Monitoring**, ADP creates and sets up targets for collecting request performance data. If you do not select **Enable Request Monitoring**, the ADP manager is only registered in Enterprise Manager.

Note: The grayed out information represents configuration data for connecting to the ADP manager by way of a secure protocol, for example Key Store, Trust Store, and passwords. This information is extracted from the ADP manager by way of the RMI call.

5. If you enable request monitoring on an existing manager, click **Upload** to populate the manager configuration properties to the ADP target in Request Monitoring.
6. Click **Test Connect** to test the connection to the new manager. Should the test connection fail, this may be because the manager is not running or the manager is not yet installed.
7. Click **Add**.

Once the manager is added, the name of the manager will display in the Configuration tab under the Managers node in the tree.

39.4.3 Editing a Previously Configured Manager (RMI Configuration)

To add a previously configured manager, perform the following steps:

1. Click + (plus sign) next to the Managers node in the tree, then select the subnode for the manager you want to edit.
2. After you make changes to the manager information, click **Update**. This results in the manager entries in the Enterprise Manager repository to be updated with the new values.

If a manager is configured before using this Enterprise Manager configuration page, Enterprise Manager continues to keep the manager as a valid manager even though the manager may be down or permanently removed.

The list of managers is not refreshed.

39.4.4 Removing or Disabling a Previously Configured Manager

To remove a configured manager, perform the following steps:

1. Navigate to **Application Dependency and Performance**.

From the **Targets** menu, select **Middleware**. In the **Related Links** section, click **Application Dependency and Performance**.

2. Click the **Registration** tab.

3. Click + (plus sign) next to the Managers node in the tree, then select the subnode for the manager you want to remove.
4. Click **Remove** in the main pane.

Deleting a manager from Enterprise Manager does not uninstall and remove the manager from the remote host where the manager is located and may be running. Remove only deletes the manager entry from the Enterprise Manager repository.

To shut down the manager after the Remove operation, execute the `acshut.sh/.bat` command from the command line.

To disable a configured manager:

1. Click + (plus sign) next to the Managers node in the tree, then select the subnode for the manager you want to disable.
2. Deselect **Enable Request Monitoring**.
3. Click **Update**.

When you deselect the Enable Request Monitoring option, the manager settings are preserved. The UI displays these managers as disabled. There will not be any further information under the disabled manager in the tree.

39.5 Using emctl to Manage the ADP Diagnostics Engine

ADP provides a grammar for the emctl tool which can be used to start, stop, and list the ADP Engines. The details of the grammar and its usage patterns are explained in [Table 39–46](#).

Table 39–46 Extended ADP emctl Commands

Command	Description
<code>emctl extended oms adp list</code>	Queries and lists all the ADP Managed servers from the Repository.
<code>emctl extended oms adp start -server=<server_name1>,<server_name2>...</code> For example: <code>emctl extended oms adp start -server=EMADPENGINE,MYADPDMGR</code>	Starts the ADP Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
<code>emctl extended oms adp start -all</code>	Starts all ADP Managed servers on the same local host on which the OMS is running.
<code>emctl extended oms adp start -global</code>	Starts all ADP Managed servers, even if they are running on remote hosts (remote to this OMS host).
<code>emctl extended oms adp stop -server=<server_name1>,<server_name2>...</code> For example: <code>emctl extended oms adp stop -server=EMADPENGINE,MYADPDMGR</code>	Stops the ADP Diagnostics Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
<code>emctl extended oms adp stop -all</code>	Stops all ADP Managed servers that are running on the same local host on which the OMS is running.
<code>emctl extended oms adp stop -global</code>	Stops all ADP Managed servers, even if they are running on remote hosts (remote to this OMS host).

Table 39–46 (Cont.) Extended ADP emctl Commands

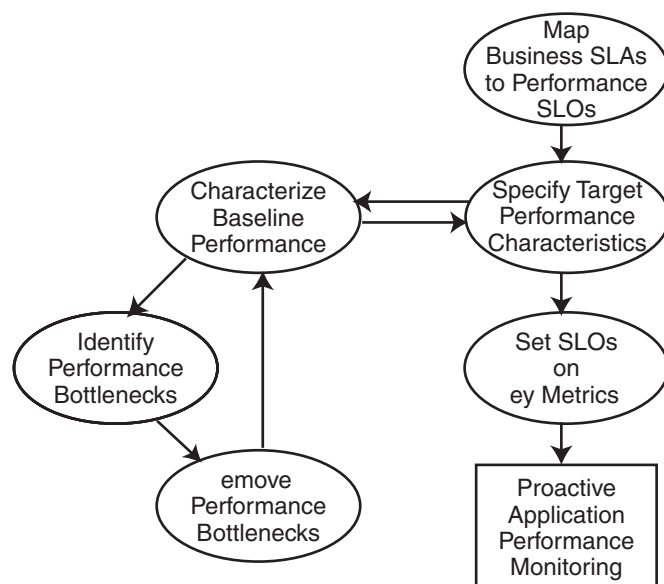
Command	Description
emctl extended oms adp status -server=<server_name1>,<server_name2>... For example: emctl extended oms adp status -server= EMADPENGINE,MYADPMGR	Shows the status of the ADP Diagnostics Managed servers mentioned in command line arguments. The servers could be running on the same local host on which the OMS is running or can be running on a remote host.
emctl extended oms adp status -all	Status of all the ADP Engines in this domain.
emctl extended oms adp -help	Shows the online help for the ADP Diagnostics commands.

ADP Methodology

The Enterprise Manager Application Dependency and Performance (ADP) capabilities automatically select performance metrics and track contextual relationships for various applications. The methodology focuses on other important activities to allow you to setup and maintain an effective application performance monitoring environment.

These activities include the following:

Figure 40–1 Steps of ADP Methodology



This methodology describes a series of steps for users to establish and maintain a proactive application performance monitoring environment leveraging the Enterprise Manager Application Dependency and Performance capabilities. [Figure 40–1](#) illustrates these steps in a sequential order.

Methodology steps:

1. Map business Service Level Agreements (SLAs) to performance Service Level Objectives (SLOs).

The process of using agreed business SLAs to determine the value of performance SLOs.

2. Specify target performance characteristics.

Specify the ideal application performance characteristics using performance SLOs identified in step 1.

3. Characterize baseline performance.
4. Identify performance bottlenecks.
5. Remove performance bottlenecks.

Steps 3, 4, and 5 should be grouped together to form a process of incremental performance improvement. Iterations of this process may be required to improve the application performance to meet the performance target as specified in step 2.

6. Set SLOs on key metrics.

Once application performance reaches the targeted goal, you need to set performance SLOs on key metrics to establish a proactive monitoring environment. This environment provides you with warnings when key performance metrics start to report abnormalities. These warnings enable you to proactively solve potential problems before they begin to impact business.

This chapter explains the following activities in more detail:

- [ADP Methodology Activities](#)
- [Mapping Business SLAs to Performance SLOs](#)
- [Characterizing Baseline Performance](#)
- [Identifying Performance Bottlenecks](#)
- [Setting SLOs on Key Metrics](#)

40.1 ADP Methodology Activities

The ADP methodology activities include the following:

- [Mapping Business SLAs to Performance SLOs](#)
- [Specifying Target Performance Characteristics](#)
- [Improving Performance](#)

40.1.1 Mapping Business SLAs to Performance SLOs

To successfully setup a proactive application performance monitoring environment, the first step is to map a set of business objectives to a set of performance thresholds for you to monitor. These business objectives are often referred to as business service level agreements (SLAs). These business SLAs provide the basic application performance requirements at a high level. As such, mapping these high level SLAs to low level performance thresholds is often a very difficult activity to do well.

Using tools that only measure performance at technology levels (EJB, JSP, servlet, portlet, SQL calls, and so on) to perform this type of activity continues to be very difficult as the correlations between low-level metrics and high-level objectives are often fuzzy at best. Consequently, the mapping activity is considered by many as an art rather than a science.

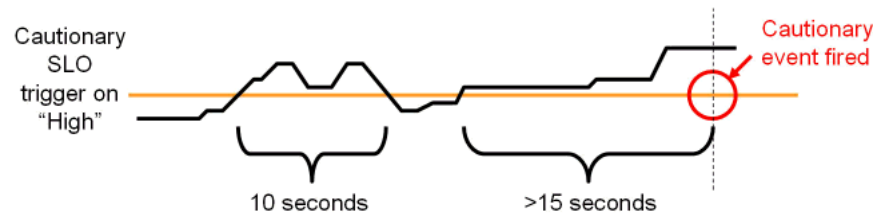
By measuring performance at both technology and functional levels, Enterprise Manager makes this mapping activity significantly less complicated. Since functional metrics measure performance for high level constructs such as business processes or portal desktops, mapping business SLAs directly to performance SLOs (Service Level Objectives) is straightforward.

40.1.2 Specifying Target Performance Characteristics

Defining the target performance characteristics for the monitored applications is the next step after mapping business SLAs to performance SLOs. Since these SLOs represent absolute minimal performance requirements for these applications, using these *violation* thresholds as target performance characteristics makes little sense. Instead, you need to define what performance range is acceptable for normal operation and when to send out cautionary alerts for abnormal activities.

For some applications, it may be sufficient to just specify a set of *cautionary* performance thresholds. Application performance monitoring tools, such as ADP, will send out cautionary alerts if these thresholds have been breached. Since these thresholds are cautionary, it may be acceptable to have a few violations before an alert is sent out. By defining the minimal violation duration, you can minimize the number of duplicate alerts generated. [Figure 40–2](#) illustrates this concept.

Figure 40–2 Control Number of Alerts



In [Figure 40–2](#), the minimal violation duration is defined to be 15 seconds. So if the cautionary state does not persist for more than 15 seconds, no cautionary alert would be fired.

For other applications, it is necessary to define both a high and low performance thresholds. Having both thresholds would effectively define a normal range of operation for these applications. With ADP, both high and low triggers can be set for any SLO.

With a set of clearly defined target performance characteristics, you are able to determine how much performance tuning is needed to achieve the ideal performance range. You will also have a set of cautionary performance thresholds to enable a proactive application performance monitoring environment to be established.

40.1.3 Improving Performance

The activities explained in this section should be grouped together as a single performance improvement process. This process would start with characterizing the baseline performance of our application, move on to identifying performance bottlenecks, and finish with removing performance bottlenecks. We would continue to perform these activities in iterations until the performance of our application meets the target characteristics.

40.1.3.1 Characterizing Baseline Performance

Once the specification of the target performance characteristics is completed, the next activity is to capture the performance baseline for our application. The performance baseline will be compared with the set of target performance characteristics to determine if further performance improvement is needed. If so, you will improve application performance iteratively through the next two steps until the performance meets the target characteristics.

40.1.3.2 Identifying Performance Bottlenecks

To identify performance bottlenecks, you must first isolate performance abnormalities in your performance baseline. Once you isolate a performance abnormality, you need to determine if this issue is a localized occurrence or a systematic problem. By using monitoring and diagnostic tools available to you, you can perform the analysis needed to identify the cause of the performance bottleneck.

40.1.3.3 Removing Performance Bottlenecks

Once these performance bottlenecks are identified, you need to determine how to remove them. The strategies for bottleneck removal vary by cause. A few examples follow:

- If the cause of the bottleneck is an application defect, the strategy would involve the application development team.
- If the bottleneck is caused by a configuration problem, you would request assistance from system administrators.
- If the bottleneck is in the application server or framework, you would seek help from those vendors.

The following is a list of possible bottleneck removal activities:

- Change application code to fix defects
- Modify environment setting to fix configuration problem
- Install patches to fix software defects
- Replace defective hardware
- Upgrade network infrastructure
- Add computing resources
- Remove resource hogging programs
- Tune back-end connectivity and response time

As you can see from the list, the Remove Performance Bottlenecks activity varies widely by cause. Correctly and quickly finding the appropriate groups to help resolve performance bottlenecks is the key for success for this activity. Once the performance bottleneck removal is completed, you must redo the Characterize Baseline Performance activity to confirm the fix implemented indeed improved performance.

40.1.3.4 Setting SLOs on Key Metrics

In addition to setting application specific performance thresholds, it is also important to set performance thresholds on key system metrics and on some selective component metrics. Setting these thresholds will help you establish an early warning system and alert you to smaller issues before they manifest into big production problems.

Setting SLOs on key system metrics involves some basic understanding of how the system behaves under load. If the system becomes unstable or performs poorly when it runs out of free JDBC connections or idle ExecuteQueue threads, these system metrics should be monitored.

To determine which system metrics to monitor, it is critical to figure out the correlations between overall system performance and specific system metrics. You would use this information to decide which of the system metrics to monitor. Once appropriate system metrics are identified, you will then determine the performance

range for normal operation and figure out the cautionary as well as violation thresholds.

While it is fairly straightforward to determine which system metrics to monitor and what system metric performance thresholds to set, setting SLOs on key component metrics is significantly more difficult. In theory, you can assume performance degradation at the component level would negatively impact application level performance. However, this assumption may not accurately reflect reality.

To predict application performance by monitoring component level performance metrics, there must be a very strong correlation between the performance of a specific component and that of the application. Sometimes, a drop in performance in one component is compensated by a jump in performance in another. These performance changes in opposite directions at the component level would essentially result in little change at the application level. Therefore, you must be careful not to draw conclusions by monitoring the performance of a few components unless there are strong correlations.

The last task to perform is to associate various actions and responses for various threshold violations. Once these associations are completed, you can begin to use your proactive application performance monitoring environment.

40.2 Mapping Business SLAs to Performance SLOs

One of the primary reasons companies purchase solutions to establish proactive application performance monitoring is the demand to meet business SLAs. Business SLAs for enterprise applications are a set of service level expectations defined by internal or external customers. In most cases, these business SLAs are defined at such a high level, they are not useful for setting thresholds in application performance monitoring tools.

As a result, the process of mapping business SLAs to performance SLOs is extremely important for companies to meet the service requirements set forth by their customers. Since Enterprise Manager monitors performance at both functional and technology levels, it is easy to perform this mapping exercise.

In this section, our example explains how to use the Enterprise Manager Application Dependency and Performance features to determine the proper performance threshold values for a set of business SLAs.

In the example, we were given the following high-level business SLAs:

Table 40–1 Example - Guidelines for Business SLAs

Business SLA	SLA Requirement
Fast customer self-service portal.	On average, pages in customer self-service portal should load within 2 seconds. This SLA must be fulfilled 99% of the time.
Customer service representative portal must be as fast as mainframe system.	All pages in customer service rep. portal must load within 6 seconds. This SLA must be fulfilled 99.9% of the time.
Fast to schedule a service call.	On average, scheduling a service call should take less than 30 seconds. This SLA must be fulfilled 99.99% of the time.

Let's map the first business SLA to a performance SLO. This SLA requirement states that the average response time for customer self-service portal (desktop) should be less than 2 seconds. In Enterprise Manager, we would set a high-level performance SLO at the desktop. Using the hierarchy in the ADP UI, you would select the *customer* desktop and right-click to set the SLO.

Because ADP monitors performance at both functional and technology levels, you can directly translate business SLAs to SLOs on functional metrics. In our example, it is the response time for portal desktop *customer*. For our example, we would proceed to set a violation SLO and a warning SLO.

We can calculate how often violations occur to figure out whether or not our current system is able to meet the SLA requirement 99% of the time. With Enterprise Manager, we can see whether there are any obvious violations. If there are any violations or close calls, we should confirm by examining actual data. If we have data for at least 24 hours, we would use the export capability within Enterprise Manager Application Dependency and Performance to prepare raw data for this calculation.

For the other two business SLAs, we would set performance SLOs on the appropriate metrics.

40.3 Characterizing Baseline Performance

Also known as performance base-lining, characterize baseline performance involves a set of activities to capture the baseline performance of a system under specific level of load. For example, you can measure the baseline performance of a portal application deployed to a WebLogic cluster.

For example, you can display the performance data during the first four hours of a load test. The number of active sessions grows at a steady pace for the first ninety minutes. Eventually, the number of active sessions stays at approximately seven hundred as the number of new and expiring sessions reach an equilibrium.

Visualize the portal performance following a typical pattern of slow performance initially and gradually reaching a steady state. The initial slow performance is expected as the application server load components into memory and populates data into its caching mechanism. The performance improves gradually and reaches a steady state after approximately thirty minutes. The performance pattern during this initial thirty-minute period can be characterized as *startup performance during increasing load*. After thirty minutes, performance of the portal application stabilizes.

Enterprise Manager's ability to quickly establish an application performance monitoring environment allows you to carry out *characterize baseline performance* painlessly. Because Enterprise Manager is able to monitor at cluster level as well as at individual server level, it can characterize performance for the entire cluster or individual servers.

By verifying that a less loaded server has lower resource utilization and faster performance, you can draw the following observations about the performance characteristics of a portal application running on this environment:

- Since Server A's resource utilization is near maximum, we can use the load on that server as the maximum limit for individual servers. We can calculate individual server maximum load limit by using the load metric provided by the Enterprise Manager Application Dependency and Performance features.
- We should examine the load balancing algorithm and the configuration of the load balancer.

Comparing load and resource usage of two servers in a cluster confirms resource usage is inversely correlated to the load.

Note: This is a very basic performance characterization of an individual server. Performance of a multi-server cluster cannot be calculated by multiplying performance characteristics of individual servers because of the overhead involved with a clustered configuration. True cluster level performance must be measured with application performance monitoring tools like Enterprise Manager.

40.4 Identifying Performance Bottlenecks

Enterprise Manager can also be used to quickly identify performance bottlenecks in QA, staging, and production settings. You can use the hierarchical model within the Enterprise Manager Application Dependency and Performance feature to identify an application performance bottleneck. Furthermore, you can use Enterprise Manager to track down an application performance problem caused by resource starvation.

40.4.1 Determining System Level Performance

Since the performance problem seems to affect all components in the same way, we should suspect there is some type of performance degradation at the system level. To view system level performance data, we would look under the *Resources* hierarchy. Performance metrics under the Resources hierarchy provides the raw data for us to perform correlation analysis. This type of analysis is needed to determine whether resource starvation is the cause of the performance slowdown.

Graphs can reveal some interesting patterns.

- OS Agent Abnormalities

We noticed a sudden drop in CPU utilization and a sudden increase in disk utilization during the time period in question. This pattern indicates a large amount of virtual memory paging activities on this machine. Memory paging to disk is extremely expensive and slows down request processing as indicated by lowered CPU utilization. To understand why page is occurring, we will take a look at performance metrics on the JVM.

- JVM Heap Size

We noticed that for the initial twelve hours of this example, both total JVM heap size and free JVM heap size grew at a steady pace. The growth of the total JVM heap size stopped at 512 MB - an expected behavior since we configured WebLogic to have a maximum heap size of 512 MB. While we expect the free JVM heap size to stop growing after total heap size reached 512 MB, the free JVM heap size actually starts to drop. Combining this information with some previously obtained information such as no sudden increase in load, we can conclude that there is a high likelihood of a memory leak.

This abnormal consumption of memory caused the total JVM heap to reach its pre-defined maximum. It is also very likely this memory leak caused the increase in virtual memory paging activities and corresponding reduction in CPU utilization. This reduction in CPU utilization impacts the response time for all components running in this machine including JDBC Connections.

- Memory Leak

We were able to identify a memory leak in the WebLogic JVM gradually caused resource starvation and eventually impacts application performance. In order to further diagnose this problem, a deep-level memory profiling tool is required to understand memory usage of the JVM.

40.5 Setting SLOs on Key Metrics

This step in the Oracle Methodology allows you to proactively monitor key system metrics to avoid catastrophic failures such as server hangs (non-responsive), server crashes, cluster hangs, and more. The ability to recognize signs leading up to these catastrophic failures is a must to maintain quality of service for your WebLogic infrastructure.

You can proactively set thresholds and actions for key WebLogic system metrics.

Table 40–2 lists the key system metrics for the WebLogic Platform:

Table 40–2 List of Key System Metrics for WebLogic

Key System Metric	Reason to Monitor
ExecuteQueue Idle Thread Count	Running out of ExecuteQueue threads is often a precursor to application server hangs (non-responsive). In some severe cases, when the application server runs out of ExecuteQueue threads, all of its operations would stop working.
ExecuteQueue Pending Request Count	A steady increase in the number of ExecuteQueue pending requests is also a precursor to server hangs. This metric is inversely correlated with the ExecuteQueue Idle Thread Count metric.
Total JVM Heap Size	There are two reasons to monitor this metric: <ol style="list-style-type: none"> 1. If total JVM heap size grows to predefined maximum, a cautionary event should be fired notifying the administrator. 2. If total JVM heap size suddenly drops to 0, this may be an indication of a JVM crash or a non-operational application server.
Free JVM Heap Size	A steady decrease in the free JVM heap size is an indicator of either a memory leak or misconfigured application server. A JVM running out of heap will experience instability and performance degradation as garbage collector and JVM competes for resources to perform cleanup and object creation respectively.
Open Sessions Count	If open session count drops to 0 and remains at 0 for a period of time, some investigation is warranted. Often this pattern indicates a network or load balancing problem.
Application Invocation Count	If application invocation count drops to 0 and remains at 0 for a period of time, some investigation is warranted. While this pattern often indicates a network or load balancing problem, it could also be a symptom of a hanged server.

Understanding these key WebLogic system metrics, setting the SLO thresholds and assigning appropriate responses are critical to establishing a proactive monitoring. In this example, we will configure SLOs and actions with ADP.

The first task is to set a cautionary and a violation SLO for ExecuteQueue Idle Thread Count metric so the appropriate person can be alerted when available ExecuteQueue is running low. To configure SLOs, right-click on the Execute Queues metric and select **Configure service level objects**. In this example, we will create the following SLOs for ExecuteQueue Idle Threads:

Table 40–3 SLOs for ExecuteQueue Idle Threads

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
Low ExecuteQueue Idle Threads	Metric.J2EE.Dispatcher.IdleThreads	Cautionary	3	Low
ExecuteQueue Idle Threads Exhaustion	Metric.J2EE.Dispatcher.IdleThreads	Violation	0	Low

When SLO trigger is set to Low, ADP will fire an alert when current measurement reaches the threshold value AND the previous measurement has a higher value than the threshold.

For example, we would create the following actions for the SLOs previously configured:

Table 40–4 Action for SLO

SLO Name	Action Name	Action Type
Low ExecuteQueue Idle Threads	Enter Low ExecuteQueue Idle Threads event into server log	Log
ExecuteQueue Idle Threads Exhaustion	Email ExecuteQueue Idle Threads Exhaustion alert	Email
ExecuteQueue Idle Threads Exhaustion	Send ExecuteQueue Idle Threads Exhaustion SNMP trap to HP Overview	SNMP
ExecuteQueue Idle Threads Exhaustion	Enter ExecuteQueue Idle Threads Exhaustion event into server log	Log

After configuring these SLOs and actions, we now have a proactive monitoring environment to detect ExecuteQueue resource starvation related problems before a catastrophic event occurs. We would use this approach to establish proactive monitoring for other key WebLogic system metrics.

The following is the Oracle recommendation:

Table 40–5 ExecuteQueue Pending Requests

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
ExecuteQueue Pending Request Warning	Metric.J2EE.Dispatcher.PendingRequests	Cautionary	5 ~ 10 ¹	High
ExecuteQueue Pending Request Violation	Metric.J2EE.Dispatcher.PendingRequests	Violation	10 ~ 20	High

¹ **Threshold values for these SLOs vary by environment.** Figuring out what threshold values to use is an iterative process. Users should gather information about the performance characteristic of their WebLogic environment as the first step. Based on this information, users can set SLOs accordingly. As users continue to improve the performance of their WebLogic environment, they should re-evaluate these threshold values and change them as needed.

When SLO trigger is set to High, ADP will trigger an alert when current measurement hits the threshold value.

Table 40–6 Total JVM Heap Size

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
JVM Heap Reached Max	Metric.J2EE.JVM.HeapSizeCurrent	Cautionary	512 MB ¹	High
JVM Heap Reached 0	Metric.J2EE.JVM.HeapSizeCurrent	Violation	0 MB	Low

¹ **Threshold value for this SLO varies by environment.** Users would set this value to the maximum heap size specified in the WebLogic configuration file.

Table 40–7 Free JVM Heap Size

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
Low JVM Free Heap Warning	Metric.J2EE.JVM.HeapFreeCurrent	Cautionary	72 MB	Low
Low JVM Free Heap Violation	Metric.J2EE.JVM.HeapFreeCurrent	Violation	24 MB	Low

Table 40–8 Open Session Count

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
No user session in system for 5 minutes	Metric.J2EE.WebApplication.OpenSessionCurrentCount	Cautionary	0 ¹	Low

¹ In the example, this SLO would have a measurement window of 5 minutes. By setting the measurement window to 5 minutes, ADP will fire an alert only if this condition persists for at least 5 minutes.

Table 40–9 Application Invocation Count

SLO Name	Metric	Threshold Type	Threshold Value	Trigger On
No application invocation in system for 5 minutes	Metric.J2EE.Servlet.InvocationTotalCount	Cautionary	0	Low

Setting these SLOs and corresponding actions establishes a proactive monitoring environment for your WebLogic deployment. This proactive monitoring approach allows you to identify problems leading up to catastrophic problems before they impact your system's performance and availability.

40.6 Conclusion

The ADP Methodology is a critical aspect of your application performance management strategy. By following this methodology carefully, you will be able to use ADP to improve your ability to proactively monitor the performance and availability of your deployed applications and WebLogic infrastructure. ADP's automation reduces time, effort, and errors associated with manual processes. This allows ADP users to focus on other crucial activities such as the ones listed in the Oracle Methodology.

Frequently Asked Questions About Application Dependency and Performance

This chapter answers frequently asked questions regarding Application Dependency and Performance.

This chapter includes the following sections:

- [Can I Erase the darchive Directory?](#)
- [How Do I Undeploy the Agent?](#)

41.1 Can I Erase the darchive Directory?

In general, you should not erase the darchive directory while the ADP manager is running. If you erase the darchive directory after shutting down the ADP manager, the darchive directory will be re-populated when the ADP manager next restarts.

If the size of the darchive directory is of concern, determine which subdirectories are occupying the most space. If there are large directories that do not contain Java class files (for example `.`, `..`, or `wlserver10.3`), modify the `Acsera.properties` file to exclude them. Search for `Model.StaticAnalysis.ExcludeClassPaths` and add the path to the list, separated by comma.

The darchive directory is located under `$ACSERA_HOME`:

```
$GCDomain/EMGC_ADPMANAGER1/ADPManager.ear/ADPManager.war
```

41.2 How Do I Undeploy the Agent?

There is a drop-down menu in the last step in the deployment process that, by default, is set to *deploy*. Change it to *disable* to remove the agent startup arguments from the application servers, and to *remove* to erase the agent files from the application servers.

Note: On some platforms, for example Windows, you need to restart the application servers before the Remove command can be run. Otherwise the Remove command may run into File Still In Use errors.

To undeploy the agent, follow these steps:

1. From the Targets menu, select **Middleware**, then select **Middleware Features** (drop-down list). Select **Application Dependency and Performance**.
2. Click the **Configuration** tab.

ADP Configuration Directories and Files

This appendix lists and defines the files and directories available in ADP. Topics include:

- [Configuration Directories](#)
- [Acsera.properties File](#)
- [UrlMap.properties](#)

A.1 Configuration Directories

After ADP is installed, all the components of the application package are located in the EMGC_ADPMANAGER1 directory. This directory is in the GC domain home, for example:

```
/net/abcdef1234/scratch/jdoe/view_storage/jdoe_aug21/work/user_
projects/domains/EMGC_DOMAIN/EMGC_ADPMANAGER1
```

A.1.1 Directory Structure

The path where the ADP Manager is installed is similar to:

```
/scratch/Middleware0712/gc_inst/user_projects/domains/GCDomain/EMGC_ADPMANAGER1
```

where domain.home=/scratch/Middleware0712/gc_inst/user_projects/domains/GCDomain
and ORACLE_HOME=/scratch/Middleware0712/oms

The directory structure is as follows:

```
ADPManager.ear/
ADPManager.ear/APP-INF/
ADPManager.ear/APP-INF/lib/
ADPManager.ear/META-INF/
ADPManager.ear/ADPManager.war/
ADPManager.ear/ADPManager.war/bin/
ADPManager.ear/ADPManager.war/config/
ADPManager.ear/ADPManager.war/mcconfig/
ADPManager.ear/ADPManager.war/deploy/
ADPManager.ear/ADPManager.war/lib/
ADPManager.ear/ADPManager.war/lib/bea/
ADPManager.ear/ADPManager.war/lib/oracle/
ADPManager.ear/ADPManager.war/META-INF/
ADPManager.ear/ADPManager.war/WEB-INF/
```

Table A–1 ADP Manager Directories

Directory	Description
bin	Contains all the executable files to start and stop ADP, run deployer for Agent and ADP EJB, run export utility.
config	Contains all the ADP runtime configuration parameters that control execution logic, ADP schemas enablement, ADP GUI functionality, Service Level Objectives definition, export logic and many more.
deploy	Contains agent libraries and configuration files, as well as <i>ADP EJB</i> and <i>ADP Admin Web Application</i> . These components are deployed on the remote host (Web or Application servers) using <i>deployer</i> utility found in bin directory of ADP package.
lib	Has all the libraries required for ADP's proper functionality
mcconfig	Contains internal base instrumentation configuration. Do not modify these files.

A.1.2 Config Directory

Config directory has many files that potentially can be configured and make ADP to run in a particular way. Any changes applied to files in this directory require restarting ADP server.

Most of the files never get touched directly by user. The following are the main three files which can be configured manually to achieve desired effect:

File	Description
Acsera.properties	This file is the main ADP configuration file customization of which helps to tune up ADP.
configuration.xml	In this file you define location of Administration Server and credentials to access it. Usually you do not touch this file. The entire configuration is done through ADP GUI.
export.xml	This file contains information that drives proper data export logic. It is used for manual and automatic export of performance metric and events data from the ADP Data Repository.
UrlMap.properties	This file is used to map server addresses to load balancer addresses. By default, this file is not available; it must be created by the user.

It is worth mentioning that Service Level Objective definitions and Actions associated with the SLOs are described in *slo.xml* and *event.xml* respectively. The content of these files is completely controlled by definitions applied from ADP GUI (configuration tab).

A.1.3 Deploy Directory

The /deploy directory contains the ADP Java Agent distributable, including configuration files as well as corresponding libraries. These files are copied to the target systems hosting the Managed Servers when running the deployer utility. Rarely one needs to modify configuration files in this directory. Remember though if you modify the files they will be distributed to ALL targets within single server/cluster.

A.2 Acsera.properties File

The *acsera.properties* file contains global configuration parameters that define the operation of the ADP Manager.

A.2.1 Log Files Management

This section of Acsera.properties file defines log rotation policies. Log.MaxFiles indicates max number of log files available at any given moment, whereas the Log.MaxFileSizeMB indicates maximum size of the log file.

Example A-1 Log Files Management Section

```
Log.CopyOut = false
Log.MaxFiles = 10
Log.MaxFileSizeMB = 30
Log.MergeLogs = true

Debug.CopyOut = false
Debug.LogLevel = all
Debug.MaxFiles = 10
Debug.MaxFileSizeMB = 30
```

Log files are stored in the log directory.

A.2.2 Multi-Domain Monitoring Configuration

One can limit number of domains to be monitored by setting resource limit parameter: ConfigurationManager.ResourceLimit=4

Example A-2 Multi-Domain Monitoring Configuration

```
ConfigurationManager.ResourceLimit=4
```

A.2.3 ADP RMI Port Assignment

ADP uses RMI ports for communication with the agents and collects incoming performance metrics from a particular RMI port. By default, the RMI port is set on the same machine that hosts ADP. RMI.Registry.Host needs to be un-commented and have a value other than localhost if the host is multi-homed (such as, many network interfaces or has any ipv6 addresses) and you need to make sure that ADP listens to the incoming traffic on the particular interface.

You may need to change RMI.Registry.Port value in case the default 51099 port number has been allocated to an other application. Also if ADP is running in multi-instance mode, the port number will be different from instance to instance.

Example A-3 ADP RMI Port Assignment

```
#RMI.Registry.Host = localhost
RMI.Registry.Port = 51099
```

A.2.4 ADP Aggregation and Data Life Time Configuration

ADP has sophisticated multi-tiered logic for aggregation (or compression) of performance data. This helps to optimize performance of interaction with the internal data repository both when querying data for presentation or inserting new performance metrics.

Users who want to store longer term data should look for this section in Acsera.properties:

```
#####
# Production setting
# NOTE: use Model.GlobalSamplingRateSecs to configure Metric.Grain.0
```

```
#####  
Metric.Grain.0 0s  
Metric.TableInterval.0 = 4h  
Metric.DataLife.0 = 2d  
  
Metric.Grain.1 = 3m  
Metric.TableInterval.1 =1d  
Metric.DataLife.1 = 8d  
  
#Metric.Grain.2 = 30m  
#Metric.TableInterval.2 = 7d  
#Metric.DataLife.2 = 420d
```

and uncomment the last 3 lines for the Metric.*.2 properties

A.2.5 Aggregating Incoming Metrics On the Fly

ADP by default aggregates data coming from multiple cluster members by application thus minimizing rate of insertion in to the data repository. This greatly improves performance of ADP in heavily loaded environments.

As a side effect of this approach though, the user is unable to see metrics from instrumentation (processes and portals) on per server level. If you need to enable this then set the JavaMIP.AggregateInserts to *false*.

A.2.6 Listing Applications to Be Monitored or Excluded From Monitoring

To avoid overhead of unnecessary monitoring of certain applications, you can explicitly state which applications to monitor, or which applications to exclude from monitoring.

Users should append the name of their application to the property ComponentProvider.Application.Exclude.

Example A-4 Specifying Which Applications to Monitor

```
# Control which applications to analyze  
#  
ComponentProvider.Application.Exclude=WLI System EJBs,WLI-AI  
Design-time,B2BDefaultWebAppApplication,WLI  
Worklist,JWSQueueTransport,Deployer,BEA_WLS_DBMS_ADK,  
Acsera,ClearApp,HttpDeployer,ServiceBus_Console,em
```

A.2.7 Firewall Mitigation (for Internal RMI Ports)

If there is a firewall between the ADP Manager and the monitored application servers, ports need to be opened between them especially in the case where multiple resources are configured. For example, if two resources are configured and the first one uses 55006 as the port, then the next resource must use 55007 as the port. Each additional resource increments the port by 1.

In addition to the application server's JMX access ports, the following two properties in Acsera.properties indicate the ports used specifically by ADP:

- RMI.Registry.Port (51099 by default)
- RMI.JavaProvider.ServerPort (55003 by default)

A.2.8 SLO Dampening

There are times when you deliberately want to cut down on the number of repeated notifications should SLO violation persist for a given period of time. To suppress notifications of the same violation in a short period of time, ADP provides the SLO Dampening feature. Once enabled, should a SLO violation occur and be repeated several times in a short period, ADP will not fire the SLO violation notification for the time period defined in SLO.RearmDelay. To disable this feature, set the value of this parameter to 0.

SLO.SuppressDelayedAsserts indicates that if the violation still persists upon time period expiry ADP, should fire the SLO notification. By default it is *false*, for example, fire the notification.

Example A-5 SLO Dampening

```
# The following property is specified in units of
# minutes (m), hours (h) or days (d)
SLO.RearmDelay = 15m
SLO.SuppressDelayedAsserts = false
```

A.3 UrlMap.properties

The UrlMap.properties file should be created in the ADP Manager's config directory and used to provide address mappings between load balancers and application servers. The format of this file is:

```
# Format:
#   $app_server_ip = $load_balancer_id
# E.g:
#   http://localhost:7001 = http://localhost:7005
#
# Note: ":" character need to be escaped with "\"
#
http://192.168.128.53:7002 = http://192.168.3.187:80
http://192.168.128.53:7003 = http://192.168.3.187:80
http://192.168.128.54:7005 = http://192.168.128.54:7011
http://192.168.128.54:7006 = http://192.168.128.54:7011
```

Support Matrix for Application Dependency and Performance

For information about the platforms supported by the Application Dependency and Performance (ADP) feature in Enterprise Manager Cloud Control, search the My Oracle Support (<https://support.oracle.com>) knowledge base for "Platform Support List ADP" to locate the current certification article.

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